IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

PRIME WIRE & CABLE, INC.	)	
	)	
Petitioner,	)	
	)	
v.	)	**Case: IPR2018-01592**
	)	**Patent No.: 9,320,122**
CANTIGNY LIGHTING	)	
CONTROL, LLC.	)	**EXHIBIT 1002**
	)	
Patent owner	)	
	)	
JASCO PRODUCTS, INC.	)	
	)	
Licensee	)	

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of NC - Statesville Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
5:18cv00044	3/14/2018	Western District of NC - Statesville Division

PLAINTIFF	DEFENDANT
Jasco Products Company, LLC	Prime Wire & Cable, Inc.

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 9,320,122	4/19/2016	Cantigny Lighting Control, LLC
2		
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
Frank Johns	Nancy Compton	3/15/2018

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	11/18/2015	John Joseph King	CEIC401D1	6303

62081 7590 03/27/2018

THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555

EXAMINER	
LE, DON P	

ART UNIT	PAPER NUMBER
2844	

NOTIFICATION DATE	DELIVERY MODE
03/27/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JOHN.KING@JKINGLAWOFFICE.COM

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
14/944,302	18 November, 2015	KING, JOHN JOSEPH	CEIC401D1

		EXAMINER	
THE LAW OFFICE OF JOHN J. KING, P.C. P.O. BOX 1555 WHEATON, IL 60187-1555		DON LE	
		ART UNIT	PAPER
		2844	20180322

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

A citation of prior art under 35 U.S.C. 301 and 37 CFR 1.501 has been filed on 03/14/2018 in your patent number 9320122 entitled PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER.
This notification is being made to inform you that the citation of prior art has been placed in the file wrapper /file history of:
[x] the above identified patent.
[ ] reexamination control # ____________.
The person submitting the prior art:
1. [ ] was not identified
2. [ ] is confidential
3. [x] is Bryce A. Johnson.

/JASON FLICK/
Primary Examiner, TC 3700

PTO-90C (Rev.04-03)

Doc Code: T501

Document Description: Prior art submission by a third party under Rule 37 CFR 1.501 during the period of enforceability of a patent.

CITATION OF PRIOR ART AND WRITTEN STATEMENTS IN PATENT FILES	Application Number	14944302
	Patent Number	9320122

U.S. PATENTS

Cite No	Patent Number	Kind Code[1]	Issue Date (YYYY-MM-DD)	First Named Inventor
1	9320122		2016-04-19	John King
2	4279012		1981-07-14	DAVID BECKEDORFF

U.S. PATENT APPLICATION PUBLICATIONS

Cite No	Publication Number	Kind Code[1]	Publication Date (YYYY-MM-DD)	First Named Inventor

FOREIGN PATENTS AND PUBLISHED FOREIGN PATENT APPLICATIONS

Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[1]	Publication Date (YYYY-MM-DD)	Applicant, Patentee or First Named Inventor	Translation
						☐

NON-PATENT PUBLICATIONS (e.g., journal article, Office action)

Cite No	Author (if any), title of the publication, page(s) being submitted, publication date, publisher (where available), place of publication (where available).	Translation	Evidence of Publication

CITATION OF PRIOR ART AND WRITTEN STATEMENTS IN PATENT FILES	Application Number	14944302
	Patent Number	9320122

1	"Timex Digital ON-OFF Lamp Timer" (published Oct. 14, 2004), Web Page <www.bookofjoe.com/2004/10/timex_digital_o.html>, 2 pages, Oct. 18, 2004, retrieved from Internet Archive Wayback Machine <http://wayback.archive.org/web> on Feb. 26, 2018	☐	☒
2	"4980 programmable repeat cycle ON-OFF timer", pages 1-5, Oct. 1, 2010, Artisan Controls Corporation, Randolph, New Jersey, U.S.A.	☐	☒
3	"5100 configurable countdown timer" pages 1-2, Aug. 21, 2013, Artisan Controls Corporation, Randolph, New Jersey, U.S.A.	☐	☒

PATENT OWNER CLAIM STATEMENT DOCUMENT

Cite No	Document Description	Translation Attached
1	Complaint, Document #1, pages 1-17, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐
2	Exhibit A, Document #1-1, pages 1-32, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐
3	Exhibit B, Document #1-2, pages 1-31, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐
4	Exhibit C, Document #1-3, pages 1-2, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐
5	Exhibit D, Document #1-4, pages 1-3, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐
6	Exhibit E, Document #1-5, pages 1-3, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐
7	Exhibit F, Document #1-6, pages 1-6, Jun. 2, 2016, Cantigny v. Jasco, Case: 1:16-cv-005794, Northern District Court for the Northern District of Illinois Eastern Division.	☐

CITATION OF PRIOR ART AND WRITTEN STATEMENTS IN PATENT FILES	Application Number	14944302
	Patent Number	9320122

EXPLANATION OF THE PERTINENCE AND MANNER OF APPLYING PRIOR ART			
☒ I have attached an explanation of the pertinence and manner of applying the submitted reference(s) in accordance with 37 CFR 1.501(b).			
Signature	/Bryce A. Johnson/		
Name/Print	Bryce A. Johnson	Registration Number (if applicable)	74733

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

CANTIGNY LIGHTING CONTROL, LLC Plaintiff, vs. JASCO PRODUCTS COMPANY LLC and AVI-ON LABS, INC. Defendant.	Civil Action No. 16-cv-05794 **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGMENT

Plaintiff Cantigny Lighting Control, LLC complains of Defendants Jasco Products Company LLC and Avi-On Labs, Inc. as follows:

THE PARTIES

1. Plaintiff Cantigny Lighting Control, LLC ("Cantigny") is an Illinois limited liability company having a place of business at 2018 Dorset Drive, Wheaton, Illinois. Cantigny holds total legal ownership of and has standing to sue for infringement of U.S. Patent No. 9,320,122, entitled "Programmable Light Timer and a Method of Implementing a Programmable Light Timer," whose inventor is John King (the "'122 Patent", attached hereto as Exhibit A). Cantigny also holds total legal ownership of and has standing to sue for infringement of U.S. Patent No. 9,226,373, also entitled "Programmable Light Timer and a Method of Implementing a Programmable Light Timer," whose inventor is also John King (the '373 Patent", attached hereto as Exhibit B). Jointly, these patents are referred to herein as the "Cantigny Patents." Cantigny was formed by Mr. King as a vehicle for the development of consumer products using his inventions in light timing technology.

2. Defendant Jasco Products Company LLC ("Jasco") is a limited liability corporation having a principal place of business at 10 E. Memorial Rd., Oklahoma City, OK 73114. Cantigny contends that Jasco's products infringe at least the '122 Patent and the '373 Patent as alleged below. Jasco has previously and is presently making, using, selling, offering for sale, and/or importing into the United States products that infringe one or more claims of the '122 and '373 Patents. Jasco has also indirectly infringed the '373 Patent.

3. Avi-On Labs, Inc. ("Avi-On") is a corporation having a principal place of business at 2570 Rasmussen Road, Suite 206, Park City, UT 84098. Avi-On has previously and is presently making, using, selling, offering for sale and/or importing into the United States products that infringe one or more claims of the '373 Patent, in collaboration with Jasco. Avi-On has also indirectly infringed the '373 Patent.

JURISDICTION AND VENUE

4. This action arises under the patent laws of the United States, e.g., 35 U.S.C. §§ 271, 281, 283-285. Subject matter jurisdiction exists under 28 U.S.C. §§ 1331 and 1338(a).

5. Jasco has transacted business by making, using, selling, or offering to sell and distributing products that infringe the Cantigny Patents. Such sales and offers to sell include sales and offers to sell in this judicial district. Accordingly, this Court has personal jurisdiction over Jasco. Avi-On has also transacted business by making, using, selling, or offering to sell and distributing products that infringe the Cantigny Patents. Such sales and offers to sale include sales and offers to sell in this judicial district. Accordingly, this Court has personal jurisdiction over Avi-On. Venue is proper in this Court under 28 U.S.C. § 1391(c) and/or 1400(b).

FACTUAL BACKGROUND

6. Jasco manufactures home electrical products for sale to the public. Avi-On creates software for use with certain Jasco products, and offers Jasco wirelessly programmable products for sale on their web site.

7. Jasco products include a number of home electrical timer products, including the GE MyTouchSmart™ Indoor Plug-In Digital Timer, the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer, the GE MyTouchSmart™ In-Wall Digital Timer, the GE Digital Plug-In TouchSmart™ Timer, and the GE In-Wall TouchSmart™ Digital Timer.

8. Jasco also manufactures a number of Bluetooth enabled timer products, which are used with the Avi-On software including the GE Plug-in Smart Switch, the GE Plug-in Smart Dimmer, the GE Plug-in Outdoor Smart Switch, the GE In-Wall Smart Switch and the GE In-Wall Smart Dimmer. These products are also offered for sale by Avi-On on the Avi-On website, and operate with Avi-On software.

9. The infringing products include three different types. The first type of infringing product permits the user to set the time, and program separate on and off times. This feature is present in the GE MyTouchSmart™ Indoor Plug-In Digital Timer, the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer, and the GE MyTouchSmart™ In-Wall Digital Timer and may include other Jasco products (the "Programmable Timers"). The second type of infringing product permits the user to set the time and then select between multiple pre-stored timing patterns. These are the GE MyTouchSmart™ Indoor Plug-In Digital Timer, the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer, the GE Digital Plug-In TouchSmart™ Timer, and the GE In-Wall TouchSmart™ Digital Timer and may include other Jasco products (the "Pre-Stored Timers"). Some products have both of these two feature sets. The third type of

infringing product is wirelessly programmable timers, which permit a user to download a program to them. These are the GE Plug-in Smart Switch, the GE Plug-in Smart Dimmer, the GE Plug-in Outdoor Smart Switch, the GE In-Wall Smart Switch and the GE In-Wall Smart Dimmer (the "Wireless Timers"), and may include other Jasco or Avi-On products.

10. Jasco makes, uses, sells, offers to sell and distributes its products to customers in the United States.

11. The infringing Jasco products include the Programmable Timers, the Pre-Stored Timers, and the Wireless Timers.

12. The infringing products sold and offered for sale by Avi-On are the Wireless Timers, and Jasco makes, uses, sells and offers the Avi-On software for sale.

COUNT I

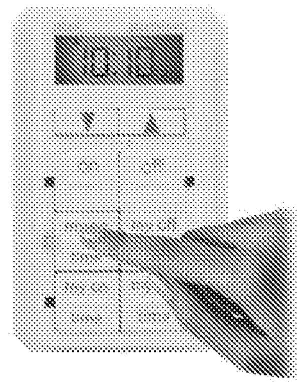
INFRINGEMENT OF THE '122 PATENT BY THE PROGRAMMABLE TIMERS

13. Cantigny hereby incorporates paragraphs 1-12 above by reference.

14. Jasco has directly infringed and continues to directly infringe at least claims 1, 6 and 7 of the '122 Patent through using, selling and/or importing the Programmable Timers. Jasco offers the products for sale through their web site and other distribution channels throughout the United States.

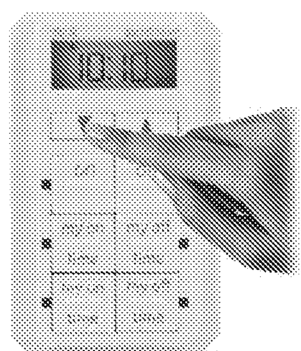
15. Claim 1 is an infringed claim. Claim 1 is infringed by the Programmable Timers. The exemplar of infringement is the MyTouchSmart™ In-Wall Digital Timer. The preamble of claim 1 states: "A programmable light timer for implementing a timing pattern, the programmable light timer comprising[.]" The MyTouchSmart™ In-Wall Digital Timer is a programmable timer. The use described for the timer on the Jasco website is "replac[ing] existing light switch." Exhibit C, Features. Steps two and three of the setup description in Exhibit

D, demonstrate setting the time and setting custom on and off times, and states that "[a]ll programmed times will run simultaneously in a 24 hour day." (Exhibit D).



The product also explicitly describes controlling lights in step 4, the manual override. The product is, therefore, a programmable light timer, which implements user-input timing patterns.

16. The first element of the claim is "an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer." Step 2 of Exhibit B demonstrates using the actuators (the up and down arrows) to set the time.



The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The MyTouchSmart™ In-Wall Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the two available user programs.

17. The second element of the claim is "a control circuit coupled to the actuator[.]" The MyTouchSmart™ In-Wall Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.

18. The third element of the claim is "a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display[.]" The MyTouchSmart™ In-Wall Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.

19. The fourth element of the claim is "a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time[.]" The "my on" time buttons are each programmable to have an on time.

20. The final element of the claim is "a second button on the user interface of the programmable timer, wherein the second button is programmable to have an off time." The "my off" buttons are each programmable to have an off time.

21. As each element of claim 1 is present in the MyTouchSmart™ In-Wall Digital Timer, claim 1 of the '122 is infringed by the MyTouchSmart™ In-Wall Digital Timer. All of the Programmable Timers infringe this claim.

22. Claim 6 calls for "The programmable light timer of claim 1 further comprising a third button having a pre-stored timing pattern." The GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer each have such a third button, including programs such as "evening" or "morning". These two products also infringe claim 6.

23. Claim 7 calls for "The programmable timer of claim 1 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer." The 'on' switch on the MyTouchSmart™ In-Wall Digital Timer overrides the timing pattern. The MyTouchSmart™ In-Wall Digital Timer infringes claim 7.

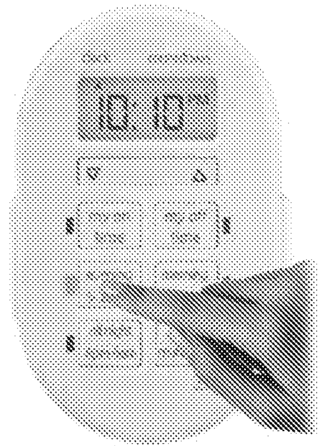
COUNT II

INFRINGEMENT OF THE '122 PATENT BY THE PRE-STORED TIMERS

24. Cantigny hereby incorporates paragraphs 1-23 above by reference.

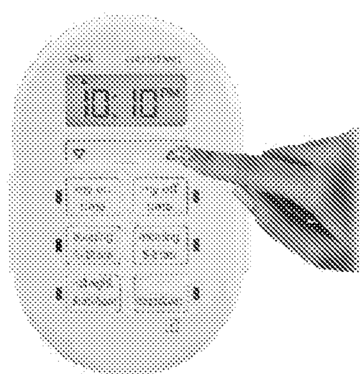
25. Jasco has also directly infringed and continues to directly infringe at least claims 8, 9, 10, 11, 12, 13, and 14 of the '122 Patent through using, selling and/or importing the Programmable Timers. Jasco offers the products for sale through their web site and other distribution channels throughout the United States.

26. Claim 8 is an infringed claim. Claim 8 is infringed by the Pre-Stored Timers. The exemplar of infringement is the GE MyTouchSmart™ Indoor Plug-In Digital Timer. The preamble of claim 1 states: "A programmable light timer for implementing a timing pattern, the programmable light timer comprising[.]" The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. Like the other Jasco products, the use for the timer is to control lighting products. Step II of the setup description in Exhibit E, demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E).



The product is, therefore, a programmable light timer for implementing a timing pattern.

27. The first element of the claim is "an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer." Step 2 of Exhibit E demonstrates using the actuators (the up and down arrows) to set the time.



The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.

28. The second element of the claim is "a control circuit coupled to the actuator[.]" The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains circuitry which controls the

display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.

29. The third element of the claim is "a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display[.]" The GE MyTouchSmart™ Indoor Plug-In Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.

30. The fourth element of the claim is "a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern[.]" The "evening" button enables the selection of a preset schedule from 5 pm to midnight.

31. The final element of the claim is "a second button on the user interface of the programmable timer, the second button enabling the selection of a second pre-stored timing pattern." The "morning" button enables the selection of a preset schedule from 5 am to 8 am.

32. As each element of claim 8 is present in the GE MyTouchSmart™ Indoor Plug-In Digital Timer, claim 8 of the '122 is infringed by the GE MyTouchSmart™ Indoor Plug-In Digital Timer. All of the Pre-Stored Timers infringe this claim.

33. Claim 9 calls for "The programmable light timer of claim 8 further comprising a third button that is user-programmable." Each of the Pre-Stored Timers which include the my on time and my off time features also infringes this claim, as they have a third (and fourth) button which is user-programmable. This includes the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer.

34. Claim 10 calls for "The programmable light timer of claim 9 wherein the third button is programmable with a user-programmable on time." Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer has the my on time button, which is programmable with an on time. Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer infringe claim 10.

35. Claim 11 calls for "The programmable light timer of claim 10 further comprising a fourth button that is user programmable." Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer have a fourth button that is programmable, the my off time button, and infringe claim 11.

36. Claim 12 calls for "The programmable light timer of claim 11 wherein the fourth button is programmable with a user programmable an off time." The GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer my off time button is so programmable, and they each infringe claim 12.

37. Claim 13 calls for "The programmable light timer of claim 8 wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer." All of the Pre-Stored Timers contain this feature, with both clock time and program times set using the up and down arrow actuators in each product.

38. Claim 14 calls for "The programmable light timer of claim 8 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer." Each of the the GE Digital Plug-In TouchSmart™ Timer, and the GE In-Wall TouchSmart™ Digital Timer include this feature, with dedicated on and off buttons used to manually control the device plugged into the timer.

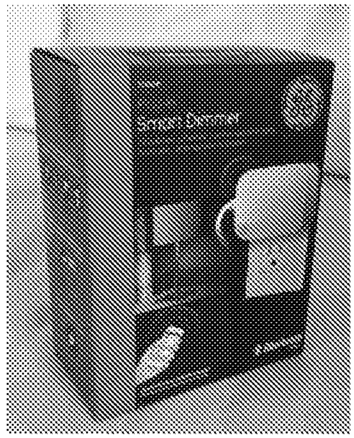
COUNT III

INFRINGEMENT OF THE '373 PATENT BY THE WIRELESS TIMERS

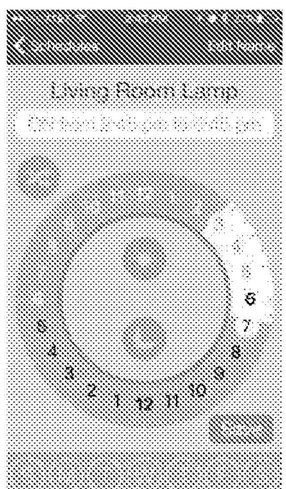
39. Cantigny hereby incorporates paragraphs 1-38 above by reference.

40. Jasco and Avi-On have infringed and continue to infringe, both directly and indirectly under 35 U.S.C. §§ 271(b) and 271(c) (inducement and contributory infringement), at least claims 1, 4, 5, 6, 7, 8, 10, 11, 12, 13, and 14 of the '373 Patent through using, selling, offering to sell and/or importing the Wireless Timers and the Avi-On software. Jasco offers the products for sale through their web site and other distribution channels throughout the United States. Jasco expressly instructs the use of the Avi-On software with the Wireless Timers, specifically including iOS or Android and Bluetooth capability. Avi-On also sells and offers the Wireless Timers for sale through their web site, and provides the software and instructions for its use for download, along with expressly instructing the use of iOS or Android devices with Bluetooth capability for their control software. At least through service of this Complaint, Jasco and Avi-On have knowledge of the '373 Patent, and notice of the reasons for infringement.

41. Claim 1 is an infringed claim. The exemplar of infringement is the GE Plug-In Smart Dimmer. The preamble of claim 1 states, "A programmable light timer for implementing a timing pattern, the programmable light timer comprising[.]" The GE Plug-In Smart Dimmer is a device to "wirelessly control lights from your smartphone or tablet," and to "control, adjust brightness and schedule table and floor lamps." Exhibit F, Product Box for GE Plug-In Smart Dimmer. It is programmable using the Avi-On software to load timing patterns into its memory, via a Bluetooth connection from a Bluetooth device such as an Android product or iPhone. It plugs into the wall and is a light timer between the wall circuit and the light, which is in turn plugged into the socket on the side of the GE Plug-In Smart Dimmer.



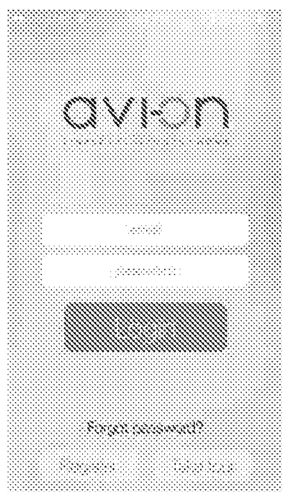
42. The first element of claim 1 calls for "a memory storing at least one timing pattern, the at least one timing pattern having one or more on/off settings for a time period[.]" The GE Plug-In Smart Dimmer contains memory which stores the programs input from the Avi-On software. This includes on and off times, as well as days of the week for which the pattern should be enabled.



43. The second element of claim 1 calls for "a wireless communication circuit configured to receive, using a wireless communication protocol, the at least one timing pattern selected on a user interface of a wireless device having a corresponding wireless communication circuit, the user interface enabling the selection of the at least one timing pattern[.]" The GE Plug-In Smart Dimmer contains a Bluetooth communications circuit over which it receives the

programming from the Avi-On wireless device, which may be used to select and send the program (the timing pattern) to the GE Plug-In Smart Dimmer. Any allowed wireless device also contains the Bluetooth circuit required to connect to the GE Plug-In Smart Dimmer. Both Jasco and Avi-On specifically teach and encourage the use of iOs and Android products to be used with the Avi-On software and the Wireless Timers.

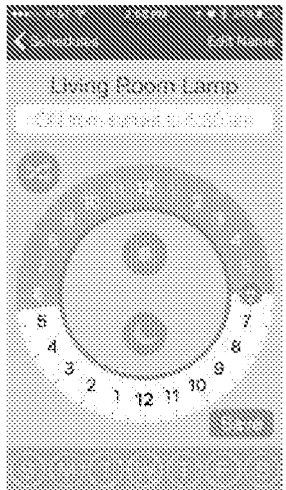
44. The third element of claim 1 calls for "wherein the user interface is configured to receive a security code enabling the downloading of the timing pattern to the memory using the wireless communication protocol." In the case of the Avi-On user interface, the Avi-On software provides a login page, including a password. The password permits the downloading of timing pattern to the GE Plug-In Smart Dimmer once it is claimed by a given user.



Other users may not download timing patterns to the device without the use of the proper login. This is a security code enabling the downloading of the timing pattern.

45. As each element of claim 1 is present in the GE Plug-In Smart Dimmer, claim 1 of the '373 Patent is infringed by the GE Plug-In Smart Dimmer. All of the Wireless Timers infringe this claim.

46. Claim 3 calls for "The programmable light timer of claim 1 wherein the user interface enables the selection of dusk as an on time of the at least one timing pattern." This is permitted, as programs may be set to begin or end at sunrise or sunset.



Claim 3 is infringed by the Wireless Timers.

47. Claim 4 calls for "The programmable light timer of claim 1 wherein the programmable light timer does not include a display." None of the Wireless Timers include a display. All of the Wireless Timers infringe claim 4.

48. The Wireless Timers permit the use of multiple schedules (up to 7) which may be set to run on multiple days of the week, each of which may be separately determined by the user. As such, the Wireless Times also infringe claim 5 which calls for "The programmable light timer of claim 1 wherein the user interface enables the selection of a first on time and a first off time for a first plurality of days of the week."

49. Claim 6 calls for "The programmable light timer of claim 5 wherein the user interface enables the selection of a second on time and a second off time for a second plurality of days of the week." Because the Wireless Timers permit up to seven schedules to run, each of which may cover multiple days of the week, they infringe claim 6 as well.

50. Claim 7 calls for "The programmable light timer of claim 1 wherein the user interface enables an astronomic time for one of the on time or the off time." As sunrise and sunset may be used as any of start or end times in the Wireless Timers, they also infringe this claim.

51. Claim 8 is an infringed claim. The exemplar of infringement is the GE Plug-In Smart Dimmer. The preamble of claim 8 states, "A programmable light timer for implementing a timing pattern, the programmable light timer comprising[.]" The GE Plug-In Smart Dimmer is a device to "wirelessly control lights from your smartphone or tablet," and to "control, adjust brightness and schedule table and floor lamps." Exhibit E, Product Box for GE Plug-In Smart Dimmer. The GE Plug-In Smart Dimmer is programmable using the Avi-On software to load timing patterns into its memory, via a Bluetooth connection from a Bluetooth device such as an Android product or iPhone. It plugs into the wall and is a light timer between the wall circuit and the light, which is in turn plugged into the socket on the side of the GE Plug-In Smart Dimmer.

52. The first element of claim 8 calls for "a memory storing at least one timing pattern, the at least one timing pattern having one or more on/off settings for a time period[.]" As described above, the GE Plug-In Smart Dimmer contains memory which stores the programs input from the Avi-On software. This includes on and off times, as well as days of the week for which the pattern should be enabled.

53. The second element of claim 8 calls for "a wireless communication circuit coupled to receive the at least one timing pattern[.]" The GE Plug-In Smart Dimmer contains a Bluetooth communications circuit which is coupled to the memory, and over which it receives the programming from the Avi-On wireless device, which may be used to select and send the program (the timing pattern) to the GE Plug-In Smart Dimmer.

54. The third element of claim 8 calls for "a control circuit coupled to the wireless communication circuit and enabling receiving the at least one timing pattern from a wireless device, wherein the wireless device comprises a user interface configured to receive a security code enabling the downloading of the timing pattern from the wireless device to the programmable light timer." As described above, the GE Plug-In Smart Dimmer receives programs from the Avi-On software only once it has been claimed, and once the proper login is entered. The control circuit in the GE Plug-In Smart Dimmer permits the downloading of timing pattern to the GE Plug-In Smart Dimmer once it is claimed by a given user but precludes such downloads if the improper login is used, as described above.

55. As each element of claim 8 is present in the GE Plug-In Smart Dimmer, claim 8 of the '373 Patent is infringed by the GE Plug-In Smart Dimmer. All of the Wireless Timers infringe this claim.

56. Claims 10, 11, 12, 13 and 14 are also infringed by the Wireless Timers, as described above in paragraphs 46 and 48-50.

57. Additional products may infringe additional claims of the Cantigny Patents or additional patents owned by Cantigny and be determined during discovery in this case. Cantigny reserves the right to amend the pleadings to state additional claims for infringement.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Cantigny asks this Court to enter judgment against Jasco Products, LLC and Avi-On Labs, Inc. and against their respective subsidiaries, affiliates, agents, servants, employees and all persons in active concert or participation with it, granting the following relief:

A. An award of damages adequate to compensate Cantigny for the infringement that has occurred, together with prejudgment interest from the date infringement began and statutory costs;

B. An award to Cantigny of all remedies available under 35 U.S.C. § 284;

C. An award to Cantigny of all remedies available under 35 U.S.C. § 285;

D. A permanent injunction prohibiting further infringement, inducement and contributory infringement of the Cantigny Patents; and,

E. Such other and further relief as this Court or a jury may deem proper and just.

JURY DEMAND

Cantigny demands a trial by jury on all issues so triable.

Dated: June 2, 2016

Cantigny Lighting Control, LLC

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Attorneys for Plaintiff
Cantigny Lighting Control, LLC

Exhibit A

US009320122B2

(12) **United States Patent**
King

(10) **Patent No.:** **US 9,320,122 B2**
(45) **Date of Patent:** **Apr. 19, 2016**

(54) **PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER**

(71) Applicant: **Cantigny Lighting Control, LLC**, Wheaton, IL (US)

(72) Inventor: **John Joseph King**, Wheaton, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/944,302**

(22) Filed: **Nov. 18, 2015**

(65) **Prior Publication Data**

US 2016/0081170 A1 Mar. 17, 2016

Related U.S. Application Data

(62) Division of application No. 14/066,724, filed on Oct. 30, 2013, now Pat. No. 9,226,373.

(51) **Int. Cl.**
H05B 37/02 (2006.01)

(52) **U.S. Cl.**
CPC ***H05B 37/0281*** (2013.01)

(58) **Field of Classification Search**
CPC H05B 37/0281
USPC 315/292, 360
See application file for complete search history.

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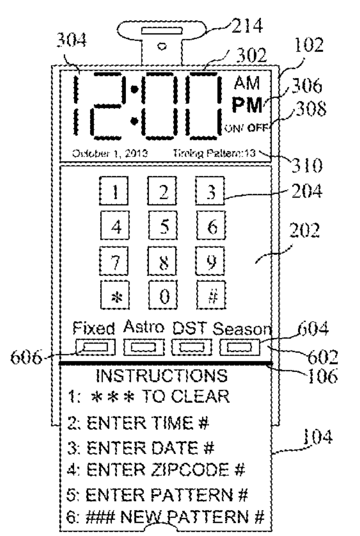
Primary Examiner — Don Le

(57) **ABSTRACT**

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time. A method of implementing a timing pattern on a programmable light timer is also described.

20 Claims, 18 Drawing Sheets



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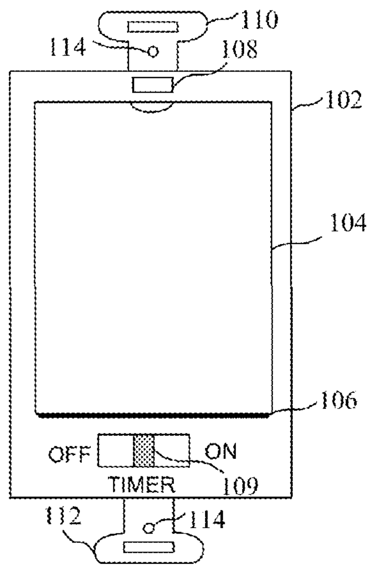

FIG. 1

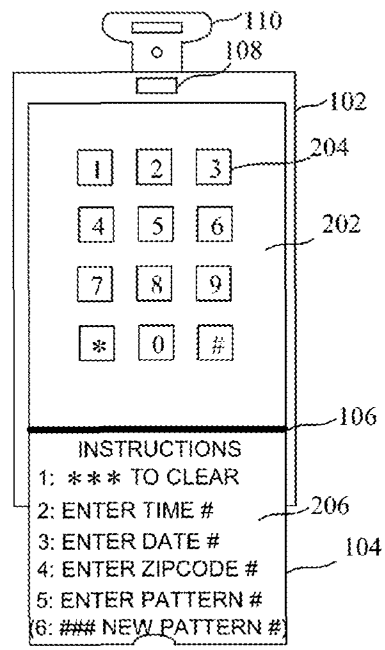

FIG. 2

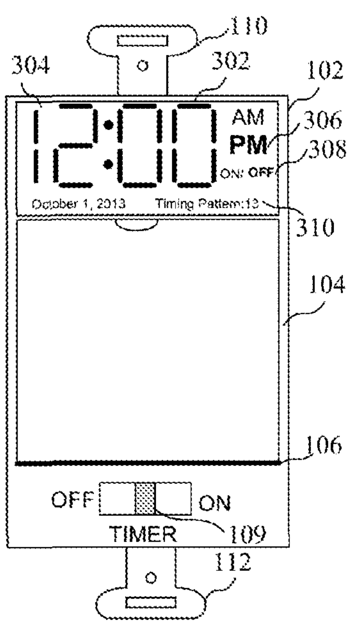

FIG. 3

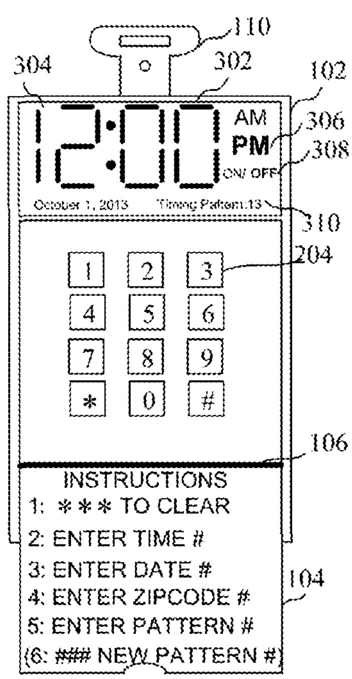

FIG. 4

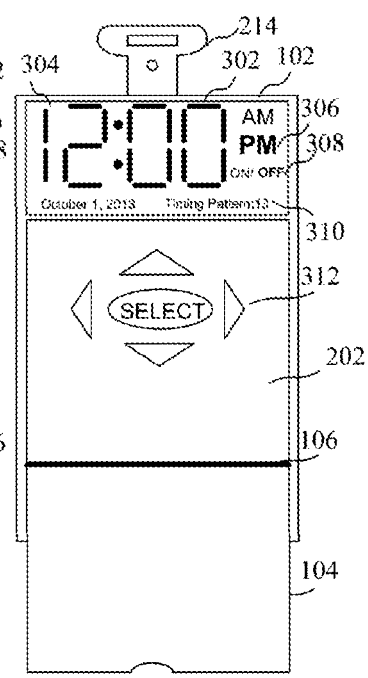

FIG. 5

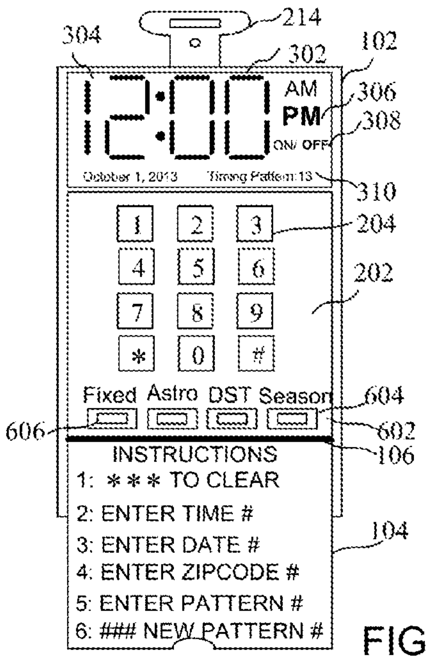

FIG. 6

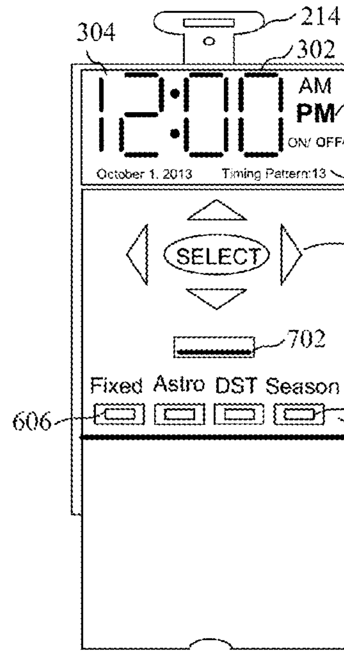

FIG. 7

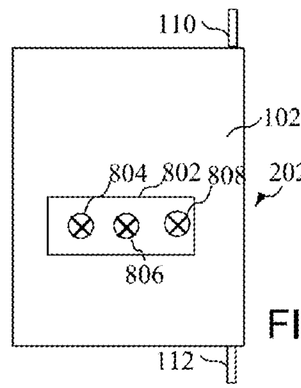

FIG. 8

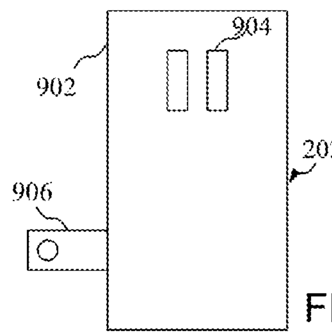

FIG. 9

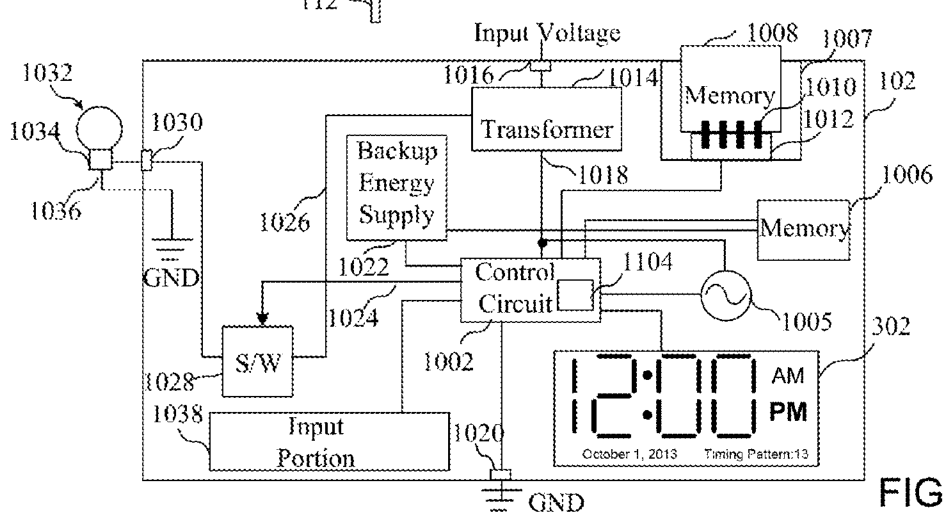

FIG. 10

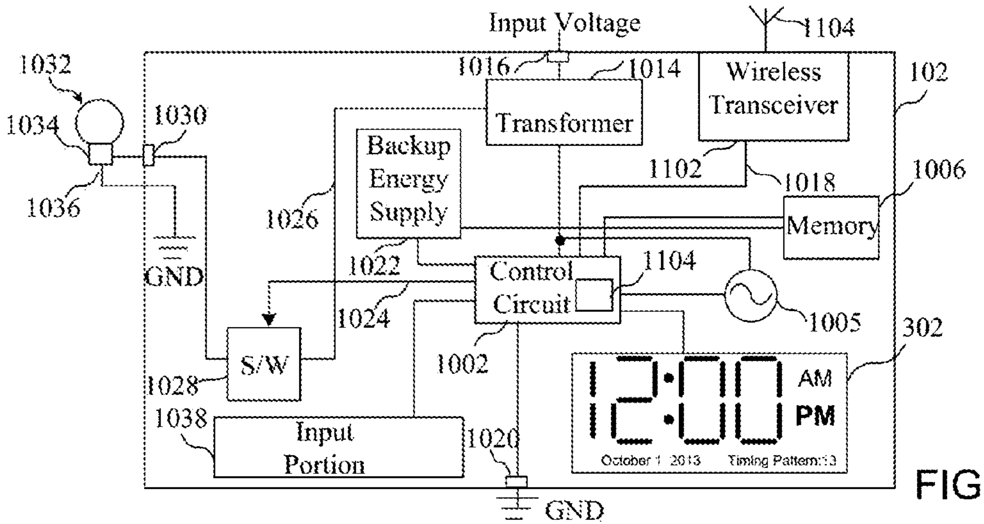

FIG. 11

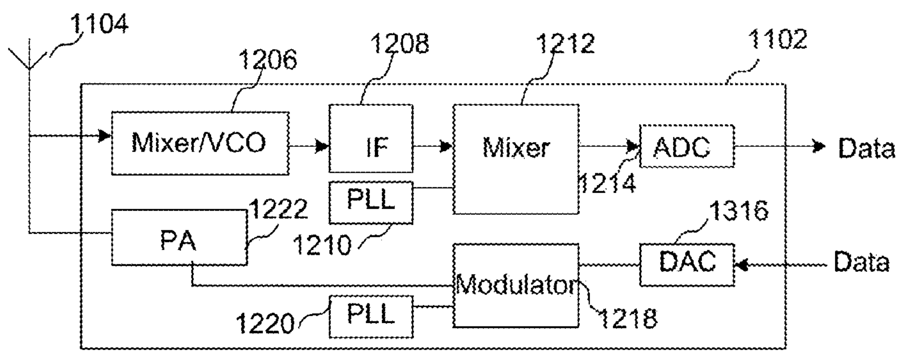

FIG. 12

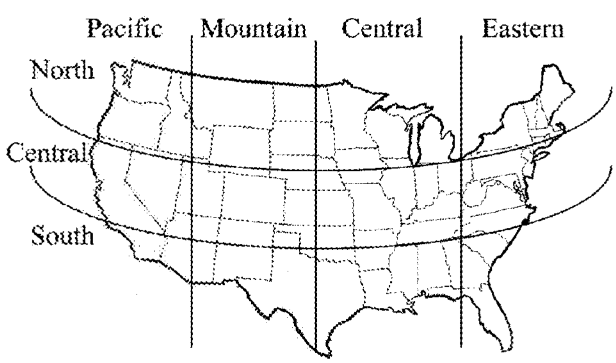

FIG. 13

1402	1404	1406	1408	1410
***	1430#	100513#	60189#	223#

FIG. 14

1402	1404	1406	1408	1410	1502
***	1430#	100513#	60189#	223#	902#

FIG. 15

Zipcode	Region
00501	NE
00502	NE
⋮	⋮
02169	NE
⋮	⋮
60068	NC
60189	NC
60189	NC
⋮	⋮
90210	CP
⋮	⋮
95124	SP

FIG. 17

DST Period Start Date	DST Period End Date	DST Fall Back Time Change	DST Spring Forward Time Change	DST Code
SEP 15	APR 1	Last Sun in OCT	First Sun in MAR	901
SEP 15	APR 1	Last Sun in OCT	2nd Sun in MAR	902
SEP 15	APR 1	First Sun in NOV	First Sun in MAR	903
SEP 15	APR 1	First Sun in Nov	2nd Sun in MAR	904
SEP 15	APR 15	Last Sun in OCT	First Sun in MAR	905
SEP 15	APR 15	Last Sun in OCT	2nd Sun in MAR	906
SEP 15	APR 15	First Sun in NOV	First Sun in MAR	907
SEP 15	APR 15	First Sun in Nov	2nd Sun in MAR	908
SEP 30	APR 1	Last Sun in OCT	First Sun in MAR	909
SEP 30	APR 1	Last Sun in OCT	2nd Sun in MAR	910
SEP 30	APR 1	First Sun in NOV	First Sun in MAR	911
SEP 30	APR 1	First Sun in Nov	2nd Sun in MAR	912
⋮	⋮	⋮	⋮	⋮
OCT 15	APR 1	Last Sun in OCT	First Sun in MAR	938
OCT 15	APR 1	Last Sun in OCT	2nd Sun in MAR	939
OCT 15	APR 1	First Sun in NOV	First Sun in MAR	940
OCT 15	APR 1	First Sun in Nov	2nd Sun in MAR	941

FIG. 19

	On Time		Off Time		Pattern
Fixed Time Year-round	4:00 PM		1:00 AM		1
	4:00 PM		5:00 AM		111
	4:00 PM		6:00 AM		112
	4:00 PM		7:00 AM		113
	⋮		⋮		⋮
	5:00 PM		1:00 AM		121
	5:00 PM		5:00 AM		122
	5:00 PM		5:00 AM		123
	⋮		⋮		⋮
	6:00 PM		7:00 AM		189
	Standard Time (Long Daylight Hrs)-On/Off		DST (Short Daylight Hours)-On/Off		
Standard/DST	4:00 PM/1:00 AM		7:00 PM/1:00 AM		2
	4:00 PM/5:00 AM		7:00 PM/5:00 AM		211
	4:00 PM/6:00 AM		7:00 PM/6:00 AM		212
	4:00 PM/7:00 AM		7:00 PM/7:00 AM		213
	⋮		⋮		⋮
	5:00 PM/1:00 AM		8:00 PM/5:00 AM		221
	5:00 PM/5:00 AM		8:00 PM/6:00 AM		222
	5:00 PM/6:00 AM		8:00 PM/7:00 AM		223
	⋮		⋮		⋮
	8:00 PM/7:00 AM		9:00 PM/7:00 AM		289
	Spring On/Off	Summer On/Off	Fall On/Off	Winter On/Off	
4 Seasons	4:00 PM/1:00 AM	7:00 PM/1:00 AM	5:00 PM/1:00 AM	4:00 PM/1:00 AM	3
	4:00 PM/5:00 AM	7:00 PM/5:00 AM	5:00 PM/5:00 AM	4:00 PM/5:00 AM	311
	4:00 PM/6:00 AM	7:00 PM/6:00 AM	5:00 PM/6:00 AM	4:00 PM/6:00 AM	312
	4:00 PM/7:00 AM	7:00 PM/7:00 AM	5:00 PM/7:00 AM	4:00 PM/7:00 AM	313
	⋮	⋮	⋮	⋮	⋮
	7:00 PM/5:00 AM	8:00 PM/5:00 AM	6:00 PM/5:00 AM	5:00 PM/5:00 AM	321
	7:00 PM/6:00 AM	8:00 PM/6:00 AM	6:00 PM/6:00 AM	5:00 PM/6:00 AM	322
	7:00 PM/7:00 AM	8:00 PM/7:00 AM	6:00 PM/7:00 AM	5:00 PM/7:00 AM	323
					⋮
	8:00 PM/7:00 AM	9:00 PM/7:00 AM	6:00 PM/7:00 AM	6:00 PM/7:00 AM	389
Astronomic	On Time/Offset		Off Time/Offset		
	Astronomic Dusk/+1hr		Astronomic Dawn/-1 hr		4
	Astronomic Dusk/none		Astronomic Dawn/None		411
	Astronomic Dusk/+0.5 hrs		5:00 AM/N/A		412
	Astronomic Dusk/+1.5 hrs		6:00 AM/N/A		413
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/None		421
	4:00 PM/None		Astronomic Dawn/-0.5 hrs		422
	4:00 PM/None		Astronomic Dawn/-1.0 hrs		423
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/-2.0 hrs		489

FIG. 16

Region	Time Period of Date	Average Dusk Time	Average Dawn Time
NE	Full Year	7:00 PM	6:00 AM
	Standard Time	7:30 PM	5:30 AM
	Daylight Savings Time	6:30 PM	7:00 AM
	Spring	7:30 PM	6:00 AM
	Summer	8:00 PM	5:30 AM
	Fall	6:30 PM	6:30 AM
	Winter	5:00 PM	7:00 AM
	January	5:30 PM	7:15 AM
	February	4:45 PM	7:10 AM
	⋮	⋮	⋮
	December	5:40 PM	6:55 AM
	January 1, 2013	5:30 PM	7:15 AM
	January 2, 2013	5:31 PM	7:14 AM
	January 3, 2013	5:33 PM	7:11 AM
	⋮	⋮	⋮
	December 31, 2013	5:39 PM	6:49 AM
NC	Full Year	6:55 PM	6:03 AM
	Standard Time	7:25 PM	5:33 AM
	Daylight Savings Time	6:25 PM	7:04 AM
	Spring	7:25 PM	6:03 AM
	Summer	7:55 PM	5:33 AM
	Fall	6:25 PM	6:33 AM
	Winter	4:55 PM	7:03 AM
	January	5:25 PM	7:17 AM
	February	4:40 PM	7:13 AM
	⋮	⋮	⋮
	December	5:35 PM	6:58 AM
	January 1, 2013	5:25 PM	7:18 AM
	January 2, 2013	5:26 PM	7:17 AM
	January 3, 2013	5:28 PM	7:14 AM
	⋮	⋮	⋮
	December 31, 2013	5:34 PM	6:54 AM
⋮	⋮	⋮	⋮
SP	Full Year	7:07 PM	6:05 AM
	Standard Time	7:36 PM	5:36 AM
	⋮	⋮	⋮
	January 3, 2013	5:39 PM	7:16 AM
	⋮	⋮	⋮
	December 31, 2013	5:44 PM	6:54 AM

FIG. 18

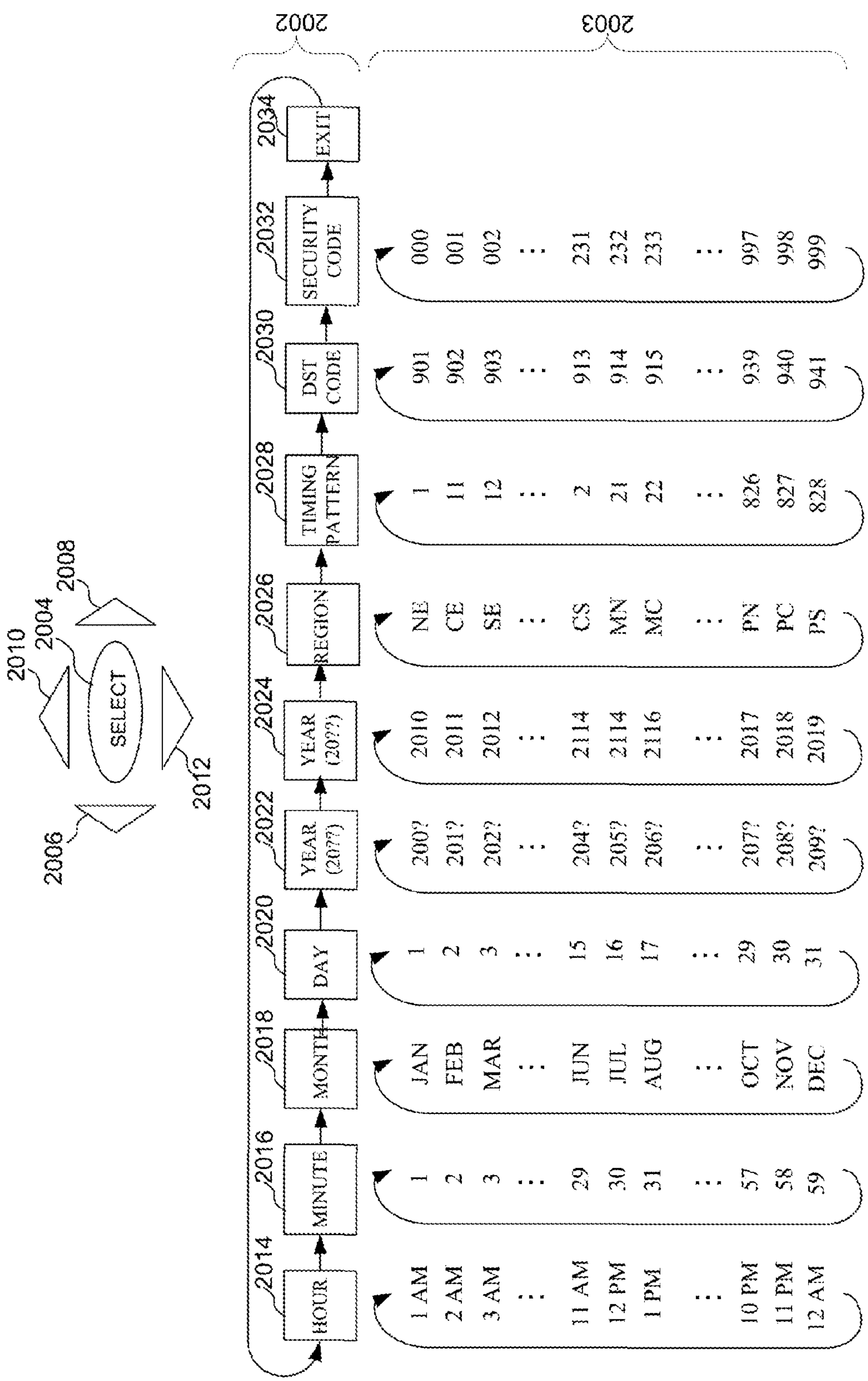
SELECT
2004
2006
2008
2010
2012
2002
2003
HOUR
2014
MINUTE
2016
MONTH
2018
DAY
2020
YEAR (20??)
2022
YEAR (20??)
2024
REGION
2026
TIMING PATTERN
2028
DST CODE
2030
SECURITY CODE
2032
EXIT
2034
1 AM 2 AM 3 AM … 11 AM 12 PM 1 PM … 10 PM 11 PM 12 AM
1 2 3 … 29 30 31 … 57 58 59
JAN FEB MAR … JUN JUL AUG … OCT NOV DEC
1 2 3 … 15 16 17 … 29 30 31
200? 201? 202? … 204? 205? 206? … 207? 208? 209?
2010 2011 2012 … 2114 2114 2116 … 2017 2018 2019
NE CE SE … CS MN MC … PN PC PS
1 11 12 … 2 21 22 … 826 827 828
901 902 903 … 913 914 915 … 939 940 941
000 001 002 … 231 232 233 … 997 998 999

FIG. 20

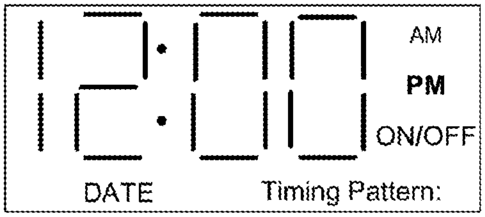

FIG. 21

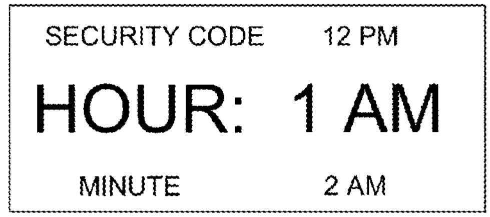

FIG. 22

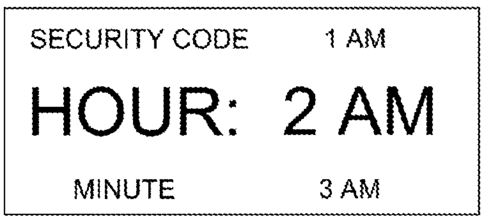

FIG. 23

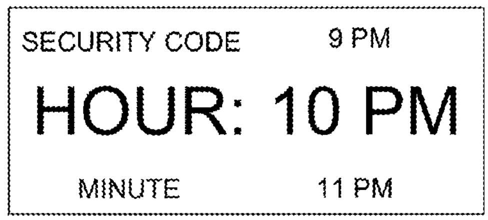

FIG. 24

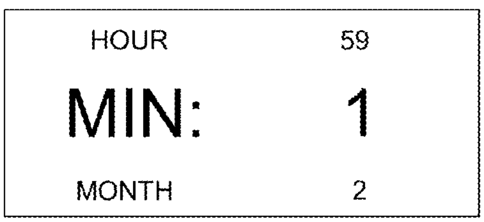

FIG. 25

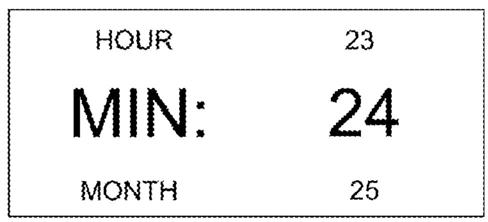

FIG. 26

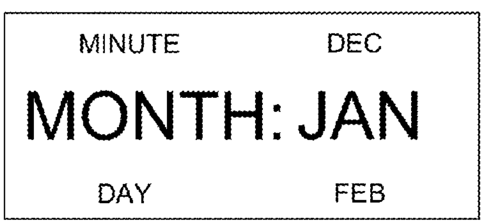

FIG. 27

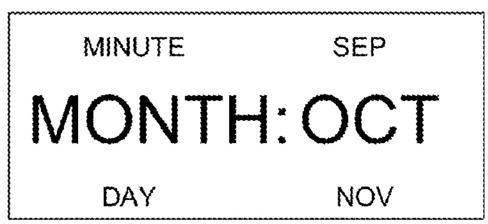

FIG. 28

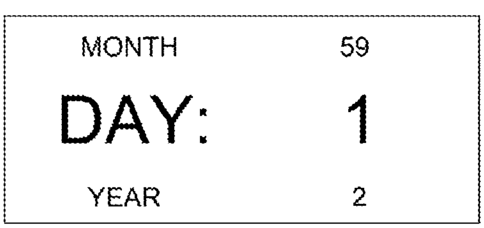

FIG. 29

FIG. 30

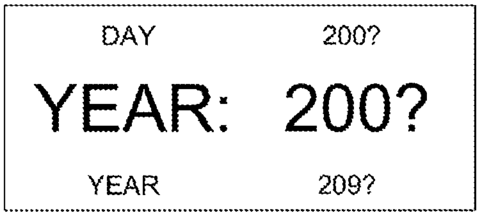

FIG. 31

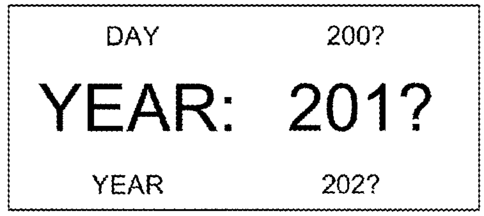

FIG. 32

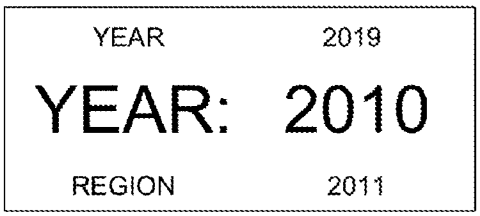

FIG. 33

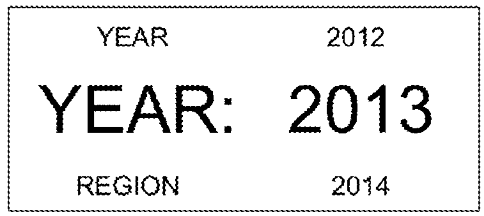

FIG. 34

FIG. 35

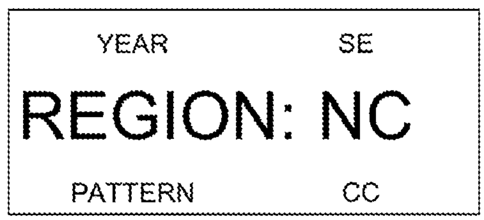

FIG. 36

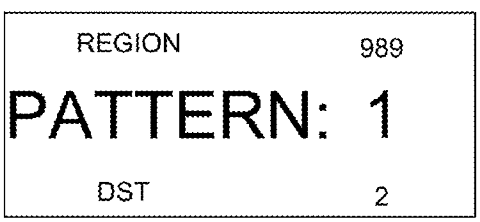

FIG. 37

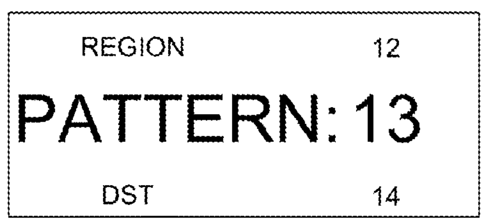

FIG. 38

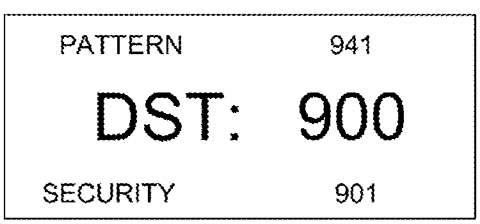

FIG. 39

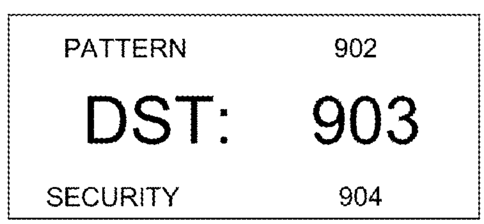

FIG. 40

FIG. 41

FIG. 42

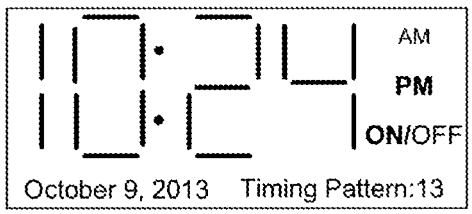

FIG. 43

FIELD	DATA
Time	10:24 PM
Date	October 24, 2013
Region	NC
Timing Pattern	13
DST Code	903
Security Code	013

FIG. 44

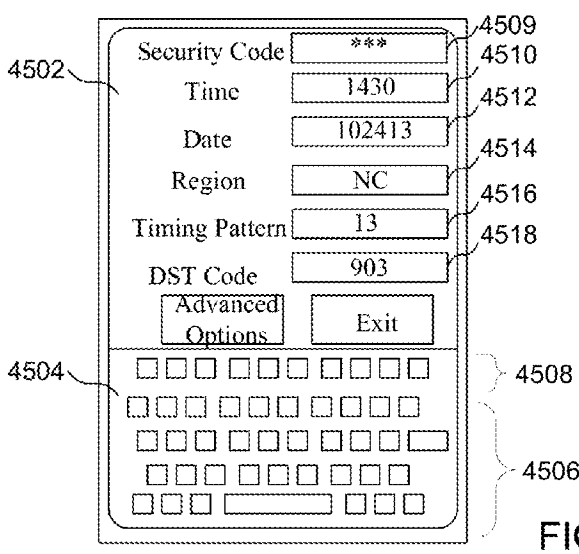

FIG. 45

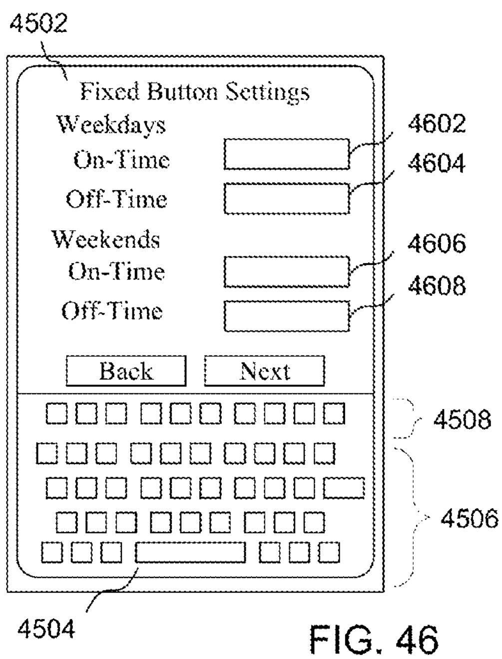

FIG. 46

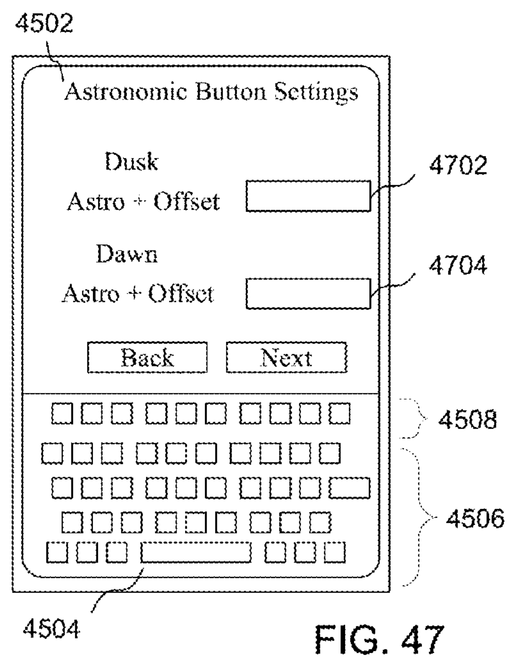

FIG. 47

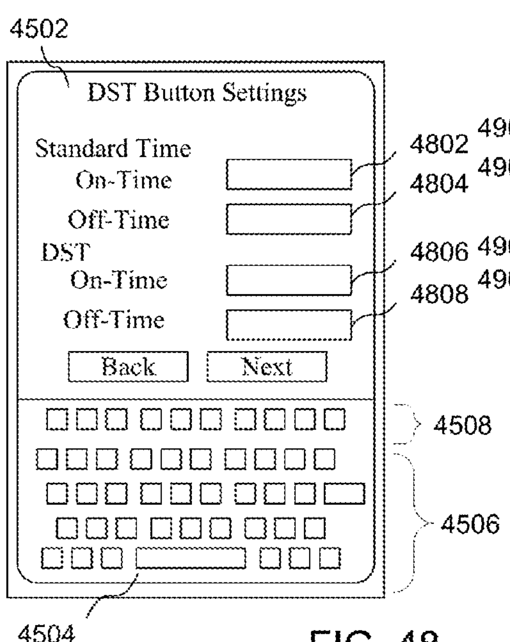

FIG. 48

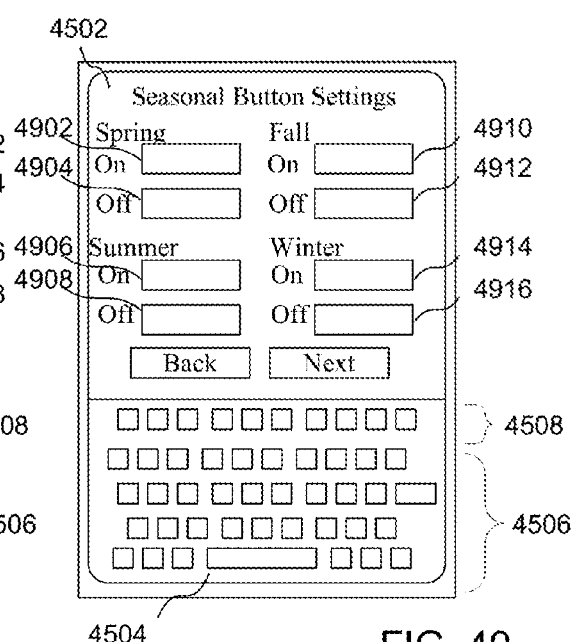

FIG. 49

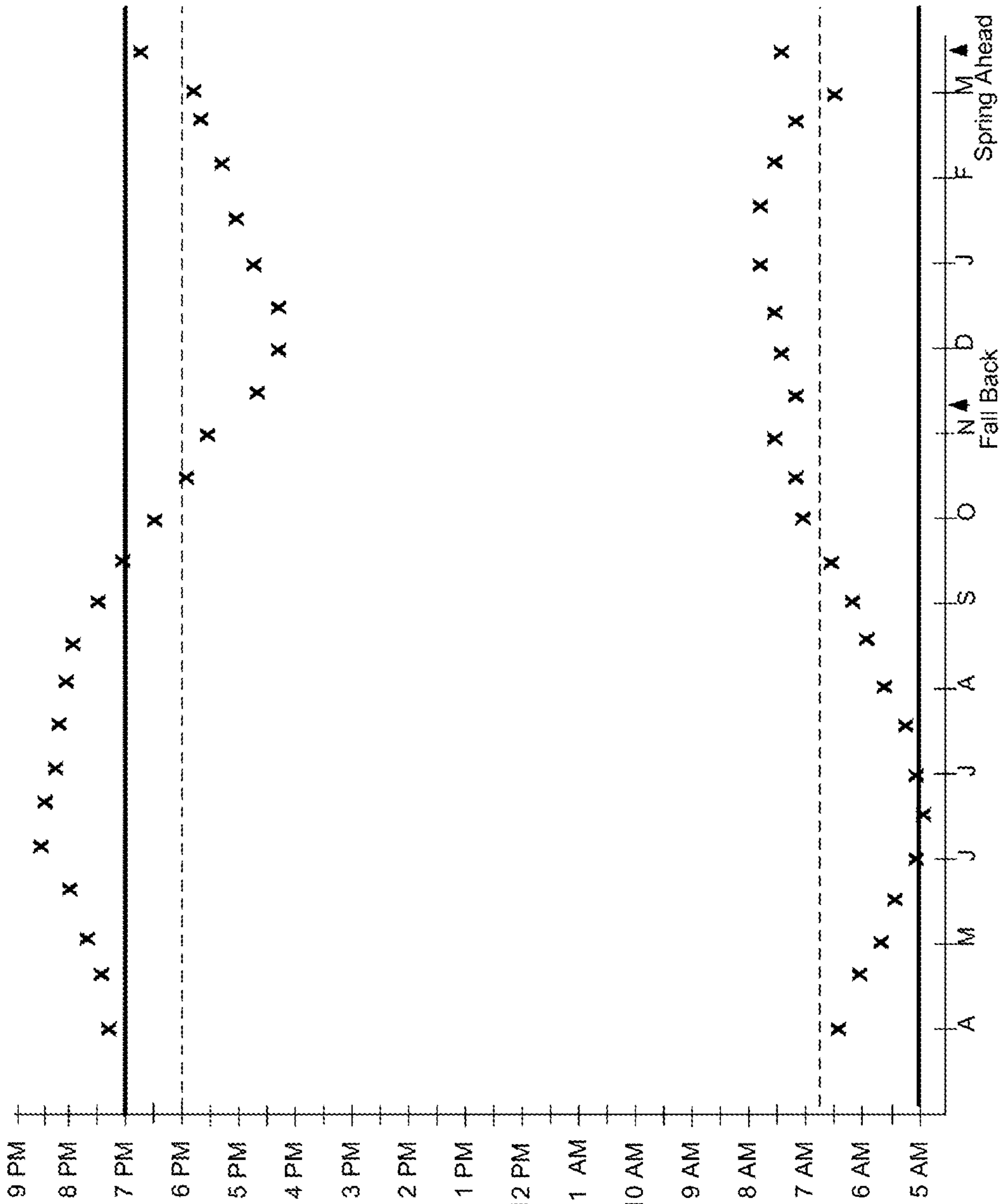
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 50

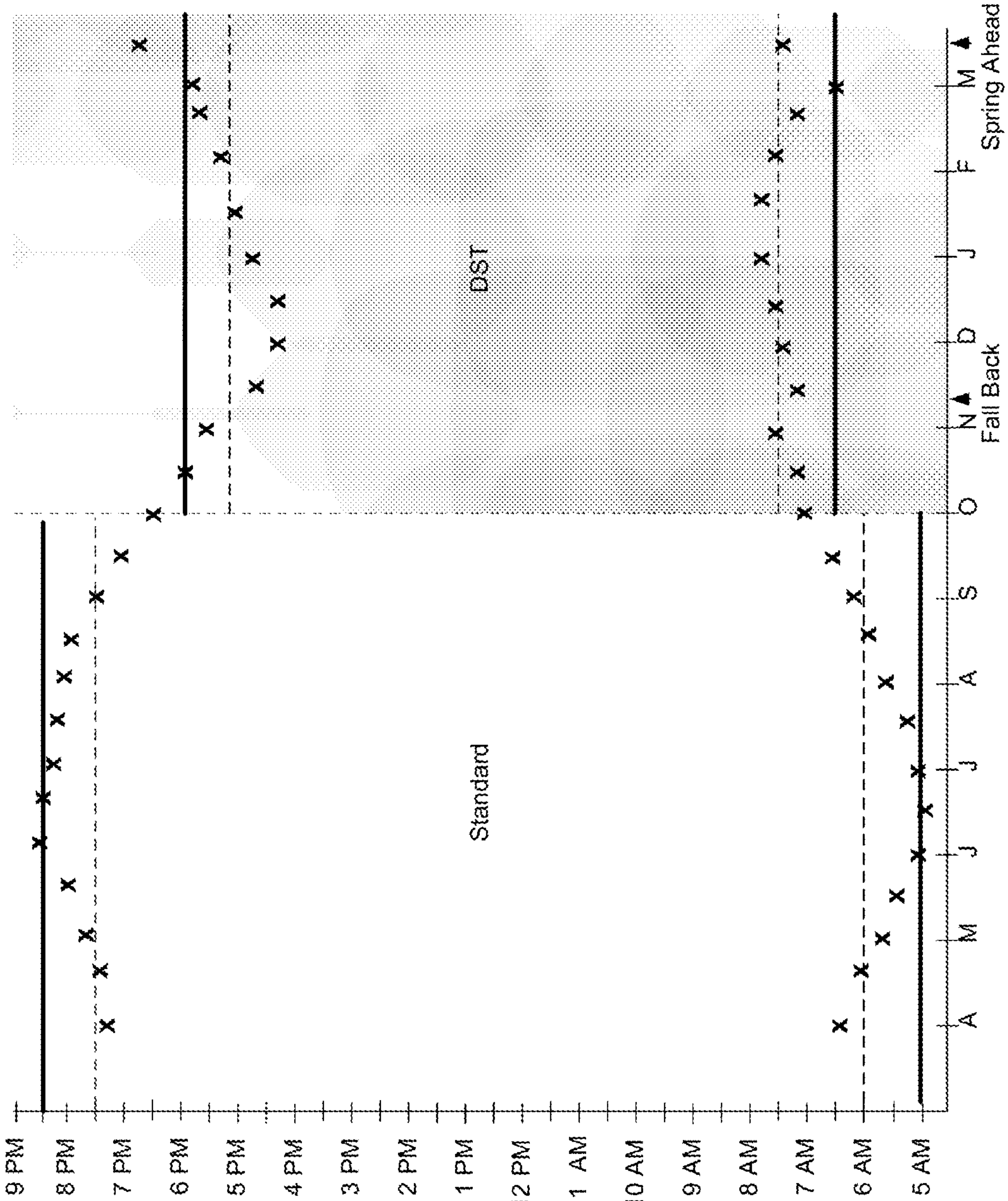
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
Standard
DST
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 51

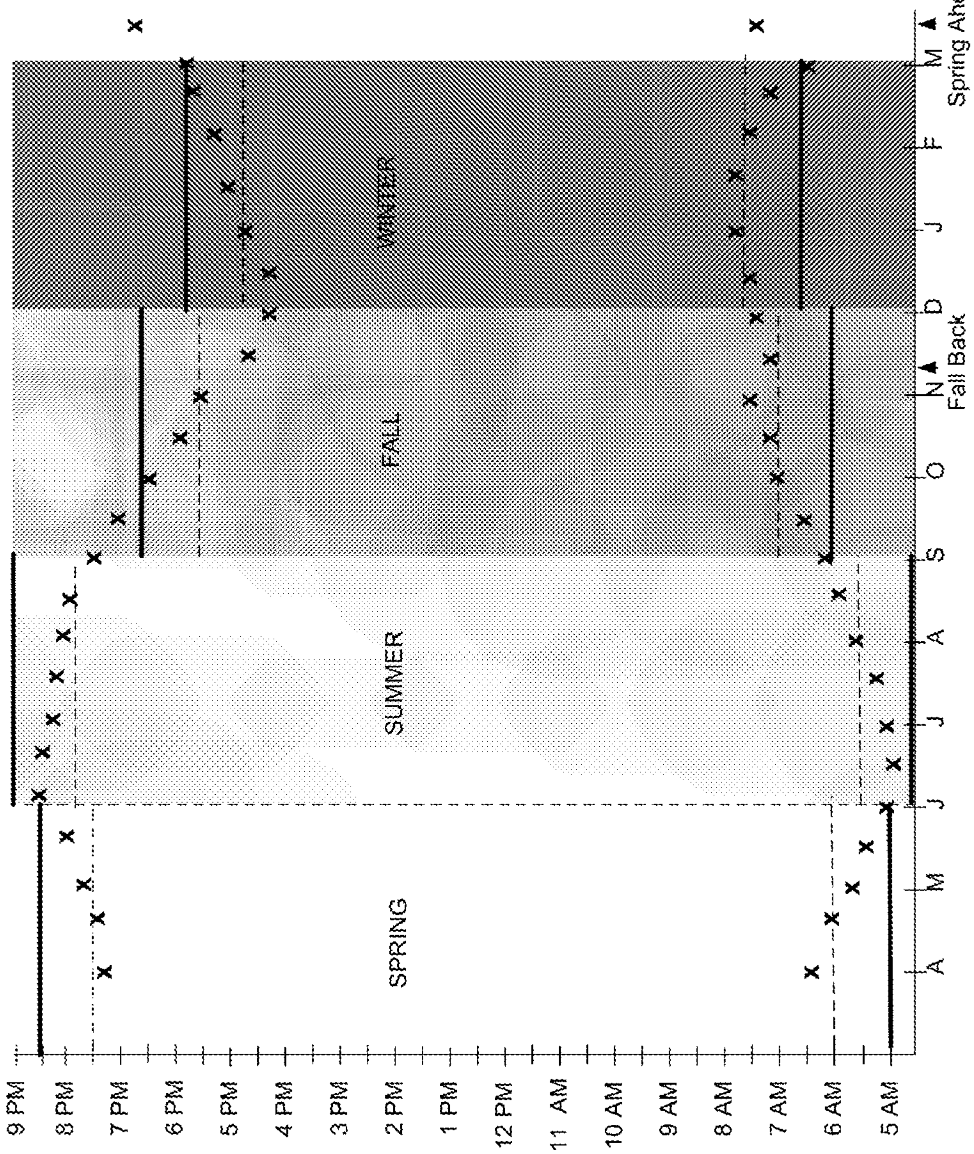
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
SPRING
SUMMER
FALL
WINTER
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 52

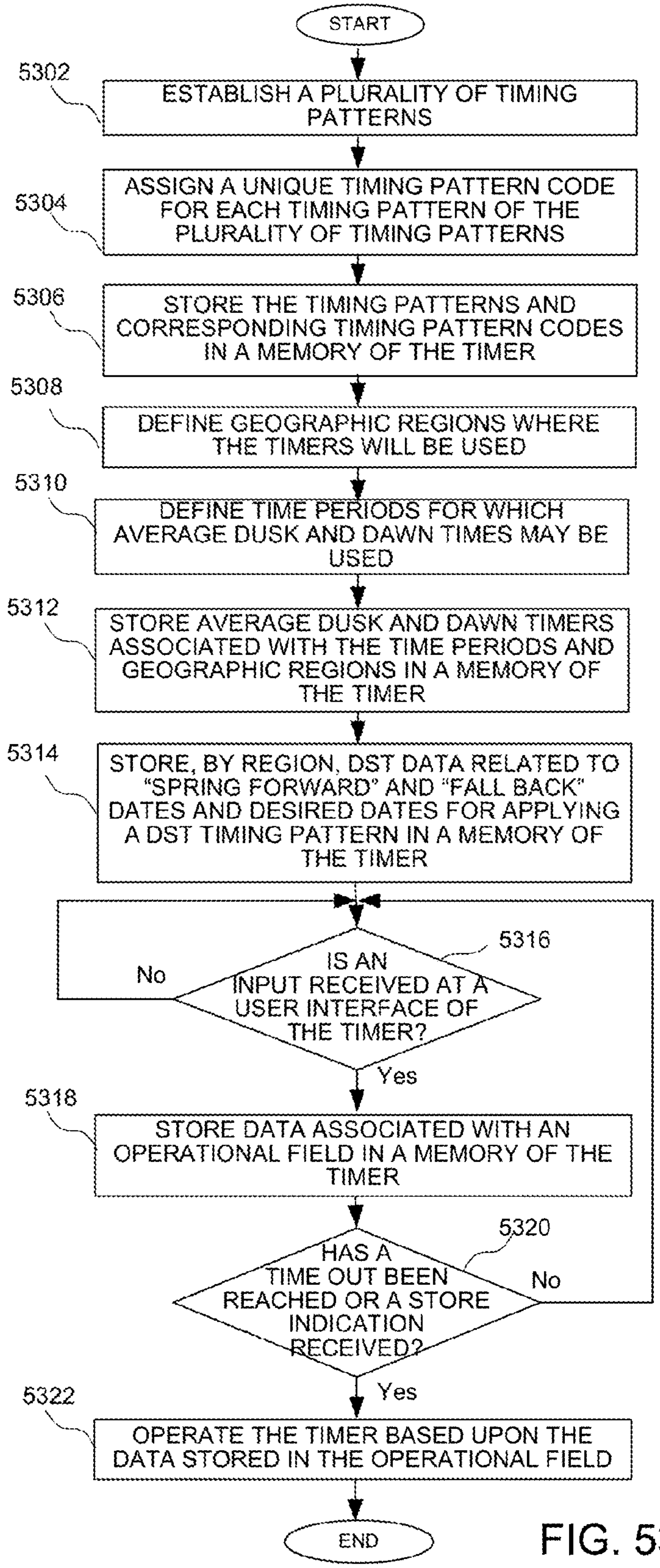
START
5302
ESTABLISH A PLURALITY OF TIMING PATTERNS
5304
ASSIGN A UNIQUE TIMING PATTERN CODE FOR EACH TIMING PATTERN OF THE PLURALITY OF TIMING PATTERNS
5306
STORE THE TIMING PATTERNS AND CORRESPONDING TIMING PATTERN CODES IN A MEMORY OF THE TIMER
5308
DEFINE GEOGRAPHIC REGIONS WHERE THE TIMERS WILL BE USED
5310
DEFINE TIME PERIODS FOR WHICH AVERAGE DUSK AND DAWN TIMES MAY BE USED
5312
STORE AVERAGE DUSK AND DAWN TIMERS ASSOCIATED WITH THE TIME PERIODS AND GEOGRAPHIC REGIONS IN A MEMORY OF THE TIMER
5314
STORE, BY REGION, DST DATA RELATED TO "SPRING FORWARD" AND "FALL BACK" DATES AND DESIRED DATES FOR APPLYING A DST TIMING PATTERN IN A MEMORY OF THE TIMER
5316
IS AN INPUT RECEIVED AT A USER INTERFACE OF THE TIMER?
No
Yes
5318
STORE DATA ASSOCIATED WITH AN OPERATIONAL FIELD IN A MEMORY OF THE TIMER
5320
HAS A TIME OUT BEEN REACHED OR A STORE INDICATION RECEIVED?
No
Yes
5322
OPERATE THE TIMER BASED UPON THE DATA STORED IN THE OPERATIONAL FIELD
END

FIG. 53

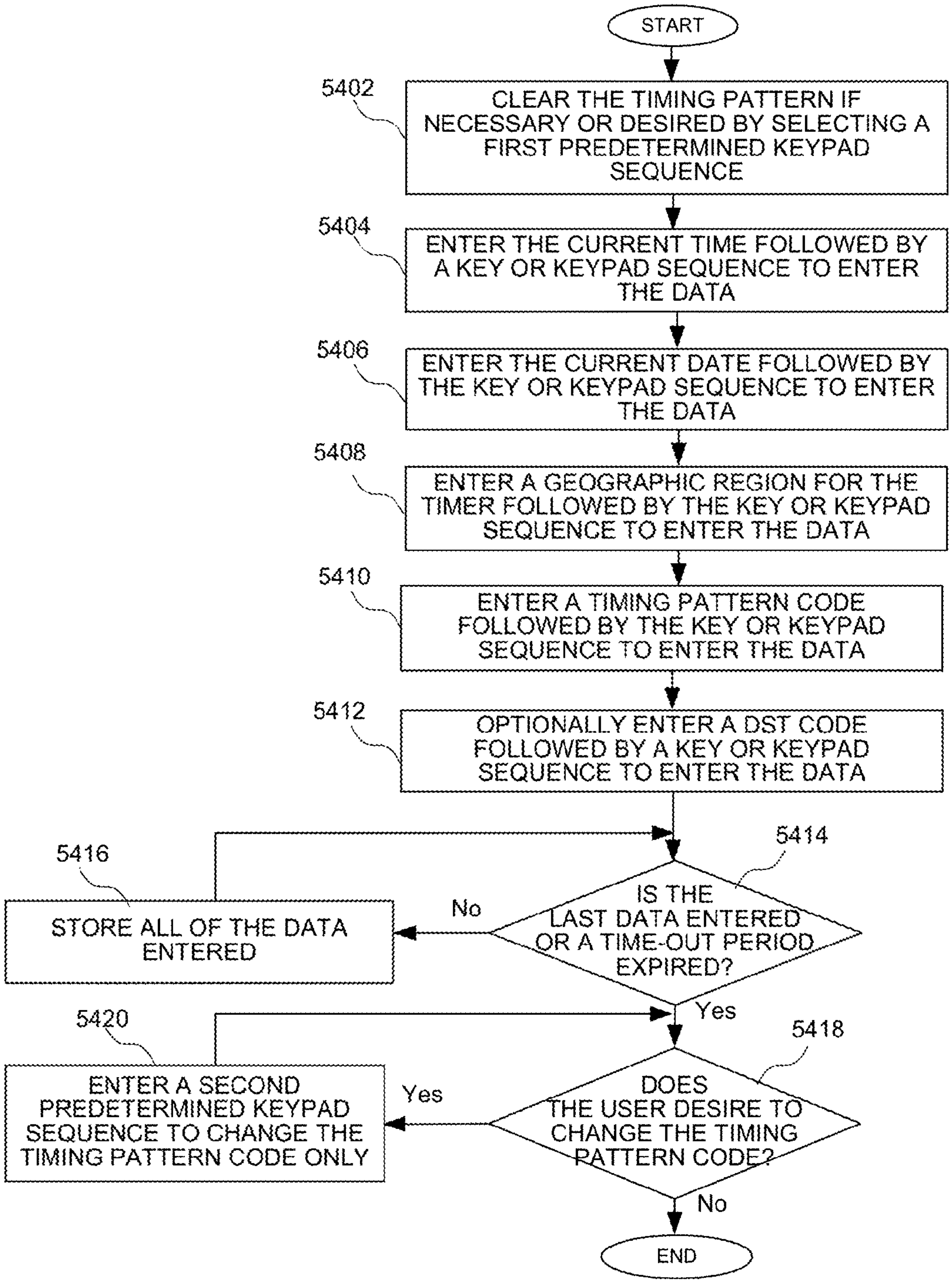
START
5402
CLEAR THE TIMING PATTERN IF NECESSARY OR DESIRED BY SELECTING A FIRST PREDETERMINED KEYPAD SEQUENCE
5404
ENTER THE CURRENT TIME FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5406
ENTER THE CURRENT DATE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5408
ENTER A GEOGRAPHIC REGION FOR THE TIMER FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5410
ENTER A TIMING PATTERN CODE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5412
OPTIONALLY ENTER A DST CODE FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5414
IS THE LAST DATA ENTERED OR A TIME-OUT PERIOD EXPIRED?
No
5416
STORE ALL OF THE DATA ENTERED
Yes
5418
DOES THE USER DESIRE TO CHANGE THE TIMING PATTERN CODE?
Yes
5420
ENTER A SECOND PREDETERMINED KEYPAD SEQUENCE TO CHANGE THE TIMING PATTERN CODE ONLY
No
END

FIG. 54

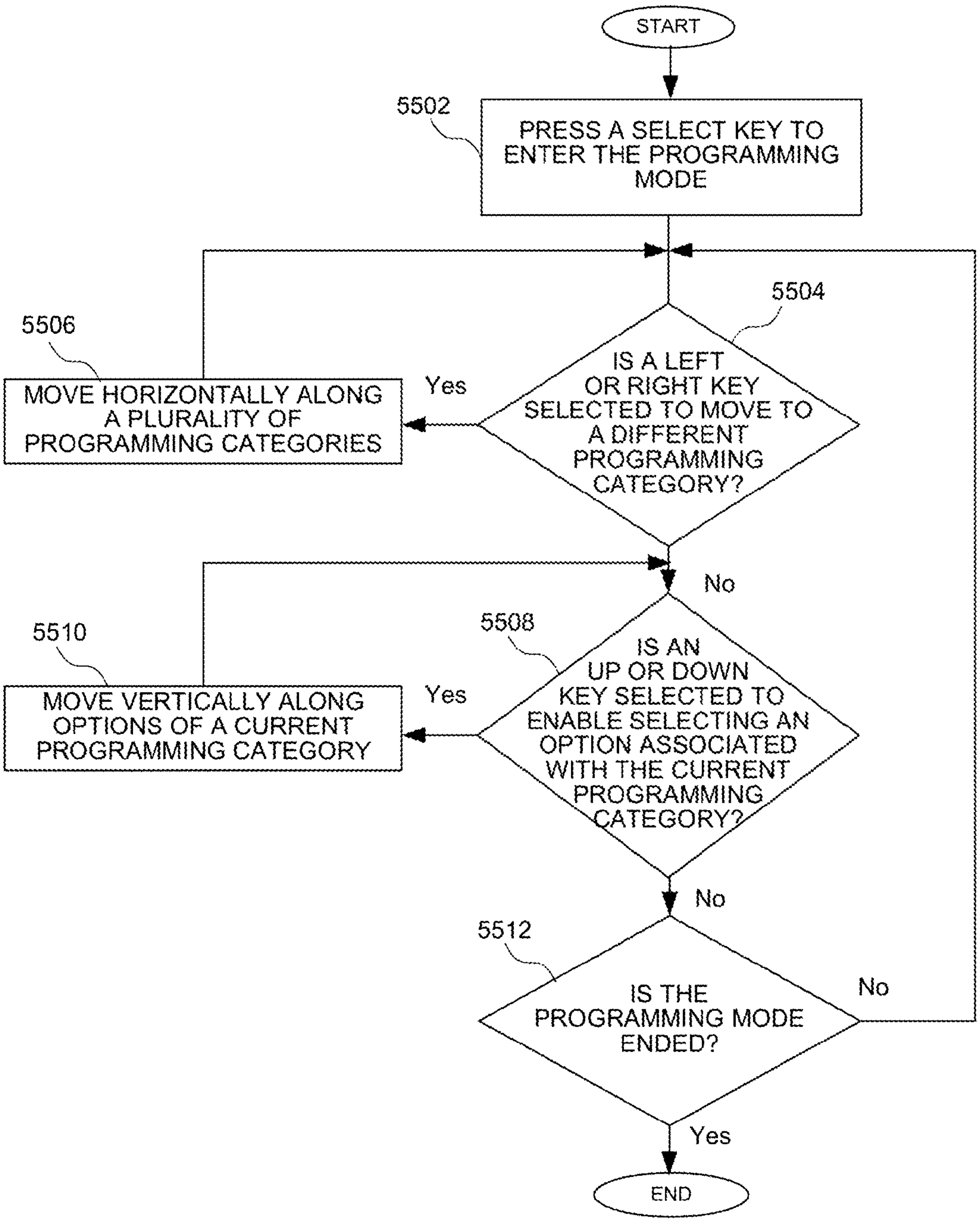
START
5502
PRESS A SELECT KEY TO ENTER THE PROGRAMMING MODE
5504
IS A LEFT OR RIGHT KEY SELECTED TO MOVE TO A DIFFERENT PROGRAMMING CATEGORY?
Yes
5506
MOVE HORIZONTALLY ALONG A PLURALITY OF PROGRAMMING CATEGORIES
No
5508
IS AN UP OR DOWN KEY SELECTED TO ENABLE SELECTING AN OPTION ASSOCIATED WITH THE CURRENT PROGRAMMING CATEGORY?
Yes
5510
MOVE VERTICALLY ALONG OPTIONS OF A CURRENT PROGRAMMING CATEGORY
No
5512
IS THE PROGRAMMING MODE ENDED?
No
Yes
END

FIG. 55

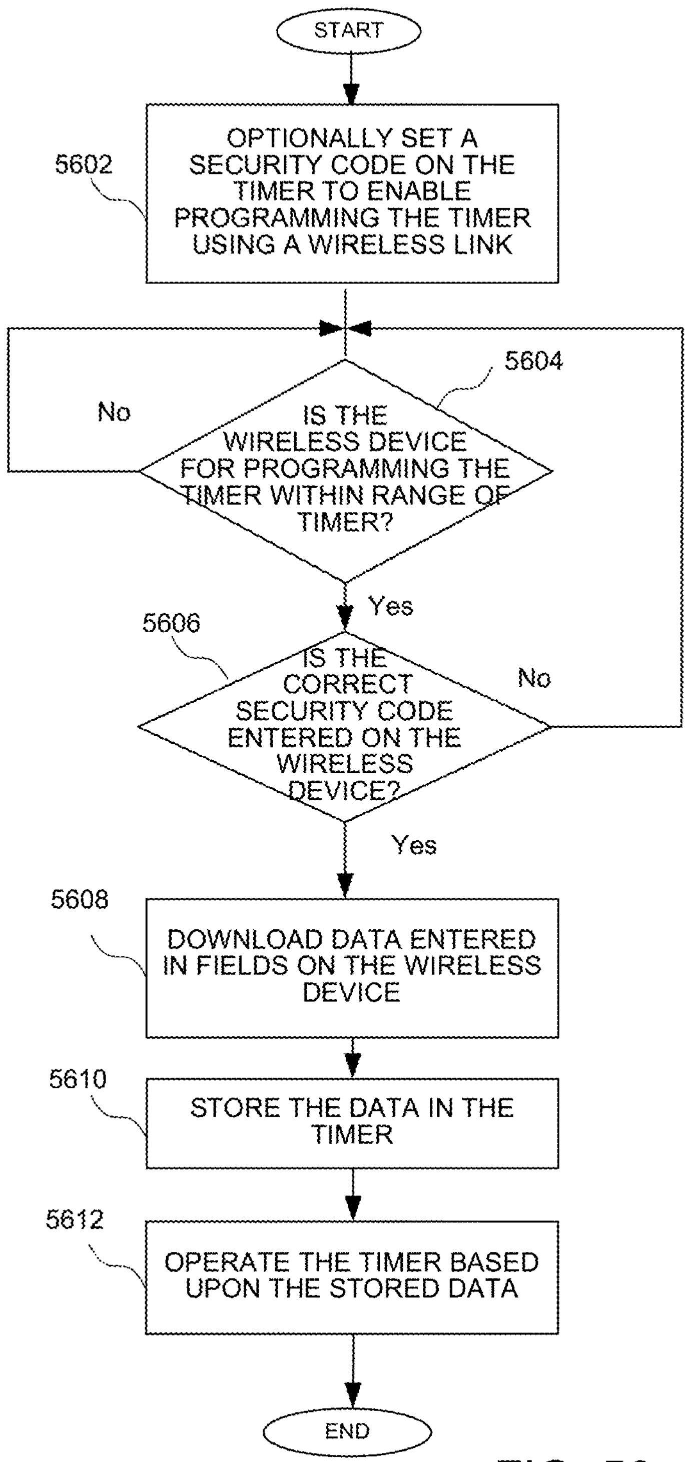
START
5602
OPTIONALLY SET A SECURITY CODE ON THE TIMER TO ENABLE PROGRAMMING THE TIMER USING A WIRELESS LINK
5604
IS THE WIRELESS DEVICE FOR PROGRAMMING THE TIMER WITHIN RANGE OF TIMER?
No
Yes
5606
IS THE CORRECT SECURITY CODE ENTERED ON THE WIRELESS DEVICE?
No
Yes
5608
DOWNLOAD DATA ENTERED IN FIELDS ON THE WIRELESS DEVICE
5610
STORE THE DATA IN THE TIMER
5612
OPERATE THE TIMER BASED UPON THE STORED DATA
END

FIG. 56

PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

FIELD OF THE INVENTION

The present invention relates generally to lighting control products, and in particular, to a programmable light timer and a method of implementing a programmable light timer. Applicant claims priority on co-pending U.S. application Ser. No. 14/066,724, filed on Oct. 20, 2013.

BACKGROUND OF THE INVENTION

Conventional timers for lights, such as timers for indoor lamps or outdoor lights for example, either provide little functionality, or are difficult to program. Because of the limited size of the conventional timers, the size of the screen and the size of the interface for programming the timer are both relatively small. This is particularly true of an in-wall timer, which must fit in an electrical box, commonly called a junction box. Not only does a user of the in-wall timer have to read a very small display, but the user has to advance through a menu shown on the small display using a very limited interface which is provided on the remaining portion of the timer. Entering data on such a user interface is particularly difficult because the in-wall timer is fixed and generally positioned well below eye level.

Further, conventional timers are often unreliable. For example, conventional mechanical timers often malfunction over time, leaving the user without the use of the timer for some period of time and requiring the user to incur the expense of replacing the timer. Moreover, advanced digital timers having electronic displays may be difficult to operate, providing a barrier to certain groups of people who would otherwise use a timer, but don't want to struggle through a complex interface on the small screen of the timer to properly set the timer. For example, not only is the display very small and difficult to read, but the user interface is difficult to navigate on such a small display. These groups of users are either left with no timing operation for their lights, or timers which do not provide the timing operation that they desire. Without an effective timer for a light for example, the light may be on significantly longer than necessary, not only wasting energy but in many cases increasing pollution as a result. As energy consumption world-wide continues to increase, it is important to reduce or minimize the consumption of energy in any way possible. The timer of the present invention provides significant benefits in reducing energy consumption.

SUMMARY OF THE INVENTION

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.

Another programmable light timer for implementing a timing pattern comprises an actuator on a user interface of the programmable light timer, the actuator enabling a selection of

a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

A method of implementing a timing pattern on a programmable light timer is also described. The method comprises enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer; displaying the time on a display of the programmable light timer; enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention;

FIG. **2** is a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention;

FIG. **3** is a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention;

FIG. **4** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to an embodiment of the present invention;

FIG. **5** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention;

FIG. **6** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to an embodiment of the present invention;

FIG. **7** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to another embodiment of the present invention;

FIG. **8** is a side view of the in-wall timer enable a connection of the timer to electrical wiring;

FIG. **9** is a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention;

FIG. **10** is a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to an embodiment of the present invention;

FIG. **11** is a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention;

FIG. **12** is a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention;

FIG. **13** is a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention;

FIG. **14** is a diagram showing data fields of data entered by a user according to an embodiment of the present invention;

FIG. **15** is a diagram showing data fields of data entered by a user according to an alternate embodiment of the present invention;

FIG. 16 is table showing timing pattern codes and associated timing characterization data and categories according to an embodiment of the present invention;

FIG. 17 is a table showing the designation of regions associated with a number of geographical locations according to an embodiment of the present invention;

FIG. 18 is a table showing average dusk and dawn times for various regions and periods according to an embodiment of the present invention;

FIG. 19 is a table showing daylight savings time codes and associated daylight savings time characterization data according to an embodiment of the present invention;

FIG. 20 is a flow diagram showing the operation of the 5-key user interface of FIGS. 5 and 7 according to an embodiment of the present invention;

FIGS. 21-43 shows a series of stages of programming a timer using the 5-key user interface of FIGS. 5 and 7;

FIG. 44 is a memory showing fields and stored data associated with the programmed timer of FIG. 43;

FIGS. 45-49 show screens of a user interface enabling the wireless programming of a timer according to an embodiment of the present invention;

FIG. 50 is a chart showing dusk and dawn times over a year;

FIG. 51 is a chart showing dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time;

FIG. 52 is a chart showing dusk and dawn times over a year and which is divided into four periods including four seasons;

FIG. 53 is a flow chart showing a method of generating timing characterization data according to an embodiment of the present invention;

FIG. 54 is a flow chart showing a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention;

FIG. 55 is a flow chart showing a method of selecting a stored timing pattern using the keypad of FIGS. 2 and 4 according to an embodiment of the present invention; and

FIG. 56 is a flow chart showing a method of selecting a stored timing pattern using 5 key user interface of FIGS. 5 and 7 according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The various embodiments set forth below overcome significant problems with conventional timers of having to use a small display, and navigating a menu on such a small display. Some embodiments eliminate the requirement of having a display by providing pre-programmed timing patterns which can be easily selected by entering a timing pattern code associated with a desired timing pattern. Other embodiments include a display, but benefit from an improved user interface which enables the easy selection of a timing pattern by selecting a desired timing pattern code. In addition to selecting the timing pattern code, the user interfaces for embodiments with or without a display enabling the easy programming of other data which must be entered to operate the timer. By storing the timing patterns which are associated with common or desirable on/off patterns which are likely to be used to operate the timer, a user does not need to enter on/off times for a light for various times during a day or week, or reprogram the timer in response to changes in dusk and dawn times during a calendar year.

Turning first to FIG. 1, a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention is shown. The timer of FIG. 1 comprises a housing portion 102 having an optional cover 104 (coupled to the timer by way of a hinge 106) which covers a user interface when in the closed position and enables programming the timer by way of the user interface in the open position. A feedback indicator 108, such as a light and more particularly a light emitting diode (LED), could be implemented to show the status of the light or other appliance attached to the timer, for example. The feedback indicator could show green when a light attached to the timer is on, and could be or (or show red) when the light is off. An optional switch 109 which is movable between an on or off position, and a timer position for implementing the timer according to a selected timing pattern. While the cover is primarily cosmetic and may generally prevent unintentional changing of the timer, the timer cover is not necessary. Alternatively, the cover may be functional, such as functioning as an on/off override switch for the light or appliance attached to the timer in place of the switch 109. For example, the state of the light may be toggled (i.e. changed from a current state, such as on, to the other state, such as off) in response to pressing the cover which would activate a switch to change the state of the light if the switch 110 is not included. Flanges 111 and 112, each having a threaded portion for receiving a screw to attach the timer to a junction box. While the various embodiments are generally described in reference to a timer which is "hard wired" in a junction and may be used for a porch light for example, it should be understood that the user interfaces, circuits and methods set forth in more detail below could be implemented in a timer which is plugged into an outlet (commonly called an light or appliance timer), as will be described in more detail below in reference to FIG. 9. Further, while some examples are provided in terms of residential-type in-wall timers which are installed in a conventional residential junction box, it should be understood that the user interfaces, circuits and methods could be implemented in commercial timers.

Turning now to FIG. 2, a perspective view of the front panel of the in-wall light timer of FIG. 1 with a cover open according to an embodiment of the present invention is shown. As shown in FIG. 2, when the cover 104 is moved to an open position, a user interface comprising a keypad 204 is accessible on an inner surface 202. Also shown on an inner surface 206 of the cover, instructions can be printed to enable the user to easily program the timer. As will be described in more detail below, a user can program the timer in 5 simple steps (and change a timing pattern using a single step). The keypad 204 of FIG. 2 comprises 0-9 keys and star (*) and pound (#) keys.

According to one embodiment, the timer could be programmed using 5 steps for entering data on the keypad as shown on the inside of the cover. The keypad is used to enter numeric data which is necessary to operate the timer. A key pattern sequence is entered to clear the timer if necessary. For example, the star key could be pressed 3 times to clear the memory. Data necessary to operate the timer according to a user's desired timing pattern is then entered. In particular, a current time is entered followed by the pound key. The pound key may be entered to indicate that all of the data for a given field. Alternatively, all of the data could be considered to be entered after a time-out period. The time is preferably entered as military time (e.g. 2:00 PM would be entered as 1400) to ensure that the correct AM or PM time is stored. Alternatively, a code at the end of the time could be entered to indicate AM or PM. A date is then entered, followed by the pound key. The date is preferably entered as a 6 digit code (e.g. in the DDMMYY format) to ensure that the date is properly interpreted. A location code (such as a zip code) could then be entered followed by the pound key. As will be described in more detail below, the location code can be associated with a region which is used to ensure that the correct daylight savings times and dawn and dusk times (or average values associated with dawn and dusk times) are used to operate the timer. The timing pattern is then entered followed by the pound key. The timing pattern will be used to operate the timer based upon the current time, date and location of the timer. Accordingly, after **5** simple steps, the timer is programmed to follow a timing pattern that meets the user's needs, and operates as it would if on/of times were entered on a user interface in a conventional manner to implement the timing pattern.

In addition to providing simple steps to program the timer, the user interface of FIG. **2** also enables easy reprogramming if desired by the user. Although the selection of a desired timing pattern will eliminate the need to reprogram the timer (such as at the start of spring or fall seasons as is generally required with conventional timers), the user interface enables easy reprogramming is a user decides that they simply want to change the timing pattern. That is, rather than having to clear all of the data and re-enter the current time, date and a zip code, a key sequence could be entered followed by the pound key to change the timing pattern. For example, a user could enter a sequence of three # keys followed by the new timing pattern, followed by the # key. While the use of pre-stored timing patterns which can easily be selected using a timing pattern code, it may be the case that the user may realize that they do not like the pattern that they selected, and decide that they simply want to change the timing pattern that they selected. Alternatively, a user may decide that they want to periodically reprogram the timer. That is, although the use of pre-stored patterns eliminates the need for reprogramming, reprogramming the timer to implement another pre-stored timer is so easy that it is an option for a user of timer implementing the pre-stored timing pattern.

Turning now to FIG. **3**, a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention is shown. According to the embodiment of FIG. **3**, a display **302** could be implemented. While a display may not be necessary to implement the timer with pre-stored timing patterns, the display may be desirable to provide information regarding stored data, including a selected timing pattern for example. That is, even though a display is not necessary in view of the use of pre-stored timing patterns, a user may desire a display for aesthetic reasons, because they are simply used to having a display, or for what information it does provide. As shown in FIG. **3**, the display includes a time field **304** which displays the current time during normal operation, an AM/PM field **306**, an on/off field **308** indicating the state of a light or appliance which is attached to the timer. Finally, an information field **310** includes other information related to the operation of the timer. For example, the information field could include the current date and the timing pattern number. The timing field could include other information, such as DST code or whether a security code is used, as will be described in more detail below. Based upon the current time, date and security code information, a user could determine whether the timer is set with the correct data and should be operating correctly. As shown in FIG. **4** which shows the embodiment of FIG. **3** with the cover in the open position, the user interface could be implemented in with the user interface.

Turning now to FIG. **5**, a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention is shown. According to the embodiment of FIG. **5**, a 5-key user interface could be implemented to enter data necessary for implementing a timer using a pre-stored timing pattern. As will be described in more detail below in reference to FIG. **20**, the left and right keys on either side of a select key will allow a user to traverse through programming categories, while the up and down keys above and below the select key will enable a user to move through the available options in a given programming category. As will be further described below, the 5-key user interface will be enable a user to select a timing pattern code so that the timer can be implemented with a pre-stored timing pattern.

Turning now to FIG. **6**, a perspective view of the front panel of the in-wall light timer of FIG. **3** having pre-set buttons according to an embodiment of the present invention is shown. As shown in FIG. **6**, dedicated, pre-set actuators **602**, shown here as buttons **604** which enable the manual selection of a pre-stored timing pattern. Four pre-set buttons are shown in the embodiment of FIG. **6**, including a fixed button (applying a fixed on time and fixed off time when selected), an astronomic button enabling the operation of the timer based upon astronomic data, a DST button enabling the operation of the timer based upon a first timing pattern for a standard time period and a second timing pattern for a daylight savings time period, and a seasonal button for applying different timing patterns for each of the four seasons. Each of the buttons includes a selection indicator (such as an LED light for example) which would indicate when the button is selected. The button could be movable between a depressed, on position (where it is flush with the surface of the timer and the LED lit) and an off position. Alternatively, the selected button would have the LED lit, with all buttons having the same positioning. Only a single button can be selected at a time, where a selected button would be deactivated if another button is selected. The selection of timing patterns for the pre-set actuators **602** will be described in more detail below. While 4 buttons are shown, it should be understood that a greater number of buttons or fewer buttons could be implemented. Further, while examples of the functions of buttons are shown, it could be understood that other functions for the pre-set buttons could be implemented. For example, one button could be dedicated to each season. As will also be described in more detail below, a wireless option would enable the wireless programming of timing patterns for the pre-set buttons.

Turning now to FIG. **7**, a perspective view of the front panel of the in-wall light timer of FIG. **5** according to another embodiment of the present invention is shown. In addition to having pre-set buttons as shown in FIG. **6**, a connector **702** for receiving a portable memory device is provided for downloading data, such as new or different timing patterns or DST data, as will be described in more detail below. While the connector for receiving a portable memory is only shown in connection with FIG. **7**, it should be understood that such a connector could be implemented in any of the embodiments of FIGS. **1-6**.

While user interfaces are provided in the embodiment of FIGS. **6** and **7** for entering data in addition to the dedicated buttons for selecting a predetermined timing pattern, it should be understood that the embodiments of FIGS. **6** and **7** could be implemented without the user interface for entering data or a display, where the only actuators which would be required for selecting a timing pattern would be the dedicated buttons of FIGS. **6** and **7** for selecting pre-stored timing pattern or a timing pattern based upon data selected for the buttons and provided to the timer. That is, the timing patterns of the dedicated buttons could be assigned defined, pre-stored timing patterns, could be downloaded using a portable memory by way of the connector **702**, or could be programmed by a user, as will be described in more detail below in reference to FIGS. **46-49**. That is, embodiments of the timer could be implemented with the pre-set buttons **602**, and not having a keypad **204** or a 5-key interface **312**.

Turning now to FIG. **8**, a side view of the in-wall timer shows connectors enabling a connection of the timer to electrical wiring. The side view of the timer shows a connector panel **802** having coupling elements **804-808**, shown here as screws, for receiving wires of a junction box. Alternatively wires could extend from the timer and be connected to wires of the junction box.

Turning now to FIG. **9**, a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention is shown. Rather than a timer which is fixedly coupled to a junction box, the various circuits and methods can be implemented in a timer adapted to be used with a wall outlet and adapted to receive a plug of a light or some other appliance. As shown in FIG. **9**, the timer **902** comprises a receptacle **904** for receiving the prongs of a plug of a light or an appliance. The timer **902** also comprises prongs **906** to be inserted to an outlet to enable applying power to the light or appliance. The user interface **202**, shown opposite of the prongs **906**, can be implemented according to any of the user interfaces set forth above.

Turning now to FIG. **10**, a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to a first embodiment of the present invention is shown. As shown in FIG. **10**, a circuit for implementing a timer having pre-stored timing patterns comprises a control circuit **1002** adapted to access one or more of a plurality of pre-stored timing patterns. The control circuit **1002** may be a processor having a cache memory **1004** storing timing patterns and other data necessary to implement the timer. A memory **1006** may also be implemented to store timing patterns or other data necessary to implement the timer. The memory **1006** may be implemented as a non-volatile memory, enabling the memory to store the timing patterns and data without loss due to a power loss. A portable memory **1008**, having contacts **1010**, may be received by a connector **1012** (such as the connector **702** of FIG. **7** for example) and coupled to corresponding contacts. A transformer **1014** is coupled to receive an input voltage at an input **1016**, and provide a regulator voltage signal **1018** to various elements of the timers. A second input **1020** is coupled to a ground terminal enabling a ground signal which is coupled various elements of the timer. A backup energy supply **1022**, which could be a battery or a capacitor for example, could be implemented to ensure that data of a memory is not lost during a loss of power. The control circuit provides a control signal by way of signal line **1024** to a switch **1028** which receives a regulated voltage by way of a line **1026**. The switch **1026** controls the application of the regulated voltage to a voltage terminal **1030** which enables power to be applied to an appliance **1032**, such as a light as shown. The appliance has a first terminal **1032** for receiving the regulated voltage from the voltage terminal **1030** and a second terminal **1036** coupled to the ground potential. An input portion **1038**, which may be implement any of the user interface elements described in reference to FIGS. **1-7** is also shown.

Turning now to FIG. **11**, a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention is shown. As shown in FIG. **11** comprises a wireless communication circuit **1102** which is adapted to enable the wireless programming of certain data or information by way of a corresponding wireless communication circuit implemented in a computer device, such as a laptop computer, a tablet computer or a "smart phone." An example of a wireless communication circuit is shown by way of example in FIG. **12**.

Turning now to FIG. **12**, a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention is shown. In particular, the antenna **1104** receives wireless communication signals according to a predetermined wireless communication protocol. The data may be sent to the wireless transceiver **1102** by way of a computer having or in communication with a corresponding wireless transceiver **1102**. The received data is coupled to a combined mixer/voltage controlled oscillator **1206**, the output of which is coupled to an intermediate frequency (IF) circuit **1208**. Based upon outputs of the IF circuit and a phase locked loop (PLL) **1210**, a mixer **1212** generates the received data. An analog-to-digital converter (ADC) **1214** then generates digital data representing the timing characterization data.

The control circuit may also provide data to the data transceiver for transmission to the computer. Data to be transmitted from the data transceiver **1102** is coupled to a digital-to-analog converter (DAC) **1216**, the output of which is coupled to a modulator **1218** which is also coupled to a PLL **1220**. A power amplifier receives the output of the modulator to drive the antenna **1104** and transmit the data. It should be noted that the wireless communication network could be configured to implement any wireless protocol for communicating with the wireless communication circuit of the timer of FIG. **11**. According to one embodiment, the data transceiver could implement the IEEE Specification 802.11 wireless communication standard, the Bluetooth standard, an infrared protocol, or any other wireless data protocol. While the circuit of FIG. **12** is provided by way of example, other wireless data transceivers could be employed according to the present invention to implement the desired wireless communication standard.

Turning now to FIG. **13**, a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention is shown. The geographic regions enable applying certain data, such a timing pattern, which is suitable for a timer implemented in the geographic area. As shown in FIG. **13**, the geographic area of the continental US is divided into 12 regions identified by a longitudinal designation (shown here as the time zones) or latitudinal designation (shown here as 3 regions designated as north, central and south). According to the embodiment of FIG. **13**, the regions are designated by a two letter code including the first letter of the longitudinal code followed by the first letter of the latitudinal code, by way of example. While 12 regions are shown by way of example, it should be understood that a greater number or fewer number of regions could be designated. Further, while geographic regions, other designation of regions could be implemented, such as zip codes or telephone area codes.

Turning now to FIGS. **14** and **15**, diagrams data fields of data entered by a user according to embodiments of the present invention, including data as entered on a keypad as described in reference to FIG. **2**. According to the embodiment of FIG. **14**, a field **1402** stores the received "clear" code, shown here as three star keys, a time code **1404** (shown here as a 4 digit time entered in military format representing 2:30 PM), a date code **1406** (shown here as a 6 digit date in the DDMMYY format), a location code **1408** (shown here as a zip code), and a timing pattern code **1410** (which will be described in more detail below). While the location is shown as a zip code, other location codes representing larger or smaller geographical errors could be utilized. According to the embodiment of FIG. **15**, an optional daylight savings code

1502 indicating daylight savings time information, such as dates associated with a period for applying a daylight savings time pattern or dates for shifting the current time by 1 hour, as will be described in more detail below. While specific codes are shown in FIGS. **14** and **15**, it should be understood that additional fields could be implemented.

Turning now to FIG. **16**, a table shows timing pattern numbers and associated timing characterization data and categories according to an embodiment of the present invention. A significant benefit of the various embodiments of the timers and methods of implementing a timer is that on and off times for implementing a timer are easily selected without having to enter the on and off times. Rather, a timing pattern designated by a timing pattern code can be easily be selected by a user rather than having a user enter the on and off times for the timer. As will be described in more detail below, the timing patterns can be categorized according to a number of broad categories, such as fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, for example, to make it easier to select a desired timing pattern. The timing pattern codes can also be arranged such that similar timing patterns can have similar numbers, and can be arranged in a tree format such that numbers having the same most significant bit will have the same broad category. Timing patterns associated with timing pattern codes having the same second most significant bit may also have a common on or off time, for example.

Referring specifically to FIG. **16**, timing patterns are shown for fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, where the fixed timing patterns having timing pattern codes between 1 and 1xx, DST timing patterns having timing pattern codes between 2 and 2xx, seasonal timing patterns having timing pattern codes between 3 and 3xx, and astronomic timing patterns having timing pattern codes between 4 and 4xx. The fixed time year-round timing patterns as shown have an on time and an off time, where timing pattern codes associated with timing patterns having the same on time have the same first two digits. For example, timing patterns having an on time of 4:00 PM will have a timing pattern code starting with 11X, while timing patterns having an on time of 5:00 PM will have a timing pattern code starting with 12X. The first timing pattern code of any of the any of the groups (i.e. the timing pattern code could be the default timing pattern code for dedicated timing pattern selection buttons as will be described in more detail below.

The second and third timing pattern categories have different timing patterns for different times of the year. In particular, the DST category has two timing patterns, one for standard time and one for daylight savings times, where the different timing pattern codes represent various combinations of on and off times for both of the standard time and daylight savings time. Similarly, the seasonal category has different on and off times for each of the four seasons.

Finally, the astronomic category of timing patterns including timing patterns based upon known dusk and dawn times. While dusk and dawn times are helpful in setting on and off times for a timer because they are close to the times when it becomes dark and light, the use of the known dusk and dawn times often leads to the timer being on at times when a user may not want the timer on. For example, during winter, lights may come on before 4:00 PM, which may be much earlier than desired. Similarly, lights may be on later than desired at dawn. During summer, lights may be on later than desired, which may be after 7:30. Therefore a user may want to use an offset. As will be described in more detail below, a certain time period delay for tuning on the timer may be desired with on times and a certain time period for turning lights off early may be desired with off times. Further, a user may desire the use of astronomic dusk times (with or without an offset) and the use of a fixed timer for turning the lights off at some time after midnight, for example. It should be understood that astronomic dusk and dawn times could be used with timing patterns in the DST and seasonal categories, or could be limited to the astronomic categories for simplicity. It should alos be noted that while even hour times are shown, on and off times based upon half hours or quarter hours could be provided.

In order to implement astronomic times, it is necessary to consider both locations and the time of year. While it may be possible to store astronomic data any level of granularity of location and time, average astronomic dusk and dawn data could be stored based upon a particular region and a particular time period as will be described in reference to FIG. **18**. In order to store average astronomic dusk and dawn data, it is necessary to identify a location where the timer will be used, and assign that location to a reasonable number of regions for which astronomic timing data is stored. By way of example in FIG. **17**, the 12 regions designated in FIG. **13** could be associated with zipcodes. Accordingly, when a user enters a zip code, data associated with the region having the zip code would be used when implementing a selected timing pattern for the timer. By way of example, the data could be based upon a central location of the region, or an average of the different dusk and dawn times of the region. Alternatively, the average dusk and dawn times could be skewed toward more populated areas of the regions. Not only would average dusk and dawn times for the location be used based upon the zip code, but the correct time in the various time zones based upon the Greenwich Mean Time (GMT) would also be used. Alternatively, three digit telephone area codes could be used.

As shown in FIG. **18**, these average dusk and dawn times are not only based upon location, but also based upon time of year. While daily dusk and dawn times could be used, it would be more efficient to use average dusk and dawn times for given time periods, and particularly time periods associated with time periods for implementing timing patterns, as described in reference to FIGS. **51** and **52**. Accordingly, for each region, an average dusk time and average dawn time for different timer periods during which a particular on time or off time would be applied, shown by way of example in FIG. **8** to include a full year, portions of a year or individual days.

Additional data which could be used in implementing a timer is DST data and corresponding DST codes. In addition to dates at which times are moved back during the fall or moved back during the spring in areas having daylight savings times (where these dates have changed over time and may change in the future), dates for applying a timing pattern for a period having shorter daylight, called a daylight savings time period. While the daylight savings time period could correspond to the times for moving the timer forward and back, a user may like to select a period for applying a daylight savings time timing pattern during a period which is different than the period between moving the clock back and returning the clock to the standard time. Accordingly, a table could be stored which has different daylight savings time data including a DST time period for applying different timing patterns and dates for changing the clock. Each of a plurality of combinations is stored with a corresponding DST code in the table. When the DST code is entered during programming of the timer, on and off times associated with a selected timing pattern will be applied subject to dates and times associated with daylight savings time data associated with the DST code.

It should be noted each of the tables **16-19** are stored in a memory of the timer, such as memory **1006** or a cache memory of the timer of FIG. **10**. The data is preferably stored at the time of manufacture (or at some point before the timer is packaged) and provided to the end user with the timing patterns selectable by a timing pattern code already stored in the memory. Further, data in the tables could be updated using a portable memory device, such as a USB drive, by way of the connector **702**.

Turning now to FIG. **20**, a flow diagram shows the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. While the keypad of FIG. **2** provides an easy way of entering data necessary to implement a timer having pre-stored timing patterns, other user interfaces could be used which take advantage of the pre-stored timing patterns associated with corresponding timing pattern codes. For example, "navigation" keys which enable a user move through a menu can be implemented to enable a user to select a timing pattern code or any other data necessary for implementing a timer as set forth above. Unlike conventional timer user interfaces, the 5 key navigation user interface of FIG. **20** is not only intuitive, but overcomes many of the problems associated with conventional user interfaces by not only showing a current programming category and a current data value for the current programming category, but also previous and following programming categories and previous and following data values which could be selected for the current programming category. That is, as will be described in more detail in reference to FIGS. **21-43**, the arrangement of programming categories and corresponding data values will enable easy navigation through the user interface by indicating where a user is within the menu.

Referring specifically to FIG. **20**, the programming categories **2002** and corresponding data values **2003** could be selected by the 5 key user interface which includes a select key **2004** which could be used to select data associated with a given programming category. In summary, the select key **2004** will enable a user to enter the menu for programming (such as by depressing the key for a predetermined period (e.g. 2 seconds), the left key **2006** will allow moving left along the programming categories, and the right key **2008** will enable moving right along the programming categories. An up key **2010** will enable a user to move up within a column for a current programming category, while a down key **2012** will enable moving down within the current programming category. By way of example, when the display is in an operational mode and shows operational values (such as the operational values shown in FIGS. **3-5**), the first programming mode (i.e. the hour programming mode **2104**) will be shown on the display when the select key **2004** is selected. If the user desires to enter a certain time, the up and down keys can be used to move to a desired data value representing the desired hour, and have that data value selected by using the select key. When a data value is selected for a given programming category, the user interface preferably then automatically moves to the following programming category. A key pad sequence (such as the selection of the select key three times or merely holding the select key for a predetermined period of time (e.g. 2 seconds)) can then be entered at any time to leave the programming mode of the timer.

The programming categories include the following: the hour mode **2014** (having 24 data values from 12 AM to 11 PM), the minute mode **2016** (having 60 data values from 0 to 59 minutes), the month mode **2018** (having 12 data values from JAN to DEC), the day mode **2020** (having 31 data values from 1 to 31), the year mode **2022** (having 10 data values for each of the tens digit of the year from 0x to 9x), the year mode **2024** (having 10 data values from 0 to 9 for the one's digit), the region mode **2026** (having 12 data values for each of the regions shown in FIG. **13**), the timing pattern mode **2028** (having a predetermined number of timing pattern codes associated with a corresponding number of pre-stored timing patterns), the DST mode **2030** (having the number of data values associated with different DST data values, such as the data associated with the DST codes of FIG. **19**), the security mode **2032** (having the number of available security codes, such as 100 codes for a two bit security code or **1000** codes for a 3 bit security code), and optionally an "exit" programming option which will be described in more detail in reference to the programming example of FIGS. **21-43**. While a user can depress and hold the select key for a predetermined period of timer for example to leave the programming mode, the exit option can also be provided to enable a user to leave the programming mode. In either case, a new data that has been selected will be stored and used by the processor of the timer to implement a timing pattern.

FIGS. **21-43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**. While displays may be desirable for some users (because they want to see what data is being entered to program the timer), conventional timers having displays are not only difficult to navigate through a menu for programming the timer (and understand where the user is in the menu), but also are difficult to see the data which is entered in a certain field of a conventional timer because the display is so small. The displays of FIGS. **21-43** show the steps of programming a timer to enable operation of the timer according to a pre-stored timing pattern from the initial, un-programmed state of the timer of FIG. **21** to the final programmed state of the timer of FIG. **43**. As shown in FIG. **21**, various fields which provide information in the normal operating state are shown. The programming mode can be entered when the select key of the 5-key user interface is selected (or some other key sequence such as the select key being selected 3 times, or the select key being depressed for a predetermined period, such as two seconds).

One unique feature of the user interface described in FIGS. **21-43** is that a current selection option (either programming categories or data values) is not only shown, but a "previous" and "next" programming category and data value is also shown. In order to further make the timer easier to program and overcome a significant problem of conventional timers with displays which are difficult to read, the current programming category and data value is larger than the "previous" and "next" programming category and data value. Making the current programming category and data value larger makes it easier to read the programming category and data value while still making it easy to navigate the menu by providing previous and next values.

After a key or key sequence is entered on **5**-key user interface to enter the programming mode, an initial programming state is entered as shown in FIG. **22**. While the initial states for data values in FIGS. **23-42** are shown as the top values of the available data values for a programming mode, the initial states could be some other value, such as a value near the middle of the available data values, or a commonly selected data value. The sequence of FIGS. **21-42** are intended to show the programming of a timer having the following data: a current timer of 10:24 PM and a current data of Oct. 9, 2013, where the timer is operated in the North Central (NC) region having a timing pattern **13**, a DST code **903** and an optional security code **013**. As will be described in more detail below, a security code could be used if a user could reprogram the timer using a wireless connection to prevent a hacker from changing the operation of the timer (from outside of a building for example).

As shown in FIG. 22, the initial programming state includes the Hour programming mode, and a initial data value of 1 AM. A user could then use the up and down keys to select the desired time. As shown in FIG. 23, the user had moved down one data value to 2 AM, and then down to the desired data value of 10 PM as shown in FIG. 24. When the user reaches the desired data value, the user can select the value using the select key, in which case the display would then display the next programming category, which happens to be the minute programming category. Alternatively, rather than automatically changing, a user could be required to move to the next programming category by selecting the right arrow key. As shown in FIG. 25, the initial state of the minute programming mode has a "1" in the data value display portion. The up and down keys can then be used to move to the desired "24" minute data value as shown in FIG. 26, where the month programming category would then be displayed as shown in FIG. 27 in response to the selection of the data in the minute programming mode. After the desired month of October is reached in FIG. 29, the programming mode is move to the day programming mode as shown in FIG. 29, where the desired 24^{th} day is selected as shown in FIG. 30. As shown in each of the displays, a previous programming category is shown above a current programming category, and a next programming category is shown below the current programming category. Similarly, a previous data value of the current programming category is shown above the current data value, and a next data value is shown below the current data value. For example, in selecting the month as shown in FIG. 27, the previous programming category "minute" in the programming category side of the display is above the current programming category "month," while the next programming category "day" is shown below the current programming category. Similarly, in the data value side of the display, the month of December is above the current data value of January, while the month of February is below the current value. Providing categories and values above and below current categories, a user can more easily navigate through the menu. Also, by providing the current category/value in a larger size, it is easy to read the category/value.

Selecting a desired year can present more of a problem because of the number of available years (e.g. 100 data values from 2000-2099). While a single year selection mode can be implemented in the same way as selecting 1 of 31 days of a month as described above, the year programming mode can be divided into two operations, enabling the selection of a decade in one step and enabling the selection of a year in another step. As shown in FIG. 31, it should be noted that the initial state is shown with a year "200?", where the "zeros" decade is provided. The user can then move down one data value to the "tens" decade as shown in FIG. 32, which, when selected, will lead to the menu option as shown in FIG. 33 enabling the selection of the year for the tens decade. Therefore, the up and down keys are used to select 2013 as shown in FIG. 34.

Other data for implementing the timer can then be entered. In particular, the region in which the timer is implemented can be selected by going from an initial region option NE as shown in FIG. 35 to desired timing region option of NC as shown in FIG. 36. The desired timing pattern can then be selected, where an initial timing program 1 shown in FIG. 37 can be changed to the desired timing program 13, as shown in FIG. 38. The desired daylight savings time code can then be selected, where an initial daylight savings time code 900 shown in FIG. 39 can be changed to the desired daylight savings time code 903, as shown in FIG. 40. Finally, a desired security code can then be selected, where an initial security code of 000 shown in FIG. 41 can be changed to the desired security code of 013, as shown in FIG. 42. After all of the data is entered, and the exit option is selected, the display of the timer returns to the operating mode, where the display shows some or all of the data (other than a value of a security code which could also be shown) entered during programming. Further, a "key" or "lock" icon could be shown on the display to indicate that a security code has been programmed.

While it is assumed that no data was programmed initially, it should be noted that, if the timer is already programmed and just some data needs to be reprogrammed, the left and right keys can be used to move within the menu to reach a desired programming category to change the data for that category, at which time the select key can be used to select the data, leave the programming mode, and return to the display for the normal operational mode. By way of example, if a timer is already programmed and a user desires to change the timing pattern (by changing the selected timing pattern code), a user would enter the programming mode and use the left and right keys to move along the programming modes until the timing pattern programming mode is reached. The up and down the available data values until the desired timing pattern code is reached. The data value be selected by using select key, at which time the programming category would move to the next programming category. If no other data values need to be changed, a user could move along the programming categories to the "exit" option to return to normal operation or hold the select key for a predetermined period of time. Accordingly, if a timer is already programmed and a user desires to change the timing pattern for example, the user can easily change the timing pattern without having to reprogram anything else.

Turning now to FIG. 44, a memory shows fields and corresponding stored data associated with the programmed timer of FIG. 43. All of the data entered using the numeric keypad or 5-key user interface is stored in memory fields of a memory of the timer, such as memory 1006 for example, and is accessed by the timer to implement a selected timing pattern in operating the timer as described above.

Turning now to FIGS. 45-49, screens of a user interface enabling the wireless programming of a timer are shown according to an embodiment of the present invention. That is, based upon a current time and date, the timer will implement the timing pattern (associated with the selected timing pattern code) by using data of FIGS. 16-19. As shown in FIG. 45, a display 4502 of a wireless device, such as a laptop computer, a tablet computer or a cellular telephone having a touch screen or some other data entry element, shows a data entry screen enabling a user to enter the necessary data, including a timing pattern code associated with a desired timing pattern, for implementing the timer. The display also includes a data entry element 4504, shown here as a touch screen entry portion having an alphabetical entry portion 4506 (such as a "QWERTY" keypad) and a numeric entry portion (having touch screen keys from 0 to 9). Various fields are provided to enter the data stored in the memory of FIG. 44. For example, a field 4509 enables a user to enter a security code. The security code may be concealed as shown to avoid someone seeing the code. A time field 4510 enables someone to enter the time, shown here as a 4 digit military time. However, because a full QWERTY keypad is provided, the time could be entered as 10:24 PM for example. The date is entered in a date field 4512. Although shown in a 6 digit DDMMYY format, it could be spelled out using letters and numbers. The desired region, timing pattern and DST code could be entered in fields **4514**, **4516**, and **4518**, respectively. The user could then exit or opt to enter an advanced options mode.

According to one embodiment, the advanced options mode enables a user to select timing patterns to be implemented with the dedicated buttons for selecting timing patterns as shown in FIG. **6** or **7**, or enables entering on and off times to be applied when the timing pattern associated with the dedicated buttons are selected. That is, a screen could have a field for each dedicated button, where a user could enter the timing pattern code in the field which corresponds to the timing pattern which is desired for the field. As shown for example in FIG. **46** which relates to a timing program for a fixed button setting, on and off times which would be applied throughout the year could be entered in data fields, where on and off times for weekdays could be entered in fields **4602** and **4604** respectively, and on and off times for weekends could be entered in fields **4606** and **4608** respectively. "Back" and "Next" selection options enable the user to move through the advanced programming options to finish the programming or exit as desired.

As shown in FIG. **47**, on and off times associated with an astronomic mode of operation applied in response to the selection of the "Astro" button can be entered in fields **4702** and **4704**, where the entries enable the selection of an offset. As will be described in more detail below in reference to FIG. **50**, users may prefer to apply astronomic times with a delay in turning the lights on at dusk, and turning the lights off early at dawn. According to another embodiment, the astronomic timing program associated with a button could include an option of setting the off time to a fixed time. That is, while users may want the on time of the timer to follow the dusk time, they may want the lights to go off at a fixed times (such as 1:00 AM or 6:00 AM for example) rather than be tied to the dawn time.

A screen for programming on and off times for a DST button is shown in FIG. **48**. According to the embodiment of FIG. **48**, on and off times to be applied during a standard time period can be entered in fields **4802** and **4804**, while on and off times to be applied during a daylight savings times period can be entered in fields **4806** and **4808**. A similar arrangement is shown in FIG. **49**, where settings for 4 "seasonal" timing patterns can be applied rather than settings for two timing patterns as described in reference to FIG. **48**. In particular, on and off times to be applied during a spring time period can be entered in fields **4902** and **4904**, on and off times to be applied during a summer time period can be entered in fields **4906** and **4908**, on and off times to be applied during a fall time period can be entered in fields **4910** and **4912**, and on and off times to be applied during a standard time period can be entered in fields **4914** and **4916**.

While specific fields are provided for entering data for applying on and off times during the operation of a timer when a dedicated button is selected, it should be understood that other fields could be implemented with the given programming categories as shown, or other programming categories could be implemented. It should be noted that if no data is entered, default timing patterns would be implemented when a dedicated button is selected, where the default timing patterns could be based upon the 1-4 timing pattern codes associated with the four categories of timing patterns shown in FIG. **16**.

Charts provided in FIGS. **50-52** show dusk and dawn times throughout the year, average dusk and dawn times for periods, and the benefits of implementing certain on and off times during certain periods. Turning first to FIG. **50**, a chart shows dusk and dawn times over a year, and an average time shown by the dashed line. As should be apparent from FIG. **50**, considerable energy can be saved by setting on and off times at times other than the average dusk and dawn times. While the charts of FIGS. **51** and **52** provide timing patterns having better granularity and therefore provide a more desirable timing pattern, the chart of FIG. **50** provides perspective as to how much energy can be saved by implementing times other than astronomic dusk and dawn times. As is apparent from FIG. **50**, each light controlled by a timer will be off for at least 2 hours longer each day compared to astronomic times by setting the on time for a light at 1 hour after dusk and setting the off time 1 hour before the average dawn.

Turning now to FIG. **51**, a chart shows dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time. As can be seen in FIG. **51**, the average dusk and dawn times are very different for the two time periods, and the timer on and off settings with a one hour offset is very different. By establishing the two time periods to apply two different time settings, it can be seen that different on and off times are much closer to the dusk and dawn times, and therefore provide an overall more desirable timing pattern for the year, while still providing savings by having the timer on less. Additional energy reduction can be achieved by moving the off time of the DST period to a fixed time, such as 5:00 AM and still provide a desirable overall timing pattern. As is apparent from FIG. **51**, the time period for applying a "daylight savings time" timing pattern is different than the period between the "fall back" date for turning back the clock in the fall, and the "spring forward" date for returning the clock to normal time during the spring.

The embodiment of FIG. **52** shows 4 timing patterns associated with the 4 seasons. As can be seen, the average times for dusk and dawn during those periods are different, and selected times relate more closely to the average times, and therefore provide a better overall timing pattern. While DST and seasonal periods are shown, it should be understood that other periods could be defined, such as monthly periods. However, a greater number of periods may require additional memory for storing data and may make it more difficult to select a desirable timing pattern by a user. Accordingly, the number of periods selected (which may provide a better timing pattern) may be a tradeoff with additional memory requirements and reduced user-friendliness. One of the benefits of the various embodiments is that they are user friendly. Therefore, the number timing pattern options available to a user must be selected to ensure that the timer is still user friendly to operate while providing enough options to provide desirable timing patterns for a variety of different users.

Turning now to FIG. **53**, a flow chart shows a method of generating timing characterization data according to an embodiment of the present invention. A plurality of timing patterns are established at a step **5302**. A unique timing pattern code is assigned for each timing pattern of the plurality of timing patterns at a step **5304**. The timing patterns and corresponding timing pattern codes are stored in a memory of the timer at a step **5306**. Geographic regions where the timers will be used are also defined at a step **5308**. Time periods for which average dusk and dawn times may be used defined at a step **5310**. Average dusk and dawn timers associated with the time periods and geographic regions are stored in a memory of the timer at a step **5312**. DST data related to "spring forward" and "fall back" dates and desired dates for applying a DST timing pattern (if different than "spring forward" and "fall back") are stored, by region, in a memory of the timer at a step **5314**. It is then determined whether an input is received at a user interface of the timer at a step **5316**. Data associated with an operational field are stored in a memory of the timer at a step **5318**. It is then determined whether a time out been reached or a stored indication received at a step **5320**. The timer is operated based upon the data stored in the operational field at a step **5322**.

Turning now to FIG. **54**, a flow chart shows a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention. The timing pattern is cleared if necessary or desired by selecting a first predetermined keypad sequence at a step **5402**. The current time is entered followed by a key or keypad sequence to enter the data at a step **5404**. The current date is entered followed by the key or keypad sequence to enter the data at a step **5406**. A geographic region for the timer is entered followed by the key or keypad sequence to enter the data at a step **5408**. A timing pattern code is entered followed by the key or keypad sequence to enter the data at a step **5410**. A DST code is optionally entered followed by a key or keypad sequence to enter the data at a step **5412**. It is then determined whether the last data is entered or a time-out period expired at a step **5414**. All of the data entered is stored at a step **5416**. It is then determined whether the user desires to change the timing pattern code at a step **5418**. A second predetermined keypad sequence is entered to change the timing pattern code only at a step **5420**.

Turning now to FIG. **55**, a flow chart shows a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention. A select key is pressed to enter the programming mode at a step **5502**. It is then determined whether a left or right key is selected to move to a different programming category at a step **5504**. The display will show another programming category as it moves horizontally along a plurality of programming categories at a step **5506**. It is then determined whether an up or down key is selected to enable selecting an option associated with the current programming category at a step **5508**. The display will show another option of a programming category as it moves vertically along options of a current programming category at a step **5510**. It is then determined whether the programming mode ended at a step **5512**.

Turning now to FIG. **56**, a flow chart shows a method of selecting a stored timing pattern using **5** key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. A security code on the timer is optionally set to enable programming the timer using a wireless link at a step **5602**. It is then determined whether a wireless device for programming the timer within range of timer at a step **5604**. It is then determined whether the correct security code entered on the wireless device at a step **5606**. Data entered in fields on the wireless device are downloaded at a step **5608**. The data in the timer is stored at a step **5610**. The timer is operated based upon the stored data at a step **5610**.

It can therefore be appreciated that the new and novel timer and method of implementing a timer has been described. It will be appreciated by those skilled in the art that numerous alternatives and equivalents will be seen to exist which incorporate the disclosed invention. As a result, the invention is not to be limited by the foregoing embodiments, but only by the following claims.

I claim:

1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:
- an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;
- a control circuit coupled to the actuator;
- a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;
- a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and
- a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.

2. The programmable light timer of claim **1** wherein the first button is further programmable to have an off time, and the second button is further programmable to have an on time.

3. The programmable light timer of claim **1** wherein the on time for the first button is a pre-stored on time, and the off time for the second button is a pre-stored off time.

4. The programmable light timer of claim **3** further comprising a third button that is programmable, by way of the actuator, with a user programmable on time.

5. The programmable light timer of claim **1** wherein the on time for the first button is programmable using the actuator, and the off time for the first button is programmable using the actuator.

6. The programmable light timer of claim **1** further comprising a third button having a pre-stored timing pattern.

7. The programmable light timer of claim **1** further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.

8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:
- an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;
- a control circuit coupled to the actuator;
- a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;
- a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and
- a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

9. The programmable light timer of claim **8** further comprising a third button that is user programmable.

10. The programmable light timer of claim **9** wherein the third button is programmable with a user programmable on time.

11. The programmable light timer of claim **10** further comprising a fourth button that is user programmable.

12. The programmable light timer of claim **11** wherein the fourth button is programmable with a user programmable an off time.

13. The programmable light timer of claim **8** wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer.

14. The programmable light timer of claim **8** further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.

15. A method of implementing a timing pattern on a programmable light timer, the method comprising:
- enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer;
- displaying the time on a display of the programmable light timer;
- enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and
- enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

16. The method of claim **15** further comprising enabling the first button to be programmed to have an off time, and the second button to be programmed to have an on time.

17. The method of claim **15** wherein the on time for the first button is a pre-stored on time, and the off time for the second button is a pre-stored off time.

18. The method of claim **17** further comprising enabling a third button, provided on the user interface of the programmable light timer, to be programmed by way of an actuator on the user interface.

19. The method of claim **15** wherein the on time for the first button is user programmable, and wherein the off time for the first button is user programmable.

20. The method of claim **15** further comprising providing a switch enabling overriding the timing pattern implemented by the programmable light timer.

* * * * *

Exhibit B

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(54) **PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER**

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See application file for complete search history.

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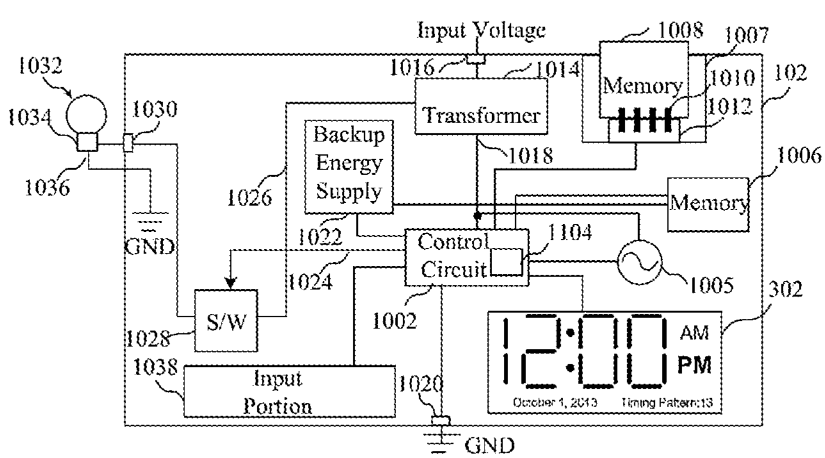
(57) **ABSTRACT**

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises a memory storing a plurality of timing patterns, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and a user interface enabling the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

20 Claims, 18 Drawing Sheets



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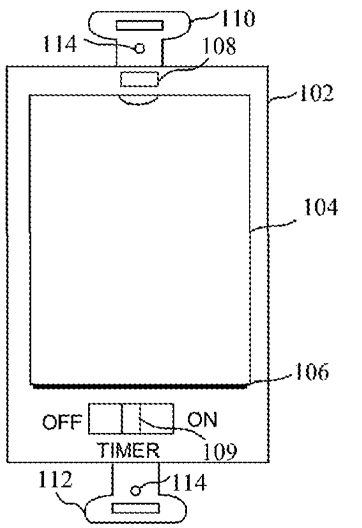


FIG. 1

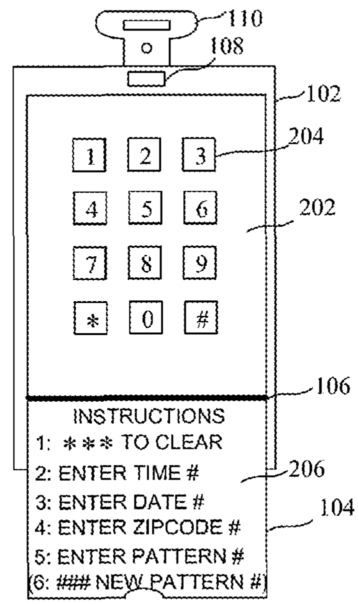


FIG. 2

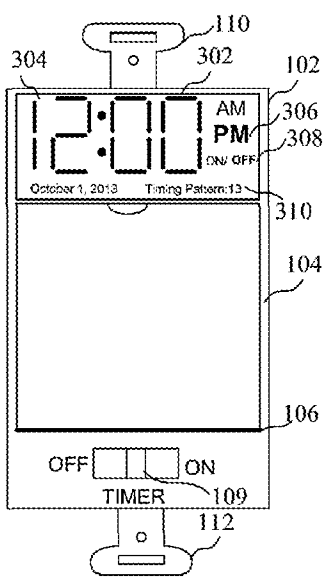


FIG. 3

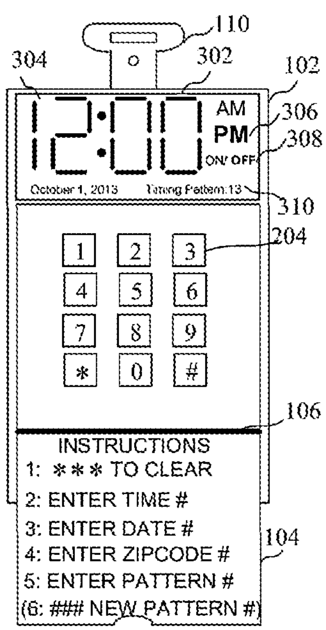


FIG. 4

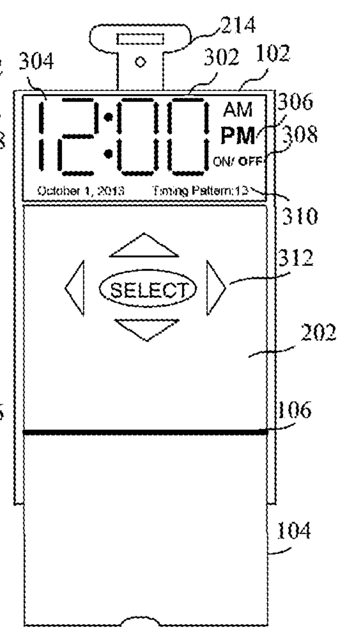


FIG. 5

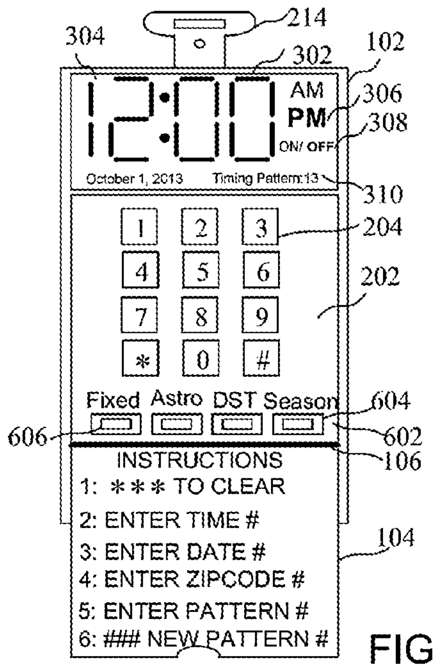


FIG. 6

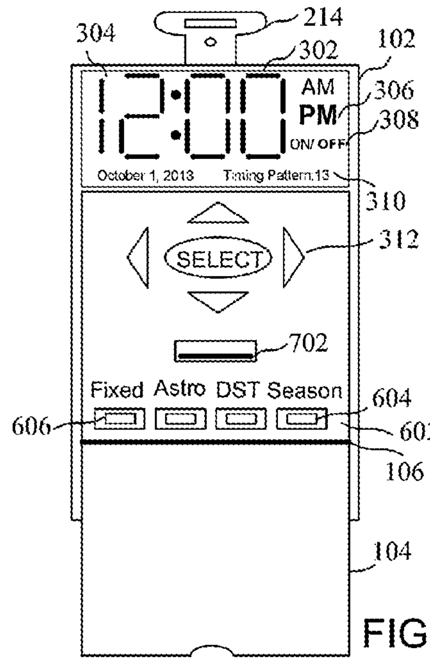


FIG. 7

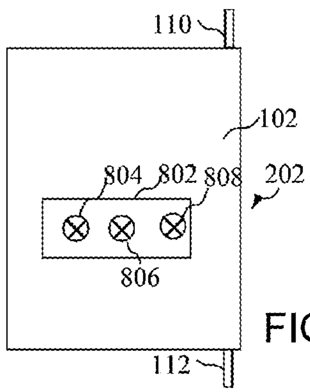


FIG. 8

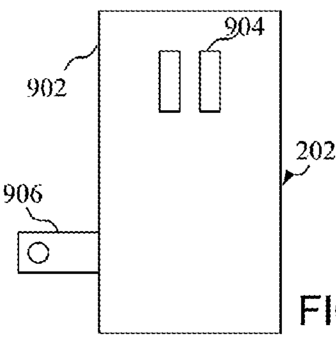


FIG. 9

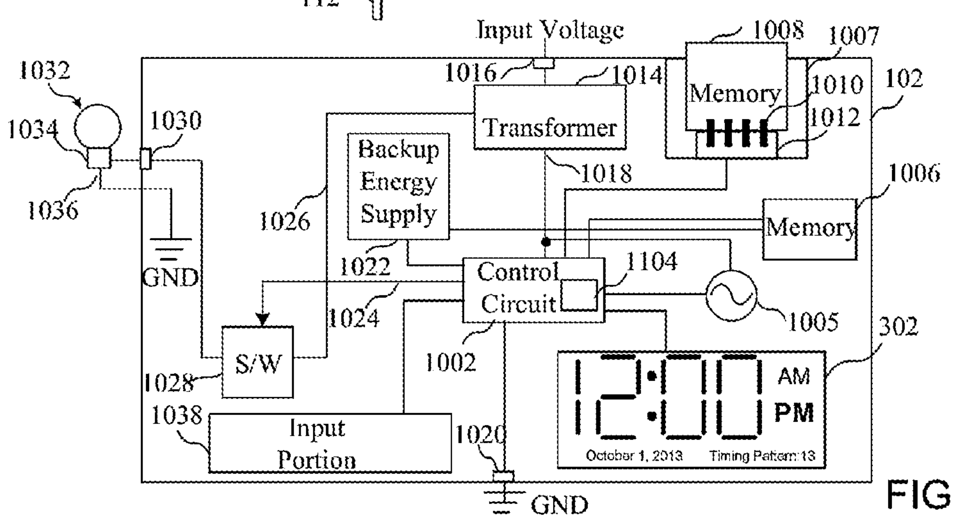


FIG. 10

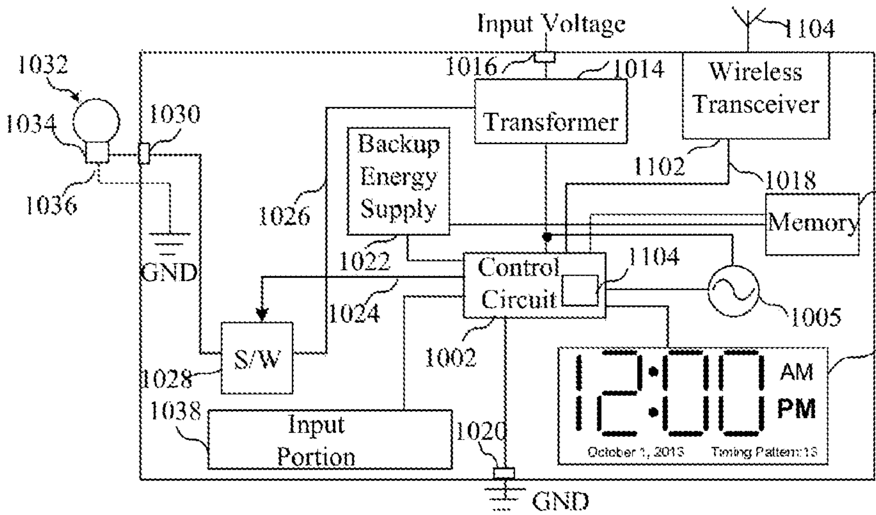


FIG. 11

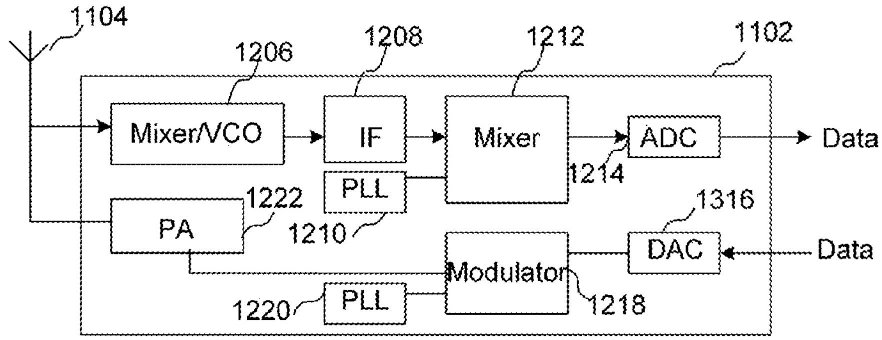


FIG. 12

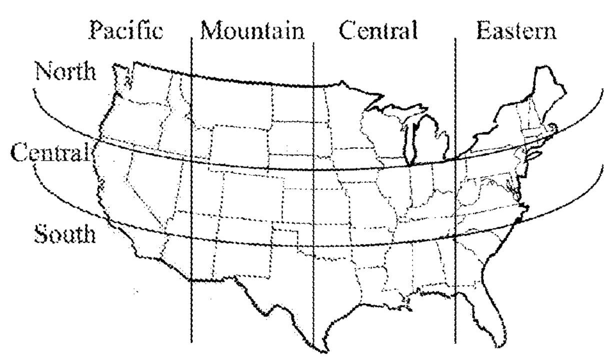


FIG. 13

1402	1404	1406	1408	1410
***	1430#	100513#	60189#	223#

FIG. 14

1402	1404	1406	1408	1410	1502
***	1430#	100513#	60189#	223#	902#

FIG. 15

Zipcode	Region
00501	NE
00502	NE
⋮	⋮
02169	NE
⋮	⋮
60068	NC
60189	NC
60189	NC
⋮	⋮
90210	CP
⋮	⋮
95124	SP

FIG. 17

DST Period Start Date	DST Period End Date	DST Fall Back Time Change	DST Spring Forward Time Change	DST Code
SEP 15	APR 1	Last Sun in OCT	First Sun in MAR	901
SEP 15	APR 1	Last Sun in OCT	2nd Sun in MAR	902
SEP 15	APR 1	First Sun in NOV	First Sun in MAR	903
SEP 15	APR 1	First Sun in Nov	2nd Sun in MAR	904
SEP 15	APR 15	Last Sun in OCT	First Sun in MAR	905
SEP 15	APR 15	Last Sun in OCT	2nd Sun in MAR	906
SEP 15	APR 15	First Sun in NOV	First Sun in MAR	907
SEP 15	APR 15	First Sun in Nov	2nd Sun in MAR	908
SEP 30	APR 1	Last Sun in OCT	First Sun in MAR	909
SEP 30	APR 1	Last Sun in OCT	2nd Sun in MAR	910
SEP 30	APR 1	First Sun in NOV	First Sun in MAR	911
SEP 30	APR 1	First Sun in Nov	2nd Sun in MAR	912
⋮	⋮	⋮	⋮	⋮
OCT 15	APR 1	Last Sun in OCT	First Sun in MAR	938
OCT 15	APR 1	Last Sun in OCT	2nd Sun in MAR	939
OCT 15	APR 1	First Sun in NOV	First Sun in MAR	940
OCT 15	APR 1	First Sun in Nov	2nd Sun in MAR	941

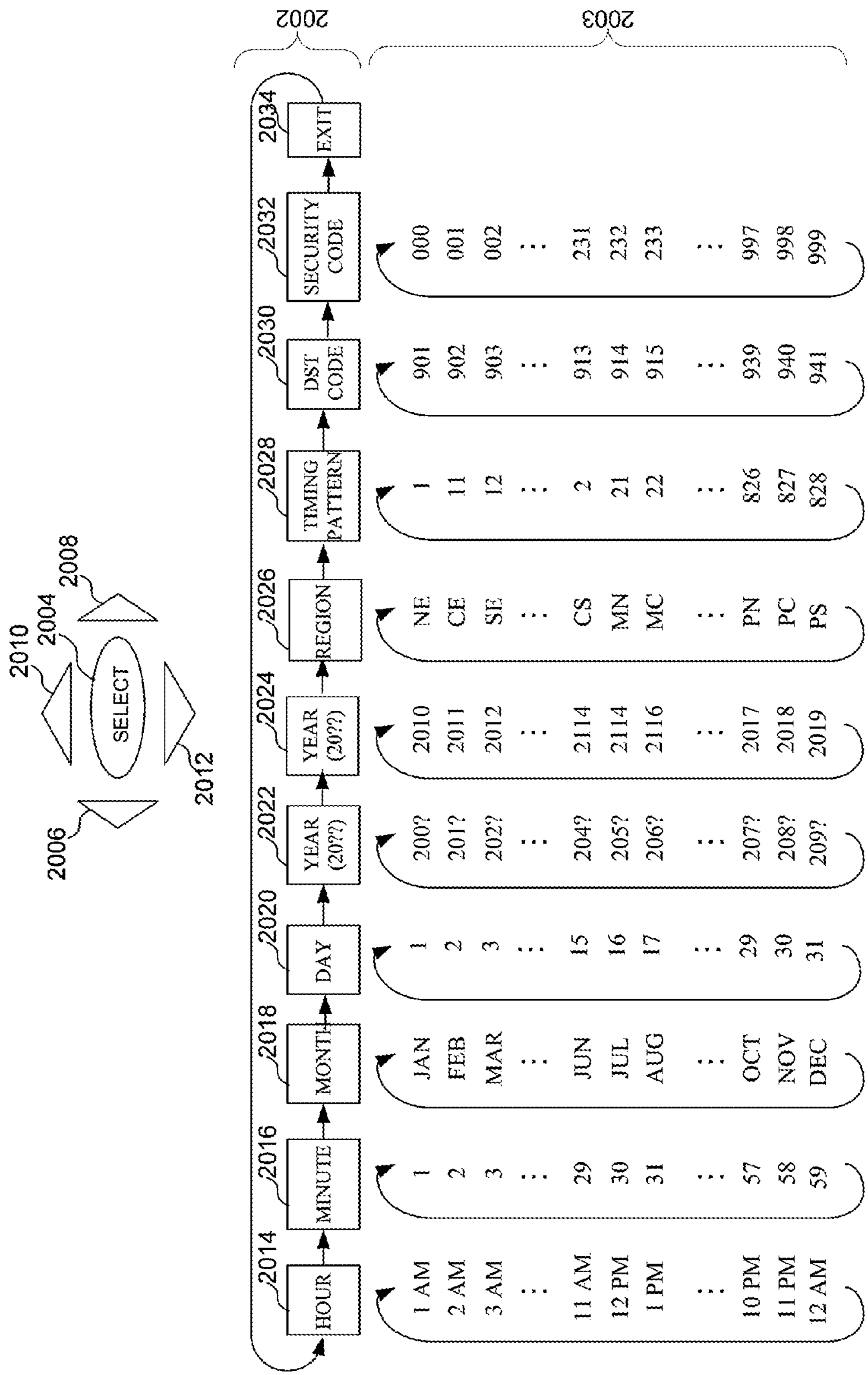
FIG. 19

	On Time		Off Time		Pattern
Fixed Time Year-round	4:00 PM		1:00 AM		1
	4:00 PM		5:00 AM		111
	4:00 PM		6:00 AM		112
	4:00 PM		7:00 AM		113
	⋮		⋮		⋮
	5:00 PM		1:00 AM		121
	5:00 PM		5:00 AM		122
	5:00 PM		5:00 AM		123
	⋮		⋮		⋮
	6:00 PM		7:00 AM		189
	Standard Time (Long Daylight Hrs)-On/Off		DST (Short Daylight Hours)-On/Off		
Standard/DST	4:00 PM/1:00 AM		7:00 PM/1:00 AM		2
	4:00 PM/5:00 AM		7:00 PM/5:00 AM		211
	4:00 PM/6:00 AM		7:00 PM/6:00 AM		212
	4:00 PM/7:00 AM		7:00 PM/7:00 AM		213
	⋮		⋮		⋮
	5:00 PM/1:00 AM		8:00 PM/5:00 AM		221
	5:00 PM/5:00 AM		8:00 PM/6:00 AM		222
	5:00 PM/6:00 AM		8:00 PM/7:00 AM		223
	⋮		⋮		⋮
	8:00 PM/7:00 AM		9:00 PM/7:00 AM		289
	Spring On/Off	Summer On/Off	Fall On/Off	Winter On/Off	
4 Seasons	4:00 PM/1:00 AM	7:00 PM/1:00 AM	5:00 PM/1:00 AM	4:00 PM/1:00 AM	3
	4:00 PM/5:00 AM	7:00 PM/5:00 AM	5:00 PM/5:00 AM	4:00 PM/5:00 AM	311
	4:00 PM/6:00 AM	7:00 PM/6:00 AM	5:00 PM/6:00 AM	4:00 PM/6:00 AM	312
	4:00 PM/7:00 AM	7:00 PM/7:00 AM	5:00 PM/7:00 AM	4:00 PM/7:00 AM	313
	⋮	⋮	⋮	⋮	⋮
	7:00 PM/5:00 AM	8:00 PM/5:00 AM	6:00 PM/5:00 AM	5:00 PM/5:00 AM	321
	7:00 PM/6:00 AM	8:00 PM/6:00 AM	6:00 PM/6:00 AM	5:00 PM/6:00 AM	322
	7:00 PM/7:00 AM	8:00 PM/7:00 AM	6:00 PM/7:00 AM	5:00 PM/7:00 AM	323
					⋮
	8:00 PM/7:00 AM	9:00 PM/7:00 AM	6:00 PM/7:00 AM	6:00 PM/7:00 AM	389
Astronomic	On Time/Offset		Off Time/Offset		
	Astronomic Dusk/+ 1hr		Astronomic Dawn/-1 hr		4
	Astronomic Dusk/none		Astronomic Dawn/None		411
	Astronomic Dusk/+0.5 hrs		5:00 AM/N/A		412
	Astronomic Dusk/+1.5 hrs		6:00 AM/N/A		413
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/None		421
	4:00 PM/None		Astronomic Dawn/-0.5 hrs		422
	4:00 PM/None		Astronomic Dawn/-1.0 hrs		423
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/-2.0 hrs		489

FIG. 16

Region	Time Period of Date	Average Dusk Time	Average Dawn Time
NE	Full Year	7:00 PM	6:00 AM
	Standard Time	7:30 PM	5:30 AM
	Daylight Savings Time	6:30 PM	7:00 AM
	Spring	7:30 PM	6:00 AM
	Summer	8:00 PM	5:30 AM
	Fall	6:30 PM	6:30 AM
	Winter	5:00 PM	7:00 AM
	January	5:30 PM	7:15 AM
	February	4:45 PM	7:10 AM
	⋮	⋮	⋮
	December	5:40 PM	6:55 AM
	January 1, 2013	5:30 PM	7:15 AM
	January 2, 2013	5:31 PM	7:14 AM
	January 3, 2013	5:33 PM	7:11 AM
	⋮	⋮	⋮
	December 31, 2013	5:39 PM	6:49 AM
NC	Full Year	6:55 PM	6:03 AM
	Standard Time	7:25 PM	5:33 AM
	Daylight Savings Time	6:25 PM	7:04 AM
	Spring	7:25 PM	6:03 AM
	Summer	7:55 PM	5:33 AM
	Fall	6:25 PM	6:33 AM
	Winter	4:55 PM	7:03 AM
	January	5:25 PM	7:17 AM
	February	4:40 PM	7:13 AM
	⋮	⋮	⋮
	December	5:35 PM	6:58 AM
	January 1, 2013	5:25 PM	7:18 AM
	January 2, 2013	5:26 PM	7:17 AM
	January 3, 2013	5:28 PM	7:14 AM
	⋮	⋮	⋮
	December 31, 2013	5:34 PM	6:54 AM
⋮	⋮	⋮	⋮
SP	Full Year	7:07 PM	6:05 AM
	Standard Time	7:36 PM	5:36 AM
	⋮	⋮	⋮
	January 3, 2013	5:39 PM	7:16 AM
	⋮	⋮	⋮
	December 31, 2013	5:44 PM	6:54 AM

FIG. 18



2002
2003
SELECT
2004
2006
2008
2010
2012
HOUR 2014
MINUTE 2016
MONTH 2018
DAY 2020
YEAR (20??) 2022
YEAR (20??) 2024
REGION 2026
TIMING PATTERN 2028
DST CODE 2030
SECURITY CODE 2032
EXIT 2034
1 AM 2 AM 3 AM … 11 AM 12 PM 1 PM … 10 PM 11 PM 12 AM
1 2 3 … 29 30 31 … 57 58 59
JAN FEB MAR … JUN JUL AUG … OCT NOV DEC
1 2 3 … 15 16 17 … 29 30 31
200? 201? 202? … 204? 205? 206? … 207? 208? 209?
2010 2011 2012 … 2114 2114 2116 … 2017 2018 2019
NE CE SE … CS MN MC … PN PC PS
1 11 12 … 2 21 22 … 826 827 828
901 902 903 … 913 914 915 … 939 940 941
000 001 002 … 231 232 233 … 997 998 999

FIG. 20

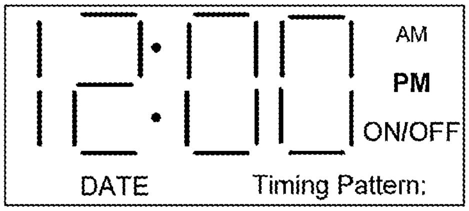


FIG. 21

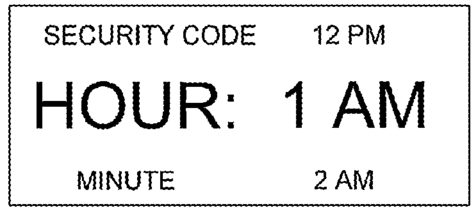


FIG. 22

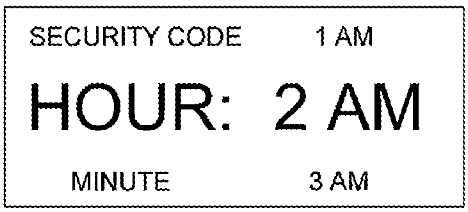


FIG. 23

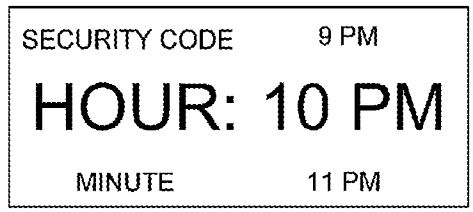


FIG. 24

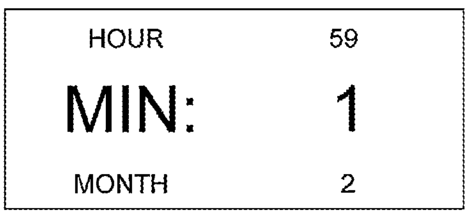


FIG. 25

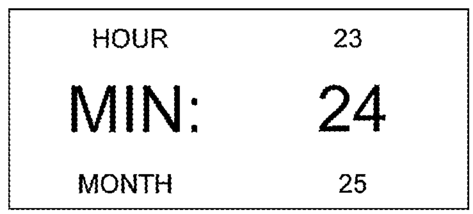


FIG. 26

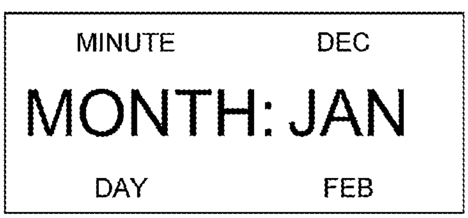


FIG. 27

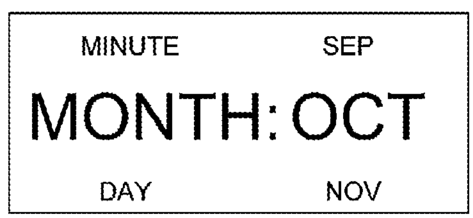


FIG. 28

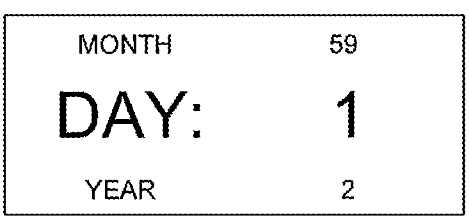


FIG. 29

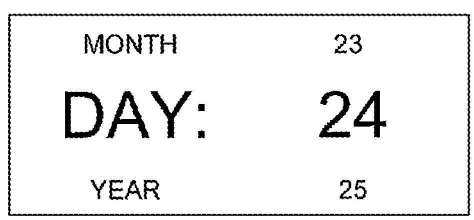


FIG. 30

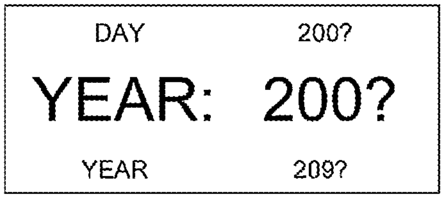


FIG. 31

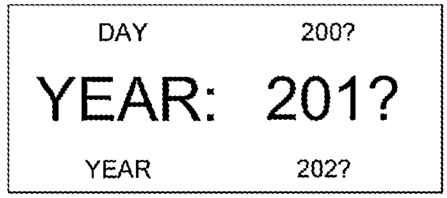


FIG. 32

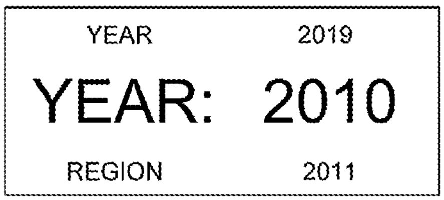


FIG. 33

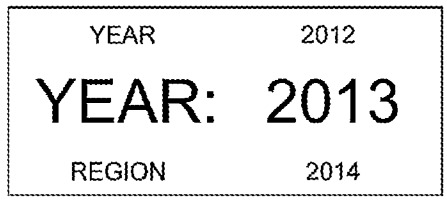


FIG. 34

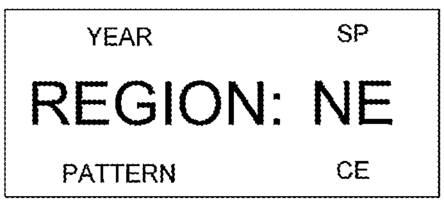


FIG. 35

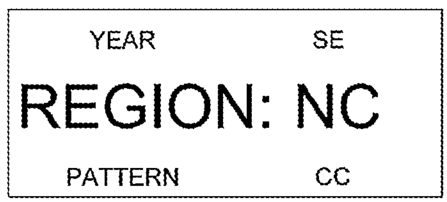


FIG. 36

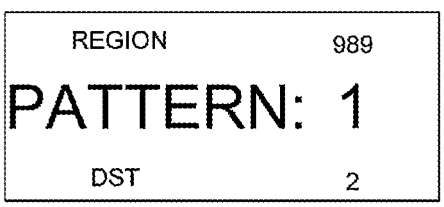


FIG. 37

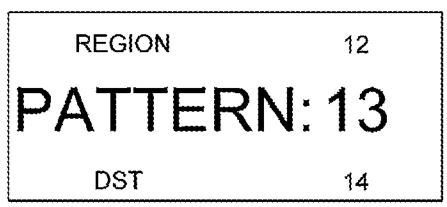


FIG. 38

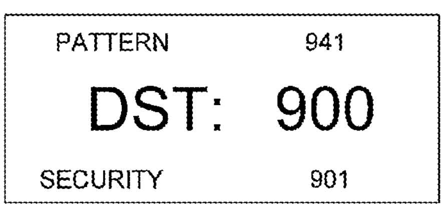


FIG. 39

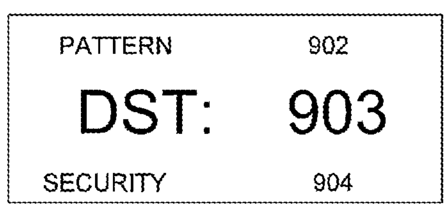


FIG. 40

FIG. 41

FIG. 42

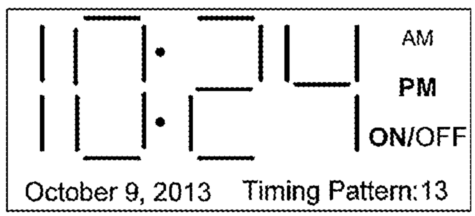


FIG. 43

FIELD	DATA
Time	10:24 PM
Date	October 24, 2013
Region	NC
Timing Pattern	13
DST Code	903
Security Code	013

FIG. 44

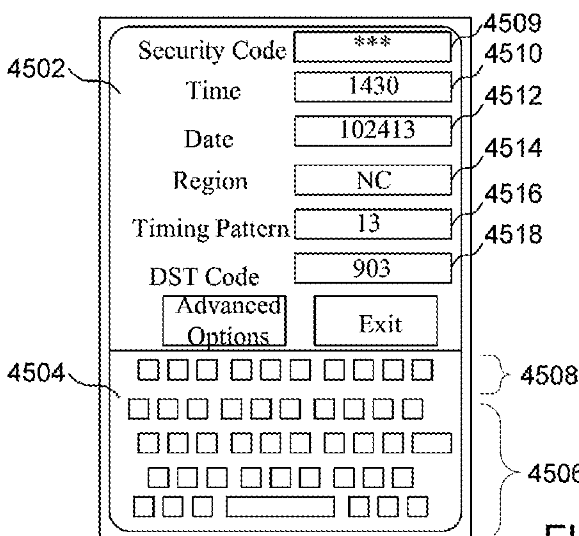


FIG. 45

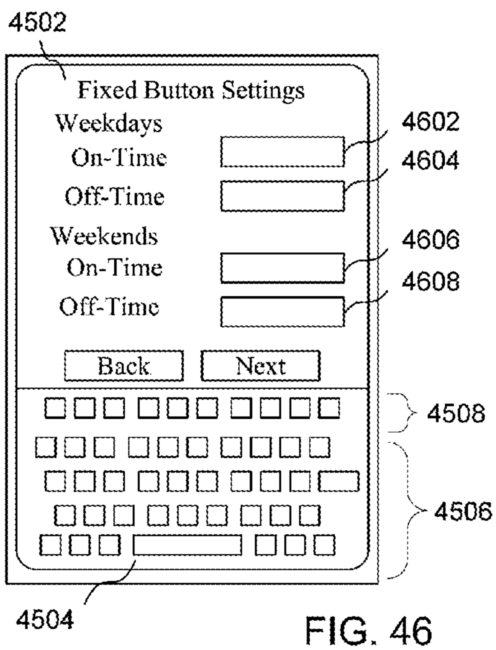


FIG. 46

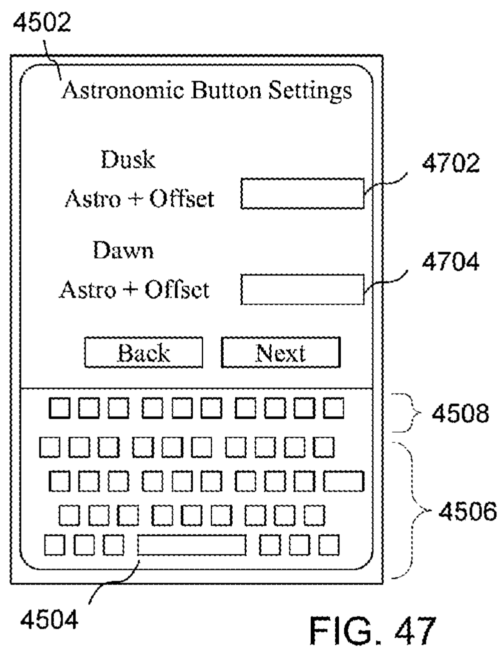


FIG. 47

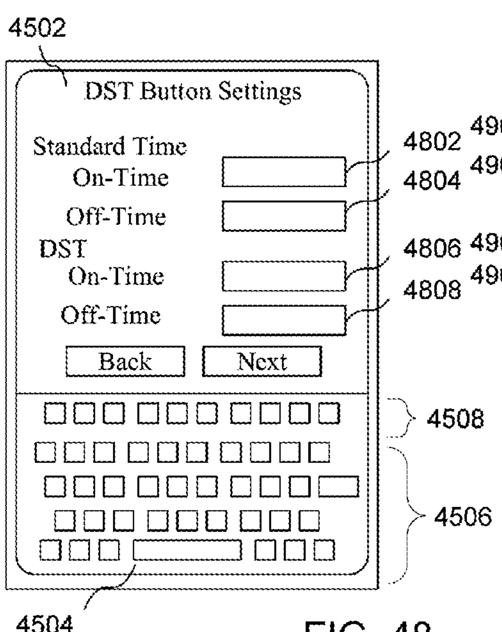


FIG. 48

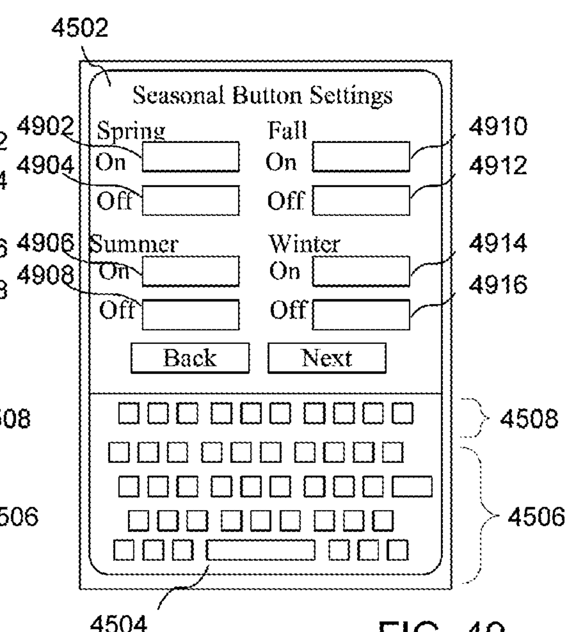


FIG. 49

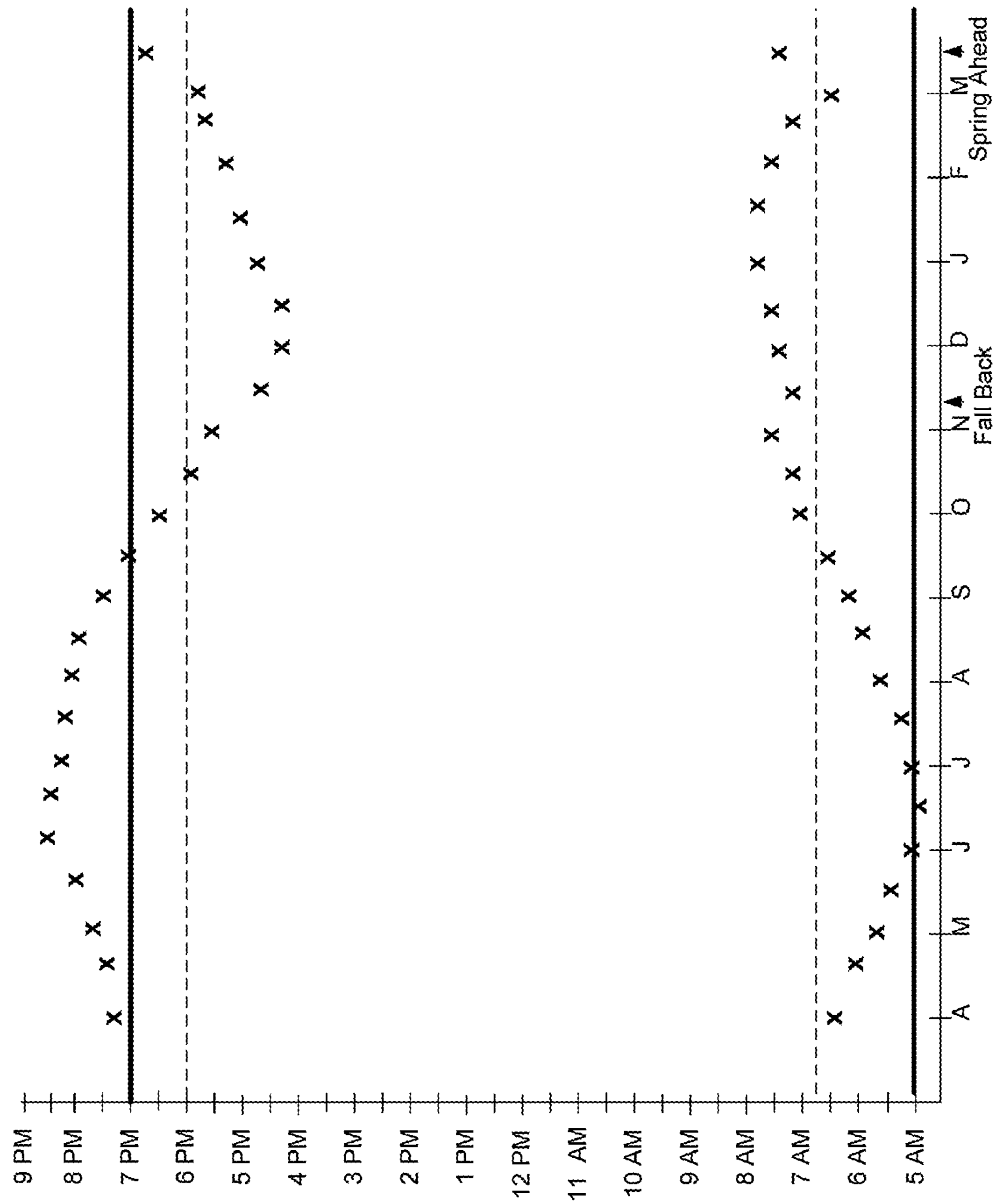

9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
A
M
J
J
A
S
O
N
Fall Back
D
J
F
M
Spring Ahead

FIG. 50

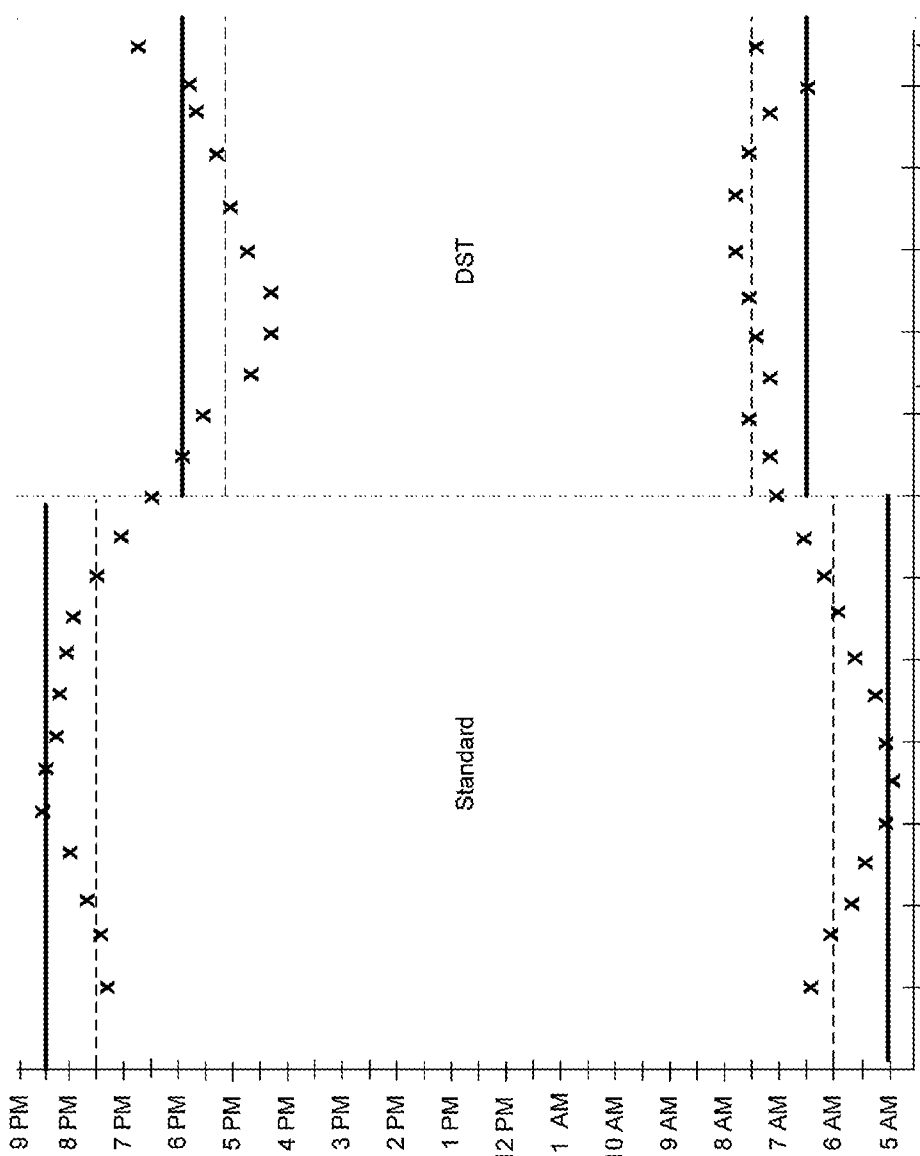
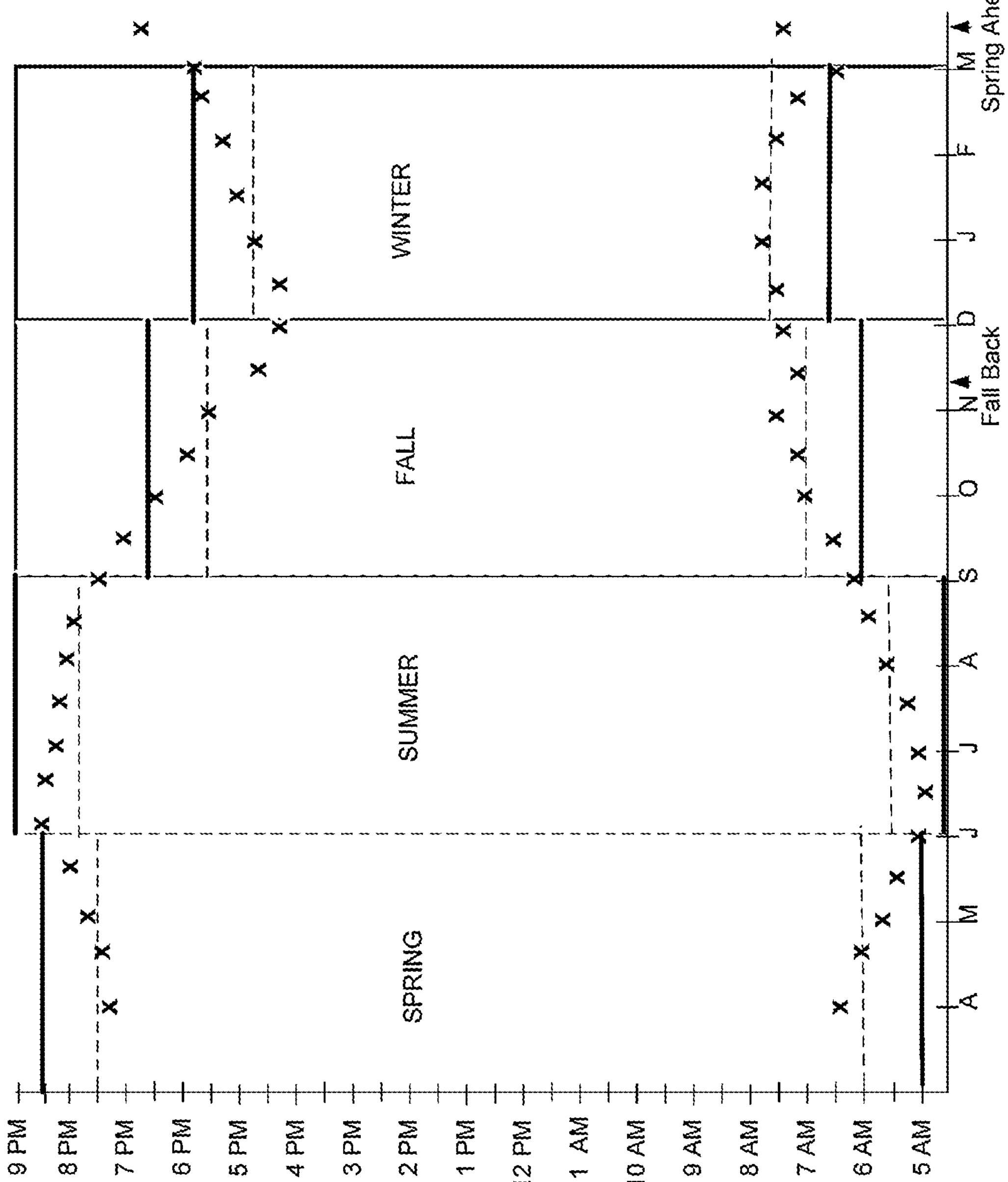

9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
Standard
DST
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 51


9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
SPRING
SUMMER
FALL
WINTER
A
M
J
J
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S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 52

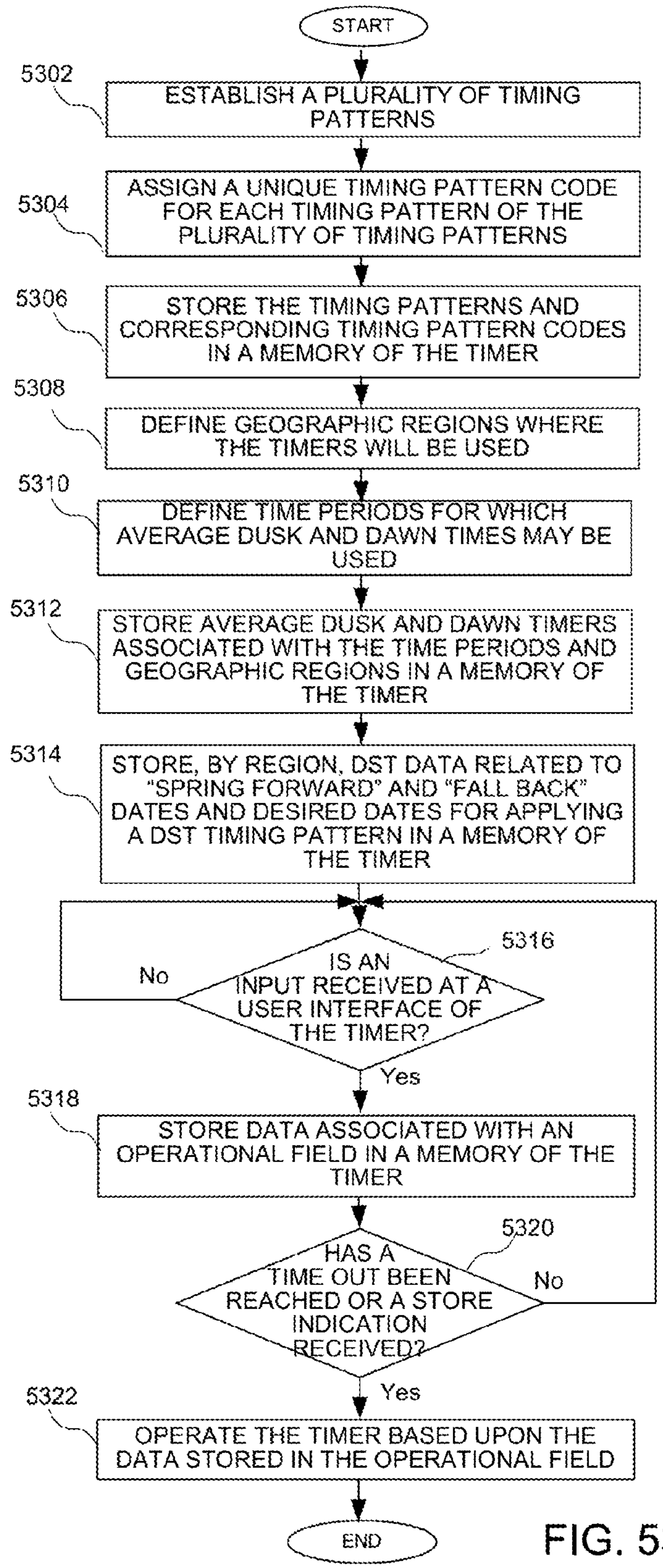

START
5302
ESTABLISH A PLURALITY OF TIMING PATTERNS
5304
ASSIGN A UNIQUE TIMING PATTERN CODE FOR EACH TIMING PATTERN OF THE PLURALITY OF TIMING PATTERNS
5306
STORE THE TIMING PATTERNS AND CORRESPONDING TIMING PATTERN CODES IN A MEMORY OF THE TIMER
5308
DEFINE GEOGRAPHIC REGIONS WHERE THE TIMERS WILL BE USED
5310
DEFINE TIME PERIODS FOR WHICH AVERAGE DUSK AND DAWN TIMES MAY BE USED
5312
STORE AVERAGE DUSK AND DAWN TIMERS ASSOCIATED WITH THE TIME PERIODS AND GEOGRAPHIC REGIONS IN A MEMORY OF THE TIMER
5314
STORE, BY REGION, DST DATA RELATED TO "SPRING FORWARD" AND "FALL BACK" DATES AND DESIRED DATES FOR APPLYING A DST TIMING PATTERN IN A MEMORY OF THE TIMER
5316
IS AN INPUT RECEIVED AT A USER INTERFACE OF THE TIMER?
No
Yes
5318
STORE DATA ASSOCIATED WITH AN OPERATIONAL FIELD IN A MEMORY OF THE TIMER
5320
HAS A TIME OUT BEEN REACHED OR A STORE INDICATION RECEIVED?
No
Yes
5322
OPERATE THE TIMER BASED UPON THE DATA STORED IN THE OPERATIONAL FIELD
END

FIG. 53

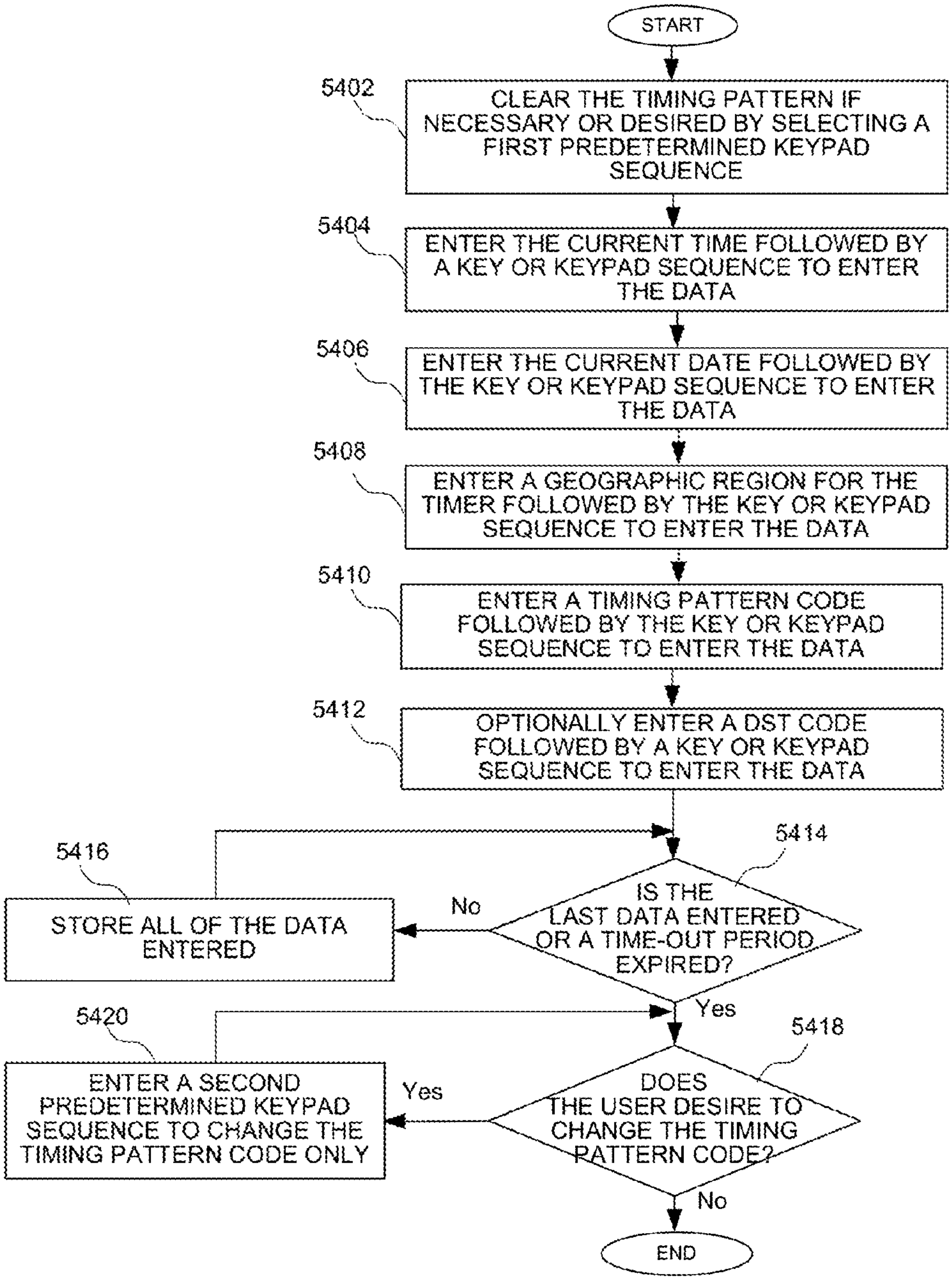

START
5402
CLEAR THE TIMING PATTERN IF NECESSARY OR DESIRED BY SELECTING A FIRST PREDETERMINED KEYPAD SEQUENCE
5404
ENTER THE CURRENT TIME FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5406
ENTER THE CURRENT DATE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5408
ENTER A GEOGRAPHIC REGION FOR THE TIMER FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5410
ENTER A TIMING PATTERN CODE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5412
OPTIONALLY ENTER A DST CODE FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5414
IS THE LAST DATA ENTERED OR A TIME-OUT PERIOD EXPIRED?
No
5416
STORE ALL OF THE DATA ENTERED
Yes
5418
DOES THE USER DESIRE TO CHANGE THE TIMING PATTERN CODE?
Yes
5420
ENTER A SECOND PREDETERMINED KEYPAD SEQUENCE TO CHANGE THE TIMING PATTERN CODE ONLY
No
END

FIG. 54

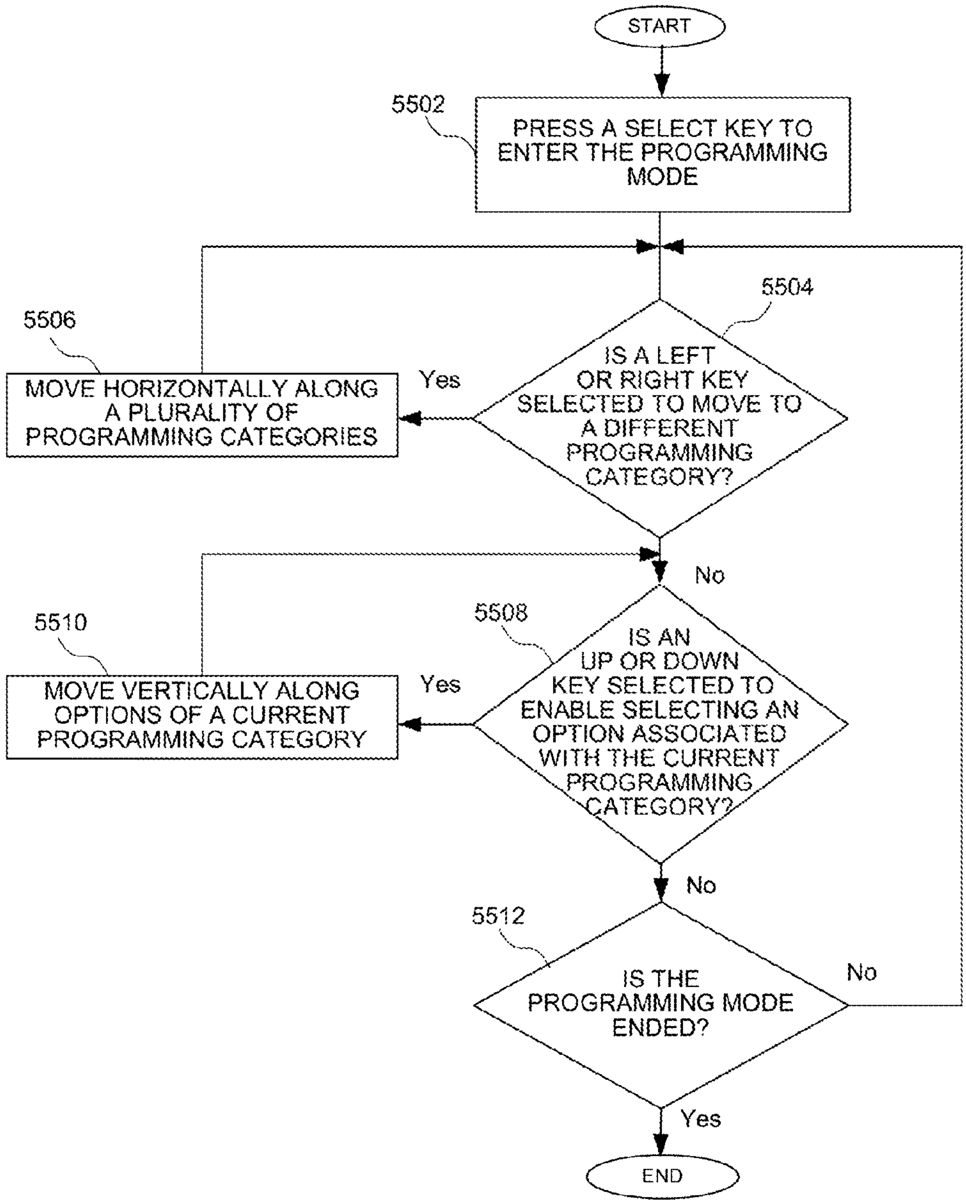
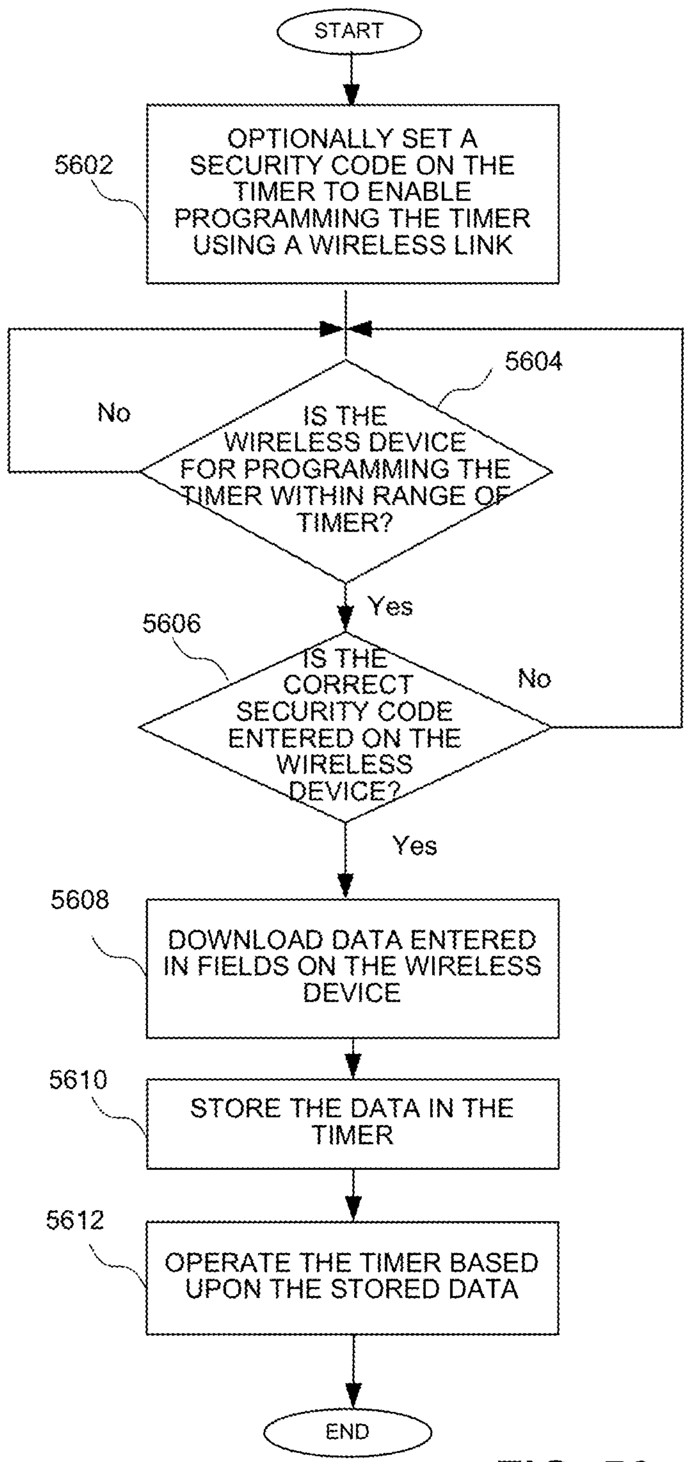

START
5502
PRESS A SELECT KEY TO ENTER THE PROGRAMMING MODE
5504
IS A LEFT OR RIGHT KEY SELECTED TO MOVE TO A DIFFERENT PROGRAMMING CATEGORY?
Yes
5506
MOVE HORIZONTALLY ALONG A PLURALITY OF PROGRAMMING CATEGORIES
No
5508
IS AN UP OR DOWN KEY SELECTED TO ENABLE SELECTING AN OPTION ASSOCIATED WITH THE CURRENT PROGRAMMING CATEGORY?
Yes
5510
MOVE VERTICALLY ALONG OPTIONS OF A CURRENT PROGRAMMING CATEGORY
No
5512
IS THE PROGRAMMING MODE ENDED?
No
Yes
END

FIG. 55



START
5602
OPTIONALLY SET A SECURITY CODE ON THE TIMER TO ENABLE PROGRAMMING THE TIMER USING A WIRELESS LINK
5604
No
IS THE WIRELESS DEVICE FOR PROGRAMMING THE TIMER WITHIN RANGE OF TIMER?
Yes
5606
IS THE CORRECT SECURITY CODE ENTERED ON THE WIRELESS DEVICE?
No
Yes
5608
DOWNLOAD DATA ENTERED IN FIELDS ON THE WIRELESS DEVICE
5610
STORE THE DATA IN THE TIMER
5612
OPERATE THE TIMER BASED UPON THE STORED DATA
END

FIG. 56

PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER

FIELD OF THE INVENTION

The present invention relates generally to lighting control products, and in particular, to a programmable light timer and a method of implementing a programmable light timer.

BACKGROUND OF THE INVENTION

Conventional timers for lights, such as timers for indoor lamps or outdoor lights for example, either provide little functionality, or are difficult to program. Because of the limited size of the conventional timers, the size of the screen and the size of the interface for programming the timer are both relatively small. This is particularly true of an in-wall timer, which must fit in an electrical box, commonly called a junction box. Not only does a user of the in-wall timer have to read a very small display, but the user has to advance through a menu shown on the small display using a very limited interface which is provided on the remaining portion of the timer. Entering data on such a user interface is particularly difficult because the in-wall timer is fixed and generally positioned well below eye level.

Further, conventional timers are often unreliable. For example, conventional mechanical timers often malfunction over time, leaving the user without the use of the timer for some period of time and requiring the user to incur the expense of replacing the timer. Moreover, advanced digital timers having electronic displays may be difficult to operate, providing a barrier to certain groups of people who would otherwise use a timer, but don't want to struggle through a complex interface on the small screen of the timer to properly set the timer. For example, not only is the display very small and difficult to read, but the user interface is difficult to navigate on such a small display. These groups of users are either left with no timing operation for their lights, or timers which do not provide the timing operation that they desire. Without an effective timer for a light for example, the light may be on significantly longer than necessary, not only wasting energy but in many cases increasing pollution as a result. As energy consumption world-wide continues to increase, it is important to reduce or minimize the consumption of energy in any way possible. The timer of the present invention provides significant benefits in reducing energy consumption.

SUMMARY OF THE INVENTION

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises a memory storing a plurality of timing patterns, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and a user interface enabling the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

Another programmable light timer for implementing a timing pattern comprises a memory storing a plurality of timing patterns, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and a numeric keypad enabling the entry of data and the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

A method of implementing a timing pattern in a programmable light timer is also disclosed. The method comprises storing a plurality of timing patterns in a memory, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and enabling the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention;

FIG. **2** is a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention;

FIG. **3** is a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention;

FIG. **4** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to an embodiment of the present invention;

FIG. **5** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention;

FIG. **6** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to an embodiment of the present invention;

FIG. **7** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to another embodiment of the present invention;

FIG. **8** is a side view of the in-wall timer enable a connection of the timer to electrical wiring;

FIG. **9** is a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention;

FIG. **10** is a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to an embodiment of the present invention;

FIG. **11** is a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention;

FIG. **12** is a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention;

FIG. **13** is a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention;

FIG. **14** is a diagram showing data fields of data entered by a user according to an embodiment of the present invention;

FIG. **15** is a diagram showing data fields of data entered by a user according to an alternate embodiment of the present invention;

FIG. **16** is table showing timing pattern codes and associated timing characterization data and categories according to an embodiment of the present invention;

FIG. **17** is a table showing the designation of regions associated with a number of geographical locations according to an embodiment of the present invention;

FIG. **18** is a table showing average dusk and dawn times for various regions and periods according to an embodiment of the present invention;

FIG. **19** is a table showing daylight savings time codes and associated daylight savings time characterization data according to an embodiment of the present invention;

FIG. **20** is a flow diagram showing the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention;

FIGS. **21-43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**;

FIG. **44** is a memory showing fields and stored data associated with the programmed timer of FIG. **43**;

FIGS. **45-49** show screens of a user interface enabling the wireless programming of a timer according to an embodiment of the present invention;

FIG. **50** is a chart showing dusk and dawn times over a year;

FIG. **51** is a chart showing dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time;

FIG. **52** is a chart showing dusk and dawn times over a year and which is divided into four periods including four seasons;

FIG. **53** is a flow chart showing a method of generating timing characterization data according to an embodiment of the present invention;

FIG. **54** is a flow chart showing a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention;

FIG. **55** is a flow chart showing a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention; and

FIG. **56** is a flow chart showing a method of selecting a stored timing pattern using 5 key user interface of FIGS. **5** and **7** according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The various embodiments set forth below overcome significant problems with conventional timers of having to use a small display, and navigating a menu on such a small display. Some embodiments eliminate the requirement of having a display by providing pre-programmed timing patterns which can be easily selected by entering a timing pattern code associated with a desired timing pattern. Other embodiments include a display, but benefit from an improved user interface which enables the easy selection of a timing pattern by selecting a desired timing pattern code. In addition to selecting the timing pattern code, the user interfaces for embodiments with or without a display enabling the easy programming of other data which must be entered to operate the timer. By storing the timing patterns which are associated with common or desirable on/off patterns which are likely to be used to operate the timer, a user does not need to enter on/off times for a light for various times during a day or week, or reprogram the timer in response to changes in dusk and dawn times during a calendar year.

Turning first to FIG. **1**, a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention is shown. The timer of FIG. **1** comprises a housing portion **102** having an optional cover **104** (coupled to the timer by way of a hinge **106**) which covers a user interface when in the closed position and enables programming the timer by way of the user interface in the open position. A feedback indicator **108**, such as a light and more particularly a light emitting diode (LED), could be implemented to show the status of the light or other appliance attached to the timer, for example. The feedback indicator could show green when a light attached to the timer is on, and could be or (or show red) when the light is off. An optional switch **109** which is movable between an on or off position, and a timer position for implementing the timer according to a selected timing pattern. While the cover is primarily cosmetic and may generally prevent unintentional changing of the timer, the timer cover is not necessary. Alternatively, the cover may be functional, such as functioning as an on/off override switch for the light or appliance attached to the timer in place of the switch **109**. For example, the state of the light may be toggled (i.e. changed from a current state, such as on, to the other state, such as off) in response to pressing the cover which would activate a switch to change the state of the light if the switch **110** is not included. Flanges **111** and **112**, each having a threaded portion for receiving a screw to attach the timer to a junction box. While the various embodiments are generally described in reference to a timer which is "hard wired" in a junction and may be used for a porch light for example, it should be understood that the user interfaces, circuits and methods set forth in more detail below could be implemented in a timer which is plugged into an outlet (commonly called an light or appliance timer), as will be described in more detail below in reference to FIG. **9**. Further, while some examples are provided in terms of residential-type in-wall timers which are installed in a conventional residential junction box, it should be understood that the user interfaces, circuits and methods could be implemented in commercial timers.

Turning now to FIG. **2**, a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention is shown. As shown in FIG. **2**, when the cover **104** is moved to an open position, a user interface comprising a keypad **204** is accessible on an inner surface **202**. Also shown on an inner surface **206** of the cover, instructions can be printed to enable the user to easily program the timer. As will be described in more detail below, a user can program the timer in 5 simple steps (and change a timing pattern using a single step). The keypad **204** of FIG. **2** comprises 0-9 keys and star (*) and pound (#) keys.

According to one embodiment, the timer could be programmed using 5 steps for entering data on the keypad as shown on the inside of the cover. The keypad is used to enter numeric data which is necessary to operate the timer. A key pattern sequence is entered to clear the timer if necessary. For example, the star key could be pressed 3 times to clear the memory. Data necessary to operate the timer according to a user's desired timing pattern is then entered. In particular, a current time is entered followed by the pound key. The pound key may be entered to indicate that all of the data for a given field. Alternatively, all of the data could be considered to be entered after a time-out period. The time is preferably entered as military time (e.g. 2:00 PM would be entered as 1400) to ensure that the correct AM or PM time is stored. Alternatively, a code at the end of the time could be entered to indicate AM or PM. A date is then entered, followed by the pound key. The date is preferably entered as a 6 digit code (e.g. in the DDMMYY format) to ensure that the date is properly interpreted. A location code (such as a zip code) could then be entered followed by the pound key. As will be described in more detail below, the location code can be associated with a region which is used to ensure that the correct daylight savings times and dawn and dusk times (or average values associated with dawn and dusk times) are used to operate the timer. The timing pattern is then entered followed by the pound key. The timing pattern will be used to operate the timer based upon the current time, date and location of the timer. Accordingly, after 5 simple steps, the timer is programmed to follow a timing pattern that meets the user's needs, and operates as it would if on/of times were entered on a user interface in a conventional manner to implement the timing pattern.

In addition to providing simple steps to program the timer, the user interface of FIG. **2** also enables easy reprogramming if desired by the user. Although the selection of a desired timing pattern will eliminate the need to reprogram the timer (such as at the start of spring or fall seasons as is generally required with conventional timers), the user interface enables easy reprogramming is a user decides that they simply want to change the timing pattern. That is, rather than having to clear all of the data and re-enter the current time, date and a zip code, a key sequence could be entered followed by the pound key to change the timing pattern. For example, a user could enter a sequence of three # keys followed by the new timing pattern, followed by the # key. While the use of pre-stored timing patterns which can easily be selected using a timing pattern code, it may be the case that the user may realize that they do not like the pattern that they selected, and decide that they simply want to change the timing pattern that they selected. Alternatively, a user may decide that they want to periodically reprogram the timer. That is, although the use of pre-stored patterns eliminates the need for reprogramming, reprogramming the timer to implement another pre-stored timer is so easy that it is an option for a user of timer implementing the pre-stored timing pattern.

Turning now to FIG. **3**, a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention is shown. According to the embodiment of FIG. **3**, a display **302** could be implemented. While a display may not be necessary to implement the timer with pre-stored timing patterns, the display may be desirable to provide information regarding stored data, including a selected timing pattern for example. That is, even though a display is not necessary in view of the use of pre-stored timing patterns, a user may desire a display for aesthetic reasons, because they are simply used to having a display, or for what information it does provide. As shown in FIG. **3**, the display includes a time field **304** which displays the current time during normal operation, an AM/PM field **306**, an on/off field **308** indicating the state of a light or appliance which is attached to the timer. Finally, an information field **310** includes other information related to the operation of the timer. For example, the information field could include the current date and the timing pattern number. The timing field could include other information, such as DST code or whether a security code is used, as will be described in more detail below. Based upon the current time, date and security code information, a user could determine whether the timer is set with the correct data and should be operating correctly. As shown in FIG. **4** which shows the embodiment of FIG. **3** with the cover in the open position, the user interface could be implemented in with the user interface.

Turning now to FIG. **5**, a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention is shown. According to the embodiment of FIG. **5**, a 5-key user interface could be implemented to enter data necessary for implementing a timer using a pre-stored timing pattern. As will be described in more detail below in reference to FIG. **20**, the left and right keys on either side of a select key will allow a user to traverse through programming categories, while the up and down keys above and below the select key will enable a user to move through the available options in a given programming category. As will be further described below, the 5-key user interface will be enable a user to select a timing pattern code so that the timer can be implemented with a pre-stored timing pattern.

Turning now to FIG. **6**, a perspective view of the front panel of the in-wall light timer of FIG. **3** having pre-set buttons according to an embodiment of the present invention is shown. As shown in FIG. **6**, dedicated, pre-set actuators **602**, shown here as buttons **604** which enable the manual selection of a pre-stored timing pattern. Four pre-set buttons are shown in the embodiment of FIG. **6**, including a fixed button (applying a fixed on time and fixed off time when selected), an astronomic button enabling the operation of the timer based upon astronomic data, a DST button enabling the operation of the timer based upon a first timing pattern for a standard time period and a second timing pattern for a daylight savings time period, and a seasonal button for applying different timing patterns for each of the four seasons. Each of the buttons includes a selection indicator (such as an LED light for example) which would indicate when the button is selected. The button could be movable between a depressed, on position (where it is flush with the surface of the timer and the LED lit) and an off position. Alternatively, the selected button would have the LED lit, with all buttons having the same positioning. Only a single button can be selected at a time, where a selected button would be deactivated if another button is selected. The selection of timing patterns for the pre-set actuators **602** will be described in more detail below. While 4 buttons are shown, it should be understood that a greater number of buttons or fewer buttons could be implemented. Further, while examples of the functions of buttons are shown, it could be understood that other functions for the pre-set buttons could be implemented. For example, one button could be dedicated to each season. As will also be described in more detail below, a wireless option would enable the wireless programming of timing patterns for the pre-set buttons.

Turning now to FIG. **7**, a perspective view of the front panel of the in-wall light timer of FIG. **5** according to another embodiment of the present invention is shown. In addition to having pre-set buttons as shown in FIG. **6**, a connector **702** for receiving a portable memory device is provided for downloading data, such as new or different timing patterns or DST data, as will be described in more detail below. While the connector for receiving a portable memory is only shown in connection with FIG. **7**, it should be understood that such a connector could be implemented in any of the embodiments of FIGS. **1-6**.

While user interfaces are provided in the embodiment of FIGS. **6** and **7** for entering data in addition to the dedicated buttons for selecting a predetermined timing pattern, it should be understood that the embodiments of FIGS. **6** and **7** could be implemented without the user interface for entering data or a display, where the only actuators which would be required for selecting a timing pattern would be the dedicated buttons of FIGS. **6** and **7** for selecting pre-stored timing pattern or a timing pattern based upon data selected for the buttons and provided to the timer. That is, the timing patterns of the dedicated buttons could be assigned defined, pre-stored timing patterns, could be downloaded using a portable memory by way of the connector **702**, or could be programmed by a user, as will be described in more detail below in reference to FIGS. **46-49**. That is, embodiments of the timer could be implemented with the pre-set buttons **602**, and not having a keypad **204** or a 5-key interface **312**.

Turning now to FIG. **8**, a side view of the in-wall timer shows connectors enabling a connection of the timer to electrical wiring. The side view of the timer shows a connector panel **802** having coupling elements **804-808**, shown here as screws, for receiving wires of a junction box. Alternatively wires could extend from the timer and be connected to wires of the junction box.

Turning now to FIG. **9**, a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention is shown. Rather than a timer which is fixedly coupled to a junction box, the various circuits and methods can be implemented in a timer adapted to be used with a wall outlet and adapted to receive a plug of a light or some other appliance. As shown in FIG. **9**, the timer **902** comprises a receptacle **904** for receiving the prongs of a plug of a light or an appliance. The timer **902** also comprises prongs **906** to be inserted to an outlet to enable applying power to the light or appliance. The user interface **202**, shown opposite of the prongs **906**, can be implemented according to any of the user interfaces set forth above.

Turning now to FIG. **10**, a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to a first embodiment of the present invention is shown. As shown in FIG. **10**, a circuit for implementing a timer having pre-stored timing patterns comprises a control circuit **1002** adapted to access one or more of a plurality of pre-stored timing patterns. The control circuit **1002** may be a processor having a cache memory **1004** storing timing patterns and other data necessary to implement the timer. A memory **1006** may also be implemented to store timing patterns or other data necessary to implement the timer. The memory **1006** may be implemented as a non-volatile memory, enabling the memory to store the timing patterns and data without loss due to a power loss. A portable memory **1008**, having contacts **1010**, may be received by a connector **1012** (such as the connector **702** of FIG. **7** for example) and coupled to corresponding contacts. A transformer **1014** is coupled to receive an input voltage at an input **1016**, and provide a regulator voltage signal **1018** to various elements of the timers. A second input **1020** is coupled to a ground terminal enabling a ground signal which is coupled various elements of the timer. A backup energy supply **1022**, which could be a battery or a capacitor for example, could be implemented to ensure that data of a memory is not lost during a loss of power. The control circuit provides a control signal by way of signal line **1024** to a switch **1028** which receives a regulated voltage by way of a line **1026**. The switch **1026** controls the application of the regulated voltage to a voltage terminal **1030** which enables power to be applied to an appliance **1032**, such as a light as shown. The appliance has a first terminal **1032** for receiving the regulated voltage from the voltage terminal **1030** and a second terminal **1036** coupled to the ground potential. An input portion **1038**, which may be implement any of the user interface elements described in reference to FIGS. **1-7** is also shown.

Turning now to FIG. **11**, a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention is shown. As shown in FIG. **11** comprises a wireless communication circuit **1102** which is adapted to enable the wireless programming of certain data or information by way of a corresponding wireless communication circuit implemented in a computer device, such as a laptop computer, a tablet computer or a "smart phone." An example of a wireless communication circuit is shown by way of example in FIG. **12**.

Turning now to FIG. **12**, a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention is shown. In particular, the antenna **1104** receives wireless communication signals according to a predetermined wireless communication protocol. The data may be sent to the wireless transceiver **1102** by way of a computer having or in communication with a corresponding wireless transceiver **1102**. The received data is coupled to a combined mixer/voltage controlled oscillator **1206**, the output of which is coupled to an intermediate frequency (IF) circuit **1208**.

Based upon outputs of the IF circuit and a phase locked loop (PLL) **1210**, a mixer **1212** generates the received data. An analog-to-digital converter (ADC) **1214** then generates digital data representing the timing characterization data.

The control circuit may also provide data to the data transceiver for transmission to the computer. Data to be transmitted from the data transceiver **1102** is coupled to a digital-to-analog converter (DAC) **1216**, the output of which is coupled to a modulator **1218** which is also coupled to a PLL1220. A power amplifier receives the output of the modulator to drive the antenna **1104** and transmit the data. It should be noted that the wireless communication network could be configured to implement any wireless protocol for communicating with the wireless communication circuit of the timer of FIG. **11**. According to one embodiment, the data transceiver could implement the IEEE Specification 802.11 wireless communication standard, the Bluetooth standard, an infrared protocol, or any other wireless data protocol. While the circuit of FIG. **12** is provided by way of example, other wireless data transceivers could be employed according to the present invention to implement the desired wireless communication standard.

Turning now to FIG. **13**, a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention is shown. The geographic regions enable applying certain data, such a timing pattern, which is suitable for a timer implemented in the geographic area. As shown in FIG. **13**, the geographic area of the continental US is divided into 12 regions identified by a longitudinal designation (shown here as the time zones) or latitudinal designation (shown here as 3 regions designated as north, central and south). According to the embodiment of FIG. **12**, the regions are designated by a two letter code including the first letter of the longitudinal code followed by the first letter of the latitudinal code, by way of example. While 12 regions are shown by way of example, it should be understood that a greater number or fewer number of regions could be designated. Further, while geographic regions, other designation of regions could be implemented, such as zip codes or telephone area codes.

Turning now to FIGS. **14** and **15**, diagrams data fields of data entered by a user according to embodiments of the present invention, including data as entered on a keypad as described in reference to FIG. **2**. According to the embodiment of FIG. **14**, a field **1402** stores the received "clear" code, shown here as three star keys, a time code **1404** (shown here as a 4 digit time entered in military format representing 2:30 PM), a date code **1406** (shown here as a 6 digit date in the DDMMYY format), a location code **1408** (shown here as a zip code), and a timing pattern code **1410** (which will be described in more detail below). While the location is shown as a zip code, other location codes representing larger or smaller geographical errors could be utilized. According to the embodiment of FIG. **15**, an optional daylight savings code **1502** indicating daylight savings time information, such as dates associated with a period for applying a daylight savings time pattern or dates for shifting the current time by 1 hour, as will be described in more detail below. While specific codes are shown in FIGS. **14** and **15**, it should be understood that additional fields could be implemented.

Turning now to FIG. **16**, a table shows timing pattern numbers and associated timing characterization data and categories according to an embodiment of the present invention. A significant benefit of the various embodiments of the timers and methods of implementing a timer is that on and off times for implementing a timer are easily selected without having to enter the on and off times. Rather, a timing pattern designated by a timing pattern code can be easily be selected by a user rather than having a user enter the on and off times for the timer. As will be described in more detail below, the timing patterns can be categorized according to a number of broad categories, such as fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, for example, to make it easier to select a desired timing pattern. The timing pattern codes can also be arranged such that similar timing patterns can have similar numbers, and can be arranged in a tree format such that numbers having the same most significant bit will have the same broad category. Timing patterns associated with timing pattern codes having the same second most significant bit may also have a common on or off time, for example.

Referring specifically to FIG. **16**, timing patterns are shown for fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, where the fixed timing patterns having timing pattern codes between 1 and 1xx, DST timing patterns having timing pattern codes between 2 and 2xx, seasonal timing patterns having timing pattern codes between 3 and 3xx, and astronomic timing patterns having timing pattern codes between 4 and 4xx. The fixed time year-round timing patterns as shown have an on time and an off time, where timing pattern codes associated with timing patterns having the same on time have the same first two digits. For example, timing patterns having an on time of 4:00 PM will have a timing pattern code starting with 11X, while timing patterns having an on time of 5:00 PM will have a timing pattern code starting with 12X. The first timing pattern code of any of the any of the groups (i.e. the timing pattern code could be the default timing pattern code for dedicated timing pattern selection buttons as will be described in more detail below.

The second and third timing pattern categories have different timing patterns for different times of the year. In particular, the DST category has two timing patterns, one for standard time and one for daylight savings times, where the different timing pattern codes represent various combinations of on and off times for both of the standard time and daylight savings time. Similarly, the seasonal category has different on and off times for each of the four seasons.

Finally, the astronomic category of timing patterns including timing patterns based upon known dusk and dawn times. While dusk and dawn times are helpful in setting on and off times for a timer because they are close to the times when it becomes dark and light, the use of the known dusk and dawn times often leads to the timer being on at times when a user may not want the timer on. For example, during winter, lights may come on before 4:00 PM, which may be much earlier than desired. Similarly, lights may be on later than desired at dawn. During summer, lights may be on later than desired, which may be after 7:30. Therefore a user may want to use an offset. As will be described in more detail below, a certain time period delay for tuning on the timer may be desired with on times and a certain time period for turning lights off early may be desired with off times. Further, a user may desire the use of astronomic dusk times (with or without an offset) and the use of a fixed timer for turning the lights off at some time after midnight, for example. It should be understood that astronomic dusk and dawn times could be used with timing patterns in the DST and seasonal categories, or could be limited to the astronomic categories for simplicity. It should also be noted that while even hour times are shown, on and off times based upon half hours or quarter hours could be provided.

In order to implement astronomic times, it is necessary to consider both locations and the time of year. While it may be possible to store astronomic data any level of granularity of location and time, average astronomic dusk and dawn data could be stored based upon a particular region and a particular time period as will be described in reference to FIG. **18**. In order to store average astronomic dusk and dawn data, it is necessary to identify a location where the timer will be used, and assign that location to a reasonable number of regions for which astronomic timing data is stored. By way of example in FIG. **17**, the 12 regions designated in FIG. **13** could be associated with zipcodes. Accordingly, when a user enters a zip code, data associated with the region having the zip code would be used when implementing a selected timing pattern for the timer. By way of example, the data could be based upon a central location of the region, or an average of the different dusk and dawn times of the region. Alternatively, the average dusk and dawn times could be skewed toward more populated areas of the regions. Not only would average dusk and dawn times for the location be used based upon the zip code, but the correct time in the various time zones based upon the Greenwich Mean Time (GMT) would also be used. Alternatively, three digit telephone area codes could be used.

As shown in FIG. **18**, these average dusk and dawn times are not only based upon location, but also based upon time of year. While daily dusk and dawn times could be used, it would be more efficient to use average dusk and dawn times for given time periods, and particularly time periods associated with time periods for implementing timing patterns, as described in reference to FIGS. **51** and **52**. Accordingly, for each region, an average dusk time and average dawn time for different timer periods during which a particular on time or off time would be applied, shown by way of example in FIG. **8** to include a full year, portions of a year or individual days.

Additional data which could be used in implementing a timer is DST data and corresponding DST codes. In addition to dates at which times are moved back during the fall or moved back during the spring in areas having daylight savings times (where these dates have changed over time and may change in the future), dates for applying a timing pattern for a period having shorter daylight, called a daylight savings time period. While the daylight savings time period could correspond to the times for moving the timer forward and back, a user may like to select a period for applying a daylight savings time timing pattern during a period which is different than the period between moving the clock back and returning the clock to the standard time. Accordingly, a table could be stored which has different daylight savings time data including a DST time period for applying different timing patterns and dates for changing the clock. Each of a plurality of combinations is stored with a corresponding DST code in the table. When the DST code is entered during programming of the timer, on and off times associated with a selected timing pattern will be applied subject to dates and times associated with daylight savings time data associated with the DST code.

It should be noted each of the tables **16**-**19** are stored in a memory of the timer, such as memory **1006** or a cache memory of the timer of FIG. **10**. The data is preferably stored at the time of manufacture (or at some point before the timer is packaged) and provided to the end user with the timing patterns selectable by a timing pattern code already stored in the memory. Further, data in the tables could be updated using a portable memory device, such as a USB drive, by way of the connector **702**.

Turning now to FIG. **20**, a flow diagram shows the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. While the keypad of FIG. **2** provides an easy way of entering data necessary to implement a timer having pre-stored timing patterns, other user interfaces could be used which take advantage of the pre-stored timing patterns associated with corresponding timing pattern codes. For example, "navigation" keys which enable a user move through a menu can be implemented to enable a user to select a timing pattern code or any other data necessary for implementing a timer as set forth above. Unlike conventional timer user interfaces, the 5 key navigation user interface of FIG. **20** is not only intuitive, but overcomes many of the problems associated with conventional user interfaces by not only showing a current programming category and a current data value for the current programming category, but also previous and following programming categories and previous and following data values which could be selected for the current programming category. That is, as will be described in more detail in reference to FIGS. **21-43**, the arrangement of programming categories and corresponding data values will enable easy navigation through the user interface by indicating where a user is within the menu.

Referring specifically to FIG. **20**, the programming categories **2002** and corresponding data values **2003** could be selected by the 5 key user interface which includes a select key **2004** which could be used to select data associated with a given programming category. In summary, the select key **2004** will enable a user to enter the menu for programming (such as by depressing the key for a predetermined period (e.g. 2 seconds), the left key **2006** will allow moving left along the programming categories, and the right key **2008** will enable moving right along the programming categories. An up key **2010** will enable a user to move up within a column for a current programming category, while a down key **2012** will enable moving down within the current programming category. By way of example, when the display is in an operational mode and shows operational values (such as the operational values shown in FIGS. **3-5**), the first programming mode (i.e. the hour programming mode **2104**) will be shown on the display when the select key **2004** is selected. If the user desires to enter a certain time, the up and down keys can be used to move to a desired data value representing the desired hour, and have that data value selected by using the select key. When a data value is selected for a given programming category, the user interface preferrably then automatically moves to the following programming category. A key pad sequence (such as the selection of the select key three times or merely holding the select key for a predetermined period of time (e.g. 2 seconds)) can then be entered at any time to leave the programming mode of the timer.

The programming categories include the following: the hour mode **2014** (having 24 data values from 12 AM to 11 PM), the minute mode **2016** (having 60 data values from 0 to 59 minutes), the month mode **2018** (having 12 data values from JAN to DEC), the day mode **2020** (having 31 data values from 1 to 31), the year mode **2022** (having 10 data values for each of the tens digit of the year from 0x to 9x), the year mode **2024** (having 10 data values from 0 to 9 for the one's digit), the region mode **2026** (having 12 data values for each of the regions shown in FIG. **13**), the timing pattern mode **2028** (having a predetermined number of timing pattern codes associated with a corresponding number of pre-stored timing patterns), the DST mode **2030** (having the number of data values associated with different DST data values, such as the data associated with the DST codes of FIG. **19**), the security mode **2032** (having the number of available security codes, such as 100 codes for a two bit security code or 1000 codes for a 3 bit security code), and optionally an "exit" programming option which will be described in more detail in reference to the programming example of FIGS. **21-43**. While a user can depress and hold the select key for a predetermined period of timer for example to leave the programming mode, the exit option can also be provided to enable a user to leave the programming mode. In either case, a new data that has been selected will be stored and used by the processor of the timer to implement a timing pattern.

FIGS. **21-43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**. While displays may be desirable for some users (because they want to see what data is being entered to program the timer), conventional timers having displays are not only difficult to navigate through a menu for programming the timer (and understand where the user is in the menu), but also are difficult to see the data which is entered in a certain field of a conventional timer because the display is so small. The displays of FIGS. **21-43** show the steps of programming a timer to enable operation of the timer according to a pre-stored timing pattern from the initial, un-programmed state of the timer of FIG. **21** to the final programmed state of the timer of FIG. **43**. As shown in FIG. **21**, various fields which provide information in the normal operating state are shown. The programming mode can be entered when the select key of the 5-key user interface is selected (or some other key sequence such as the select key being selected 3 times, or the select key being depressed for a predetermined period, such as two seconds).

One unique feature of the user interface described in FIGS. **21-43** is that a current selection option (either programming categories or data values) is not only shown, but a "previous" and "next" programming category and data value is also shown. In order to further make the timer easier to program and overcome a significant problem of conventional timers with displays which are difficult to read, the current programming category and data value is larger than the "previous" and "next" programming category and data value. Making the current programming category and data value larger makes it easier to read the programming category and data value while still making it easy to navigate the menu by providing previous and next values.

After a key or key sequence is entered on 5-key user interface to enter the programming mode, an initial programming state is entered as shown in FIG. **22**. While the initial states for data values in FIGS. **23-42** are shown as the top values of the available data values for a programming mode, the initial states could be some other value, such as a value near the middle of the available data values, or a commonly selected data value. The sequence of FIGS. **21-42** are intended to show the programming of a timer having the following data: a current timer of 10:24 PM and a current data of Oct. 9, 2013, where the timer is operated in the North Central (NC) region having a timing pattern 13, a DST code 903 and an optional security code 013. As will be described in more detail below, a security code could be used if a user could reprogram the timer using a wireless connection to prevent a hacker from changing the operation of the timer (from outside of a building for example).

As shown in FIG. **22**, the initial programming state includes the Hour programming mode, and a initial data value of 1 AM. A user could then use the up and down keys to select the desired time. As shown in FIG. **23**, the user had moved down one data value to 2 AM, and then down to the desired data value of 10 PM as shown in FIG. **24**. When the user reaches the desired data value, the user can select the value using the select key, in which case the display would then display the next programming category, which happens to be the minute programming category. Alternatively, rather than automatically changing, a user could be required to move to the next programming category by selecting the right arrow key. As shown in FIG. 25, the initial state of the minute programming mode has a "1" in the data value display portion. The up and down keys can then be used to move to the desired "24" minute data value as shown in FIG. 26, where the month programming category would then be displayed as shown in FIG. 27 in response to the selection of the data in the minute programming mode. After the desired month of October is reached in FIG. 29, the programming mode is move to the day programming mode as shown in FIG. 29, where the desired 24^{th} day is selected as shown in FIG. 30. As shown in each of the displays, a previous programming category is shown above a current programming category, and a next programming category is shown below the current programming category. Similarly, a previous data value of the current programming category is shown above the current data value, and a next data value is shown below the current data value. For example, in selecting the month as shown in FIG. 27, the previous programming category "minute" in the programming category side of the display is above the current programming category "month," while the next programming category "day" is shown below the current programming category. Similarly, in the data value side of the display, the month of December is above the current data value of January, while the month of February is below the current value. Providing categories and values above and below current categories, a user can more easily navigate through the menu. Also, by providing the current category/value in a larger size, it is easy to read the category/value.

Selecting a desired year can present more of a problem because of the number of available years (e.g. 100 data values from 2000-2099). While a single year selection mode can be implemented in the same way as selecting 1 of 31 days of a month as described above, the year programming mode can be divided into two operations, enabling the selection of a decade in one step and enabling the selection of a year in another step. As shown in FIG. 31, it should be noted that the initial state is shown with a year "200?", where the "zeros" decade is provided. The user can then move down one data value to the "tens" decade as shown in FIG. 32, which, when selected, will lead to the menu option as shown in FIG. 33 enabling the selection of the year for the tens decade. Therefore, the up and down keys are used to select 2013 as shown in FIG. 34.

Other data for implementing the timer can then be entered. In particular, the region in which the timer is implemented can be selected by going from an initial region option NE as shown in FIG. 35 to desired timing region option of NC as shown in FIG. 36. The desired timing pattern can then be selected, where an initial timing program 1 shown in FIG. 37 can be changed to the desired timing program 13, as shown in FIG. 38. The desired daylight savings time code can then be selected, where an initial daylight savings time code 900 shown in FIG. 39 can be changed to the desired daylight savings time code 903, as shown in FIG. 40. Finally, a desired security code can then be selected, where an initial security code of 000 shown in FIG. 41 can be changed to the desired security code of 013, as shown in FIG. 42. After all of the data is entered, and the exit option is selected, the display of the timer returns to the operating mode, where the display shows some or all of the data (other than a value of a security code which could also be shown) entered during programming. Further, a "key" or "lock" icon could be shown on the display to indicate that a security code has been programmed.

While it is assumed that no data was programmed initially, it should be noted that, if the timer is already programmed and just some data needs to be reprogrammed, the left and right keys can be used to move within the menu to reach a desired programming category to change the data for that category, at which time the select key can be used to select the data, leave the programming mode, and return to the display for the normal operational mode. By way of example, if a timer is already programmed and a user desires to change the timing pattern (by changing the selected timing pattern code), a user would enter the programming mode and use the left and right keys to move along the programming modes until the timing pattern programming mode is reached. The up and down the available data values until the desired timing pattern code is reached. The data value be selected by using select key, at which time the programming category would move to the next programming category. If no other data values need to be changed, a user could move along the programming categories to the "exit" option to return to normal operation or hold the select key for a predetermined period of time. Accordingly, if a timer is already programmed and a user desires to change the timing pattern for example, the user can easily change the timing pattern without having to reprogram anything else.

Turning now to FIG. 44, a memory shows fields and corresponding stored data associated with the programmed timer of FIG. 43. All of the data entered using the numeric keypad or 5-key user interface is stored in memory fields of a memory of the timer, such as memory 1006 for example, and is accessed by the timer to implement a selected timing pattern in operating the timer as described above.

Turning now to FIGS. 45-49, screens of a user interface enabling the wireless programming of a timer are shown according to an embodiment of the present invention. That is, based upon a current time and date, the timer will implement the timing pattern (associated with the selected timing pattern code) by using data of FIGS. 16-19. As shown in FIG. 45, a display 4502 of a wireless device, such as a laptop computer, a tablet computer or a cellular telephone having a touch screen or some other data entry element, shows a data entry screen enabling a user to enter the necessary data, including a timing pattern code associated with a desired timing pattern, for implementing the timer. The display also includes a data entry element 4504, shown here as a touch screen entry portion having an alphabetical entry portion 4506 (such as a "QWERTY" keypad) and a numeric entry portion (having touch screen keys from 0 to 9). Various fields are provided to enter the data stored in the memory of FIG. 44. For example, a field 4509 enables a user to enter a security code. The security code may be concealed as shown to avoid someone seeing the code. A time field 4510 enables someone to enter the time, shown here as a 4 digit military time. However, because a full QWERTY keypad is provided, the time could be entered as 10:24 PM for example. The date is entered in a date field 4512. Although shown in a 6 digit DDMMYY format, it could be spelled out using letters and numbers. The desired region, timing pattern and DST code could be entered in fields 4514, 4516, and 4518, respectively. The user could then exit or opt to enter an advanced options mode.

According to one embodiment, the advanced options mode enables a user to select timing patterns to be implemented with the dedicated buttons for selecting timing patterns as shown in FIG. 6 or 7, or enables entering on and off times to be applied when the timing pattern associated with the dedicated buttons are selected. That is, a screen could have a field for each dedicated button, where a user could enter the timing pattern code in the field which corresponds to the timing pattern which is desired for the field. As shown for example in FIG. 46 which relates to a timing program for a fixed button setting, on and off times which would be applied throughout the year could be entered in data fields, where on and off times for weekdays could be entered in fields **4602** and **4604** respectively, and on and off times for weekends could be entered in fields **4606** and **4608** respectively. "Back" and "Next" selection options enable the user to move through the advanced programming options to finish the programming or exit as desired.

As shown in FIG. **47**, on and off times associated with an astronomic mode of operation applied in response to the selection of the "Astro" button can be entered in fields **4702** and **4704**, where the entries enable the selection of an offset. As will be described in more detail below in reference to FIG. **50**, users may prefer to apply astronomic times with a delay in turning the lights on at dusk, and turning the lights off early at dawn. According to another embodiment, the astronomic timing program associated with a button could include an option of setting the off time to a fixed time. That is, while users may want the on time of the timer to follow the dusk time, they may want the lights to go off at a fixed times (such as 1:00 AM or 6:00 AM for example) rather than be tied to the dawn time.

A screen for programming on and off times for a DST button is shown in FIG. **48**. According to the embodiment of FIG. **48**, on and off times to be applied during a standard time period can be entered in fields **4802** and **4804**, while on and off times to be applied during a daylight savings times period can be entered in fields **4806** and **4808**. A similar arrangement is shown in FIG. **49**, where settings for 4 "seasonal" timing patterns can be applied rather than settings for two timing patterns as described in reference to FIG. **48**. In particular, on and off times to be applied during a spring time period can be entered in fields **4902** and **4904**, on and off times to be applied during a summer time period can be entered in fields **4906** and **4908**, on and off times to be applied during a fall time period can be entered in fields **4910** and **4912**, and on and off times to be applied during a standard time period can be entered in fields **4914** and **4916**.

While specific fields are provided for entering data for applying on and off times during the operation of a timer when a dedicated button is selected, it should be understood that other fields could be implemented with the given programming categories as shown, or other programming categories could be implemented. It should be noted that if no data is entered, default timing patterns would be implemented when a dedicated button is selected, where the default timing patterns could be based upon the 1-4 timing pattern codes associated with the four categories of timing patterns shown in FIG. **16**.

Charts provided in FIGS. **50-52** show dusk and dawn times throughout the year, average dusk and dawn times for periods, and the benefits of implementing certain on and off times during certain periods. Turning first to FIG. **50**, a chart shows dusk and dawn times over a year, and an average time shown by the dashed line. As should be apparent from FIG. **50**, considerable energy can be saved by setting on and off times at times other than the average dusk and dawn times. While the charts of FIGS. **51** and **52** provide timing patterns having better granularity and therefore provide a more desirable timing pattern, the chart of FIG. **50** provides perspective as to how much energy can be saved by implementing times other than astronomic dusk and dawn times. As is apparent from FIG. **50**, each light controlled by a timer will be off for at least 2 hours longer each day compared to astronomic times by setting the on time for a light at 1 hour after dusk and setting the off time 1 hour before the average dawn.

Turning now to FIG. **51**, a chart shows dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time. As can be seen in FIG. **51**, the average dusk and dawn times are very different for the two time periods, and the timer on and off settings with a one hour offset is very different. By establishing the two time periods to apply two different time settings, it can be seen that different on and off times are much closer to the dusk and dawn times, and therefore provide an overall more desirable timing pattern for the year, while still providing savings by having the timer on less. Additional energy reduction can be achieved by moving the off time of the DST period to a fixed time, such as 5:00 AM and still provide a desirable overall timing pattern. As is apparent from FIG. **51**, the time period for applying a "daylight savings time" timing pattern is different than the period between the "fall back" date for turning back the clock in the fall, and the "spring forward" date for returning the clock to normal time during the spring.

The embodiment of FIG. **52** shows 4 timing patterns associated with the 4 seasons. As can be seen, the average times for dusk and dawn during those periods are different, and selected times relate more closely to the average times, and therefore provide a better overall timing pattern. While DST and seasonal periods are shown, it should be understood that other periods could be defined, such as monthly periods. However, a greater number of periods may require additional memory for storing data and may make it more difficult to select a desirable timing pattern by a user. Accordingly, the number of periods selected (which may provide a better timing pattern) may be a tradeoff with additional memory requirements and reduced user-friendliness. One of the benefits of the various embodiments is that they are user friendly. Therefore, the number timing pattern options available to a user must be selected to ensure that the timer is still user friendly to operate while providing enough options to provide desirable timing patterns for a variety of different users.

Turning now to FIG. **53**, a flow chart shows a method of generating timing characterization data according to an embodiment of the present invention. A plurality of timing patterns are established at a step **5302**. A unique timing pattern code is assigned for each timing pattern of the plurality of timing patterns at a step **5304**. The timing patterns and corresponding timing pattern codes are stored in a memory of the timer at a step **5306**. Geographic regions where the timers will be used are also defined at a step **5308**. Time periods for which average dusk and dawn times may be used defined at a step **5310**. Average dusk and dawn timers associated with the time periods and geographic regions are stored in a memory of the timer at a step **5312**. DST data related to "spring forward" and "fall back" dates and desired dates for applying a DST timing pattern (if different than "spring forward" and "fall back") are stored, by region, in a memory of the timer at a step **5314**. It is then determined whether an input is received at a user interface of the timer at a step **5316**. Data associated with an operational field are stored in a memory of the timer at a step **5318**. It is then determined whether a time out been reached or a stored indication received at a step **5320**. The timer is operated based upon the data stored in the operational field at a step **5322**.

Turning now to FIG. **54**, a flow chart shows a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention. The timing pattern is cleared if necessary or desired by selecting a first predetermined keypad sequence at a step **5402**. The current time is entered followed by a key or keypad sequence to enter the data at a step **5404**. The current date is entered followed by the key or keypad sequence to enter the data at a step **5406**. A geographic region for the timer is entered followed by the key or keypad sequence to enter the data at a step **5408**. A timing pattern code is entered followed by the key or keypad sequence to enter the data at a step **5410**. A DST code is optionally entered followed by a key or keypad sequence to enter the data at a step **5412**. It is then determined whether the last data is entered or a time-out period expired at a step **5414**. All of the data entered is stored at a step **5416**. It is then determined whether the user desires to change the timing pattern code at a step **5418**. A second predetermined keypad sequence is entered to change the timing pattern code only at a step **5420**.

Turning now to FIG. **55**, a flow chart shows a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention. A select key is pressed to enter the programming mode at a step **5502**. It is then determined whether a left or right key is selected to move to a different programming category at a step **5504**. The display will show another programming category as it moves horizontally along a plurality of programming categories at a step **5506**. It is then determined whether an up or down key is selected to enable selecting an option associated with the current programming category at a step **5508**. The display will show another option of a programming category as it moves vertically along options of a current programming category at a step **5510**. It is then determined whether the programming mode ended at a step **5512**.

Turning now to FIG. **56**, a flow chart shows a method of selecting a stored timing pattern using 5 key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. A security code on the timer is optionally set to enable programming the timer using a wireless link at a step **5602**. It is then determined whether a wireless device for programming the timer within range of timer at a step **5604**. It is then determined whether the correct security code entered on the wireless device at a step **5606**. Data entered in fields on the wireless device are downloaded at a step **5608**. The data in the timer is stored at a step **5610**. The timer is operated based upon the stored data at a step **5610**.

It can therefore be appreciated that the new and novel timer and method of implementing a timer has been described. It will be appreciated by those skilled in the art that numerous alternatives and equivalents will be seen to exist which incorporate the disclosed invention. As a result, the invention is not to be limited by the foregoing embodiments, but only by the following claims.

I claim:

1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

a memory storing at least one timing pattern, the at least one timing pattern having one or more on/off settings for a time period; and

a wireless communication circuit configured to receive, using a wireless communication protocol, the at least one timing pattern selected on a user interface of a wireless device having a corresponding wireless communication circuit, the user interface enabling the selection of the at least one timing pattern;

wherein the user interface is configured to receive a security code enabling the downloading of the timing pattern to the memory using the wireless communication protocol.

2. The programmable light timer of claim **1** wherein the at least one timing pattern has at least a first set of on and off times for a first time period and a second set of on and off times for a second time period.

3. The programmable light timer of claim **1** wherein the user interface enables the selection of dusk as an on time of the at least one timing pattern.

4. The programmable light timer of claim **1** wherein the programmable light timer does not include a display.

5. The programmable light timer of claim **1** wherein the user interface enables the selection of a first on time and a first off time for a first plurality of days of the week.

6. The programmable light timer of claim **5** wherein the user interface enables the selection of a second on time and a second off time for a second plurality of days of the week.

7. The programmable light timer of claim **1** wherein the user interface enables an astronomic time for one of the on time or the off time.

8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

a memory storing at least one timing pattern, the at least one timing pattern having one or more on/off settings for a time period;

a wireless communication circuit coupled to receive the at least one timing pattern; and

a control circuit coupled to the wireless communication circuit and enabling receiving the at least one timing pattern from a wireless device, wherein the wireless device comprises a user interface configured to receive a security code enabling the downloading of the timing pattern from the wireless device to the programmable light timer.

9. The programmable light timer of claim **8** wherein the at least one timing pattern has at least a first set of on and off times for a first time period and a second set of on and off times for a second time period.

10. The programmable light timer of claim **9** wherein the user interface enables the selection of dusk as an on time of the at least one timing pattern.

11. The programmable light timer of claim **10** wherein the user interface enables the selection of dawn as an off time of the at least one timing pattern.

12. The programmable light timer of claim **8** wherein the user interface enables the selection of a first on time and a first off time for a first plurality of days of the week.

13. The programmable light timer of claim **12** wherein the user interface enables the selection of a second on time and a second off time for a second plurality of days of the week.

14. The programmable light timer of claim **8** wherein the user interface enables the selection of an astronomic time for one of the on time or the off time and a fixed time for the other of the on time and the off time.

15. A method of implementing a timing pattern in a programmable light timer, the method comprising:

implementing a wireless communication circuit in the programmable light timer;

storing at least one timing pattern in a memory, the at least one timing pattern having one or more on/off settings for a time period;

enabling the entry of a security code on a user interface of a wireless device having a wireless communication circuit in communication with the wireless communication circuit of the programmable light timer;

enabling the selection of a timing pattern on the user interface of the wireless device; and

downloading the selected timing pattern from the wireless device to the programmable light timer.

16. The method of claim **15** wherein storing at least one timing pattern comprises storing at least one timing pattern comprises storing a timing pattern having at least a first set of on and off times for a first time period and a second set of on and off timers for a second time period.

17. The method of claim **16** further comprising enabling the selection of dusk as an on time of the at least one timing pattern.

18. The method of claim **15** further comprising enabling the programming of the programmable light timer without a display.

19. The method of claim **15** further comprising enabling the selection of a first on time and a first off time for a first plurality of days of the week.

20. The method of claim **15** further comprising enabling the selection of an astronomic time for one of the on time or the off time and a fixed time for the other of the on time and the off time.

* * * * *

Exhibit C

Product Info Support Related

Description

GE MyTouchSmart™ Timers are an incredibly easy way to automate your lights to be on when you need them most. Save energy, save money and feel secure with GE MyTouchSmart™ In-Wall Digital Timers. The state-of-the art timer delivers convenient automation for lights, fans, appliances and electronics, both indoor and out. It is equipped with two sets of ""My On/Off Time"" buttons, enabling you to easily program your lights to turn on and off for anytime that suits your schedule, as well as on/off override buttons. The in-wall timer also features blue LED indicators that show active programs, a large LCD screen for effortless viewing, large buttons for added convenience and a battery backup that maintains your settings in the event of a power loss. Easy-to-install, the GE MyTouchSmart™ In-Wall Digital Timer replaces your existing light switch. GE MYTouchSmart™ Timers are an incredibly easy way to automate your lights to be on when you need them most and are compatible with CFL, LED, incandescent and halogen light sources. Requires neutral wire for installation. for use in single-pole applications only. Wallplate not included. This product is UL listed and is backed by a one-year limited warranty.

Features

- Easy-to-set digital timer for indoor and outdoor lights and appliances
- Fully customizable "My On/Off Time" settings
- Convenient on/off override buttons
- Blue LED indicators show active programs
- Battery backup to maintain settings during power loss
- Replaces existing light switch
- Deters crime
- For use in single pole applications only
- Compatible with CFL, LED, incandescent and halogen light sources
- Neutral wire required
- 120V/60Hz
- 15A/1200W General purpose/resistive
- Wallplate not included
- UL listed

REVIEW SNAPSHOT® by PowerReviews

Not yet rated. Be the first to Write a Review

Exhibit D

In-Wall Digital Timer

myTOUCH SMART™

SIMPLE SET TIMERS

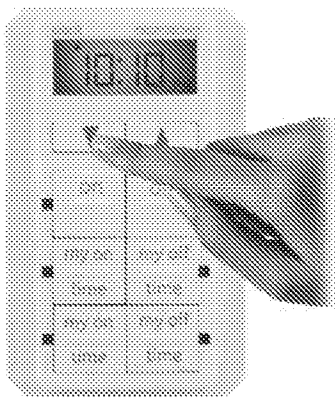
Fast, easy setup!

1. After installation

For first use, press the reset button (r) below the arrow buttons using a toothpick or pencil.

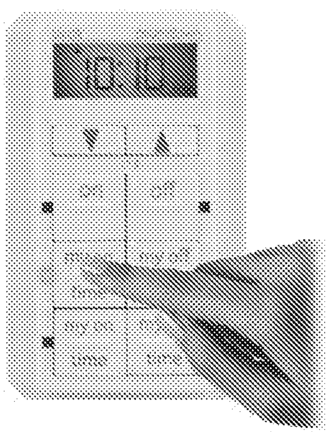
2. Set the time

Use up (△) and down (▽) arrows to set current time.



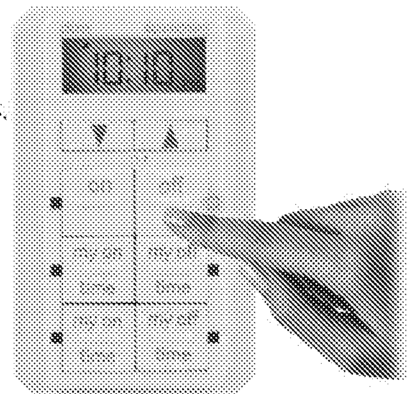
3. Choose your custom on/off times

Press "my on time," then use up (△) and down (▽) arrows to set on time. Press "my off time," then use up (△) and down (▽) arrows to set off time. If the blue LED is on the program is set. If the LED is off the program will not operate. Repeat for each additional "my on"/"my off" button. All programmed times will run simultaneously in a 24 hour day.



4. Manual/Override

Press on and off buttons to manually control your lights.



Note: When daylight savings time occurs use the down (▽) and up (△) arrows to adjust the time by 1 hour.

⚠ WARNING

RISK OF ELECTRIC SHOCK
- SHUT OFF POWER AT FUSE BOX OR CIRCUIT BREAKER BEFORE INSTALLATION
- DO NOT USE IN WET LOCATIONS
- USE INDOORS ONLY

RISK OF FIRE
- DO NOT USE TO CONTROL APPLIANCES THAT CONTAIN HEATING ELEMENTS (COOKING APPLIANCES, HEATERS, IRONS, ETC.)
- DO NOT EXCEED ELECTRICAL RATINGS
- USE COPPER WIRE ONLY WITH THIS DEVICE
- DO NOT USE TO CONTROL RECEPTACLES

Specifications:
120VAC 60 Hz
15A General/Resistive
1200W Tungsten
1200VA Ballast
1/2 HP

Works with dimmable LED and CFL bulbs.

c UL us LISTED

MADE IN CHINA

This Jasco product comes with a 1-year limited warranty. Visit www.jascoproducts.com for warranty details product registration.

Questions? Contact us at 1-800-654-8483 between 7:30AM-5:00PM CST.

26893 VERSION 01 4/29/15

Temporizador digital de pared

myTOUCH SMART™

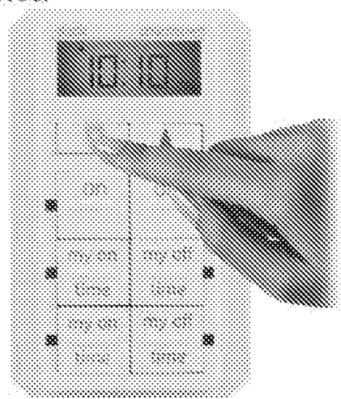
SIMPLE SET TIMERS

¡Programación fácil y rápida!

1. Programación

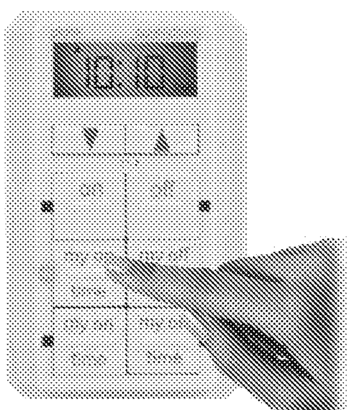
Para usarlo por primera vez, presione el botón restablecer (r) debajo de los botones de flecha con un lápiz o palillo de dientes.

2. Cómo programar la hora



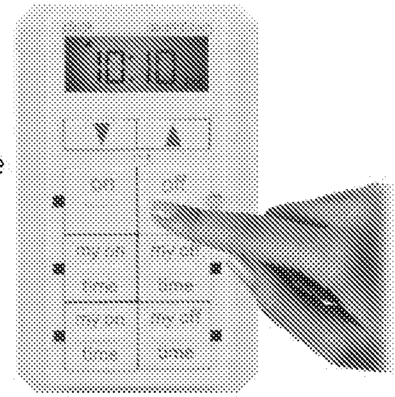
Use las flechas arriba (△) y abajo (▽) para programar la hora actual.

3. Escoja la hora de encendido/apagado que desee



Presione "my on time" (mi hora de encendido), luego con las flechas programe la hora. Presione el botón "my off time" (mi hora de apagado), luego con las flechas programe la hora. Si la luz LED azul está encendida, el programa ha sido establecido. Si la luz LED está apagada, el programa no funcionará. Repita el proceso para cada botón de "my on" / "my off" que desee programar. Todos las horas programadas se activarán de manera simultánea en un día de 24 horas.

4. Manual/Anulación



Presione [on] y [off] botones para controlar manualmente el dispositivo enchufado al temporizador.

Nota: Cuando se cambie el horario de verano, use las flechas (▽ / △)para ajustar la hora en 1 hora.

⚠ ADVERTENCIA

RIESGO DE CHOQUE ELÉCTRICO
- CORTE LA CORRIENTE ANTES DE EFECTUAR UNA INSTALACIÓN
- NO LO USE EN LUGARES HÚMEDOS
- USE SOLAMENTE EN INTERIORES

RIESGO DE INCENDIO
- NO USE PARA CONTROLAR ELECTRODOMÉSTICOS QUE CONTENGAN ELEMENTOS CALORÍFICOS (APARATOS PARA COCINAR, CALENTADORES, PLANCHAS, ETC.).
- NO EXCEDA LOS LÍMITES ELÉCTRICOS PERMITIDOS
- UTILÍCELO CON ALAMBRE DE COBRE ÚNICAMENTE
- NO LO UTILICE PARA CONTROLAR RECEPTÁCULOS

Especificaciones:
120 VAC 60 Hz
15 A General/Resistiva
1200W 10 A Tungsteno
1200 VA Balasto
1/2 HP

Funciona con bombillas atenuables LED e CFL.

HECHO EN CHINA

Este producto de Jasco Products tiene una garantía limitada de 1 Año.
Visite www.jascoproducts.com para detalles.

¿Tiene preguntas? Comuníquese al 1-800-654-8483 entre las 7:30 a.m. y las 5:00 p.m. CST (hora central estándar).

Exhibit E

Indoor/Plug-In Digital Timer

myTOUCH SMART™

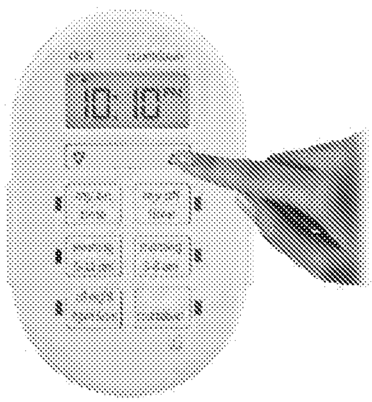
SIMPLE SET TIMERS

1. Setup

If no numbers are visible on-screen, plug timer into an outlet and let timer charge for 1 hour. Once charged, press the reset (Ⓡ) button in the lower right corner using a toothpick or pencil.

2. Set the time

Use up (△) and down (▽) arrows to set current time, take note of AM or PM time.

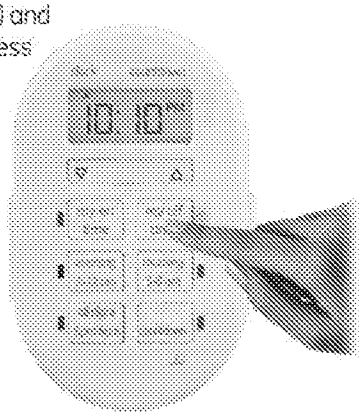


3. Programming Options

Set your custom on & off time and/or pick any of the presets that suit your schedule!

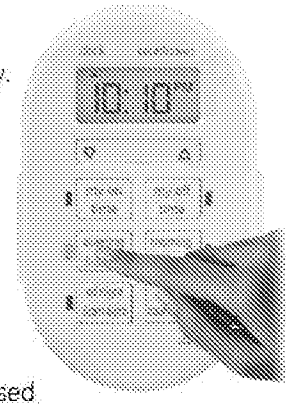
I. Choose your custom on/off times

Press "my on time," then use up (△) and down (▽) arrows to set on time. Press "my off time," then use up (△) and down (▽) arrows to set off time. (If you set the "my on time" earlier than the current time, it will not turn on until the next day at the time scheduled. Use the Countdown to turn on the timer if needed immediately.) When using "my on" and "my off" times make sure the blue light is lit next to the button. The blue lights will only illuminate when plugged into a wall outlet.



II. Preset schedules

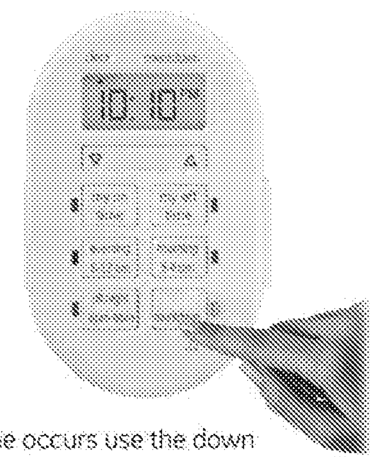
There are 3 pre-programmed times that run individually or simultaneously. Choose from the following:
"evening" (5pm-12am)
"morning" (5am-8am)
"all night" (6pm-6am).
When a preset or custom program is chosen, the blue LED indicator light will turn on.



If a preset schedule does not fit your needs, a custom on/off time can be used to modify the preset. Example: Using "evening" (5pm-12am) and adding a "my off time" of 10pm will create a 5pm-10pm timer schedule.

III. Countdown

Press "countdown," then use up (△) and down (▽) arrows to set from 1 minute to 24 hours. The last countdown time set will become the new default until the countdown button is pushed again.



Note: When daylight savings time occurs use the down (▽) and up (△) arrows to adjust the time by 1 hour.

MADE IN CHINA

This Jasco product comes with a 1-year limited warranty.
Visit www.jascoproducts.com for warranty details product registration.

Questions? Contact us at 1-800-654-8483 between 7:30AM–5:00PM CST.

⚠ WARNING

RISK OF ELECTRIC SHOCK
- PLUG DIRECTLY INTO AN ELECTRICAL OUTLET
- DO NOT USE IN WET LOCATIONS
- FULLY INSERT PLUG
- USE INDOORS ONLY
- UNPLUG TIMER BEFORE CLEANING
- KEEP CHILDREN AWAY

RISK OF FIRE
- DO NOT USE TO CONTROL APPLIANCES THAT CONTAIN HEATING ELEMENTS (COOKING APPLIANCES, HEATERS, IRONS, ETC.)
- DO NOT EXCEED ELECTRICAL RATINGS
- DO NOT USE WITH EXTENSION CORDS

Specifications:
125V 50/60 Hz
15A 1875W General Purpose/Resistive
10A 1250W Tungsten
1/2 HP

c UL us LISTED

Works with dimmable LED and CFL bulbs.

This device complies with part 15 of the FCC and Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1 this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encourage to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAN ICES-3(B)/NMB-3(B)

28443, 26892 VERSION 02 6/19/15

Temporizador digital enchufable para interiores

myTOUCH SMART™

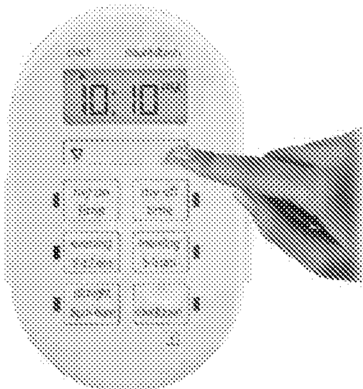
SIMPLE SET TIMERS

1. Programación

Si no aparecen números en la pantalla, enchufe el temporizador en un tomacorriente y deje que se cargue durante una hora. Una vez cargado, presione el botón restablecer (R) que se encuentra en la esquina inferior derecha con un lápiz o palillo de dientes.

2. Cómo programar la hora

Use las flechas arriba (△) y abajo (▽) para programar la hora actual.

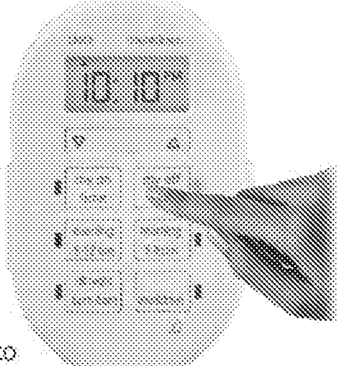


3. Opciones de Programación

Programe su hora de encendido y apagado y escoja el programa preestablecido que se adapte a su horario.

I. Escoja la hora de vencendido/apagado que desee.

Presione "my on time" (mi hora de encendido), luego con las flechas (△/▽) programe la hora. Presione el botón "my off time" (mi hora de apagado), luego con las flechas programe la hora. (Si establece la Mi Hora antes de la hora actual, no se enciende hasta el día siguiente a la hora programada). Utilice la cuenta regresiva para encender el temporizador Si necesita de inmediato



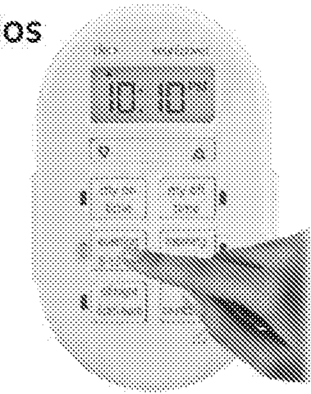
Cuando utiliza los botones "my on time" (mi hora de encendido) o "my off time" (mi hora de apagado) asegúrese de que la luz azul al lado del botón esté encendida. La luz azul solo se encenderá si el temporizador está enchufado.

II. Horarios programados

Existen tres programas preestablecidos que pueden activarse de manera individual o simultánea. Elija entre los siguientes:

"noche" (5 p. m. - 12 a. m.)
"mañana" (5 a. m. - 8 a. m.)
"toda la noche" (6 p. m. - 6 a. m.)

Cuando un preset o la costumbre se elige programa, el luz indicadora LED azul se encenderá .

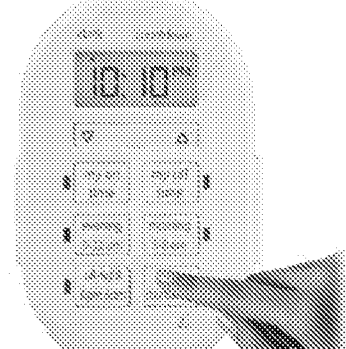


Si un horario preestablecido no satisface sus necesidades, puede usar un tiempo de encendido/apagado personalizado para modificar el preestablecido. Ejemplo: Si usa "noche" (5 p.m. -12 a. m.) y a "mi hora de apagado" le asigna el valor de 10 p. m., se creará un horario de 5 p. m. - 10 p. m. en el temporizador.

III. Cuenta regresiva

Presione el botón de "cuenta regresiva", luego use arriba (△) y abajo (▽) flechas para programar desde 1 minuto a 24 horas. La cuenta regresiva quedará en la memoria hasta que se cambie.

Nota: Cuando se cambie el horario de verano, use las flechas (▽/△) para ajustar la hora en 1 hora.



HECHO EN CHINA

GE es una marca registrada de la compania General Electric Company y es utilizada bajo licencia a la companía Jasco Prodcucts Company LLC, 10 E. Memorial Rd., Oklahoma City, OK 73114.

Este producto de Jasco Products tiene una garantía limitada de 1 Año.
Visite www.jascoproducts.com para detalles.

¿Tiene preguntas? Comuníquese al 1-800-654-8483 entre las 7:30 a.m. y las 5:00 p.m. CST (hora central estándar).

⚠ ADVERTENCIA

RIESGO DE DESCARGA ELÉCTRICA
- CONECTE DIRECTAMENTE A UNA TOMA ELÉCTRICA
- USE SOLAMENTE EN ESPACIOS INTERIORES
- INSERTE COMPLETAMENTE EL ENCHUFE
- USE SOLAMENTE EN ESPACIOS INTERIORES
- DESCONECTE EL TEMPORIZADOR ANTES DE LIMPIAR
- MANTENGA ALEJADOS A LOS NIÑOS

RIESGO DE INCENDIO
- NO USE PARA CONTROLAR ELECTRODOMÉSTICOS QUE CONTENGAN ELEMENTOS CALORÍFICOS (APARATOS PARA COCINAR, CALENTADORES, PLANCHAS, ETC.)
- NO EXCEDA LAS ESPECIFICACIONES ELÉCTRICAS LÍMITE
- NO USE CON CORDONES DE EXTENSIÓN

Especificaciones:
125 V 50/60 Hz
15A 1875W Fines generales/
Carga Resistiva
10 A 1250 W Tungsteno
1/2 HP

c UL us LISTED

Funciona con bombillas atenuables LED e CFL.

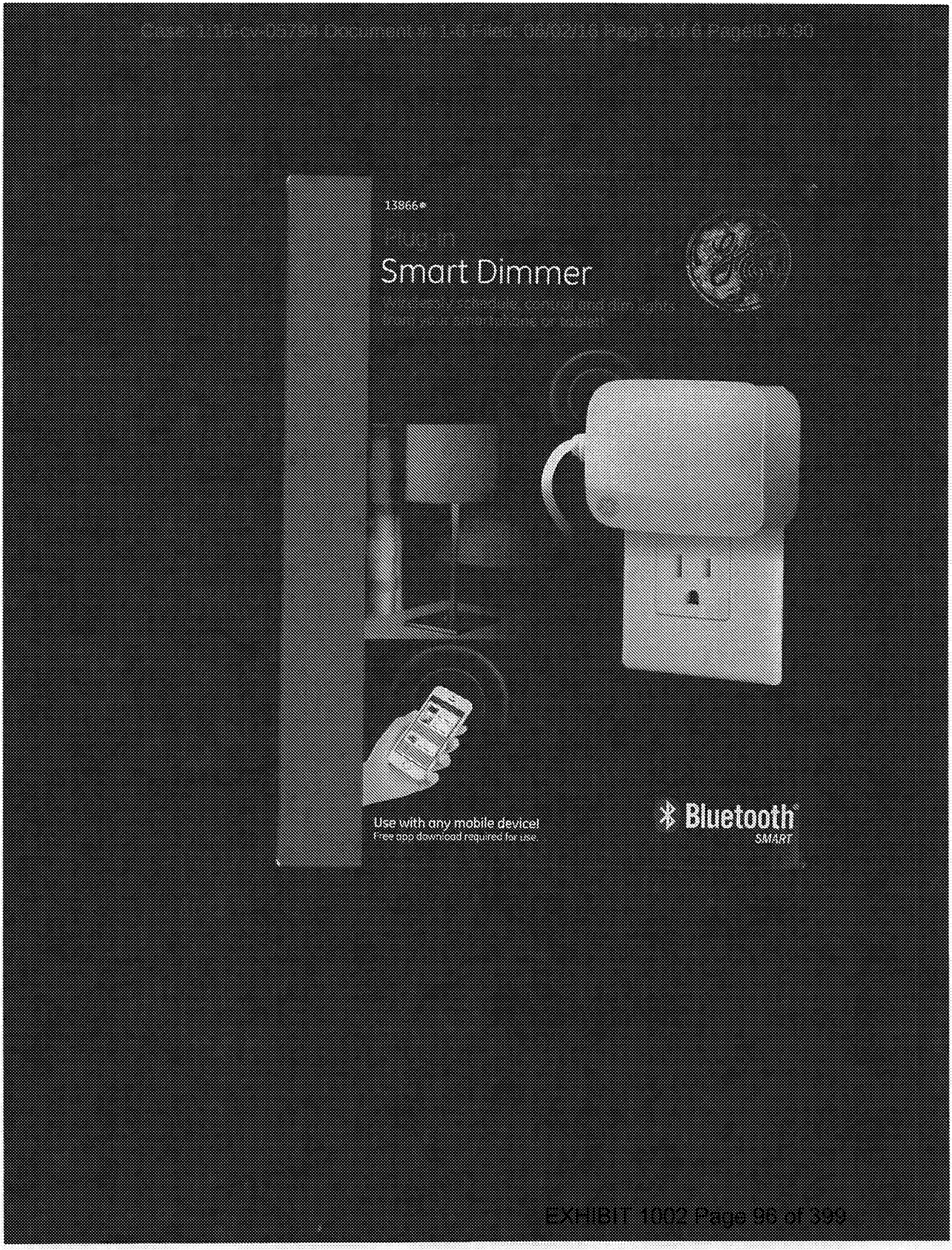
Este dispositivo cumple con la Parte 15 de las Normas de la FCC. La operación está sujeta a las siguientes dos condiciones: (1) este dispositivono puede causar interferencias perjudiciales y (2) este dispositivo debe aceptar cualquier interferencia recibida, incluidas las interferencias que puedan provocar una operación indeseable.

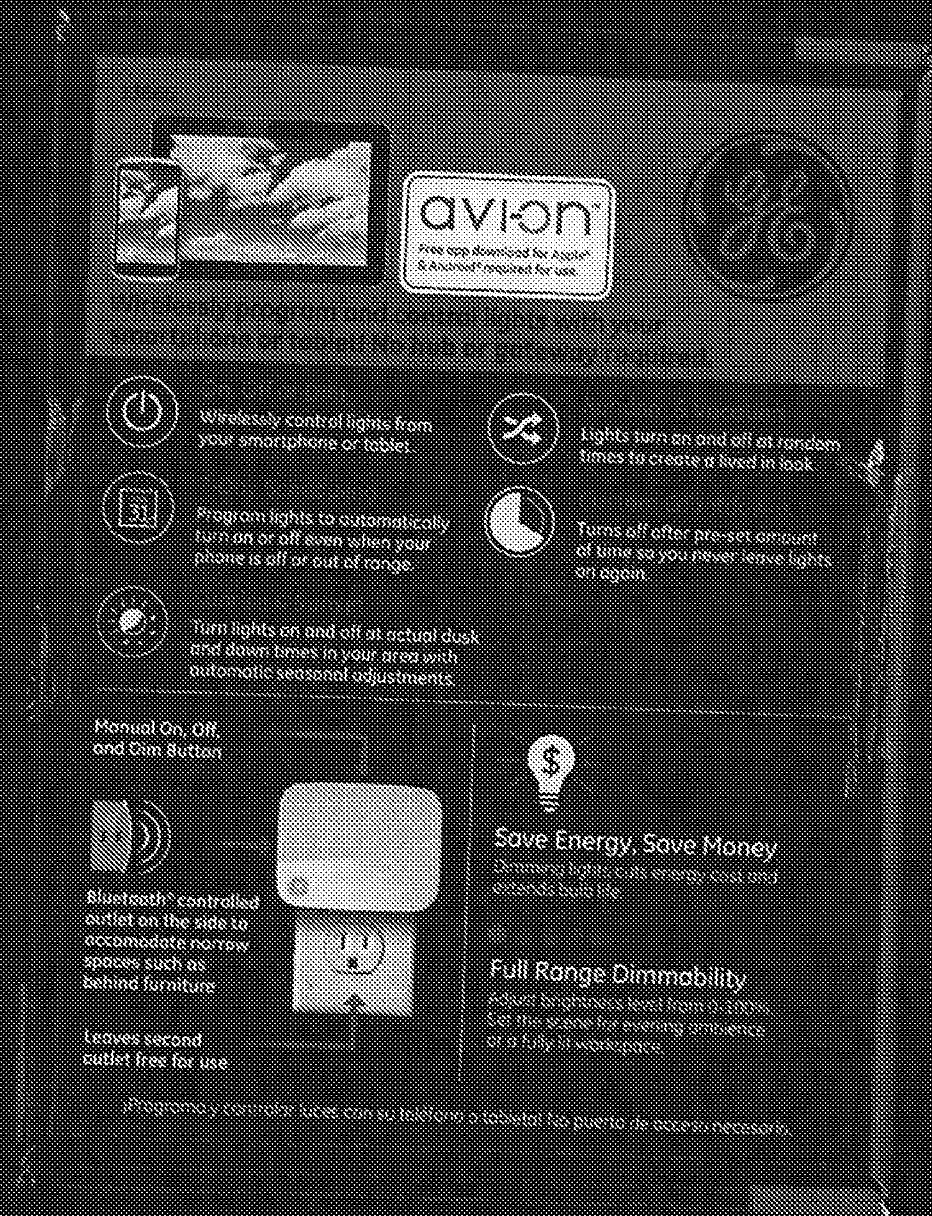
FCC NOTA: Los cambios o modificaciones a esta unidad que no hayan sidoexpresamente aprobados por la parte responsable del cumplimiento de las reglas, pueden anular la autoridad del usuario para poder operar el equipo.

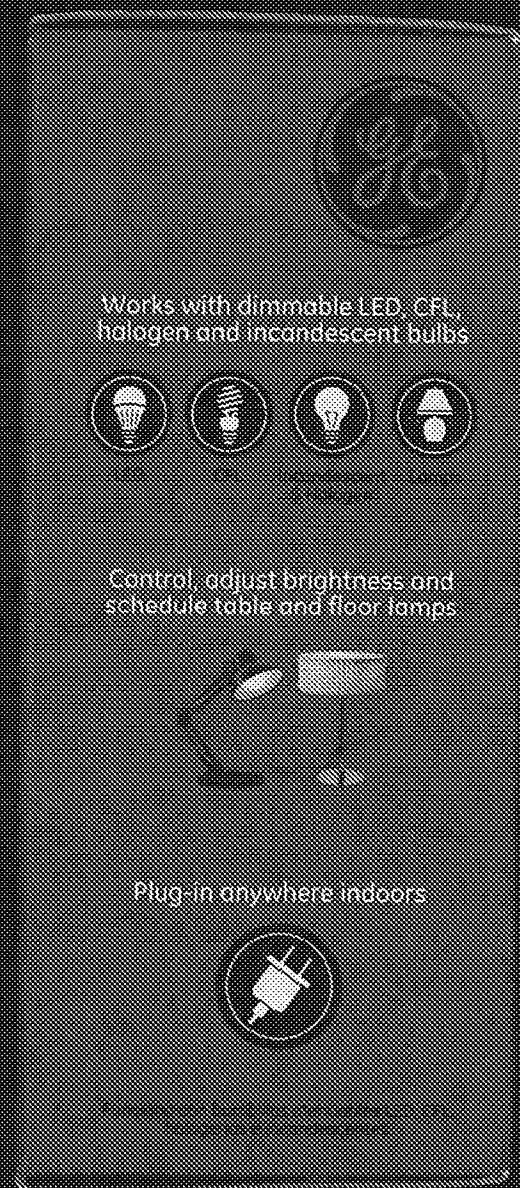
NOTA: Este equipo ha sido probado y cumple con los límites para un dispositivo digital de Clase B, de conformidad con la Parte 15 de las Normas de la FCC. Estos límites están diseñados para proporcionar una protección razonable contra interferencias en una instalación residencial. Este equipo genera, utiliza y puede irradiar energía de radiofrecuencia y, si no se instala y utiliza de acuerdo con las instrucciones, puede causar interferencia dañina a la comunicación por radio. Sin embargo, no hay ninguna garantía que no ocurra interferencia en una instalación en particular. Si este equipo causa interferencias perjudiciales a la recepción de radio o televisión, esto se puede comprobar apagando y encendiendo el equipo repetidamente, se le sugiere al usuario tratar de remediar la interferencia tomando una o más de las siguientes medidas.

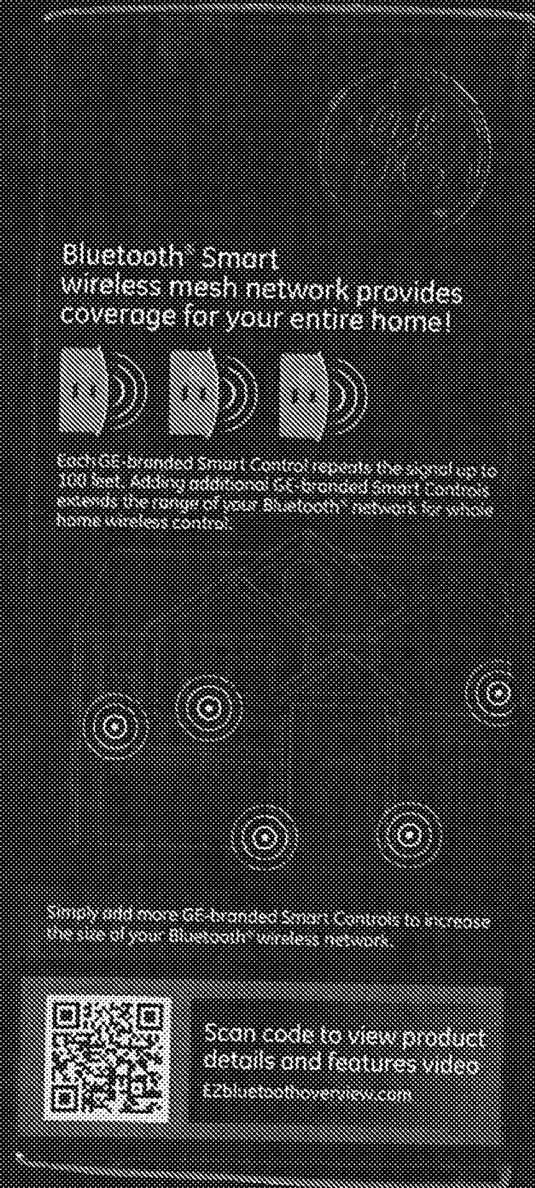
- Reorientar o reubicar la antena de recepción
- Aumentar la separación entre el equipo y el receptor
- Conectar el equipo a un tomacorriente en un circuito distinto de aquel al que está conectado el receptor
- Consultar al distribuidor o a un técnico de radio / TV para obtener ayuda.

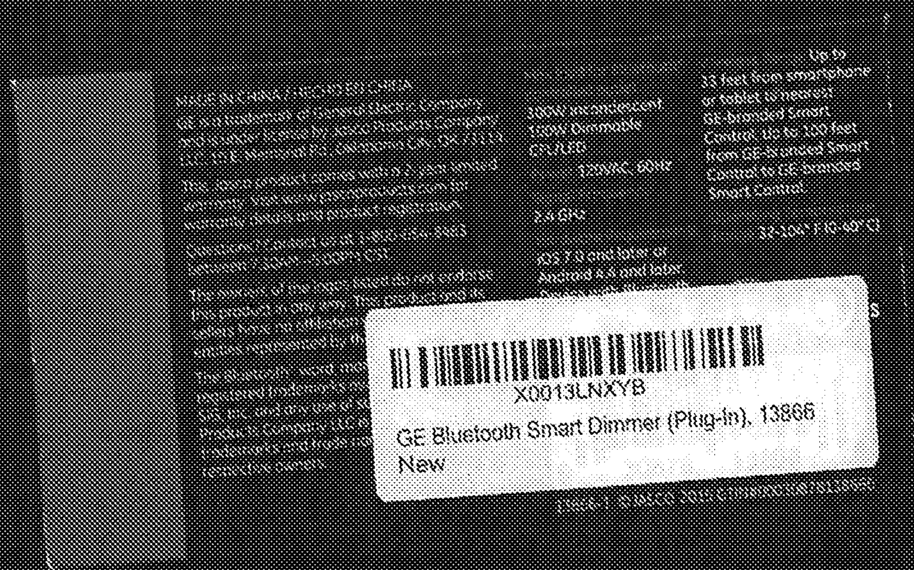
Exhibit F


13866*
Smart Dimmer
Use with any mobile device!
Free app download required for use.
Bluetooth
SMART


avi-on
Wirelessly control lights from your smartphone or tablet.
Lights turn on and off at random times to create a lived in look.
Program lights to automatically turn on or off even when your phone is off or out of range.
Turns off after pre-set amount of time so you never leave lights on again.
Turn lights on and off at actual dusk and dawn times in your area with automatic seasonal adjustments.
Manual On, Off, and Dim Button
Bluetooth® controlled outlet on the side to accomodate narrow spaces such as behind furniture
Leaves second outlet free for use
Save Energy, Save Money
Full Range Dimmability


Works with dimmable LED, CFL,
halogen and incandescent bulbs
Control, adjust brightness and
schedule table and floor lamps
Plug-in anywhere indoors


Bluetooth® Smart
wireless mesh network provides
coverage for your entire home!
Each GE-branded Smart Control repeats the signal up to 100 feet. Adding additional GE-branded Smart Controls extends the range of your Bluetooth® network for whole home wireless control.
Simply add more GE-branded Smart Controls to increase the size of your Bluetooth® wireless network.
Scan code to view product
details and features video
EZbluetoothoverview.com


MADE IN CHINA / HECHO EN CHINA
300W incandescent
100W Dimmable CFL/LED
120VAC, 60Hz
2.4 GHz
X0013LNXYB
GE Bluetooth Smart Dimmer (Plug-In), 13866
New

bookofjoe

« The sundial returns | Home | BehindTheMedspeak: 'Beating Back Cancer... Again' »

October 14, 2004

Timex Digital On-Off Lamp Timer

Very cool device.

For $19.99, you get a timer that lets you set an exact time for on/off, unlike other plug-in lamp timers.

You set it just like a digital alarm clock and then plug in your lamp - or any appliance up to 600W - to turn it on and off once per day.

They also have a 7-day version that will vary the on/off times daily, to make your empty home seem even more inhabited.

October 14, 2004 at 10:01 AM | Permalink

TrackBack

TrackBack URL for this entry:
http://www.typepad.com/t/trackback/1222407

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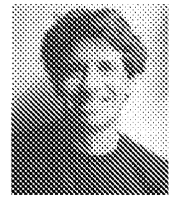

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October 14, 2004

Timex Digital On-Off Lamp Timer

Very cool device.

For $19.99, you get a timer that lets you set an exact time for on/off, unlike other plug-in lamp timers.

You set it just like a digital alarm clock and then plug in your lamp - or any appliance up to 600W - to turn it on and off once per day.

They also have a 7-day version that will vary the on/off times daily, to make your empty home seem even more inhabited.

October 14, 2004 at 10:01 AM | Permalink

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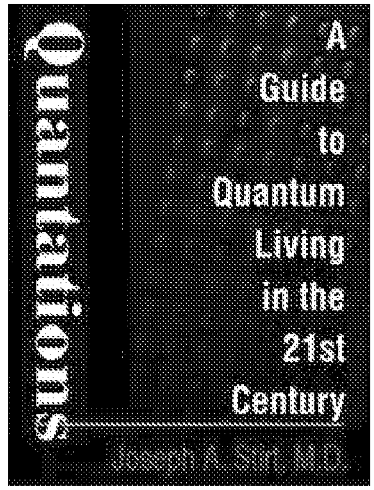
Comments

I am trying to get an instruction sheet for setting this lamp on,off control

Posted by: Ray Martin | Oct 3, 2009 8:21:09 PM

I, too, have a Timex Digital On-Off Timer and I don't have instructions on how to set the thing. Help.



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Carolyn

Model # 12/874 (tx12693ta

Posted by: carolyn | Mar 30, 2009 6:17:46 PM

I have the timer pictured above and have lost the instructions for programming it. I plugged it in to charge and now I can't get it to do anything else. It says 18:88 and won't budge. Can someone help me to set it?

Thanks,
Connie

Posted by: Connie | Nov 30, 2008 12:43:52 AM

Susan Pfeuffer, Have you tried Rebooting your Pc? Your internal PC clock's time keeping quarts crystal can be osclating out of time with your Timex Timer. That can cause the above error that you found. Report back as to how this worked for you in case we have to try new options.

Posted by: RocketReturns | Nov 11, 2008 12:17:18 PM

Well, Suze, you could wait a few more months, you know, after Christmas, like, and go to Target or Macy's or Walgreen's or KMart or Walmart or BestBuys or one of those kinds of places, whether they sell those or not, and tell 'em its a present but the dang thing don't work and didn't even work after you adjusted the hell out of it, and you want a new one by God. Just walk right in and tell em that, don't bother bringin a receit or the old dead one. Theyll probably just hand you one right over. Shoot, tell the manger you need more than one. Works for me.

Posted by: Flutella's Shoppin Skool | Nov 11, 2008 12:48:23 AM

I just brought a brand new Timex about 2 months ago and the model number is 12-879. It dont even work. The timer moves too slow or too fast and i've adjusted several times and it still not working. I dont remember where i brought this... i think it was at Target or Walmart but how can i return it or can you send me a new one if i send this to you?

Please let me know
Thanks

Posted by: Susan Pfeuffer | Nov 10, 2008 11:47:32 PM

Do you have any such timers the same color as the plug cover?

Posted by: Jim Roberts | Oct 15, 2007 3:53:30 PM

We are a medical device mfr. We are looking to replace a mechanical 0-30 minute timer with a relay to turn the system on or off.

Any suggestion. We will need about 100 per yr

Posted by: Aftab Kapadya | Jul 26, 2006 6:24:20 PM

February 20, 2018

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sir-this is a suggestion-on ur timers u might want to add a red indicator light to tell if the timer is on-in my case the timer was on but the light bulb was burned out-the indicator light would only go on when the timer goes on- i have the model 12-879

Posted by: robert arenson | Dec 6, 2004 7:02:51 PM

The comments to this entry are closed.

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4980-2

EN
This Datasheet is presented by the manufacturer

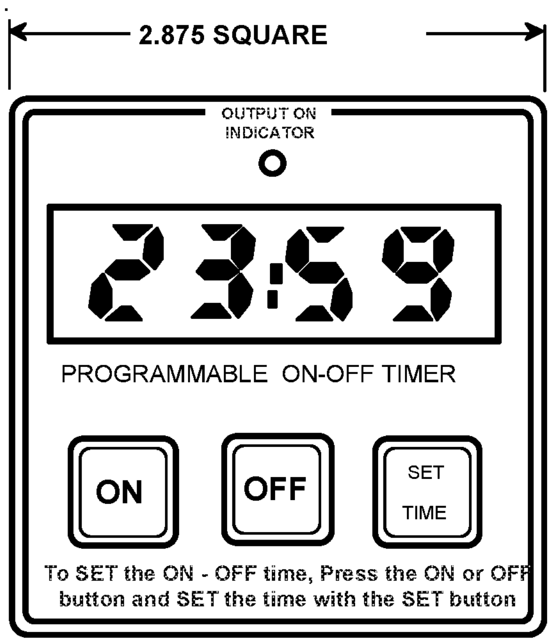
DE
Dieses Datenblatt wird vom Hersteller bereitgestellt

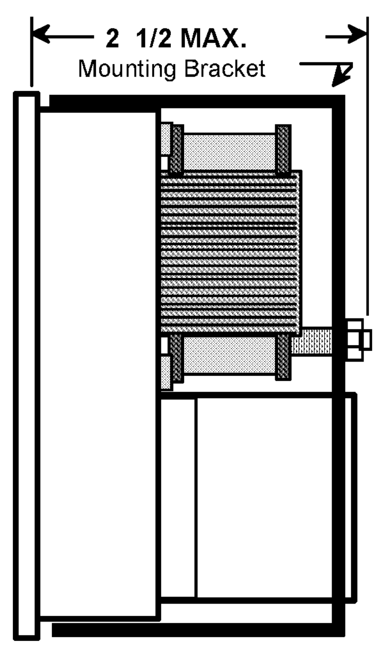
FR
Cette fiche technique est présentée par le fabricant

4980 Programmable Repeat Cycle ON - OFF Timer

The model 4980 is a microcontroller based ON - OFF timer with digital display of timing. The 4980 controls a set of high current output contacts in accordance with a pre-programmed ON-OFF schedule which continues for as long as power is applied. During an ON cycle the output relay is energized and the display will countdown to zero, at which time the output relay de-energizes and the OFF period begins. The ON and the OFF time can be programmed to be any time from 1 second to 99 minutes and 59 seconds in 1 second increments. When operating in the ON portion of the ON - OFF cycle, an LED INDICATOR on the front panel will be ON, turning OFF when operating in the OFF portion of the cycle. When the timer is operating in both the ON and OFF portion of the timing cycle the digital display will count down in minutes and seconds. When the time reaches 00:00 the next cycle is automatically displayed and the countdown proceeds. At 00:00 the output contacts reverse their state corresponding to whether an ON or an OFF portion of the cycle is scheduled next. When a timing cycle is in progress, pressing the ON or OFF switch will display the time that was originally programmed. This action in no way interferes with the timing cycle that is in progress. To program a new ON or OFF time the SET TIME switch may be pressed while holding down the ON or OFF switch. The SET TIME switch advances the time only. By holding the SET SWITCH down the speed of the timing change increases permitting rapid programming. As the desired time is approached the SET TIME switch may be tapped to advance the time by increments of 1 second. At 99:59 the time rolls over to 00:00. When finished programming the model 4980 will keep the new time in memory without the aid of batteries. The new programmed time will always begin with the next cycle. Upon powerup, the 4980 can be programmed to complete the last cycle in progress before a power interruption or reset to the beginning of the ON cycle.

Mechanical . . . .





Solid State Timers and Controllers

Specifications

Operating Voltage: 12V DC (10V - 18V DC) (-1),
115V AC 50/60Hz. (105V - 135V AC) (-2),
230V AC 50/60Hz. (208V - 250V AC) (-3) See *Ordering Information.*

Operating Current: 300mA maximum for 12V DC model, 3 watts for AC models.

Timing Mode: Programmable Repeat Cycle ON - OFF.

ON - OFF Time Base: Three (4) time base selections can be changed by the user:
00:01 - 99:59 minutes : seconds (Code 1 or 5)
0001 - 9999 seconds (Code 2 or 6),
00:01 - 99:59 hours : minutes (Code 3 or 7).

Time Base Memory: Time base programmed remains as the operating time base even after operating voltage has been interrupted.

Timing Accuracy: ±.5% of ON - OFF setting.

Digital Display: Four (4) digit red LED, 0.5 inch high characters displays the time remaining in both the ON and OFF cycle when in progress.

Timing Cycle Memory: Preset ON - OFF times kept in non-volatile memory, When the timer is programmed with codes 1 - 3, the timing cycle is backed up to the last five (5) second tick for restoration on recovery from a power failure, which can last indefinitely. When the timer is programmed with codes 5 - 7, the timer will always powerup at the beginning of the ON cycle.

Front Panel Indicator: An LED INDICATOR is ON when the ON timing period is in progress and the output contacts energized.

Front Panel Switches: Three (3) momentary push-buttons behind front panel label overlay. Two (2) for selecting the ON or OFF period. One (1) for setting the time.

Output: SPDT Power relay contacts.

Output Contact Rating: Normally Open Contacts: Rated for 20 amperes inductive or resistive at 125 or 240 VAC and 30V DC, 6 amps inductive or resistive at 277 VAC. 2 HP motor load at 240 VAC, 1 HP motor load at 125 VAC, 6 amperes ballast load at 125 or 277 VAC, 60 amps LRA at 240 VAC, 20 amperes FLA at 240 VAC. Normally Closed Contacts: rated for 10 amperes inductive or resistive at 125 or 240 VAC, 3 amps inductive or resistive at 277 VAC, 10 amps inductive or resistive at 30 VDC, 1/2 HP motor load at 240 VAC, 1/4 HP motor load at 125 VAC, 3 amperes ballast load at 125 or 277 VAC, 33 LRA at 240 VAC, 10 amperes FLA at 240 VAC.

Timing Indication: When Min:Sec, or Hrs:Min are selected, the ':' in the display blinks to indicate timing in progress.

Operating Temperature: 0°C to 70° C.

Mounting: 2.62 sq. cutout accepts timer. Timer secured with rear attached bracket & nut. (hardware supplied)

Wiring: Three (3) .25" Quick Connect terminals for power relay connections, two (2) #18 AWG wires, 12 inches long for operating voltage.

Transient Protection: Operating voltage input circuit protected by silicon transient suppressors responding to transients within 1×10^{-12} seconds to a peak pulse power dissipation of 1500 watts, with transient surge currents to 200 amperes for durations up to 1/120 second at 25°C. Maximum transient voltage protection is 6000 volts as delivered through a source resistance of 30 ohms with a maximum duration of 8.3ms.

Data Sheet Revision Date: October 1, 2010

Artisan Controls Corporation, 111 Canfield Ave., Bldg B15-18, Randolph, New Jersey 07869, USA

Wiring

Two wires that are already connected to the model 4980 are the operating voltage wires. When operating from DC voltages, there is no need to observe polarity of the plus and minus voltage, merely connect the AC or DC operating voltage to the two wires supplied. The relay contact wiring is found atop the power relay, providing three .25 quick connect terminals for the SPDT contacts. There is no electrical connection between the three relay contacts and the two operating voltage wires.

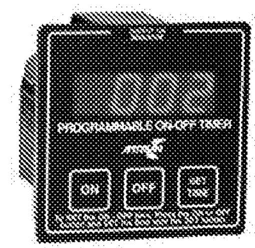
Changing The Time Base

The model 4980 is shipped from the factory preset to the Code 3 time base of 99:59 Hours : Minutes. To program another time base perform the following steps:

1. Turn the power OFF.
2. Press the **[OFF]** button while turning the power ON.
3. Release the button after the display turns ON.
4. A number from 0 to 7 will appear. This number corresponds to:
   - 1 = 00:01 - 99:59 min : sec, Continue last cycle on powerup.
   - 2 = 0001 - 9999 sec, Continue last cycle on powerup.
   - 3 = 00:01 - 99:59 hr : min, Continue last cycle on powerup.
   - 5 = 00:01 - 99:59 min : sec, Restart to the ON cycle on powerup.
   - 6 = 0001 - 9999 sec, Restart to the ON cycle on powerup.
   - 7 = 00:01 - 99:59 hr : min, Restart to the ON cycle on powerup.
5. Use the **[ON]** button to select the desired time base code.
6. Turn the power OFF.
7. Wait 2 seconds.
8. Turn the power ON. The model 4980 will remain in the new time base programmed until reprogrammed as above.

Ordering Information

Model	Operating Voltage	
4980 -	-1 (12V DC) -2 (120V AC) -3 (230V AC)	All versions of the model 4980 can be programmed with one of three time bases.



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4980-2

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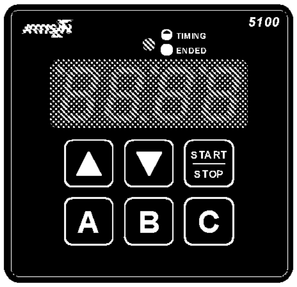

5100 Configurable Countdown Timer

The 5100 is an Artisan 4970 controller with the addition of three preset times. This highly flexible countdown interval timer with digital display controls a set of high current output contacts. The timing cycle range can be configured for the following: 00:01-99:59 Minutes:Seconds, 00:01-99:59 Hours:Minutes, 0001-9999 Seconds, and 00.01-99.99 Seconds. The two arrow buttons on the front panel are used to set the time, the Up button increases the time and the Down decreases it. The longer a button is held down the faster the rate at which the time value will change, the time value rolls around at both ends of the time range. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values.

The Start/Stop button performs multiple functions. Pressing the Start/Stop button while the timer is idle will energize the output power relay contacts and the controller begins counting down the time on the display, once the display reaches 0 the contacts de-energize and the unit alarms per it's configuration option. Pressing the Start/Stop button while the controller is timing will pause the controller at the current time and de-energize the output relay contacts. Pressing the Start/Stop button while in pause mode causes the output relay to energize and the controller continues timing from the point at which it was paused. Should the Start/Stop switch be held down for longer than two seconds while in pause mode the controller will reset and the display will return to the original starting time.

Should power fail during a timing cycle the controller remembers the last time value and will recover upon restoration of power dependant on its configuration. The 5100 always remembers the last interval time programmed and when first powered up resets to that time. The LED above the 4 digit display flashes during the timing cycle to indicate timing and is on continuously when the cycle is ended. *The 5100 can be configured with a variety of time ranges, timing adjustment, alarming, power recovery, and power conservation options, see the second page for details. The 4 digit LED display is available in Red (standard), Green, and Blue.*

Specifications . . . .

Operating Voltage: 12VDC -10/+20%, 115VAC ±15%, 230VAC ±15%, 24VAC ±10%, 50/60 Hz for AC.
Current Consumption: See table for operating current at nominal input voltages; Idle = display on, Timing = display & relay on, Standby = display off (option LP:02 selected)
Timing Accuracy: ±0.5% of set time.
LED Digital Display: Four digit LED, 0.56" characters. Red = standard, green and blue available.
Timing Cycle Memory: All data stored in non-volatile memory, 10 yr. min. retention with no power.
Audible Alarm: Solid state alarm operating dependant on unit configuration.
Output Contact Ratings: See table below for various load types and voltages.
Mounting: 2.63 sq. cutout accepts timer which is secured with supplied bracket & nut. Mounting nut must be tightened to 3 inch pounds maximum.
Agency Listing: Model 4970 is listed under UL File E47858 Appliance Controls - Component ATNZ2 (US) & ATNZ8 (Can), the Model 5100 is identical with three additional switches and modified software, .

c UL us

Wiring: .25" Quick Connect terminals.
Operating Temperature: 0°C to 70°C.
Data Sheet Revision Date: August 21, 2013

	Operating Current (mA)		
	Idle	Timing	Standby
12V DC	55	135	20
115V AC	22	30	19
230V AC	10	15	8.0
24V AC	105	150	95

	Output Contact Ratings	
	NO Contacts	NC Contacts
Resistive Inductive	20A @ 125/240VAC, 30VDC 6A @ 277VAC	10A @ 125/240VAC, 30VDC 3A @ 277VAC
Motor	2HP @ 240VAC 1HP @ 125VAC	½HP @ 240VAC ¼HP @ 125VAC
LRA/FLA	60A LRA @ 240VAC 20A FLA @ 240VAC	33A LRA @ 240VAC 10A FLA @ 240VAC
Ballast	6A @ 125/277VAC	3A @ 125/277VAC

Ordering Information . . . .

Model -	Voltage -	Display Color
5100	**-1** = 12V DC **-2** = 115V AC **-3** = 230V AC **-4** = 24V AC	**-R** = Red **-G** = Green **-B** = Blue

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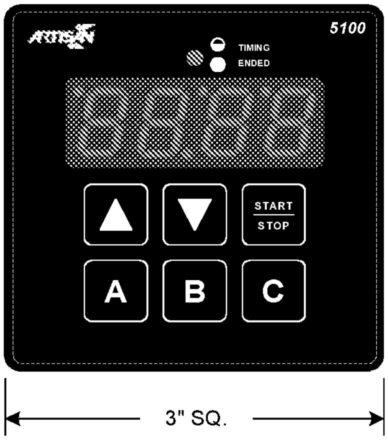
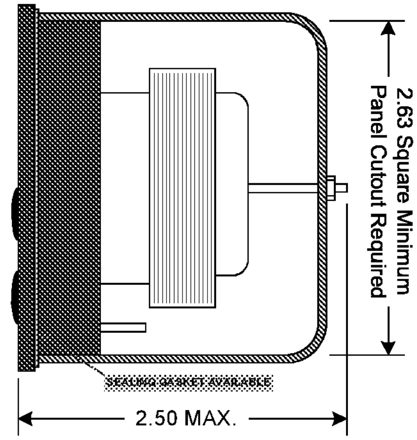
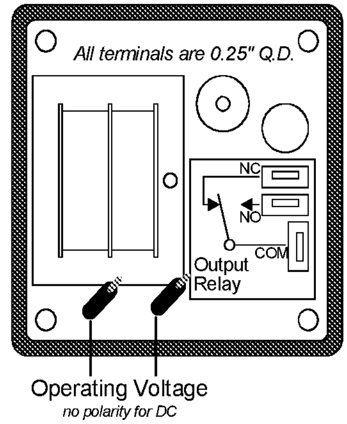
Tel: 973-598-9400 • Fax: 973-598-9410 • Toll Free: 800-457-4950
Artisan Controls Corporation, 111 Canfield Ave, Bldg B15-18, Randolph, New Jersey 07869, USA

Mechanical . . . . Wiring . . . .







Configuration . . . .

The 5100 controller provides many configuration options allowing the OEM to customize it's operation for their application. Holding the Down button when applying the input power places the controller into configuration mode. In this mode, the controller displays a two character code and a two digit value for each option. Pressing the Start/Stop button advances to the next option. Press the Up or Down buttons to change the option code or time value according to the range of the item being configured. Once the options have been set, remove and re-apply power with no buttons pressed to operate the controller with its new configuration. *The 5100 is supplied from the factory configured with the italicized option codes below and all time values set to 0.*

Timing Cycle Range	
rA:00	*Minutes:Seconds, 00:01 to 99:59*
rA:01	Hours:Minutes, 00:01 to 99:59
rA:02	Seconds 1 to 9999
rA:03	Seconds 0:01 to 99.99
rA:04	Minutes 1 to 9999
rA:05	Hours 1 to 9999

Cycle Time Adjustment	
CA:00	*Full time range available*
CA:01	Adjustable between limits
CA:02	Timing fixed

Time Adjustment Increment	
tI:XX	Time increment value, *default = 1*

Lower Limit or Fixed Time	
- - - -	*Disabled by code CA:00*
XXXX	Displays Lower Time Limit for CA:01
XXXX	Displays Fixed Time for CA:02

Upper Limit Time	
- - - -	*Disabled by code CA:00 or CA:02*
XXXX	Displays Upper Time Limit for CA:01

Output Type	
Ot:00	*Output relay on during timing*
Ot:01	Relay on for end notification length
Ot:02	Relay on for 1 second @ end
Ot:03	Relay always off

Cycle End Notification	
CE:00	*Triple beep for 5 Seconds*
CE:01	Triple beep until key pressed
CE:02	Continuous tone for 5 Seconds
CE:03	Continuous tone until key pressed
CE:04 - CE:07	Same as above with display flash

End Notification Length	
EL:05	Length of notification, *default = 5 sec*

LED Display Power	
LP:00	*LED display always on*
LP:01	Display dims after 1 minute in idle mode
LP:02	Display OFF after 1 minute in idle mode

Recovery from Power Interruption	
Pr:00	*Return to last time, output on, continue timing*
Pr:01	Return to last time, output off, in pause mode
Pr:02	Return to full cycle time, ready for new cycle

Alarming Notification	
AL:00	*No alarming enabled*
AL:01	Triple beeping
AL:02	Continuous tone
AL:03	Triple beeping with display flash
AL:04	Continuous tone with display flash

Alarm Duration	
Ad:00	*Disabled by code AL:00*
Ad:XX	Alarm length in seconds, 01 - 99

Alarm Time	
- - - -	*Disabled by code AL:00*
XXXX	Displays alarm time for AL:01-AL:04

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

U.S. Patent No. 9,320,122	§	
Issued: Apr. 19, 2016	§	**37 CFR 1.501 Citation of prior art and written statements in patent files**
For: PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER	§	
Patentee: Cantingy Lighting Control, LLC	§	
Art Unit: 2841 (for	§	

<u>Rule 501 citation of prior art and written "claim scope statements" in U.S. Pat. No. 9,320,122</u>

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Cantigny Lighting Control, LLC's ("Cantigny") owns U.S. Patent No. 9,320,122 ("the '122 patent")(Real/Frame: 038505/0163).[1] Mid-2016, Cantigny sued Jasco Products Company, LLC ("Jasco") for infringement of the '122 patent in the District Court for the Northern District of Illinois, Eastern Division (<u>Civil Action No. 16-cv-05794</u>). Cantigny's complaint in that lawsuit contains multiple

[1] Cantigny "holds total legal ownership" of the '122 patent. The inventor and patent attorney of record, John Joseph King, formed Cantigny as "a vehicle for the development of consumer products using his inventions in light timing technology." Document #1, page 1, ¶ 1, *Cantigny v. Jasco* (case no. 1:16-cv-05794).

infringement contentions and associated "claim scope statements" that are now made of record pursuant to 35 U.S.C. § 301 and 37 C.F.R. § 1.501 ("rule 501"). Importantly, Cantigny's overreach on the scope of its claims causes the claims to encompass prior art that was not considered by the USPTO before it decided to allow the '122 patent. Such prior art was presumably overlooked during the Examiner's patentability search and examination of the patented technology because the USPTO and Cantigny took a much narrower position on the claims during prosecution than Cantigny now takes in the Federal Courts and in the marketplace. Moving forward, fairness, equity, and rule 501 demand that Cantigny either (1) explain its forum-dependent positions on claim scope and state for the record the limitations of its claims via its own Rule 501 citation or (2) otherwise be held to its invalidatingly expansive positions on claim scope during any reexaminations or *inter partes* reviews of this patent. *See* MPEP § 2202 ("The basic purpose for citing written claim scope statements is to ensure that the patent owner takes consistent positions regarding the scope of the claims of a particular patent in the courts and before the Office.").

Respectfully Submitted,

Bryce A. Johnson
/*Bryce A. Johnson*/
Reg. No. 74,733

March 14, 2018
Date

Table of Contents

I. Background & Introduction

The '122 patent issued on April 19, 2016 with all claims limited to "programmable **light timer[s]**" (emphasis added).[2] Almost immediately after issuance, Cantigny sued Jasco for infringement of the '122 patent (Civil Action No. 1:16-cv-05794). The accused product was a general-purpose programmable **power-outlet timer** called the "myTouchSmart™ Indoor/Plug-In Digital Timer." *See* Table 1:

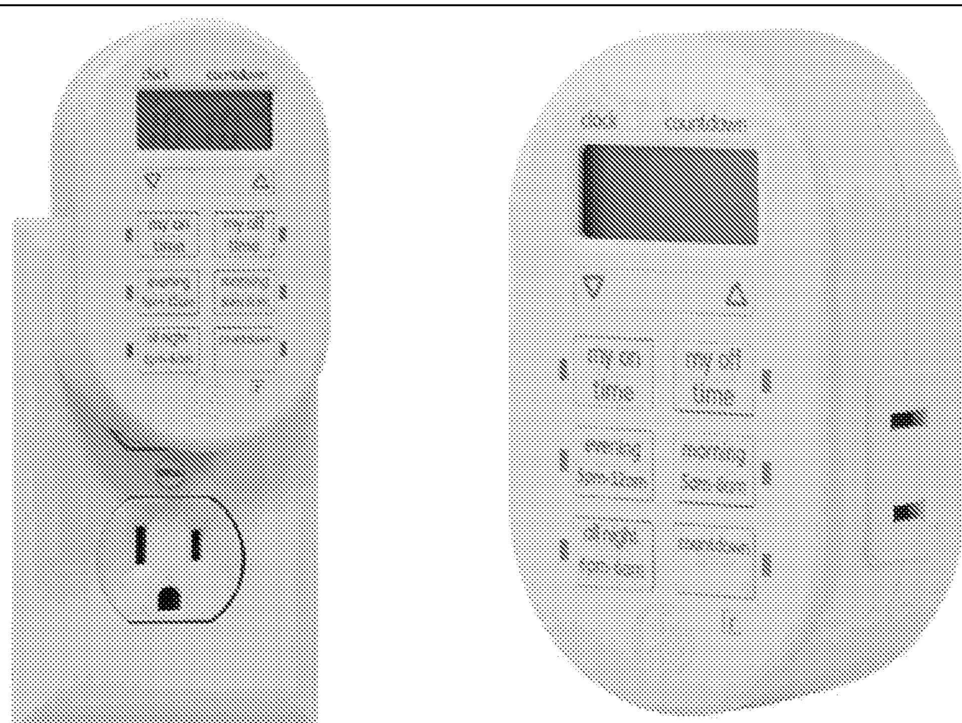


Table 1: Jasco's "myTouchSmart™ Indoor/Plug-In Digital Timer." ***See*, e.g., Document #1-5, page 2, *Cantigny v. Jasco* (case no. 1:16-cv-05794).**

[2] Independent claims 1 and 8 are directed to a "programmable light timer;" independent claim 15 is a method of implementing a "programmable light timer;" each of the three independent claims 1, 8, and 15 recite the term "programmable light timer" six times.

Cantingy also accused a general-purpose in-wall timer called "MyTouchSmart™ In-Wall Digital Timer" of infringing the '122 patent.

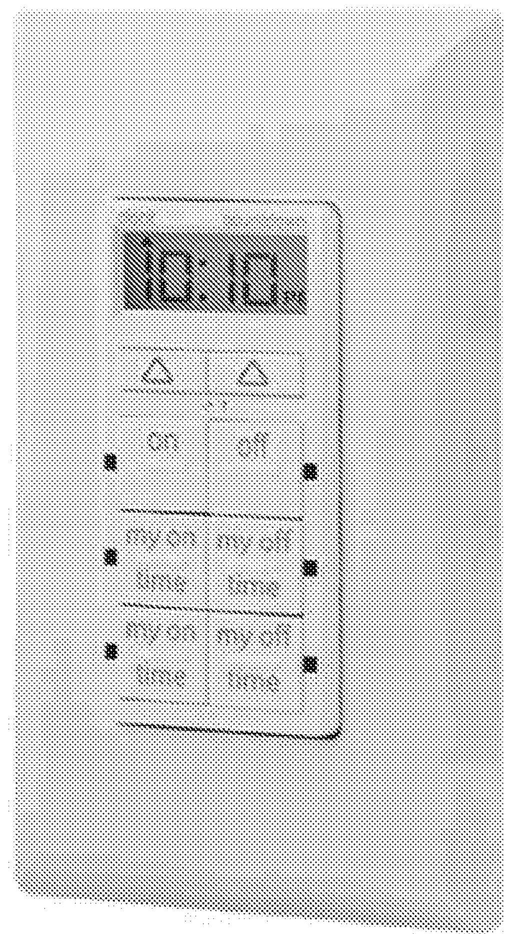


Table 2: Jasco's "myTouchSmart™ In-Wall Digital Timer." ***See*****, e.g., Document #1-4, page 2,** ***Cantigny v. Jasco*** **(case no. 1:16-cv-05794).**

Cantigny's infringement contentions and associated "claim scope statements" underlying the lawsuit against Jasco were extremely disingenuous considering how the patent was prosecuted at the Patent Office.

On one hand, Cantigny prosecuted the '122 patent at the Patent Office with a narrow claim scope limited to **programmable light timers**. **Light timers** are not stand-alone devices because they have a specific purpose related to lighting and therefore must be built-in or hardwired to a lamp or lighting circuit. For this reason, the Patent Office appears to have only Examined the claims against prior art in just one USPC technology class for lamps (class 315 (Electric lamp and discharge device)) before deciding to grant this patent.[3] Cantigny's taking such a narrow position on claim scope at the Patent Office made it easier to obtain the patent because there was a limited class of prior art for the Patent Office to consider[4] when weighing the patentability of the claimed **light timers.**

On the other hand, Cantigny now asserts the '122 patent in the Federal Courts and in the marketplace with an extremely broad claim scope that includes general-purpose **programmable power-outlet timers**. General-purpose **power-outlet timers** are not limited to lighting and have long predated the '122 patent. Many such timers are stand-alone auxiliary power-sockets that are not built-in or

[3] Indeed, the front of the '122 patent shows a "Field of Classification Search" with only one USPC technology class (class 315). The "Examiner's search strategy and results," and "Search information including classification, databases and other search related notes" of Mar. 1, 2016 in the File History prove (1) that no other classes besides class 315 were searched for relevant prior art by the USPTO prior to issuing the '122 patent and (2) that the claims were prosecuted by Cantigny in just the one USPC class 315 for **light timers**. Every independent claims recites "programmable light timer" at least six times.

[4] The Patent Office also appears to have omitted to consider highly-relevant prior art submitted by Information Disclosure Statement (IDS) because the listed prior art was not in the same technology class of the narrowly prosecuted claims.

hardwired to anything. General purpose power-outlet timers simply plug-in to a power-outlet auxiliary to any type of electrical appliance. For instance, general-purpose **power-outlet timers** have been used since at least the 1980's to provide: programmed timing control to TV show schedules (before DVRs and cable boxes), programmed lawn-watering schedules for sprinkler systems, programmed cook-times for crockpots or toasters, and programmed ON/OFF timing of Christmas-light-strings. So, general-purpose **power-outlet timers** fall in several different patent classes and they were not considered – even though they should have been prior art according to the '122 patent holders own view of its invention formed after prosecution. *See*, e.g., U.S. Patent classes 368 (Horology: time measuring systems or devices), 307 (Electrical transmission or interconnection systems), 323 (Power supply or regulation systems), 361 (Electrical systems and devices), 200 (Electricity Circuit makers and breakers), 336 (Electronic digital logic circuitry), 174 (Electricity: conductors and insulators), or 315 (Electric lamp and discharge device).[5] Given that the Patent Office only looked for prior art in one relevant technology class before granting the '122 patent, Cantingy's broad position on claim scope in the Federal Court opens the patent claims to validity challenges by new prior art in new technology classes that were not considered by the Patent

[5] This is not an exhaustive list of patent classifications for general purpose power outlet timers. These exemplary power-outlet timer classes were taken from the field of search listed in Several U.S. Patents for power-outlet timers like Jasco's "myTouchSmart™ Indoor/Plug-In Digital Timer."

Office. Basic searching of general purpose power-outlet timer classes nearly immediately reveals on-point prior art under 35 USC §§ 102 or 103.

Cantigny's forum-dependent position on claim scope is academically disingenuous. If validity of the '122 patent is challenged in the Federal Courts, then Cantigny can rely on a heavy presumption of patent validity and a fact-finder who is not necessarily familiar or savvy with the laws of patentability would be badly misled into thinking broadly scoped claims of an issued patent define a novel invention. On the other hand, if the validity of the '122 patent is challenged at the Patent Office, then Cantigny could make invalidating the patent more difficult by relying on the very narrow claim scope position it used to originally prosecute the patent. Such inconsistency is unfair and not consistent with the purposes of the Patent Act.

Fortunately, Rule 501 holds patent owners accountable for these types of inconsistent forum-dependent claim scope positions. By rule, Cantigny's expanded position on the claim scope in the Federal Courts can be made known to the Patent Office and then used to challenge the '122 patent at the Patent Office during *ex parte* reexamination or *inter partes review*. *See* MPEP § 2202 ("The basic purpose for citing written claim scope statements is to ensure that the patent owner takes consistent positions regarding the scope of the claims of a particular patent in the courts and before the Office."). The relevant claim scope statements and samples of invalidating prior art are thus submitted so that Cantigny can either (1) state for the record the "light timer" limitations of its claims via its own Rule 501 citation or (2) otherwise be held to its invalidatingly expansive positions on claim scope during any reexaminations or *inter partes* reviews of the '122 patent.

II. Requirements for Rule 501 citations of prior art and "claim scope statements"

With regard to "claim scope statements," 37 CFR § 1.501 (a)(2) through (b)(1) reads:

> (a) Information content of submission: At any time during the period of enforceability of a patent, any person may file a written submission with the Office under this section, which is directed to the following information:
>
> > (1) Prior art consisting of patents or printed publications which the person making the submission believes to have a bearing on the patentability of any claim of the patent; or
> >
> > (2) Statements of the patent owner filed by the patent owner in a proceeding before a Federal court or the Office in which the patent owner took a position on the scope of any claim of the patent. Any statement submitted under this paragraph must be accompanied by any other documents, pleadings, or evidence from the proceeding in which the statement was filed that address the written statement, and such statement and accompanying information under this paragraph must be submitted in redacted form to exclude information subject to an applicable protective order.
> >
> > (3) Submissions under paragraph (a)(2) of this section must identify:

(i) The forum and proceeding in which patent owner filed each statement;

(ii) The specific papers and portions of the papers submitted that contain the statements; and

(iii) How each statement submitted is a statement in which patent owner took a position on the scope of any claim in the patent.

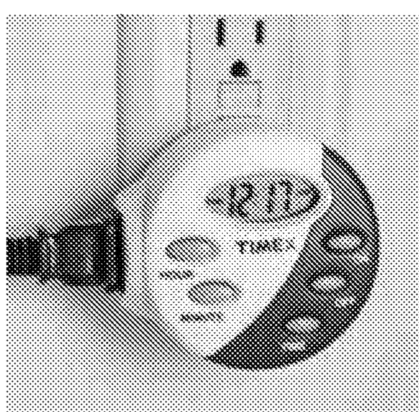
(b) Explanation: A submission pursuant to paragraph (a) of this section:

(1) Must include an explanation in writing of the pertinence and manner of applying any prior art submitted under paragraph (a)(1) of this section and any written statement and accompanying information submitted under paragraph (a)(2) of this section to at least one claim of the patent, in order for the submission to become a part of the official file of the patent

A. Prior art that has a bearing on the patentability of the '122 patent claims

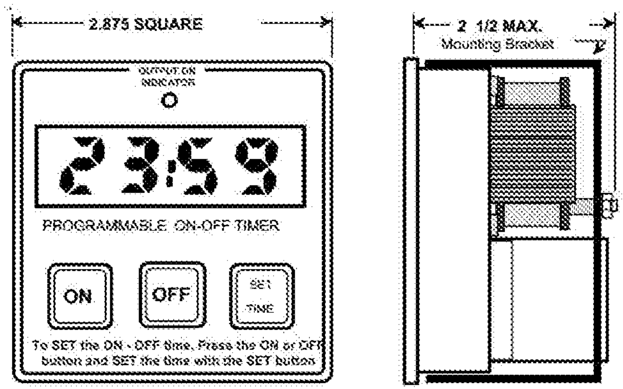
The following general purpose timers bear on the patentability of the '122 patent claims:

Prior art #1



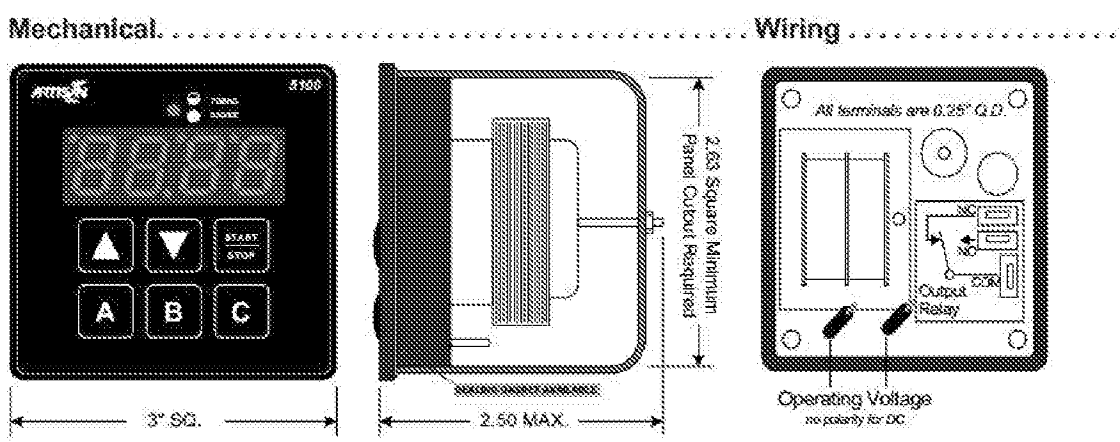
"Timex Digital ON-OFF Lamp Timer" (published Oct. 14, 2004), Web page < http://www.bookofjoe.com/2004/10/timex_digital_o.html>, 2 pages, Oct. 18, 2004, retrieved from Internet Archive Wayback Machine <http://wayback.archive.org/web> on Feb. 26, 2018.

Prior art #2



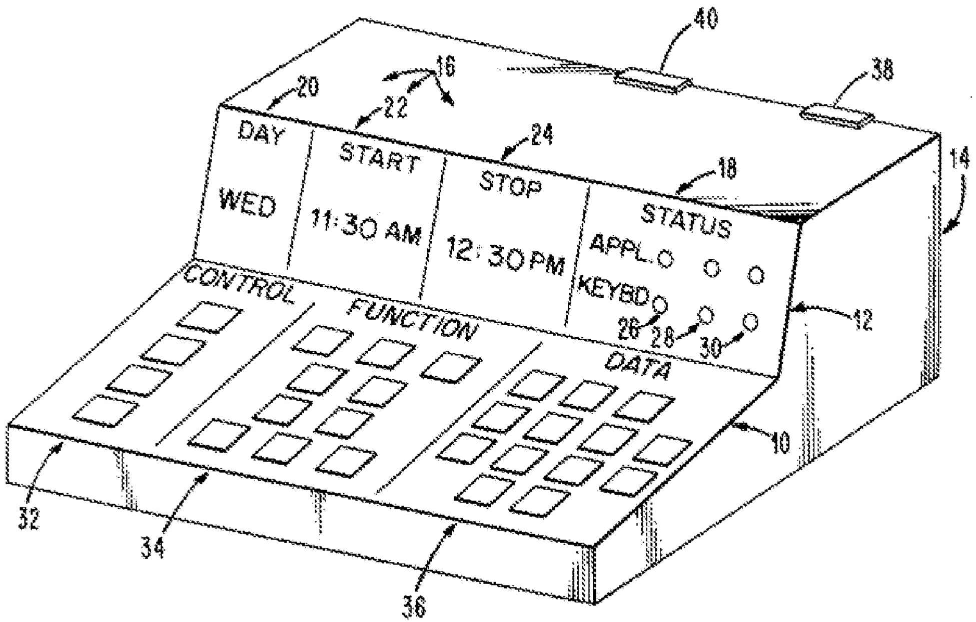
Data Sheet for "4980 Programmable repeat cycle ON-OFF timer" (published Oct. 1, 2010) (pages 1-5) by *Artisan Controls Corporation*, 111 Canfield Ave., Bldg B15-18, Randolph, New Jersey 07896, U.S.A.

Prior art #3



Data Sheet for “5100 Configurable countdown timer” (published Aug. 21, 2013) (pages 1-2) by *Artisan Controls Corporation*, 111 Canfield Ave., Bldg B15-18, Randolph, New Jersey 07896, U.S.A.

Prior art #4



U.S. Pat. No. 4,279,012(issued Jul. 14, 1981) by *Beckerdorff et al.* for a “programmable appliance controller.”

B. Claim scope statements made in Federal Court.

Cantigny’s claim scope statements or written positions on claim scope are repeated below:

Statement 1:

> “The first type of infringing product permits the user to set the time, and program separate ON and OFF times. This feature is present in

> the GE MyTouchSmart™ Indoor Plug-In Digital Timer, GE MyTouchSmart™ In-Wall Digital Timer,… ('the Programmable Timers')."

Cantigny v. Jasco, Case: 1:16-cv-005794, Complaint, Document #1, page 3, ¶ 9.

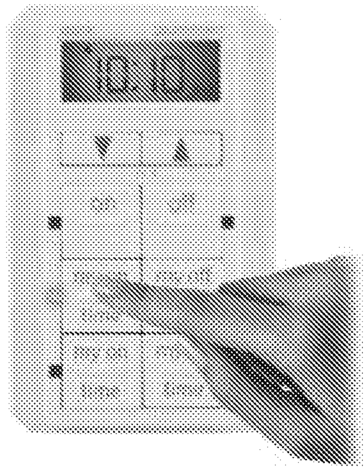
Statement 2:

> "Jasco has directly infringed and continues to directly infringe at least claims 1, 6 and 7 of the '122 patent through using, selling and/or importing the Programmable Timers…."

Id., page 4, ¶ 14.

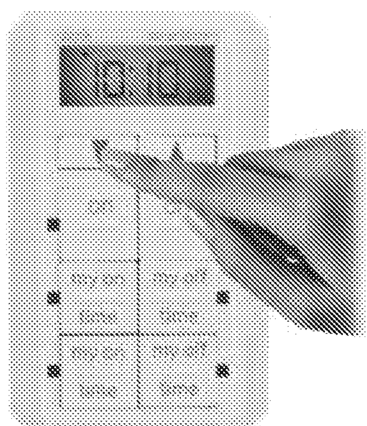
Statement 3:

> "Claim 1 is an infringed claim. Claim 1 is infringed by the Programmable Timers. The exemplar of infringement is the MyTouchSmart™ In-Wall Digital Timer. The preamble of claim 1 states: "A programmable light timer for implementing a timing pattern, the programmable light timer comprising[.]" The MyTouchSmart™ In-Wall Digital Timer is a programmable timer. The use described for the timer on the Jasco website is "replac[ing]existing light switch." Exhibit C [Document #1-3], Features. Steps two and three of the setup description in Exhibit D [Document #1-4], demonstrate setting the time and setting custom on and off times, and states that "[a]ll programmed times will run simultaneously in a 24 hour day." (Exhibit D [Document #1-4]).



The product also explicitly describes controlling lights in step 4, the manual override. The product is, therefore, a programmable light timer, which implements user-input timing patterns.

The first element of the claim is "an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer." Step 2 of Exhibit [D] [Document #1-4] demonstrates using the actuators (the up and down arrows) to set the time.



The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The MyTouchSmart™ In-Wall Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the two available user programs.

The second element of the claim is "a control circuit coupled to the actuator[.]" The MyTouchSmart™ In-Wall Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.

The third element of the claim is "a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display[.]" The MyTouchSmart™ In-Wall Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.

The fourth element of the claim is "a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time[.]" The "my on" time buttons are each programmable to have an on time.

The final element of the claim is "a second button on the user interface of the programmable timer, wherein the second button is programmable to have an off time." The "my off" buttons are each programmable to have an off time.

As each element of claim 1 is present in the MyTouchSmart™ In-Wall Digital Timer, claim 1 of the '122 is infringed by the MyTouchSmart™ In-Wall Digital Timer. All of the Programmable Timers infringe this claim.

Claim 6 calls for "The programmable light timer of claim 1 further comprising a third button having a pre-stored timing pattern." The GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer each have such a third button, including programs such as "evening" or "morning". These two products also infringe claim 6.

Claim 7 calls for "The programmable timer of claim 1 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer." The 'on' switch on the MyTouchSmart™ In-Wall Digital Timer overrides the timing

> pattern. The MyTouchSmart™ In-Wall Digital Timer infringes claim 7."

Complaint, Document #1, page 4, ¶ 15 through page 7, ¶ 23.

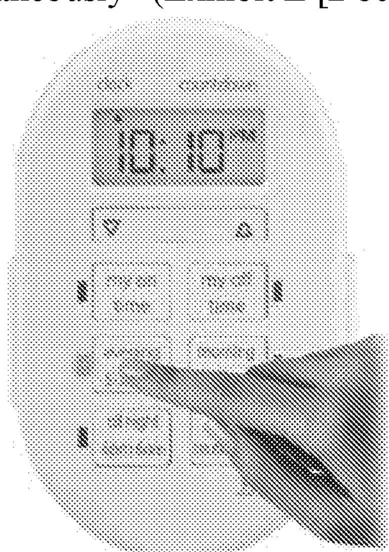
Statement 4:

> "Jasco has also directly infringed and continues to directly infringe at least claims 8, 9, 10, 11, 12, 13, and 14 of the '122 Patent through using, selling and/or importing the Programmable Timers."

Id., page 7, ¶ 25.

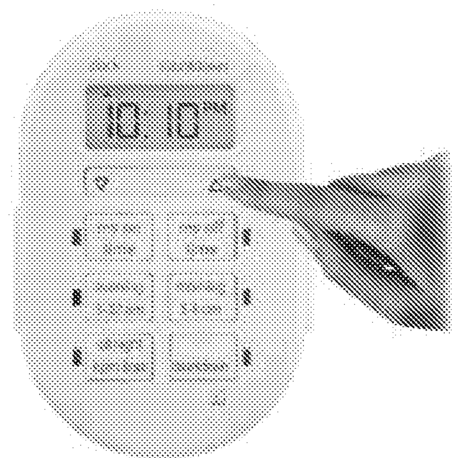
Statement 5:

> "Claim 8 is an infringed claim. Claim 8 is infringed by the Pre-Stored Timers. The exemplar of infringement is the GE MyTouchSmart™ Indoor Plug-In Digital Timer. The preamble of claim 1 states: "A programmable light timer for implementing a timing pattern, the programmable light timer comprising[.]" The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. Like the other Jasco products, the use for the timer is to control lighting products. Step II of the setup description in Exhibit E [Document #1-5], demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E [Document #1-5]).



The product is, therefore, a programmable light timer for implementing a timing pattern.

The first element of the claim is "an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer." Step 2 of Exhibit E [Document #1-5] demonstrates using the actuators (the up and down arrows) to set the time.



The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.

The second element of the claim is "a control circuit coupled to the actuator[.]" The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.

The third element of the claim is "a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display[.]" The GE MyTouchSmart™ Indoor Plug-In Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.

The fourth element of the claim is "a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern[.]" The "evening" button enables the selection of a preset schedule from 5 pm to midnight.

The final element of the claim is "a second button on the user interface of the programmable timer, the second button enabling the selection of a second pre-stored timing pattern." The "morning" button enables the selection of a preset schedule from 5 am to 8 am.

As each element of claim 8 is present in the GE MyTouchSmart™ Indoor Plug-In Digital Timer, claim 8 of the '122 is infringed by the GE MyTouchSmart™ Indoor Plug-In Digital Timer. All of the Pre-Stored Timers infringe this claim.

Claim 9 calls for "The programmable light timer of claim 8 further comprising a third button that is user-programmable." Each of the Pre-Stored Timers which include the my on time and my off time features also infringes this claim, as they have a third (and fourth) button which is user-programmable. This includes the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer.

Claim 10 calls for "The programmable light timer of claim 9 wherein the third button is programmable with a user-programmable on time." Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer has the my on time button, which is programmable with an on time. Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer infringe claim 10.

Claim 11 calls for "The programmable light timer of claim 10 further comprising a fourth button that is user programmable." Each of the

> GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer have a fourth button that is programmable, the my off time button, and infringe claim 11.
>
> Claim 12 calls for "The programmable light timer of claim 11 wherein the fourth button is programmable with a user programmable an off time." The GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer my off time button is so programmable, and they each infringe claim 12.
>
> Claim 13 calls for "The programmable light timer of claim 8 wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer." All of the Pre-Stored Timers contain this feature, with both clock time and program times set using the up and down arrow actuators in each product.
>
> Claim 14 calls for "The programmable light timer of claim 8 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer." Each of the GE Digital Plug-In MyTouchSmart™ Timer, and the GE In-Wall MyTouchSmart™ Digital Timer include this feature, with dedicated on and off buttons used to manually control the device plugged into the timer."

Id., page 7, ¶ 26 through page 10, ¶ 38.

1. Any other documents, pleadings, or evidence from the proceeding in which the statement was filed that address the written statement

The statements were made in the complaint (Document #1) for Cantigny's lawsuit against Jasco, and that document was accompanied by Exhibits A through F (Documents #1-1 through 1-6). The complaint and all the exhibits are submitted per Rule 501 citation. The lawsuit settled before any other responsive pleadings were filed by Jasco.[6] So, there are no other documents in this proceeding that address the claim scope statements. The document is not subject to a protective order, so the document is submitted without redactions.

2. *The forum and proceeding in which patent owner filed each statement*

The claim scope statements were made in a complaint (Document #1) and accompanying exhibits (Documents #1-1 through 1-6) for patent infringement filed in the District Court for the Northern District of Illinois, Eastern Division. The proceeding is captioned *Cantigny v. Jasco* (Civil Action No. 1:16-cv-05794).

3. *The specific papers and portions of the papers submitted that contain the statements*

In the complaint, the claim scope statements can be located at the following pages and paragraphs:

Statement 1 - Complaint, Document #1, page 3, ¶ 9, *Cantigny v. Jasco* (Civil Action No. 1:16-cv-05794).

Statement 2 - *Id.*, page 4, ¶ 14.

Statement 3 - *Id.*, page 4, ¶ 15 through page 7, ¶ 23.

Statement 4 - *Id.*, page 7, ¶ 25.

Statement 5 - *Id.*, page 7, ¶ 26 through page 10, ¶ 38.

[6] On information and belief, Jasco's development of its "MyTouchSmart" Digital Plug-In and In-Wall Timers predates and therefore invalidates the critical date of the '122 patent under AIA 35 USC § 102. The case was settled before this point was litigated.

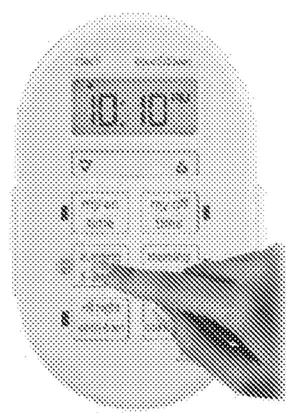
4. How each statement submitted is a statement in which patent owner took a position on the scope of any claim in the patent

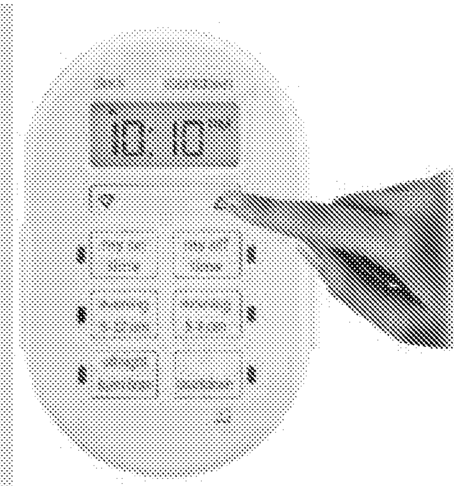
Each of the written "claim scope statements" (statements 1 through 5) or "written positions on claim scope" identified above are in fact Cantigny's expressed position on the scope of the claims of the '122 patent. The statements amount to stated/written infringement contentions. Specifically, each of the statements collectively and individually show Cantigny's position that the scope of claims 1, 6, 7 and 8 through 14 of the '122 patent is expansive enough to include the general purpose timers of Jasco (i.e., MyTouchSmart™ Indoor Plug-In Digital Timer; and MyTouchSmart™ In-Wall Digital Timer). Cantigny's statements are helpful for interpreting the claims against any prior art that presents a substantial new question of patentability (SNQ) because Cantigny's statements give two examples of what it thinks its claims cover. Moreover, Cantigny's vastly expansive position regarding what the claims cover sheds light on how broad a prior art search should be to properly identify whether Cantigny's alleged inventions meet the standard of "new, useful and nonobvious" under 35 U.S.C. §§ 101-103, and whether the alleged innovations actually rise to the dignity of a patent – and the corresponding right to file lawsuits to exclude others from the marketplace. Cantigny's claim scope statements make a variety of prior art references available as prior art and suitable additional references may be submitted as part of IDS statements under Rule 501.

Written infringement contentions, like those submitted by Cantigny in its lawsuit against Jasco, are in fact positions of claim scope. No doubt, infringement contentions qualify as claim scope statements under Rule 501 which states that claim scope statements include: "statements of the patent owner filed by the patent owner in a proceeding before a Federal Court… in which the patent owner took a position on the scope of any claim of the patent. 37 CFR § 1.501. The contentions presented by Cantigny take the claims of the '122 patent and compare them to the accused products, namely: MyTouchSmart™ Indoor Plug-In Digital Timer; and MyTouchSmart™ In-Wall Digital Timer. The accused products must be believed by Cantigny to fall within the "scope" of the claims or else there would be no complaint for infringement. The very nature of an infringement contention in a complaint for patent infringement involves Cantigny taking a position on the claim scope and making statements about how the broad scope is overlaid on the accused products. So, this submission is proper under Rule 501.

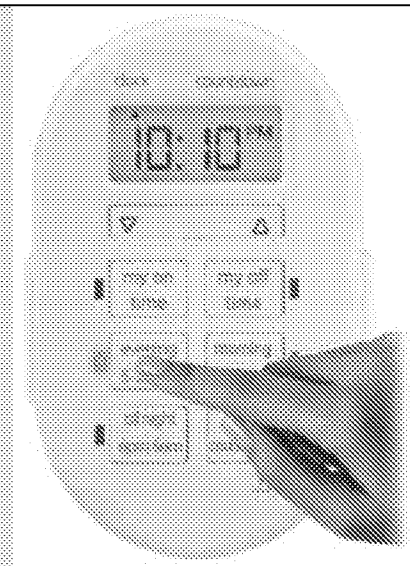
C. Explanation –Patent Owner Statements:

Generally, the claim scope statements make it apparent that, now that Cantigny has the patent issued, it expanded the meaning of the term "programmable light timer" to include any general-purpose programmable power outlet timer that could be used to control lights <u>and even other electronic devices</u>. Of course, any general purpose timer could be used to control a lamp, although the full scope of prior art was not considered in prosecution because only light related prior art was evaluated. Cantigny's expansive position on the scope of the claims of the '122 patent is illustrated below in a claim v. statement chart. The left column of the charts show the language of the claims, row-by-row. The right column of the chart shows how Cantigny believes its claims for "programmable light timers" read on Jasco's general purpose power-outlet timer.

US9320122	**"myTouchSmart™ Plug-In Digital Timer"**
1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. Step II of the setup description in Exhibit E [Document #1-5], demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E [Document #1-5]).  The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;	Step 2 of Exhibit E [Document #1-5] demonstrates using the actuators (the up and down arrows) to set the time.

	 The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.
a control circuit coupled to the actuator;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The MyTouchSmart™ In-Wall Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.
a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and	The "my on" time buttons are each programmable to have an on time.

a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.	The "my off" buttons are each programmable to have an off time.
6. The programmable light timer of claim 1 further comprising a third button having a pre-stored timing pattern.	Claim 6 calls for "The programmable light timer of claim 1 further comprising a third button having a pre-stored timing pattern." The GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer each have such a third button, including programs such as "evening" or "morning". These two products also infringe claim 6.
7. The programmable light timer of claim 1 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.	Claim 7 calls for "The programmable timer of claim 1 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer." The 'on' switch on the MyTouchSmart™ In-Wall Digital Timer overrides the timing pattern. The MyTouchSmart™ In-Wall Digital Timer infringes claim 7."
8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. Step II of the setup description in Exhibit E [Document #1-5], demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E [Document #1-5])

	 The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;	Step 2 of Exhibit E [Document #1-5] demonstrates using the actuators (the up and down arrows) to set the time.)  The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user

	programs.
a control circuit coupled to the actuator;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.
a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern;	The "evening" button enables the selection of a preset schedule from 5 pm to midnight.
and a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.	The "morning" button enables the selection of a preset schedule from 5 am to 8 am.
9. The programmable light timer of claim 8 further comprising a third button that is user programmable.	Claim 9 calls for "The programmable light timer of claim 8 further comprising a third button that is user-programmable." Each of the Pre-Stored Timers which include the my on time and my off time features also infringes this claim, as they have a third (and fourth) button which is user-programmable. This includes the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer.
10. The programmable light timer of claim 9 wherein the third button is programmable with a user programmable	Claim 10 calls for "The programmable light timer of claim 9 wherein the third button is programmable with a user-programmable on time." Each of the GE MyTouchSmart™ Indoor Plug-In

on time.	Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer has the my on time button, which is programmable with an on time. Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer infringe claim 10.
11. The programmable light timer of claim 10 further comprising a fourth button that is user programmable.	Claim 11 calls for "The programmable light timer of claim 10 further comprising a fourth button that is user programmable." Each of the GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer have a fourth button that is programmable, the my off time button, and infringe claim 11.
12. The programmable light timer of claim 11 wherein the fourth button is programmable with a user programmable an off time.	Claim 12 calls for "The programmable light timer of claim 11 wherein the fourth button is programmable with a user programmable an off time." The GE MyTouchSmart™ Indoor Plug-In Digital Timer and the GE MyTouchSmart™ Indoor/Outdoor Plug-In Digital Timer my off time button is so programmable, and they each infringe claim 12.
13. The programmable light timer of claim 8 wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer.	Claim 13 calls for "The programmable light timer of claim 8 wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer." All of the Pre-Stored Timers contain this feature, with both clock time and program times set using the up and down arrow actuators in each product.
14. The programmable light timer of claim 8 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.	Claim 14 calls for "The programmable light timer of claim 8 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer." Each of the GE Digital Plug-In MyTouchSmart™ Timer, and the GE In-Wall MyTouchSmart™ Digital Timer include this feature, with dedicated on and off buttons used to manually control the device plugged into the timer."

D. Explanation –Patent Owner Statements:

The manner of applying the prior art is provided below. First the prior art is introduced as presenting a substantial new question of patentability (SNQ). Then the prior art is applied to a claim chart (claim v. prior art chart). The left column of the charts show the language of the claims, row-by-row. The right column of the chart shows how Cantigny believes its claims for "programmable light timers" read on Jasco's general purpose power-outlet timer.

1. **At least independent claims 1 and 15 of the '122 patent are invalid under AIA 35 U.S.C. § 102 (a)(1) for being anticipated by "Timex Digital ON-OFF Lamp Timer" (published Oct. 14, 2004) by BookOfJoe, in view of Cantigny's "claim scope statements"**

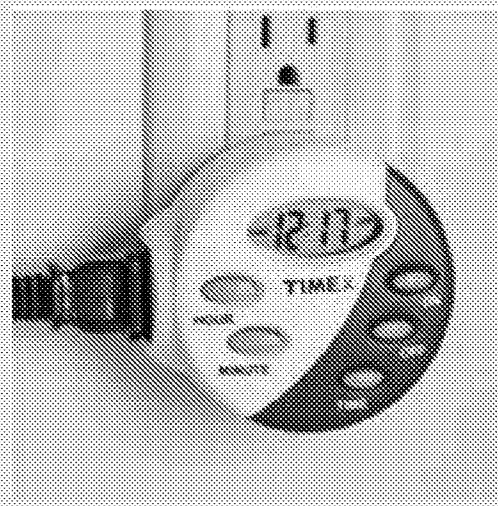
AIA 35 U.S.C. § 102 (a)(1) reads:

> A person shall be entitled to a patent unless – the claimed invention was described in a printed publication before the effective filing date of the claimed invention.

Thus, at least independent claims of the '122 (effective date Oct. 2013) are clearly anticipated by the "Timex Lamp Timer" (effective date circa 2004) under pre-AIA § 102(a)(1). This is a document that describes a general purpose digital timer that would be prior art in light of Cantigny's expansive view of what its claims cover.

US9320122	**Timex Digital Lamp Timer**
1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The Timex Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. It is described as a "Lamp Timer"  The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;	"HOUR" and "MINUTE" buttons are used to set the time.

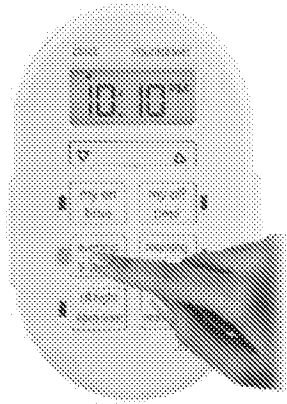
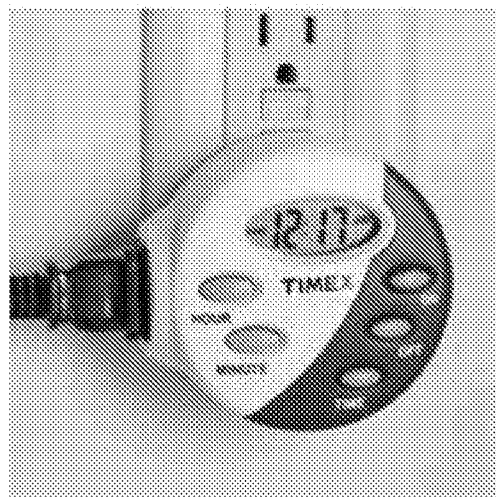
	 The user interface is the set of control buttons and the display of the timer, as shown in the picture. The Timex Digital Lamp Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program ON or OFF times for the user programs.
a control circuit coupled to the actuator;	The Timex Digital Lamp Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The Timex Digital Lamp Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "ON" and "OFF" times.
a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and	The "ON" time buttons is programmable to have an on time.
a second button on the user interface of	The "OFF" buttons is programmable to have an off

the programmable light timer, wherein the second button is programmable to have an off time.	time.
15. A method of implementing a timing pattern on a programmable light timer, the method comprising:	The Timex Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. It is described as a "Lamp Timer"  The product is, therefore, a programmable light timer for implementing a timing pattern.
enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer;	"HOUR" and "MINUTE" buttons are used to set the time.  The user interface is the set of control buttons and the display of the timer, as shown in the picture. The Timex Digital Lamp Timer therefore has an

	actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program ON or OFF times for the user programs.
displaying the time on a display of the programmable light timer;	The Timex Digital Lamp Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time;	The "ON" time buttons is programmable to have an on time.
and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.	The "OFF" buttons is programmable to have an off time.

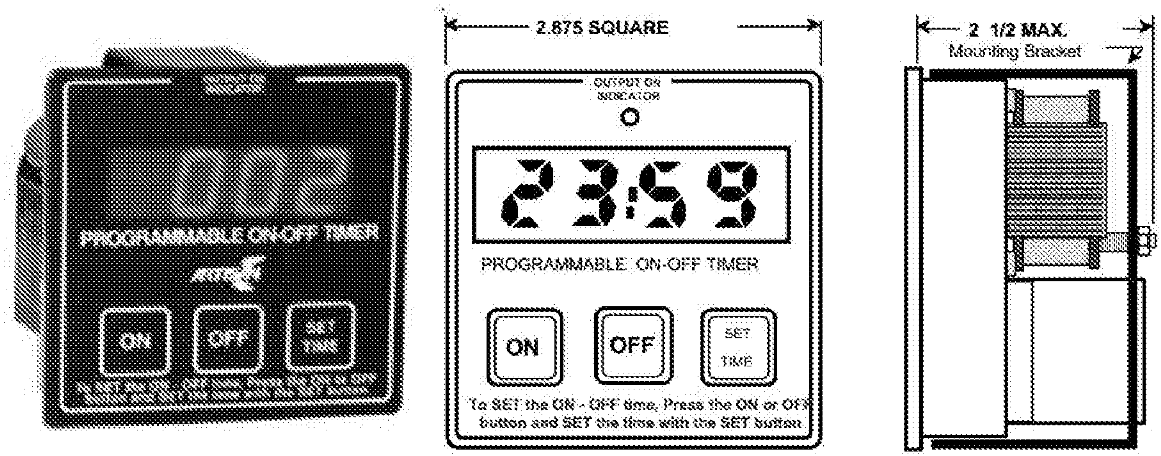
The invalidating prior art for claim 1 is presented next to the claim scope statement and the claim language for reference.

US9320122	**CLAIM SCOPE STATEMENT**	**Timex Digital Lamp Timer**
1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. Step II of the setup description in Exhibit E [Document #1-5], demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E [Document #1-5]).	The Timex Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. It is described as a "Lamp Timer"

	 The product is, therefore, a programmable light timer for implementing a timing pattern.	 The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;	Step 2 of Exhibit E [Document #1-5] demonstrates using the actuators (the up and down arrows) to set the time.  The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.	"HOUR" and "MINUTE" buttons are used to set the time.  The user interface is the set of control buttons and the display of the timer, as shown in the picture. The Timex Digital Lamp Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program ON or OFF times for the user programs.
a control circuit coupled to the actuator;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is	The Timex Digital Lamp Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators

	connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.	permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The MyTouchSmart™ In-Wall Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.	The Timex Digital Lamp Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "ON" and "OFF" times.
a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and	The "my on" time buttons are each programmable to have an on time.	The "ON" time buttons is programmable to have an on time.
a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.	The "my off" buttons are each programmable to have an off time.	The "OFF" buttons is programmable to have an off time.

2. At least independent claims 1 and 15 of the '122 patent are invalid under AIA 35 U.S.C. § 102 (a)(1) for being anticipated by Data Sheet for "4980 Programmable repeat cycle ON-OFF timer" (published Oct. 1, 2010) by *Artisan Controls Corporation*, in view of Cantigny's "claim scope statements"

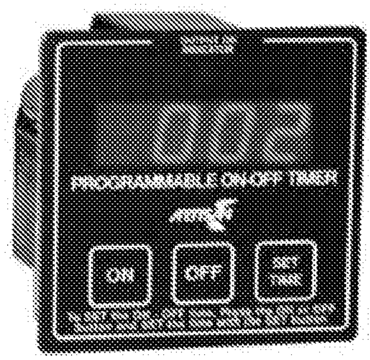
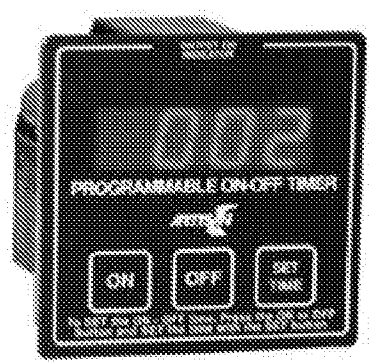


AIA 35 U.S.C. § 102 (a)(1) reads:

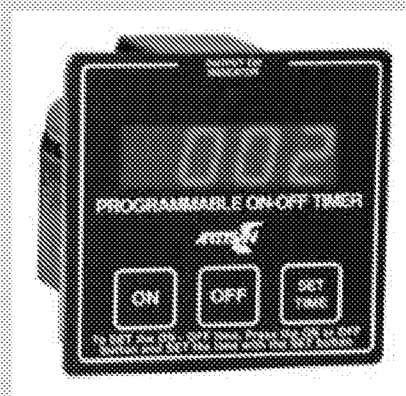
> A person shall be entitled to a patent unless – the claimed invention was described in a printed publication before the effective filing date of the claimed invention.

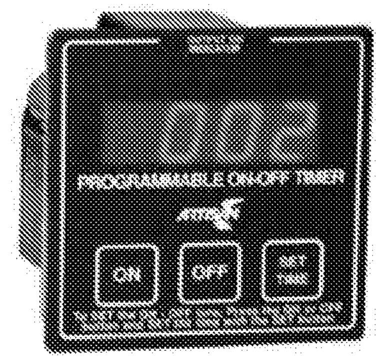
Thus, at least independent claims of the '122 (effective date Oct. 2013) are clearly anticipated by the "4980 timer" (effective date circa 2010) under pre-AIA § 102(a)(1).

US9320122	**4980 Timer**
1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The Timer is a programmable timer. One use for the timer is to control lighting products. "the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The '4980 controls a set of high current output contacts in accordance with pre-programmed ON-OFF schedules. The timer is "general purpose" so the contacts could be hardwired into a lamp or other lighting circuit.

	During an ON cycle the output relay is energized and the display with count down to zero, at which time the output relay de-energizes and the OFF period begins. The ON and the OFF time can be programmed to be any time from 1 second to 99 minutes and 59 seconds in 1 second increments.  The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;	To program a new ON or OFF time the SET TIME switch may be pressed while holding down the ON or OFF switch. The SET TIME switch advances the time only. By holding the SET TIME switch down the speed of the timing change increases permitting rapid programming. As the desired time is approached the SET TIME switch may be tapped to advance the time by increments of 1 second. When finished programming the model 4980 will keep the new time in memory without the aid of batteries. The SET TIME switch is an actuator. 

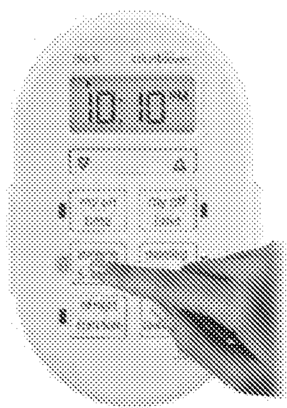
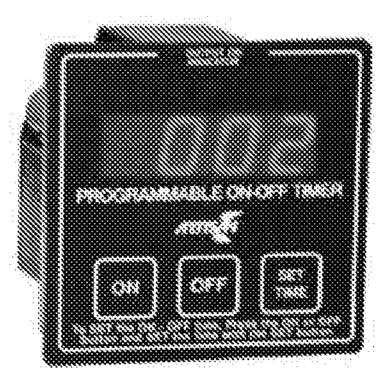
	The user interface is the set of control buttons and the display of the timer, as shown in the picture. The Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.
a control circuit coupled to the actuator;	"the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	"the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "on" and "off" times.
a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.	The "ON" time button is programmable to have an on time. The "OFF" button is programmable to have an off time.
15. A method of implementing a timing pattern on a programmable light timer, the method comprising:	The Timer is a programmable timer. One use for the timer is to control lighting products. "the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The '4980 controls a set of high current output contacts in accordance with

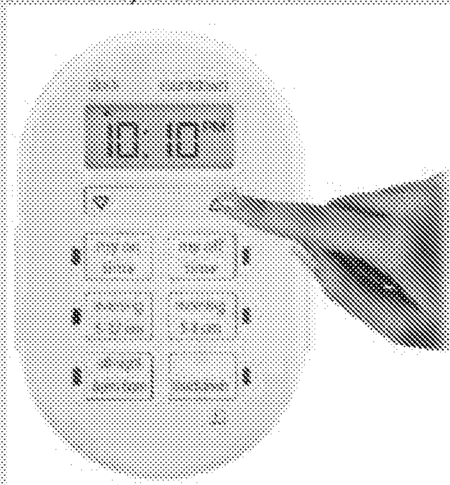
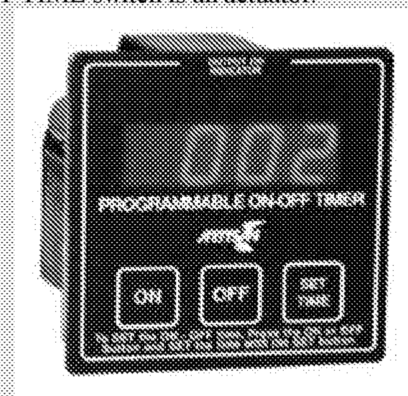
	pre-programmed ON-OFF schedules. The timer is "general purpose" so the contacts could be hardwired into a lamp or other lighting circuit. During an ON cycle the output relay is energized and the display with count down to zero, at which time the output relay de-energizes and the OFF period begins. The ON and the OFF time can be programmed to be any time from 1 second to 99 minutes and 59 seconds in 1 second increments.  The product is, therefore, a programmable light timer for implementing a timing pattern.
enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer;	To program a new ON or OFF time the SET TIME switch may be pressed while holding down the ON or OFF switch. The SET TIME switch advances the time only. By holding the SET TIME switch down the speed of the timing change increases permitting rapid programming. As the desired time is approached the SET TIME switch may be tapped to advance the time by increments of 1 second. When finished programming the model 4980 will keep the new time in memory without the aid of batteries. The SET TIME switch is an actuator.

	 The user interface is the set of control buttons and the display of the timer, as shown in the picture. The Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.
displaying the time on a display of the programmable light timer;	"the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "on" and "off" times.
enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time;	The "ON" time button is programmable to have an on time. The ON time can be programmed to be any time from 1 second to 99 minutes and 59 seconds in 1 second increments. pre-programmed ON schedules are an option.
and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.	The "OFF" button is programmable to have an off time. The OFF time can be programmed to be any time from 1 second to 99 minutes and 59 seconds in 1 second increments. pre-programmed OFF schedules

	are an option.

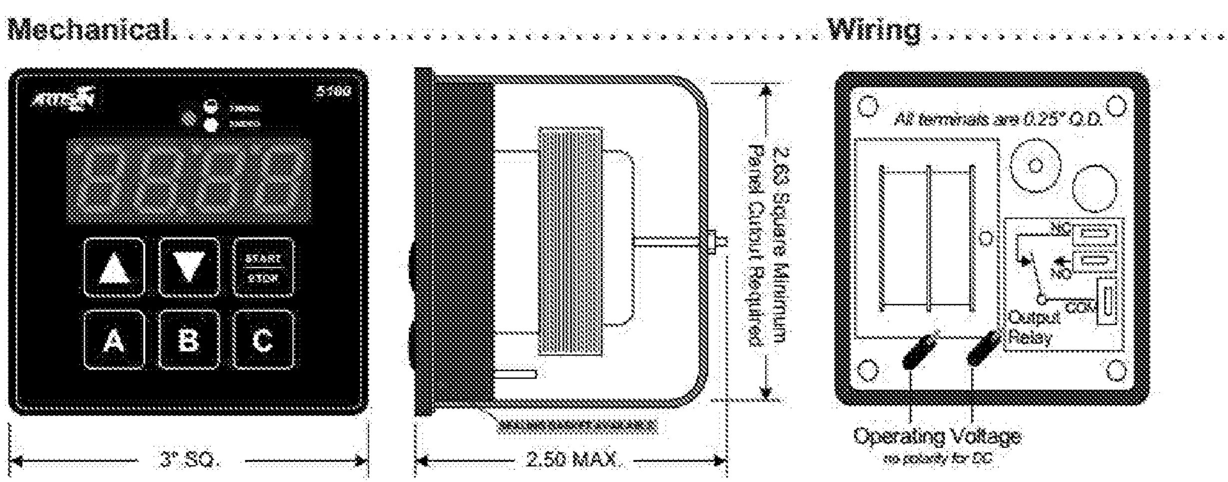
The invalidating prior art for claim 1 is presented next to the claim scope statement and the claim language for reference.

US9320122	**CLAIM SCOPE STATEMENT**	**4980 Timer**
1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. Step II of the setup description in Exhibit E [Document #1-5], demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E [Document #1-5]).  The product is, therefore, a programmable light timer for implementing a timing pattern.	The Timer is a programmable timer. One use for the timer is to control lighting products. "the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The '4980 controls a set of high current output contacts in accordance with pre-programmed ON-OFF schedules. The timer is "general purpose" so the contacts could be hardwired into a lamp or other lighting circuit. During an ON cycle the output relay is energized and the display with count down to zero, at which time the output relay de-energizes and the OFF period begins. The ON and the OFF time can be programmed to be any time from 1 second to 99 minutes and 59 seconds in 1 second increments.  The product is, therefore, a programmable light timer for implementing a timing pattern.

an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;	Step 2 of Exhibit E [Document #1-5] demonstrates using the actuators (the up and down arrows) to set the time.  The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.	To program a new ON or OFF time the SET TIME switch may be pressed while holding down the ON or OFF switch. The SET TIME switch advances the time only. By holding the SET TIME switch down the speed of the timing change increases permitting rapid programming. As the desired time is approached the SET TIME switch may be tapped to advance the time by increments of 1 second. When finished programming the model 4980 will keep the new time in memory without the aid of batteries. The SET TIME switch is an actuator.  The user interface is the set of control buttons and the display of the timer, as shown in the picture. The Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.
a control circuit coupled to the actuator;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.	"the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The MyTouchSmart™ In-Wall Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the	"the model 4980 is a microcontroller based ON-OFF timer with digital display of timing. The Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the

	programmed "my on" and "my off" times.	programmed "on" and "off" times.
a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and	The "my on" time buttons are each programmable to have an on time.	The "ON" time button id programmable to have an on time.
a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.	The "my off" buttons are each programmable to have an off time.	The "OFF" button is programmable to have an off time.

3. At least independent claim 8 of the '122 patent is invalid under AIA 35 U.S.C. § 102 (a)(1) for being anticipated by Data Sheet for "5100 configurable countdown timer" (published Aug. 21, 2013) by *Artisan Controls Corporation*, in view of Cantigny's "claim scope statements"

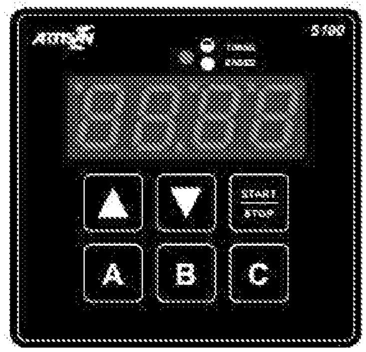


AIA 35 U.S.C. § 102 (a)(1) reads:

> A person shall be entitled to a patent unless – the claimed invention was described in a printed publication before the effective filing date of the claimed invention.

Thus, at least independent claim 8 of the ‘122 (effective date Oct. 2013) is clearly anticipated by the “5100” (effective date Aug. 21, 2013) under pre-AIA § 102(a)(1).

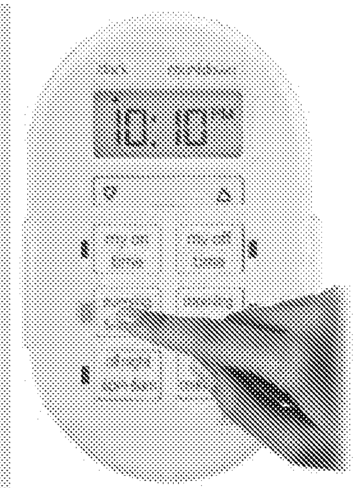
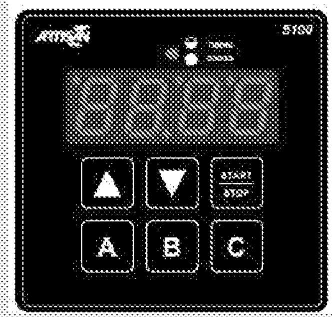
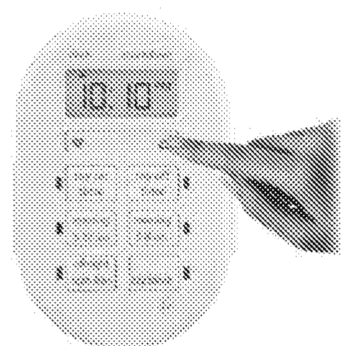
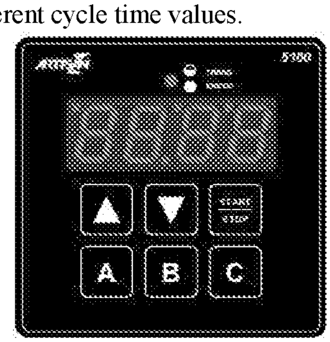
US9320122	**5100 Timer**
8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The 5100 is a controller with the addition of three preset times. This highly flexible countdown interval timer with digital display controls a set of high current output contacts. The contacts can be electrically coupled to any electrical device.  The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;	The two arrow buttons on the front panel are used to set the time, the Up button increases the time and the Down decreases it. The longer a button is held down the faster the rate at which the time value will change, the time value rolls around at both ends of the time range. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values.

	 The user interface is the set of arrows, buttons and the display of the timer, as shown in the picture. The Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.
a control circuit coupled to the actuator;	The Digital Timer contains circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	"The 5100 can be configured with a variety of time ranges, timing adjustment, alarming, power recovery, and power conservation options, see the second page for details. The 4 digit LED display is available in Red (standard), Green, and Blue." The timing cycle range can be configured for the following: 00:01-99:59 Minutes:Seconds, 00:01-99:59 Hours:Minutes, 0001-9999 Seconds, and 00.01-99.99 Seconds. The two arrow buttons on the front panel are used to set the time, the Up button increases the time and the Down decreases it. The longer a button is held down the faster the rate at which the time value will change, the time value rolls around at both ends of the time range. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values.

a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern;	"The 5100 is supplied from the factory configured with … all time values set." That means the interval time for button A is preset with a timing pattern. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values. The 5100 is an Artisan 4970 controller with the addition of three preset times.
and a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.	"The 5100 is supplied from the factory configured with … all time values set." That means the interval time for button B is preset with a timing pattern" The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values. The 5100 is an Artisan 4970 controller with the addition of three preset times.

The invalidating prior art for claim 1 is presented next to the claim scope statement and the claim language for reference.

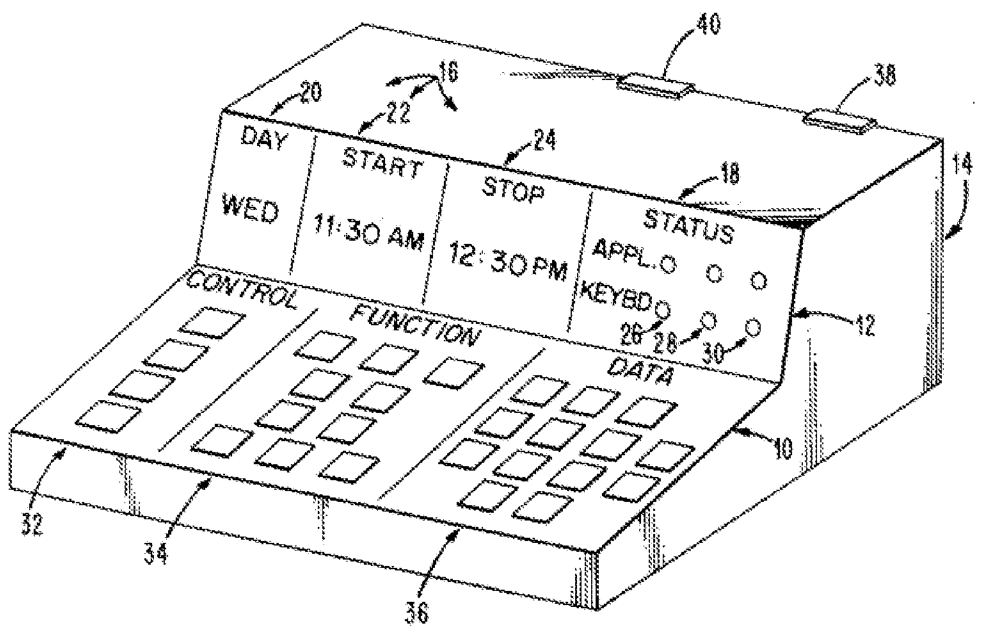
US9320122	CLAIM SCOPE STATEMENT	5100 Timer
8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	The GE MyTouchSmart™ Indoor Plug-In Digital Timer is a programmable timer. One use for the timer is to control lighting products. Step II of the setup description in Exhibit E [Document #1-5], demonstrates selection and use of pre-stored programs that "run individually or simultaneously" (Exhibit E [Document #1-5])	The 5100 is a controller with the addition of three preset times. This highly flexible countdown interval timer with digital display controls a set of high current output contacts. The contacts can be electrically coupled to any electrical device.

	 The product is, therefore, a programmable light timer for implementing a timing pattern.	 The product is, therefore, a programmable light timer for implementing a timing pattern.
an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;	Step 2 of Exhibit E [Document #1-5] demonstrates using the actuators (the up and down arrows) to set the time.)  The user interface is the set of control buttons and the display of the timer, as shown in the picture accompanying step 2. The GE MyTouchSmart™ Indoor Plug-In Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.	The two arrow buttons on the front panel are used to set the time, the Up button increases the time and the Down decreases it. The longer a button is held down the faster the rate at which the time value will change, the time value rolls around at both ends of the time range. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values.  The user interface is the set of arrows, buttons and the display of the timer, as shown in the picture. The Digital Timer therefore has an actuator on the interface enabling selection of a time. These same actuators are used both to set the clock time and to set the program times for the user programs.
a control circuit coupled to the actuator;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer contains	The Digital Timer contains circuitry which controls the display of the

	circuitry which controls the display of the clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.	clock and the time for programs, and which is connected to the actuators permitting the changing of both clock time and program time. This circuitry meets the second element of the claim.
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The GE MyTouchSmart™ Indoor Plug-In Digital Timer includes an LCD display which shows the time selected by the actuator both for clock time and for selected program times. The time selected by the actuator is provided on the display both during setting of the clock and the programmed "my on" and "my off" times.	"The 5100 can be configured with a variety of time ranges, timing adjustment, alarming, power recovery, and power conservation options, see the second page for details. The 4 digit LED display is available in Red (standard), Green, and Blue." The timing cycle range can be configured for the following: 00:01-99:59 Minutes:Seconds, 00:01-99:59 Hours:Minutes, 0001-9999 Seconds, and 00.01-99.99 Seconds. The two arrow buttons on the front panel are used to set the time, the Up button increases the time and the Down decreases it. The longer a button is held down the faster the rate at which the time value will change, the time value rolls around at both ends of the time range. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values.
a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern;	The "evening" button enables the selection of a preset schedule from 5 pm to midnight.	"The 5100 is supplied from the factory configured with … all time values set." That means the interval time for button A is preset with a timing pattern. The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values. The 5100 is an Artisan 4970 controller with the addition of three preset times.
and a second button on the user interface of the programmable light timer, the	The "morning" button enables the selection of a preset schedule from 5 am to 8 am.	"The 5100 is supplied from the factory configured with … all time values set." That means the interval time for button

second button enabling the selection of a second pre-stored timing pattern.		B is preset with a timing pattern" The A, B, and C buttons allow the user to store and recall up to 3 time values providing simplified switching between different cycle time values. The 5100 is an Artisan 4970 controller with the addition of three preset times.

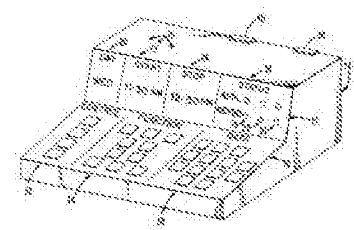
4. At least the independent claims of the '122 patent are invalid under AIA 35 U.S.C. § 102 (a)(1) for being anticipated by U.S. Pat. No. 4,279,012(issued Jul. 14, 1981) by *Beckerdorff et al.* for a "programmable appliance controller" in view of Cantigny's "claim scope statements"



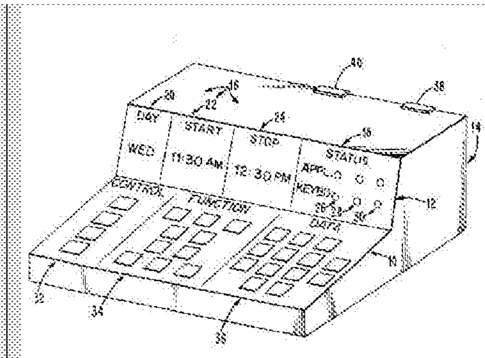
AIA 35 U.S.C. § 102 (a)(1) reads:

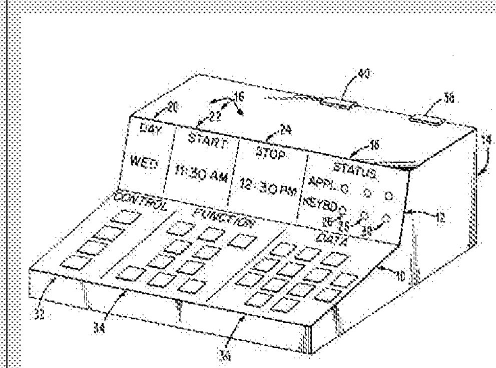
> A person shall be entitled to a patent unless – the claimed invention was patented before the effective filing date of the claimed invention.

Thus, at least independent claims of the '122 (effective date Oct. 2013) are clearly anticipated by the *Beckerdorff et al*. (effective date circa 1981) under pre-AIA § 102(a)(1).

US9320122 (2013)	**US4279012 (1981)**
1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	Controllers for electrical devices such as appliances have in one of their simplest forms included timers which plug into the AC line power source, with the appliance, such as a **light**, radio, coffee pot, etc., plugging into the timer. (col. 1:8-12)  The **programmable appliance controller** of the present invention is shown in FIGS. 1 and 2 (col. 2:67-68) The controller of the present invention is used to control the availability of power to the sockets 48 and 50 to which an appliance may be connected. (col. 4:20-23)
an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;	FUNCTION KEYS 34 & DATA KEYS 36 The function keys are used in conjunction with the data keys to ..., start times, and stop times. They are also used... to set and display the controller's clock (time of day)...The ten keys which may be used in the function section are: day, start, stop, store, review, set time, display time, clear memory, clear day, and clear error. The data keys are used to specify a particular day of the week of a particular time. Keys used in this field may include: 1/MON (i.e., 1 or Monday), 2/TUE,

	3/WED, 4/THU, 5/FRI, 6/SAT, 7/SUN, 8, 9, 0, full colon, AM and PM. (col. 4:1-13)
a control circuit coupled to the actuator;	FIG. 3; Such apparatus or controller includes …The microprocessing unit (MPU), a device control unit… (col. 5:22)
a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;	The programming information, as well as the time of day, may be displayed on display 12 (col. Such apparatus or controller includes …a display 106 (col. 5:22)
a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.	By way of example, the operation of the controller by an operator shall now be discussed. Suppose the operator desires that his television set be operable each weekday between the hours of 7:00 A.M. to 8:00 A.M… The following sequence of keystrokes is then entered: Start [a first of the 10 function keys 34], 7:00 A.M., Stop [a second of the 10 function keys 34] , 8:00 A.M… (col. 4:56-66; *see also* col. 4:1-13) The start and stop fields indicate a time when the appliance will be on.(Col. 3:25-26) If the on/off control of the appliance is in the on position, the appliance will actually switch on and off according to the program in the controller. Col. 3:45-48
8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:	Controllers for electrical devices such as appliances have in one of their simplest forms included timers which plug into the AC line power source, with the appliance, such as a **light**, radio, coffee pot, etc., plugging into the timer. (col. 1:8-12)

	 The **programmable appliance controller** of the present invention is shown in FIGS. 1 and 2 (col. 2:67-68) The controller of the present invention is used to control the availability of power to the sockets 48 and 50 to which an appliance may be connected. (col. 4:20-23)
an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;	FUNCTION KEYS 34 & DATA KEYS 36 The function keys are used in conjunction with the data keys to …, start times, and stop times. They are also used… to set and display the controller's clock (time of day)…The ten keys which may be used in the function section are: day, start, stop, store, review, set time, display time, clear memory, clear day, and clear error. The data keys are used to specify a particular day of the week of a particular time. Keys used in this field may include: 1/MON (i.e., 1 or Monday), 2/TUE, 3/WED, 4/THU, 5/FRI, 6/SAT, 7/SUN, 8, 9, 0, full colon, AM and PM. (col. 4:1-13)
a control circuit coupled to the actuator;	FIG. 3; Such apparatus or controller includes …The microprocessing unit (MPU), a device control unit… (col. 5:22)
a display coupled to the control circuit,	(FIG. 1)

wherein a time selected by the actuator is provided on the display;	The programming information, as well as the time of day, may be displayed on display 12 (col. Such apparatus or controller includes …a display 106 (col. 5:22)
a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern;	CONTROL KEYS 32 “begin program” – stored timing pattern with “set time” described (see Col. 4:1-13)
and a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.	CONTROL KEYS 32 “End program” – no pattern is technically a pre-stored pattern (see Col. 4:1-13)
15. A method of implementing a timing pattern on a programmable light timer, the method comprising:	Controllers for electrical devices such as appliances have in one of their simplest forms included timers which plug into the AC line power source, with the appliance, such as a **light**, radio, coffee pot, etc., plugging into the timer. (col. 1:8-12)  The **programmable appliance controller** of the present invention is shown in FIGS. 1 and 2 (col. 2:67-68) The controller of the present invention is used to control the availability of power to the sockets 48 and 50 to which an appliance may be connected. (col. 4:20-23)

enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer;	FUNCTION KEYS 34 & DATA KEYS 36 The function keys are used in conjunction with the data keys to …, start times, and stop times. They are also used… to **set and display the controller's clock (time of day)**…The ten keys which may be used in the function section are: day, start, stop, store, review, set time, display time, clear memory, clear day, and clear error. The data keys are used to specify a particular day of the week of a particular time. Keys used in this field may include: 1/MON (i.e., 1 or Monday), 2/TUE, 3/WED, 4/THU, 5/FRI, 6/SAT, 7/SUN, 8, 9, 0, full colon, AM and PM. (col. 4:1-13)
displaying the time on a display of the programmable light timer;	The programming information, as well as the time of day, may be displayed on display 12 (col. Such apparatus or controller includes …a display 106 (col. 5:22)
enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.	By way of example, the operation of the controller by an operator shall now be discussed. Suppose the operator desires that his television set be operable each weekday between the hours of 7:00 A.M. to 8:00 A.M… The following sequence of keystrokes is then entered: Start [a first of the 10 function keys 34], 7:00 A.M., Stop [a second of the 10 function keys 34], 8:00 A.M… (col. 4:56-66; *see also* col. 4:1-13) The start and stop fields indicate a time when the appliance will be on.(Col. 3:25-26) If the on/off control of the appliance is in the on position, the appliance will actually switch on and off according to the program in the controller. Col. 3:45-48

III. Reexamination Expected.

Rule 1.501 citations are extraordinarily relevant to any subsequently filed *ex parte* reexaminations or *inter partes* reviews. 37 C.F.R. § 1.502. This submission provides basic examples of how the patents are invalid if given the scope asserted by the patent owner in Federal Courts. Challenges to the validity of the patents based on prior art timers, the cited prior art and the claim scope statements are expected in this patent and the submitter respectfully invites that this document be cited in any reviews or reexaminations filed after the submission date of this document. We also invite this document to be cited in any federal litigations and for *Markman* purposes whenever the file history of the '122 patent is entered into evidence in pending litigation.

IV. Identity of Submitter

This document is being submitted by attorney Bryce A. Johnson, Reg. No. 74,733 of Buche & Associates, P.C. on behalf of Prime Wire & Cable, Inc.

V. Certificate of Service.

A certificate of service is provided below after the signatures.

Respectfully Submitted,

Bryce A. Johnson

March 14, 2018
Date

/Bryce A. Johnson/
Reg. No. 74,733

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing: **37 CFR 1.501 Citation of prior art and written statements in US9320122** has been served in its entirety on the patent owner as provided in 37 C.F.R. § 1.33 by being deposited on this date with the U.S. Postal Service:

___ Mailed via US certified mail
_X_ Mailed regular first class U.S. mail;
___ Sent via facsimile; and/or
___ Delivered via courier service
_X_ Delivered email PDF to john.king@kinglawoffice.com;
_X_ Uploaded via EFS WEB

To the following counsel for the patent applicant on March 14, 2018:

ATTORNEY OF RECORD & FEE CORRESPONDENCE ADDRESS

Name:	THE LAW OFFICE OF JOHN J. KING, P.C.
Address:	ATTN: JOHN KING P.O. BOX 1555 WHEATON IL 60187-1555
Customer Number:	62081

By:

/Bryce A. Johnson/
Bryce A. Johnson
Reg. No. 74,733

Electronic Acknowledgement Receipt

EFS ID:	32048695
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	Johnson Bryce
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	14-MAR-2018
Filing Date:	18-NOV-2015
Time Stamp:	13:48:08
Application Type:	

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Prior art submission by a third party under Rule 37 CFR 1.501 during the period of enforceability of a patent	501-submission.pdf	51060 b5ce57f162d1e4dff8fbf79f09335995eaabe925	no	3

Warnings:

Information:					
2	Request Notice of Non-compliant 1.501 Submission	Prior-art-notification-request.pdf	19301 14196cfa4e89e84178d5dedfd8233486395 0caef	no	1
Warnings:					
Information:					
3	Accompanying Info for patent owner claim scope stmnt	003_Complaint.pdf	5886496 6fe66f694acc666130172b050f6725023731 b2c6	no	17
Warnings:					
Information:					
4	Accompanying Info for patent owner claim scope stmnt	004_EXHIBITA.pdf	13667136 f9e6f81587bf00fdd37fc42a5ee06cd55b395 652	no	32
Warnings:					
Information:					
5	Accompanying Info for patent owner claim scope stmnt	005_EXHIBITB.pdf	12510555 28c1eea8d89c4fe81a791fd578704a0785f5 abd8	no	31
Warnings:					
Information:					
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Warnings:					
Information:					
7	Accompanying Info for patent owner claim scope stmnt	007_EXHIBITD.pdf	1287399 389cd2416881e6da1ba9334b9ea59d6927 70227f	no	3
Warnings:					
Information:					
8	Accompanying Info for patent owner claim scope stmnt	008_EXHIBITE.pdf	2052115 cc392c33ee8f502e8c41e2465d5a547511b 4b32d	no	3
Warnings:					
Information:					

9	Accompanying Info for patent owner claim scope stmnt	009_EXHIBITF.pdf	11930351 03afd225552e9c7262c8ad8a0aff464578bddb37	no	6
Warnings:					
Information:					
10	Evidence of Publication	010_Timex.pdf	965014 246585f61a1279c99c8a2d5b0c94d07bf135f50e	no	5
Warnings:					
Information:					
11	Evidence of Publication	011_20101001_Programable_ONOFFTIMER.pdf	418410 32f9ea3fcf498a8a1380b2087ec40d6a51b8ba9a	no	5
Warnings:					
Information:					
12	Evidence of Publication	012_20130821_Programable_TIMER5100.pdf	301524 b796e9e0b11609867814a720da7722c108650d7f	no	2
Warnings:					
Information:					
13		013_20180314_Rule501.pdf	691792 a5e2150ba109f0a39e25eeb6c38e6b35499763cb	yes	57

Multipart Description/PDF files in .zip description

Document Description	Start	End
Patent Owner Claim Scope Statements	1	22
Patent Owner Clm Scope Stmnt Explanation/Justification	23	29
Statement(s) of Pertinence and Manner (Prior Art)	30	56
Certificate of Service under 37 CFR 1.248	57	57

Warnings:

Information:

Total Files Size (in bytes):	49912152

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

AO 120 (Rev. 08/10)

TO: **Mail Stop 8** **Director of the U.S. Patent and Trademark Office** **P.O. Box 1450** **Alexandria, VA 22313-1450**	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Northern District of Illinois on the following

☑ Trademarks or ☐ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
16cv5794	6/2/2016	Northern District of Illinois

PLAINTIFF	DEFENDANT
Cantigny Lighting Control LLC	Jasco Products Company LLC et al

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 See Attachment		
2		
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
08/19/2016: See Order

CLERK	(BY) DEPUTY CLERK	DATE
Thomas G. Bruton	Rosio Mendez	8/22/2016

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

	On Time		Off Time		Pattern
Fixed Time Year-round	4:00 PM		1:00 AM		1
	4:00 PM		5:00 AM		111
	4:00 PM		6:00 AM		112
	4:00 PM		7:00 AM		113
	⋮		⋮		⋮
	5:00 PM		1:00 AM		121
	5:00 PM		5:00 AM		122
	5:00 PM		5:00 AM		123
	⋮		⋮		⋮
	6:00 PM		7:00 AM		189
	Standard Time (Long Daylight Hrs)-On/Off		DST (Short Daylight Hours)-On/Off		
Standard/DST	4:00 PM/1:00 AM		7:00 PM/1:00 AM		2
	4:00 PM/5:00 AM		7:00 PM/5:00 AM		211
	4:00 PM/6:00 AM		7:00 PM/6:00 AM		212
	4:00 PM/7:00 AM		7:00 PM/7:00 AM		213
	⋮		⋮		⋮
	5:00 PM/1:00 AM		8:00 PM/5:00 AM		221
	5:00 PM/5:00 AM		8:00 PM/6:00 AM		222
	5:00 PM/6:00 AM		8:00 PM/7:00 AM		223
	⋮		⋮		⋮
	8:00 PM/7:00 AM		9:00 PM/7:00 AM		289
	Spring On/Off	Summer On/Off	Fall On/Off	Winter On/Off	
4 Seasons	4:00 PM/1:00 AM	7:00 PM/1:00 AM	5:00 PM/1:00 AM	4:00 PM/1:00 AM	3
	4:00 PM/5:00 AM	7:00 PM/5:00 AM	5:00 PM/5:00 AM	4:00 PM/5:00 AM	311
	4:00 PM/6:00 AM	7:00 PM/6:00 AM	5:00 PM/6:00 AM	4:00 PM/6:00 AM	312
	4:00 PM/7:00 AM	7:00 PM/7:00 AM	5:00 PM/7:00 AM	4:00 PM/7:00 AM	313
	⋮	⋮	⋮	⋮	⋮
	7:00 PM/5:00 AM	8:00 PM/5:00 AM	6:00 PM/5:00 AM	5:00 PM/5:00 AM	321
	7:00 PM/6:00 AM	8:00 PM/6:00 AM	6:00 PM/6:00 AM	5:00 PM/6:00 AM	322
	7:00 PM/7:00 AM	8:00 PM/7:00 AM	6:00 PM/7:00 AM	5:00 PM/7:00 AM	323
					⋮
	8:00 PM/7:00 AM	9:00 PM/7:00 AM	6:00 PM/7:00 AM	6:00 PM/7:00 AM	389
	On Time/Offset		Off Time/Offset		
Astronomic	Astronomic Dusk/+ 1hr		Astronomic Dawn/-1 hr		4
	Astronomic Dusk/none		Astronomic Dawn/None		411
	Astronomic Dusk/+0.5 hrs		5:00 AM/N/A		412
	Astronomic Dusk/+1.5 hrs		6:00 AM/N/A		413
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/None		421
	4:00 PM/None		Astronomic Dawn/-0.5 hrs		422
	4:00 PM/None		Astronomic Dawn/-1.0 hrs		423
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/-2.0 hrs		489

FIG. 16

Region	Time Period of Date	Average Dusk Time	Average Dawn Time
NE	Full Year	7:00 PM	6:00 AM
	Standard Time	7:30 PM	5:30 AM
	Daylight Savings Time	6:30 PM	7:00 AM
	Spring	7:30 PM	6:00 AM
	Summer	8:00 PM	5:30 AM
	Fall	6:30 PM	6:30 AM
	Winter	5:00 PM	7:00 AM
	January	5:30 PM	7:15 AM
	February	4:45 PM	7:10 AM
	⋮	⋮	⋮
	December	5:40 PM	6:55 AM
	January 1, 2013	5:30 PM	7:15 AM
	January 2, 2013	5:31 PM	7:14 AM
	January 3, 2013	5:33 PM	7:11 AM
	⋮	⋮	⋮
	December 31, 2013	5:39 PM	6:49 AM
NC	Full Year	6:55 PM	6:03 AM
	Standard Time	7:25 PM	5:33 AM
	Daylight Savings Time	6:25 PM	7:04 AM
	Spring	7:25 PM	6:03 AM
	Summer	7:55 PM	5:33 AM
	Fall	6:25 PM	6:33 AM
	Winter	4:55 PM	7:03 AM
	January	5:25 PM	7:17 AM
	February	4:40 PM	7:13 AM
	⋮	⋮	⋮
	December	5:35 PM	6:58 AM
	January 1, 2013	5:25 PM	7:18 AM
	January 2, 2013	5:26 PM	7:17 AM
	January 3, 2013	5:28 PM	7:14 AM
	⋮	⋮	⋮
	December 31, 2013	5:34 PM	6:54 AM
⋮	⋮	⋮	⋮
SP	Full Year	7:07 PM	6:05 AM
	Standard Time	7:36 PM	5:36 AM
	⋮	⋮	⋮
	January 3, 2013	5:39 PM	7:16 AM
	⋮	⋮	⋮
	December 31, 2013	5:44 PM	6:54 AM

FIG. 18

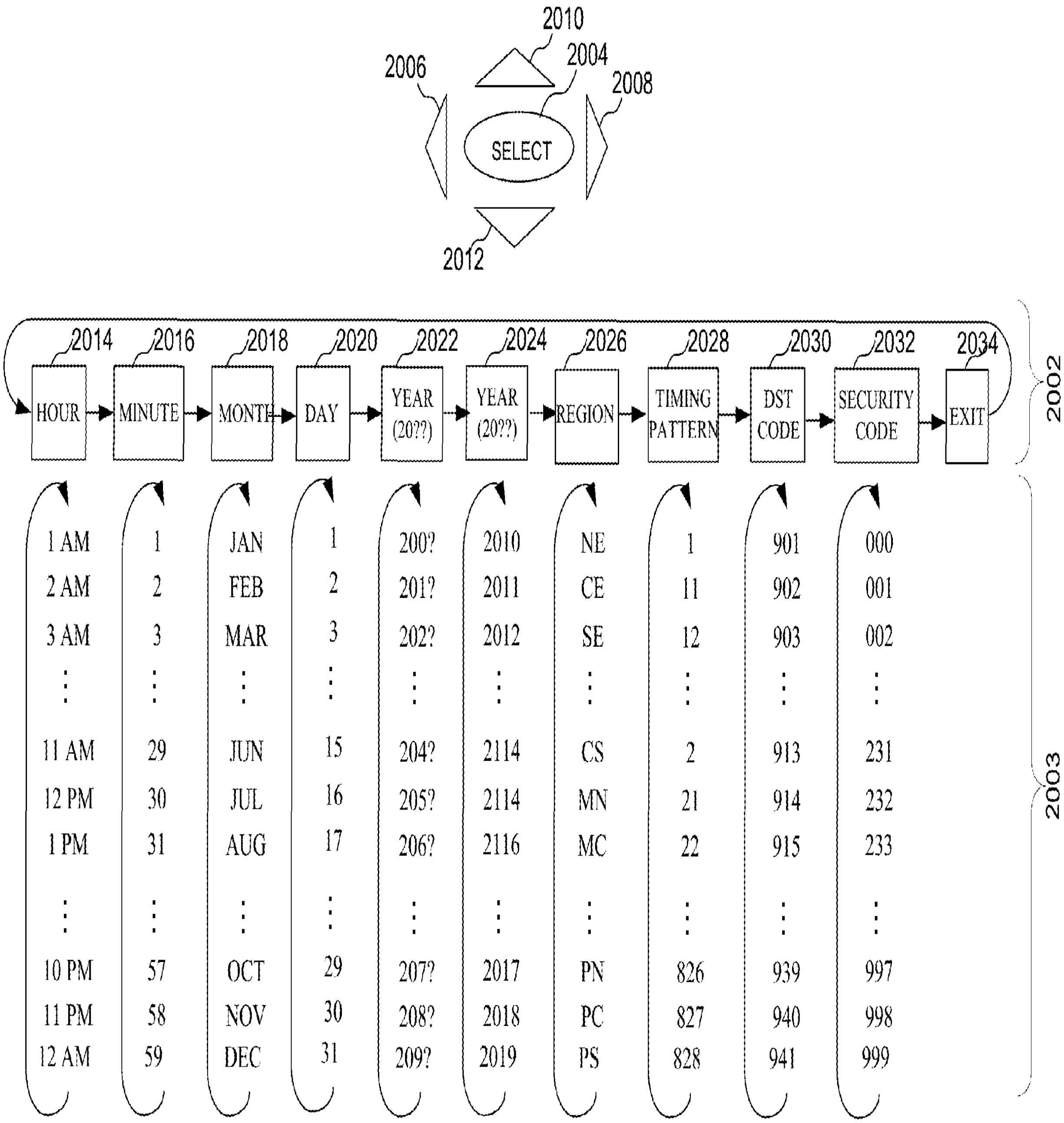
2010
2004
2006
2008
SELECT
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2002
HOUR
MINUTE
MONTH
DAY
YEAR (20??)
YEAR (20??)
REGION
TIMING PATTERN
DST CODE
SECURITY CODE
EXIT
2003
1 AM 2 AM 3 AM 11 AM 12 PM 1 PM 10 PM 11 PM 12 AM
1 2 3 29 30 31 57 58 59
JAN FEB MAR JUN JUL AUG OCT NOV DEC
1 2 3 15 16 17 29 30 31
200? 201? 202? 204? 205? 206? 207? 208? 209?
2010 2011 2012 2114 2114 2116 2017 2018 2019
NE CE SE CS MN MC PN PC PS
1 11 12 2 21 22 826 827 828
901 902 903 913 914 915 939 940 941
000 001 002 231 232 233 997 998 999

FIG. 20

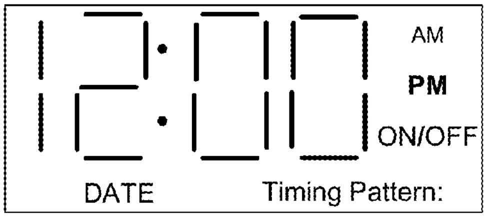

FIG. 21

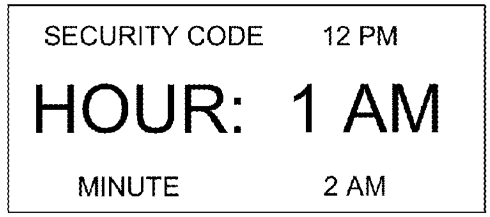

FIG. 22

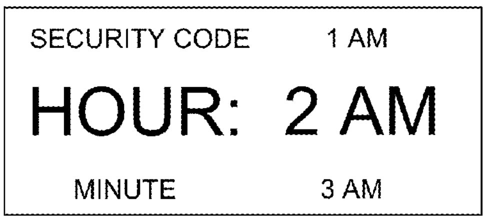

FIG. 23

FIG. 24

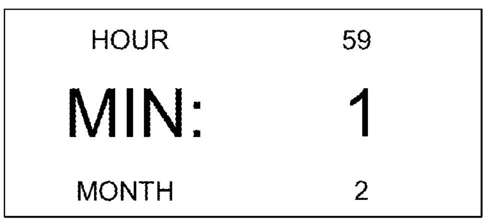

FIG. 25

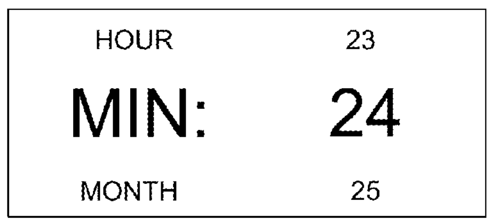

FIG. 26

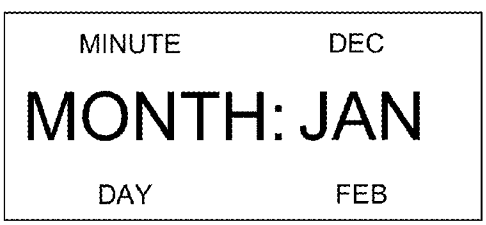

FIG. 27

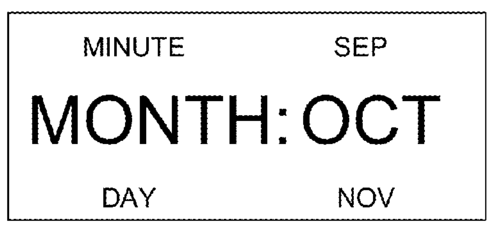

FIG. 28

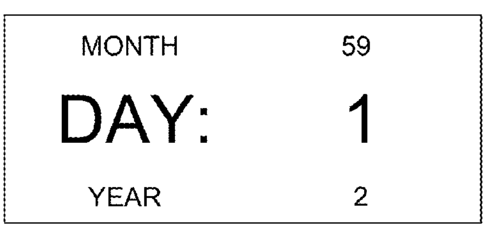

FIG. 29

FIG. 30

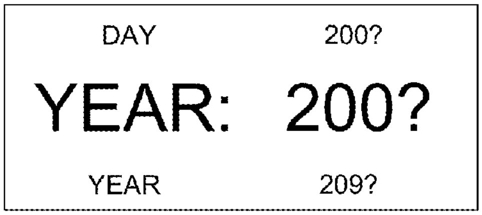

FIG. 31

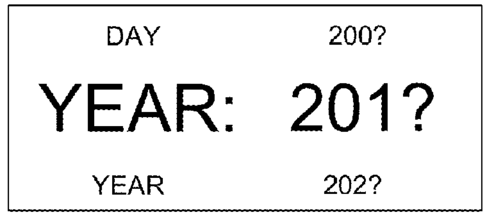

FIG. 32

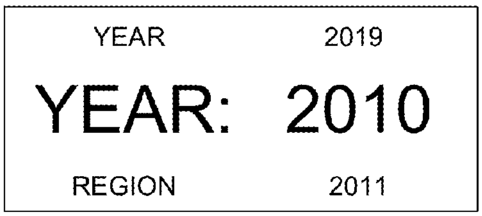

FIG. 33

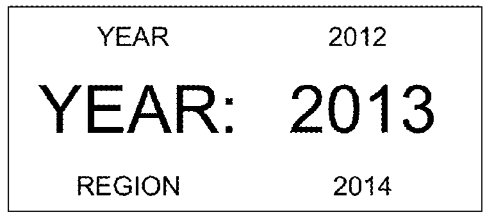

FIG. 34

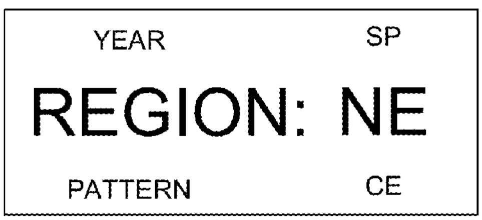

FIG. 35

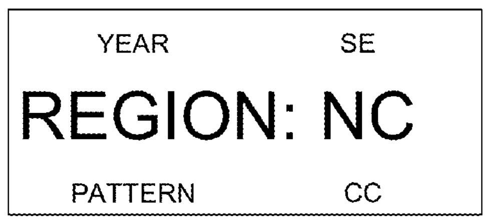

FIG. 36

FIG. 37

FIG. 38

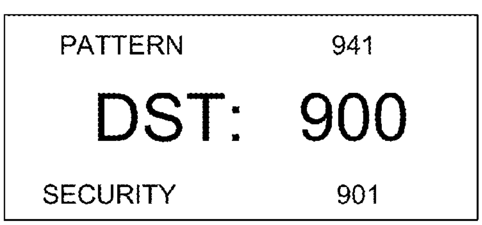

FIG. 39

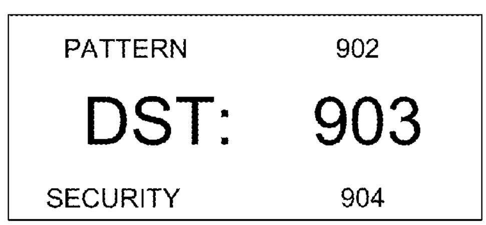

FIG. 40

FIG. 41

FIG. 42

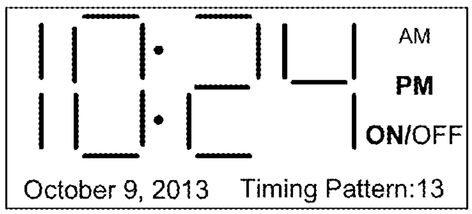

FIG. 43

FIELD	DATA
Time	10:24 PM
Date	October 24, 2013
Region	NC
Timing Pattern	13
DST Code	903
Security Code	013

FIG. 44

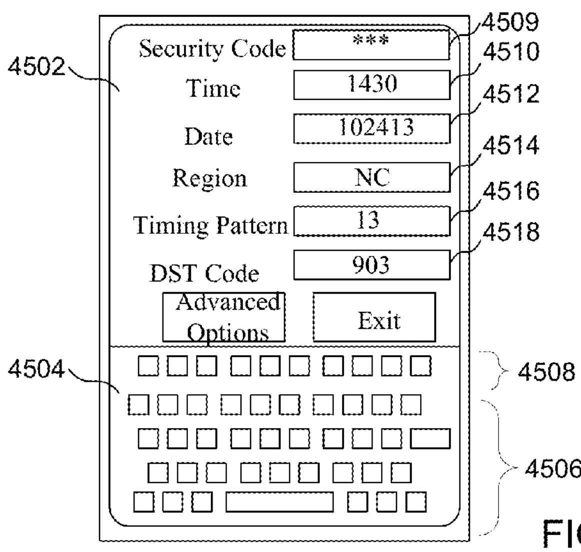

FIG. 45

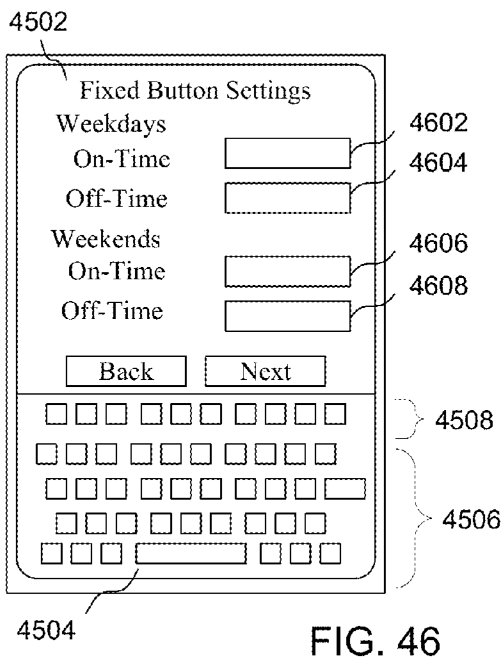

FIG. 46

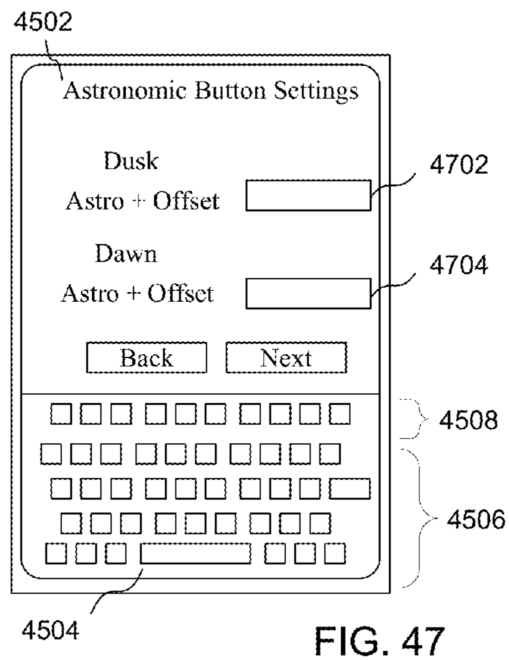

FIG. 47

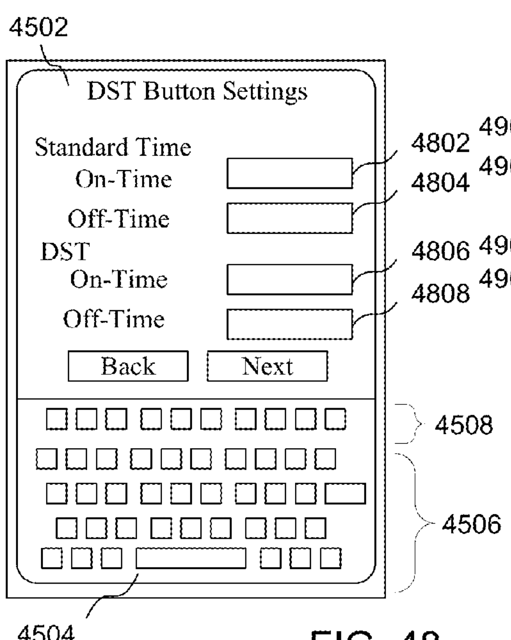

FIG. 48

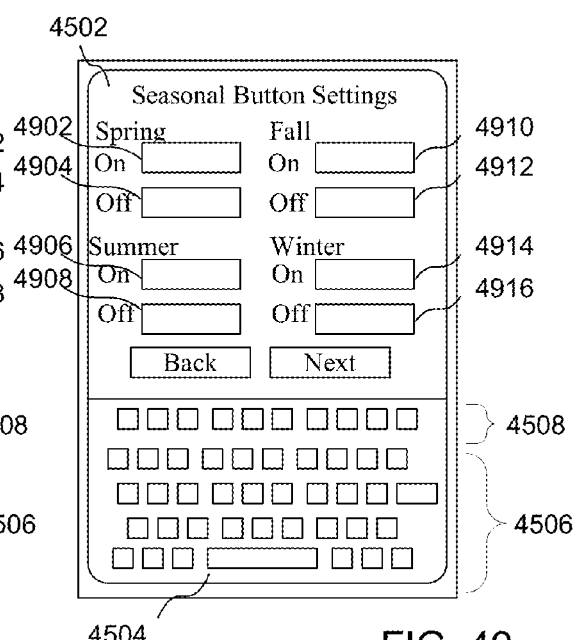

FIG. 49

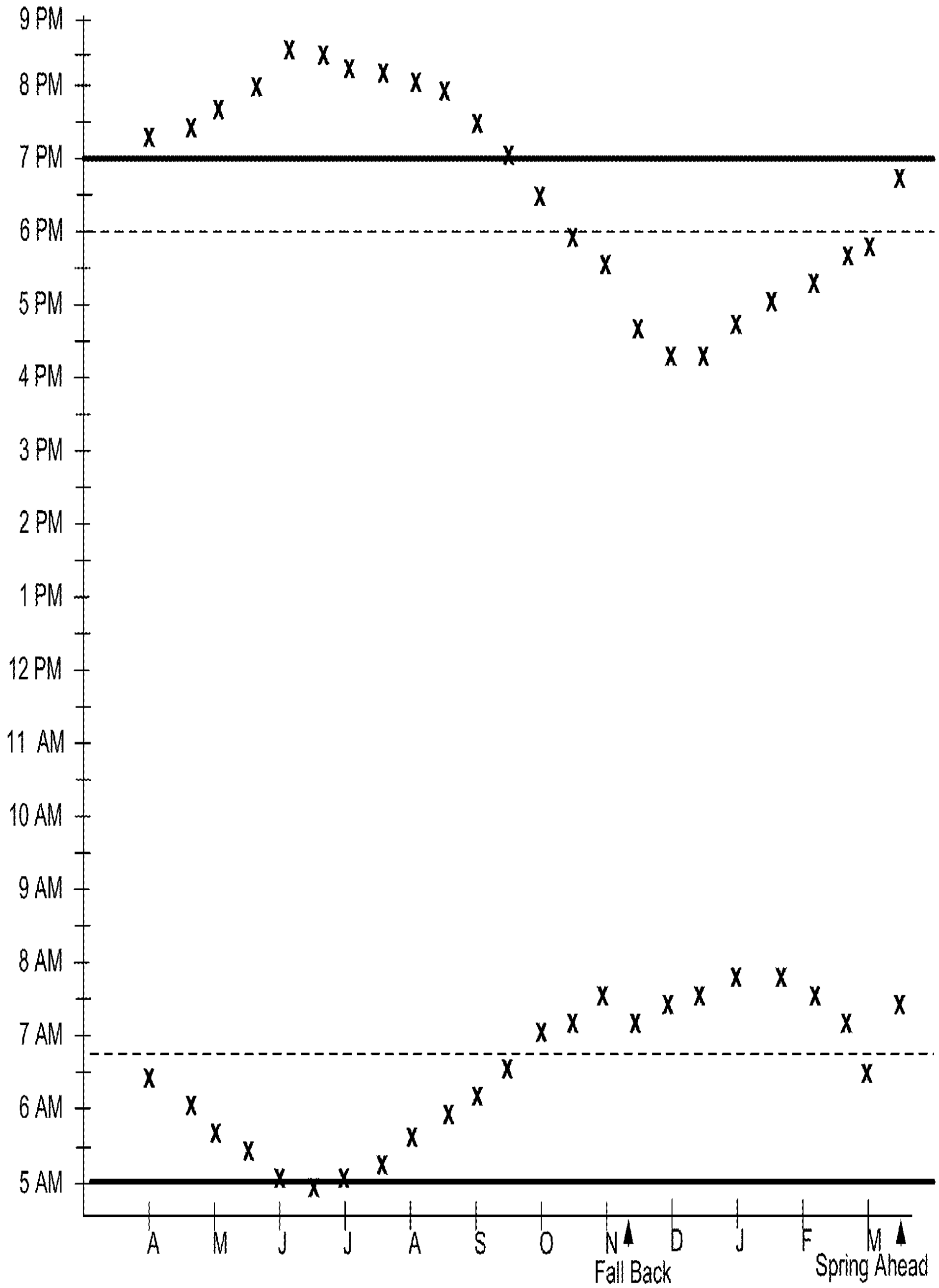
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 50

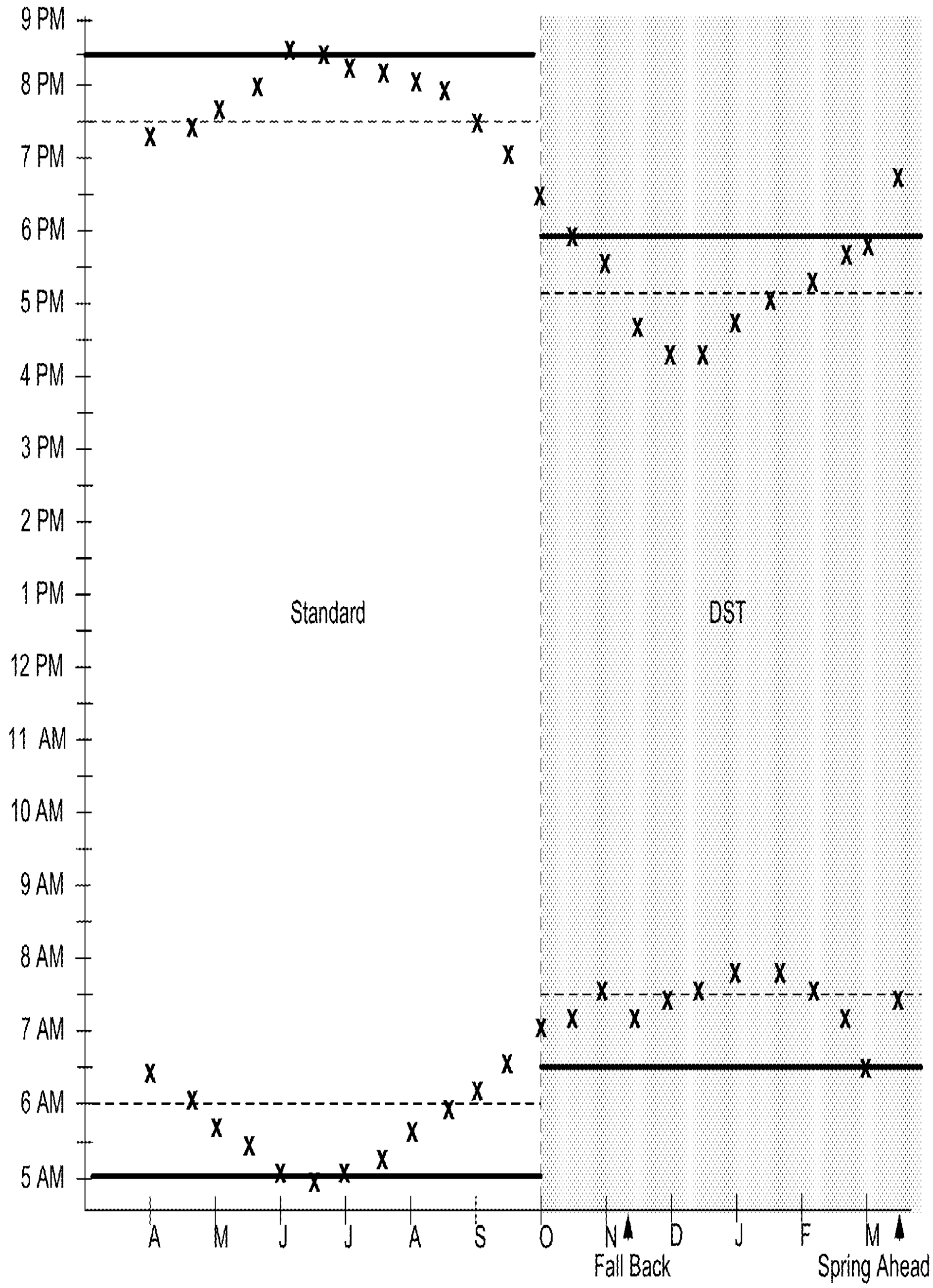
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
Standard
DST
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 51

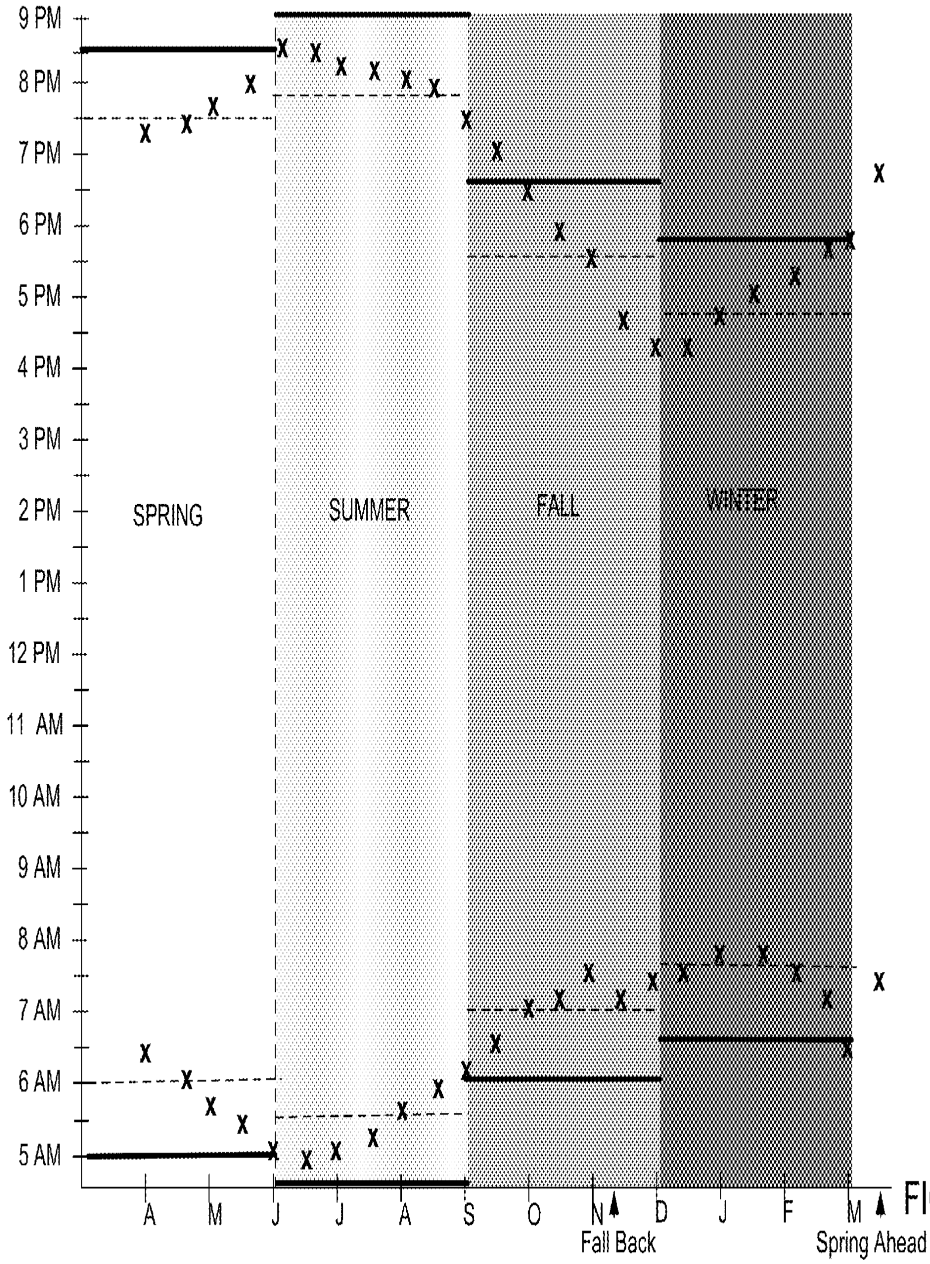
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
SPRING
SUMMER
FALL
WINTER
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 52

UNITED STATES DISTRICT COURT
FOR THE Northern District of Illinois – CM/ECF LIVE
Eastern Division

Cantigny Lighting Control LLC

Plaintiff,

v.

Case No.: 1:16–cv–05794
Honorable Milton I. Shadur

Jasco Products Company LLC, et al.

Defendant.

NOTIFICATION OF DOCKET ENTRY

This docket entry was made by the Clerk on Friday, August 19, 2016:

MINUTE entry before the Honorable Milton I. Shadur:Status hearing set for 9/2/2016 is stricken. Defendant Jasco Products Company LLC is voluntarily dismissed with prejudice. Defendant Avi–On Labs, Inc. is voluntarily dismissed without prejudice. Mailed notice(clw,)

ATTENTION: This notice is being sent pursuant to Rule 77(d) of the Federal Rules of Civil Procedure or Rule 49(c) of the Federal Rules of Criminal Procedure. It was generated by CM/ECF, the automated docketing system used to maintain the civil and criminal dockets of this District. If a minute order or other document is enclosed, please refer to it for additional information.

For scheduled events, motion practices, recent opinions and other information, visit our web site at ***www.ilnd.uscourts.gov***.

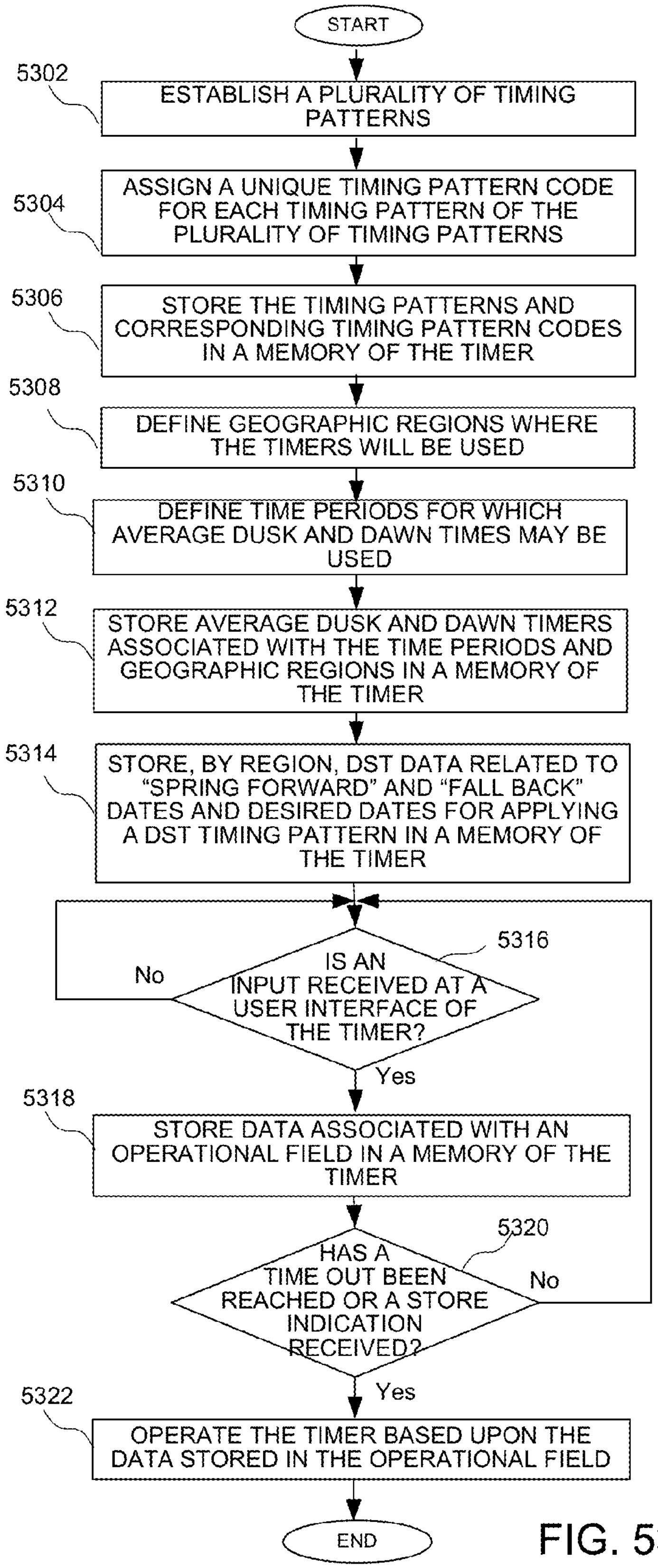
START
5302
ESTABLISH A PLURALITY OF TIMING PATTERNS
5304
ASSIGN A UNIQUE TIMING PATTERN CODE FOR EACH TIMING PATTERN OF THE PLURALITY OF TIMING PATTERNS
5306
STORE THE TIMING PATTERNS AND CORRESPONDING TIMING PATTERN CODES IN A MEMORY OF THE TIMER
5308
DEFINE GEOGRAPHIC REGIONS WHERE THE TIMERS WILL BE USED
5310
DEFINE TIME PERIODS FOR WHICH AVERAGE DUSK AND DAWN TIMES MAY BE USED
5312
STORE AVERAGE DUSK AND DAWN TIMERS ASSOCIATED WITH THE TIME PERIODS AND GEOGRAPHIC REGIONS IN A MEMORY OF THE TIMER
5314
STORE, BY REGION, DST DATA RELATED TO "SPRING FORWARD" AND "FALL BACK" DATES AND DESIRED DATES FOR APPLYING A DST TIMING PATTERN IN A MEMORY OF THE TIMER
5316
IS AN INPUT RECEIVED AT A USER INTERFACE OF THE TIMER?
No
Yes
5318
STORE DATA ASSOCIATED WITH AN OPERATIONAL FIELD IN A MEMORY OF THE TIMER
5320
HAS A TIME OUT BEEN REACHED OR A STORE INDICATION RECEIVED?
No
Yes
5322
OPERATE THE TIMER BASED UPON THE DATA STORED IN THE OPERATIONAL FIELD
END

FIG. 53

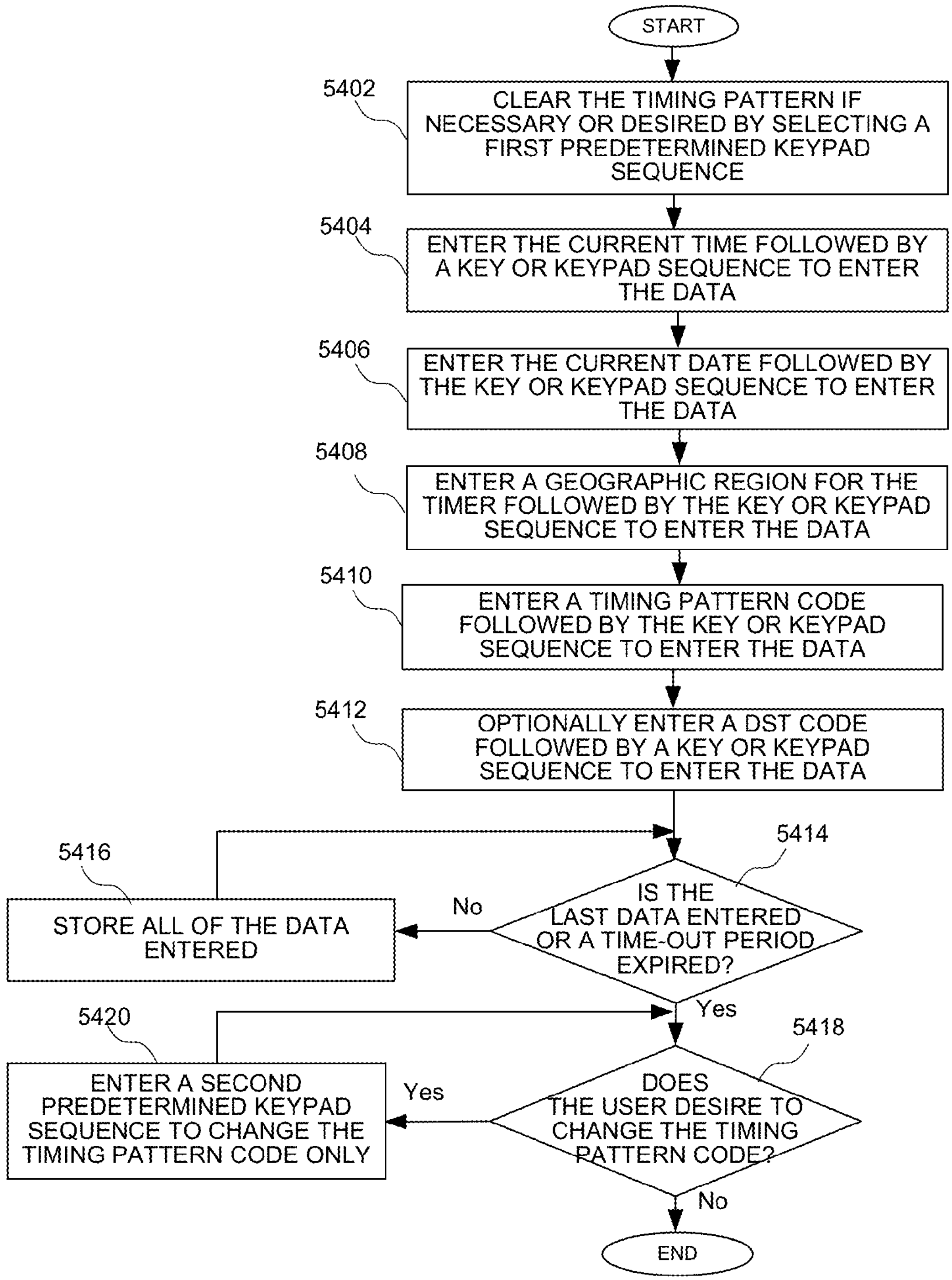
START
5402
CLEAR THE TIMING PATTERN IF NECESSARY OR DESIRED BY SELECTING A FIRST PREDETERMINED KEYPAD SEQUENCE
5404
ENTER THE CURRENT TIME FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5406
ENTER THE CURRENT DATE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5408
ENTER A GEOGRAPHIC REGION FOR THE TIMER FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5410
ENTER A TIMING PATTERN CODE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5412
OPTIONALLY ENTER A DST CODE FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5414
IS THE LAST DATA ENTERED OR A TIME-OUT PERIOD EXPIRED?
No
5416
STORE ALL OF THE DATA ENTERED
Yes
5418
DOES THE USER DESIRE TO CHANGE THE TIMING PATTERN CODE?
Yes
5420
ENTER A SECOND PREDETERMINED KEYPAD SEQUENCE TO CHANGE THE TIMING PATTERN CODE ONLY
No
END

FIG. 54

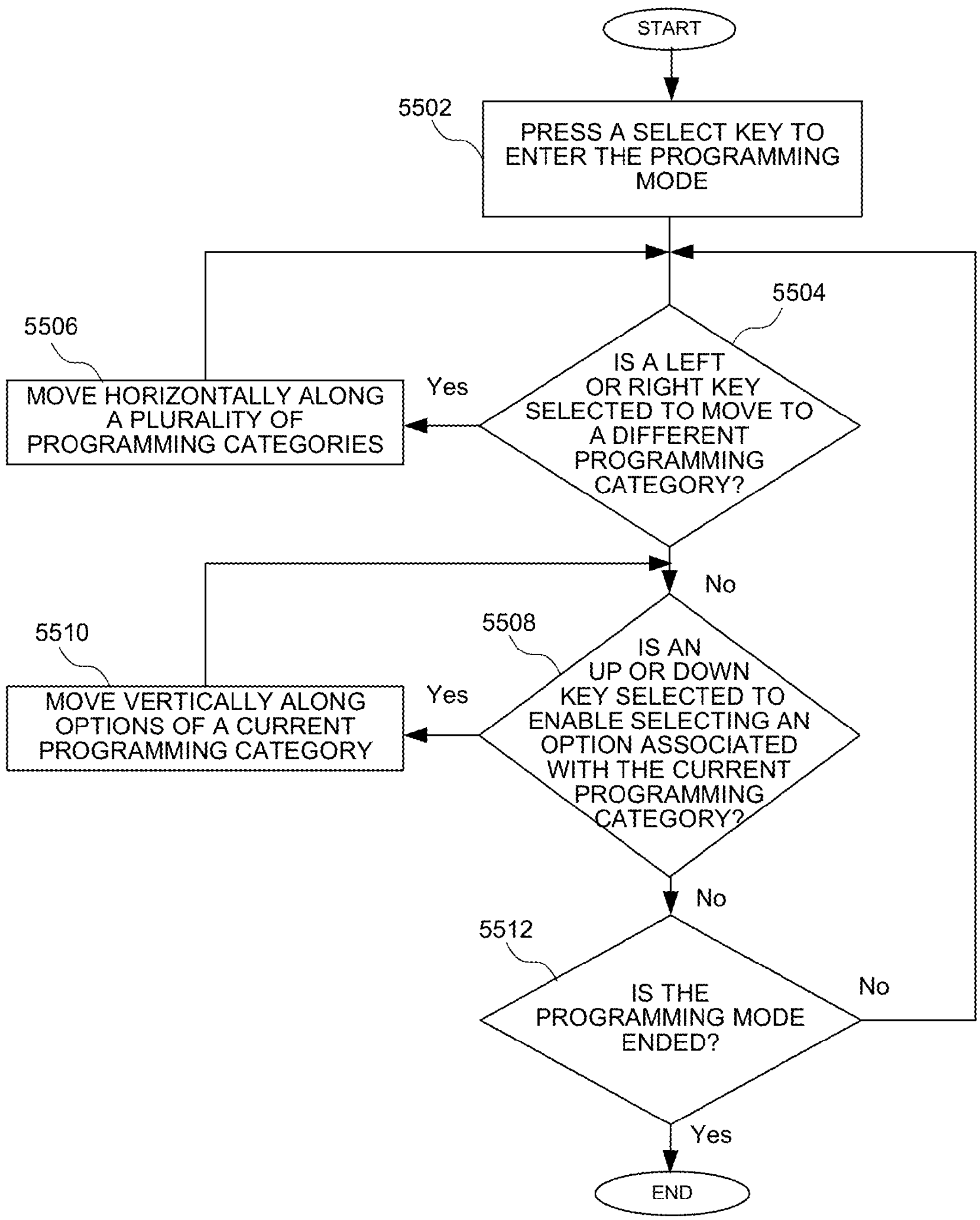
START
5502
PRESS A SELECT KEY TO ENTER THE PROGRAMMING MODE
5504
IS A LEFT OR RIGHT KEY SELECTED TO MOVE TO A DIFFERENT PROGRAMMING CATEGORY?
Yes
5506
MOVE HORIZONTALLY ALONG A PLURALITY OF PROGRAMMING CATEGORIES
No
5508
IS AN UP OR DOWN KEY SELECTED TO ENABLE SELECTING AN OPTION ASSOCIATED WITH THE CURRENT PROGRAMMING CATEGORY?
Yes
5510
MOVE VERTICALLY ALONG OPTIONS OF A CURRENT PROGRAMMING CATEGORY
No
5512
IS THE PROGRAMMING MODE ENDED?
No
Yes
END

FIG. 55

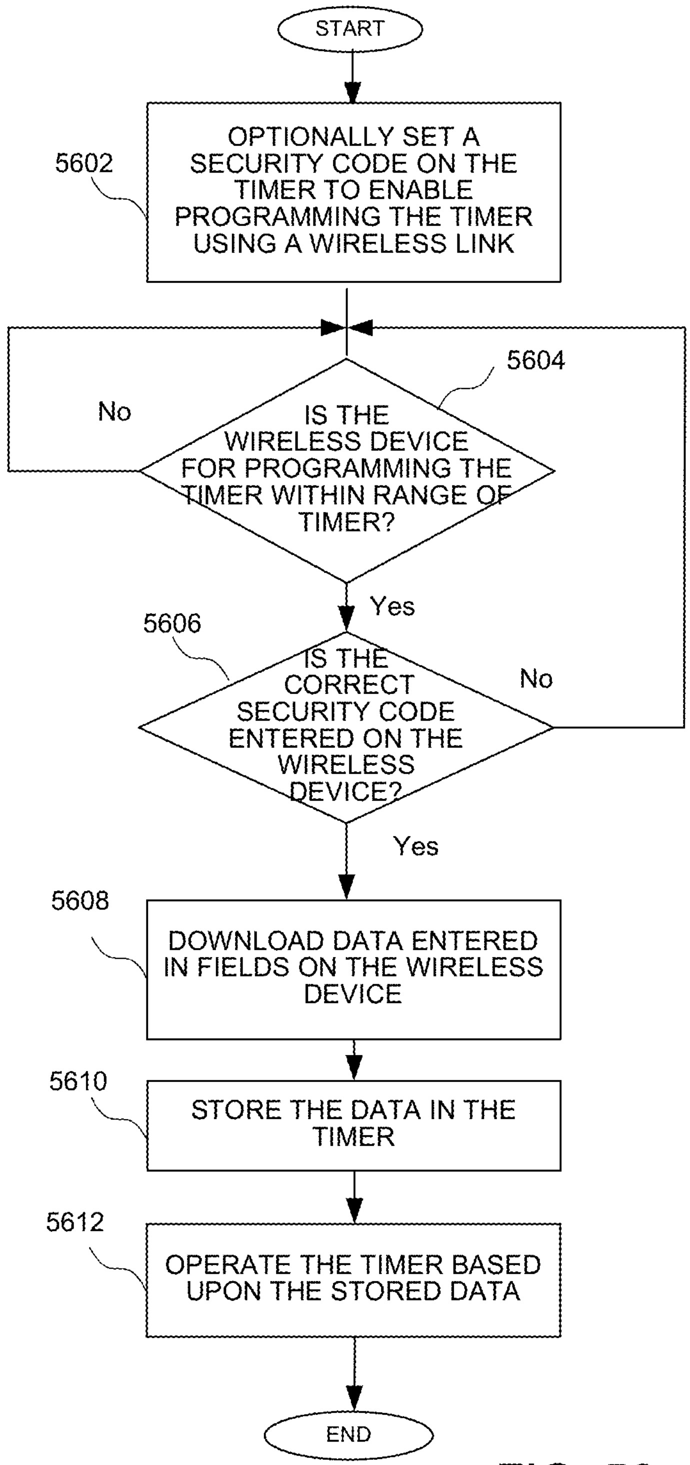
START
5602
OPTIONALLY SET A SECURITY CODE ON THE TIMER TO ENABLE PROGRAMMING THE TIMER USING A WIRELESS LINK
5604
No
IS THE WIRELESS DEVICE FOR PROGRAMMING THE TIMER WITHIN RANGE OF TIMER?
Yes
5606
IS THE CORRECT SECURITY CODE ENTERED ON THE WIRELESS DEVICE?
No
Yes
5608
DOWNLOAD DATA ENTERED IN FIELDS ON THE WIRELESS DEVICE
5610
STORE THE DATA IN THE TIMER
5612
OPERATE THE TIMER BASED UPON THE STORED DATA
END

FIG. 56

PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

FIELD OF THE INVENTION

The present invention relates generally to lighting control products, and in particular, to a programmable light timer and a method of implementing a programmable light timer. Applicant claims priority on co-pending U.S. application Ser. No. 14/066,724, filed on Oct. 20, 2013.

BACKGROUND OF THE INVENTION

Conventional timers for lights, such as timers for indoor lamps or outdoor lights for example, either provide little functionality, or are difficult to program. Because of the limited size of the conventional timers, the size of the screen and the size of the interface for programming the timer are both relatively small. This is particularly true of an in-wall timer, which must fit in an electrical box, commonly called a junction box. Not only does a user of the in-wall timer have to read a very small display, but the user has to advance through a menu shown on the small display using a very limited interface which is provided on the remaining portion of the timer. Entering data on such a user interface is particularly difficult because the in-wall timer is fixed and generally positioned well below eye level.

Further, conventional timers are often unreliable. For example, conventional mechanical timers often malfunction over time, leaving the user without the use of the timer for some period of time and requiring the user to incur the expense of replacing the timer. Moreover, advanced digital timers having electronic displays may be difficult to operate, providing a barrier to certain groups of people who would otherwise use a timer, but don't want to struggle through a complex interface on the small screen of the timer to properly set the timer. For example, not only is the display very small and difficult to read, but the user interface is difficult to navigate on such a small display. These groups of users are either left with no timing operation for their lights, or timers which do not provide the timing operation that they desire. Without an effective timer for a light for example, the light may be on significantly longer than necessary, not only wasting energy but in many cases increasing pollution as a result. As energy consumption world-wide continues to increase, it is important to reduce or minimize the consumption of energy in any way possible. The timer of the present invention provides significant benefits in reducing energy consumption.

SUMMARY OF THE INVENTION

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.

Another programmable light timer for implementing a timing pattern comprises an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

A method of implementing a timing pattern on a programmable light timer is also described. The method comprises enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer; displaying the time on a display of the programmable light timer; enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention;

FIG. **2** is a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention;

FIG. **3** is a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention;

FIG. **4** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to an embodiment of the present invention;

FIG. **5** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention;

FIG. **6** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to an embodiment of the present invention;

FIG. **7** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to another embodiment of the present invention;

FIG. **8** is a side view of the in-wall timer enable a connection of the timer to electrical wiring;

FIG. **9** is a side view of a timer having a front panel according to FIGS. **1**-**7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention;

FIG. **10** is a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1**-**9** according to an embodiment of the present invention;

FIG. **11** is a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1**-**9** having a wireless communication circuit according to an embodiment of the present invention;

FIG. **12** is a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention;

FIG. **13** is a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention;

FIG. **14** is a diagram showing data fields of data entered by a user according to an embodiment of the present invention;

FIG. **15** is a diagram showing data fields of data entered by a user according to an alternate embodiment of the present invention;

FIG. **16** is table showing timing pattern codes and associated timing characterization data and categories according to an embodiment of the present invention;

FIG. **17** is a table showing the designation of regions associated with a number of geographical locations according to an embodiment of the present invention;

FIG. **18** is a table showing average dusk and dawn times for various regions and periods according to an embodiment of the present invention;

FIG. **19** is a table showing daylight savings time codes and associated daylight savings time characterization data according to an embodiment of the present invention;

FIG. **20** is a flow diagram showing the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention;

FIGS. **21**-**43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**;

FIG. **44** is a memory showing fields and stored data associated with the programmed timer of FIG. **43**;

FIGS. **45**-**49** show screens of a user interface enabling the wireless programming of a timer according to an embodiment of the present invention;

FIG. **50** is a chart showing dusk and dawn times over a year;

FIG. **51** is a chart showing dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time;

FIG. **52** is a chart showing dusk and dawn times over a year and which is divided into four periods including four seasons;

FIG. **53** is a flow chart showing a method of generating timing characterization data according to an embodiment of the present invention;

FIG. **54** is a flow chart showing a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention;

FIG. **55** is a flow chart showing a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention; and

FIG. **56** is a flow chart showing a method of selecting a stored timing pattern using 5 key user interface of FIGS. **5** and **7** according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The various embodiments set forth below overcome significant problems with conventional timers of having to use a small display, and navigating a menu on such a small display. Some embodiments eliminate the requirement of having a display by providing pre-programmed timing patterns which can be easily selected by entering a timing pattern code associated with a desired timing pattern. Other embodiments include a display, but benefit from an improved user interface which enables the easy selection of a timing pattern by selecting a desired timing pattern code. In addition to selecting the timing pattern code, the user interfaces for embodiments with or without a display enabling the easy programming of other data which must be entered to operate the timer. By storing the timing patterns which are associated with common or desirable on/off patterns which are likely to be used to operate the timer, a user does not need to enter on/off times for a light for various times during a day or week, or reprogram the timer in response to changes in dusk and dawn times during a calendar year.

Turning first to FIG. **1**, a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention is shown. The timer of FIG. **1** comprises a housing portion **102** having an optional cover **104** (coupled to the timer by way of a hinge **106**) which covers a user interface when in the closed position and enables programming the timer by way of the user interface in the open position. A feedback indicator **108**, such as a light and more particularly a light emitting diode (LED), could be implemented to show the status of the light or other appliance attached to the timer, for example. The feedback indicator could show green when a light attached to the timer is on, and could be or (or show red) when the light is off. An optional switch **109** which is movable between an on or off position, and a timer position for implementing the timer according to a selected timing pattern. While the cover is primarily cosmetic and may generally prevent unintentional changing of the timer, the timer cover is not necessary. Alternatively, the cover may be functional, such as functioning as an on/off override switch for the light or appliance attached to the timer in place of the switch **109**. For example, the state of the light may be toggled (i.e. changed from a current state, such as on, to the other state, such as off) in response to pressing the cover which would activate a switch to change the state of the light if the switch **110** is not included. Flanges **111** and **112**, each having a threaded portion for receiving a screw to attach the timer to a junction box. While the various embodiments are generally described in reference to a timer which is "hard wired" in a junction and may be used for a porch light for example, it should be understood that the user interfaces, circuits and methods set forth in more detail below could be implemented in a timer which is plugged into an outlet (commonly called an light or appliance timer), as will be described in more detail below in reference to FIG. **9**. Further, while some examples are provided in terms of residential-type in-wall timers which are installed in a conventional residential junction box, it should be understood that the user interfaces, circuits and methods could be implemented in commercial timers.

Turning now to FIG. **2**, a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention is shown. As shown in FIG. **2**, when the cover **104** is moved to an open position, a user interface comprising a keypad **204** is accessible on an inner surface **202**. Also shown on an inner surface **206** of the cover, instructions can be printed to enable the user to easily program the timer. As will be described in more detail below, a user can program the timer in 5 simple steps (and change a timing pattern using a single step). The keypad **204** of FIG. **2** comprises 0-9 keys and star (*) and pound (#) keys.

According to one embodiment, the timer could be programmed using 5 steps for entering data on the keypad as shown on the inside of the cover. The keypad is used to enter numeric data which is necessary to operate the timer. A key pattern sequence is entered to clear the timer if necessary. For example, the star key could be pressed 3 times to clear the memory. Data necessary to operate the timer according to a user's desired timing pattern is then entered. In particular, a current time is entered followed by the pound key. The pound key may be entered to indicate that all of the data for a given field. Alternatively, all of the data could be considered to be entered after a time-out period. The time is preferably entered as military time (e.g. 2:00 PM would be entered as **1400**) to ensure that the correct AM or PM time is stored. Alternatively, a code at the end of the time could be entered to indicate AM or PM. A date is then entered, followed by the pound key. The date is preferably entered as a 6 digit code (e.g. in the DDMMYY format) to ensure that the date is properly interpreted. A location code (such as a zip code) could then be entered followed by the pound key. As will be described in more detail below, the location code can be associated with a region which is used to ensure that the correct daylight savings times and dawn and dusk times (or average values associated with dawn and dusk times) are used to operate the timer. The timing pattern is then entered followed by the pound key. The timing pattern will be used to operate the timer based upon the current time, date and location of the timer. Accordingly, after **5** simple steps, the timer is programmed to follow a timing pattern that meets the user's needs, and operates as it would if on/of times were entered on a user interface in a conventional manner to implement the timing pattern.

In addition to providing simple steps to program the timer, the user interface of FIG. **2** also enables easy reprogramming if desired by the user. Although the selection of a desired timing pattern will eliminate the need to reprogram the timer (such as at the start of spring or fall seasons as is generally required with conventional timers), the user interface enables easy reprogramming is a user decides that they simply want to change the timing pattern. That is, rather than having to clear all of the data and re-enter the current time, date and a zip code, a key sequence could be entered followed by the pound key to change the timing pattern. For example, a user could enter a sequence of three # keys followed by the new timing pattern, followed by the # key. While the use of pre-stored timing patterns which can easily be selected using a timing pattern code, it may be the case that the user may realize that they do not like the pattern that they selected, and decide that they simply want to change the timing pattern that they selected. Alternatively, a user may decide that they want to periodically reprogram the timer. That is, although the use of pre-stored patterns eliminates the need for reprogramming, reprogramming the timer to implement another pre-stored timer is so easy that it is an option for a user of timer implementing the pre-stored timing pattern.

Turning now to FIG. **3**, a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention is shown. According to the embodiment of FIG. **3**, a display **302** could be implemented. While a display may not be necessary to implement the timer with pre-stored timing patterns, the display may be desirable to provide information regarding stored data, including a selected timing pattern for example. That is, even though a display is not necessary in view of the use of pre-stored timing patterns, a user may desire a display for aesthetic reasons, because they are simply used to having a display, or for what information it does provide. As shown in FIG. **3**, the display includes a time field **304** which displays the current time during normal operation, an AM/PM field **306**, an on/off field **308** indicating the state of a light or appliance which is attached to the timer. Finally, an information field **310** includes other information related to the operation of the timer. For example, the information field could include the current date and the timing pattern number. The timing field could include other information, such as DST code or whether a security code is used, as will be described in more detail below. Based upon the current time, date and security code information, a user could determine whether the timer is set with the correct data and should be operating correctly. As shown in FIG. **4** which shows the embodiment of FIG. **3** with the cover in the open position, the user interface could be implemented in with the user interface.

Turning now to FIG. **5**, a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention is shown. According to the embodiment of FIG. **5**, a 5-key user interface could be implemented to enter data necessary for implementing a timer using a pre-stored timing pattern. As will be described in more detail below in reference to FIG. **20**, the left and right keys on either side of a select key will allow a user to traverse through programming categories, while the up and down keys above and below the select key will enable a user to move through the available options in a given programming category. As will be further described below, the 5-key user interface will be enable a user to select a timing pattern code so that the timer can be implemented with a pre-stored timing pattern.

Turning now to FIG. **6**, a perspective view of the front panel of the in-wall light timer of FIG. **3** having pre-set buttons according to an embodiment of the present invention is shown. As shown in FIG. **6**, dedicated, pre-set actuators **602**, shown here as buttons **604** which enable the manual selection of a pre-stored timing pattern. Four pre-set buttons are shown in the embodiment of FIG. **6**, including a fixed button (applying a fixed on time and fixed off time when selected), an astronomic button enabling the operation of the timer based upon astronomic data, a DST button enabling the operation of the timer based upon a first timing pattern for a standard time period and a second timing pattern for a daylight savings time period, and a seasonal button for applying different timing patterns for each of the four seasons. Each of the buttons includes a selection indicator (such as an LED light for example) which would indicate when the button is selected. The button could be movable between a depressed, on position (where it is flush with the surface of the timer and the LED lit) and an off position. Alternatively, the selected button would have the LED lit, with all buttons having the same positioning. Only a single button can be selected at a time, where a selected button would be deactivated if another button is selected. The selection of timing patterns for the pre-set actuators **602** will be described in more detail below. While 4 buttons are shown, it should be understood that a greater number of buttons or fewer buttons could be implemented. Further, while examples of the functions of buttons are shown, it could be understood that other functions for the pre-set buttons could be implemented. For example, one button could be dedicated to each season. As will also be described in more detail below, a wireless option would enable the wireless programming of timing patterns for the pre-set buttons.

Turning now to FIG. **7**, a perspective view of the front panel of the in-wall light timer of FIG. **5** according to another embodiment of the present invention is shown. In addition to having pre-set buttons as shown in FIG. **6**, a connector **702** for receiving a portable memory device is provided for downloading data, such as new or different timing patterns or DST data, as will be described in more detail below. While the connector for receiving a portable memory is only shown in connection with FIG. **7**, it should be understood that such a connector could be implemented in any of the embodiments of FIGS. **1**-**6**.

While user interfaces are provided in the embodiment of FIGS. **6** and **7** for entering data in addition to the dedicated buttons for selecting a predetermined timing pattern, it should be understood that the embodiments of FIGS. **6** and **7** could be implemented without the user interface for entering data or a display, where the only actuators which would be required for selecting a timing pattern would be the dedicated buttons of FIGS. **6** and **7** for selecting pre-stored timing pattern or a timing pattern based upon data selected for the buttons and provided to the timer. That is, the timing patterns of the dedicated buttons could be assigned defined, pre-stored timing patterns, could be downloaded using a portable memory by way of the connector **702**, or could be programmed by a user, as will be described in more detail below in reference to FIGS. **46**-**49**. That is, embodiments of the timer could be implemented with the pre-set buttons **602**, and not having a keypad **204** or a 5-key interface **312**.

Turning now to FIG. **8**, a side view of the in-wall timer shows connectors enabling a connection of the timer to electrical wiring. The side view of the timer shows a connector panel **802** having coupling elements **804-808**, shown here as screws, for receiving wires of a junction box. Alternatively wires could extend from the timer and be connected to wires of the junction box.

Turning now to FIG. **9**, a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention is shown. Rather than a timer which is fixedly coupled to a junction box, the various circuits and methods can be implemented in a timer adapted to be used with a wall outlet and adapted to receive a plug of a light or some other appliance. As shown in FIG. **9**, the timer **902** comprises a receptacle **904** for receiving the prongs of a plug of a light or an appliance. The timer **902** also comprises prongs **906** to be inserted to an outlet to enable applying power to the light or appliance. The user interface **202**, shown opposite of the prongs **906**, can be implemented according to any of the user interfaces set forth above.

Turning now to FIG. **10**, a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to a first embodiment of the present invention is shown. As shown in FIG. **10**, a circuit for implementing a timer having pre-stored timing patterns comprises a control circuit **1002** adapted to access one or more of a plurality of pre-stored timing patterns. The control circuit **1002** may be a processor having a cache memory **1004** storing timing patterns and other data necessary to implement the timer. A memory **1006** may also be implemented to store timing patterns or other data necessary to implement the timer. The memory **1006** may be implemented as a non-volatile memory, enabling the memory to store the timing patterns and data without loss due to a power loss. A portable memory **1008**, having contacts **1010**, may be received by a connector **1012** (such as the connector **702** of FIG. **7** for example) and coupled to corresponding contacts. A transformer **1014** is coupled to receive an input voltage at an input **1016**, and provide a regulator voltage signal **1018** to various elements of the timers. A second input **1020** is coupled to a ground terminal enabling a ground signal which is coupled various elements of the timer. A backup energy supply **1022**, which could be a battery or a capacitor for example, could be implemented to ensure that data of a memory is not lost during a loss of power. The control circuit provides a control signal by way of signal line **1024** to a switch **1028** which receives a regulated voltage by way of a line **1026**. The switch **1026** controls the application of the regulated voltage to a voltage terminal **1030** which enables power to be applied to an appliance **1032**, such as a light as shown. The appliance has a first terminal **1032** for receiving the regulated voltage from the voltage terminal **1030** and a second terminal **1036** coupled to the ground potential. An input portion **1038**, which may be implement any of the user interface elements described in reference to FIGS. **1-7** is also shown.

Turning now to FIG. **11**, a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention is shown. As shown in FIG. **11** comprises a wireless communication circuit **1102** which is adapted to enable the wireless programming of certain data or information by way of a corresponding wireless communication circuit implemented in a computer device, such as a laptop computer, a tablet computer or a "smart phone." An example of a wireless communication circuit is shown by way of example in FIG. **12**.

Turning now to FIG. **12**, a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention is shown. In particular, the antenna **1104** receives wireless communication signals according to a predetermined wireless communication protocol. The data may be sent to the wireless transceiver **1102** by way of a computer having or in communication with a corresponding wireless transceiver **1102**. The received data is coupled to a combined mixer/voltage controlled oscillator **1206**, the output of which is coupled to an intermediate frequency (IF) circuit **1208**. Based upon outputs of the IF circuit and a phase locked loop (PLL) **1210**, a mixer **1212** generates the received data. An analog-to-digital converter (ADC) **1214** then generates digital data representing the timing characterization data.

The control circuit may also provide data to the data transceiver for transmission to the computer. Data to be transmitted from the data transceiver **1102** is coupled to a digital-to-analog converter (DAC) **1216**, the output of which is coupled to a modulator **1218** which is also coupled to a PLL **1220**. A power amplifier receives the output of the modulator to drive the antenna **1104** and transmit the data. It should be noted that the wireless communication network could be configured to implement any wireless protocol for communicating with the wireless communication circuit of the timer of FIG. **11**. According to one embodiment, the data transceiver could implement the IEEE Specification 802.11 wireless communication standard, the Bluetooth standard, an infrared protocol, or any other wireless data protocol. While the circuit of FIG. **12** is provided by way of example, other wireless data transceivers could be employed according to the present invention to implement the desired wireless communication standard.

Turning now to FIG. **13**, a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention is shown. The geographic regions enable applying certain data, such a timing pattern, which is suitable for a timer implemented in the geographic area. As shown in FIG. **13**, the geographic area of the continental US is divided into 12 regions identified by a longitudinal designation (shown here as the time zones) or latitudinal designation (shown here as 3 regions designated as north, central and south). According to the embodiment of FIG. **13**, the regions are designated by a two letter code including the first letter of the longitudinal code followed by the first letter of the latitudinal code, by way of example. While 12 regions are shown by way of example, it should be understood that a greater number or fewer number of regions could be designated. Further, while geographic regions, other designation of regions could be implemented, such as zip codes or telephone area codes.

Turning now to FIGS. **14** and **15**, diagrams data fields of data entered by a user according to embodiments of the present invention, including data as entered on a keypad as described in reference to FIG. **2**. According to the embodiment of FIG. **14**, a field **1402** stores the received "clear" code, shown here as three star keys, a time code **1404** (shown here as a 4 digit time entered in military format representing 2:30 PM), a date code **1406** (shown here as a 6 digit date in the DDMMYY format), a location code **1408** (shown here as a zip code), and a timing pattern code **1410** (which will be described in more detail below). While the location is shown as a zip code, other location codes representing larger or smaller geographical errors could be utilized. According to the embodiment of FIG. **15**, an optional daylight savings code

1502 indicating daylight savings time information, such as dates associated with a period for applying a daylight savings time pattern or dates for shifting the current time by 1 hour, as will be described in more detail below. While specific codes are shown in FIGS. **14** and **15**, it should be understood that additional fields could be implemented.

Turning now to FIG. **16**, a table shows timing pattern numbers and associated timing characterization data and categories according to an embodiment of the present invention. A significant benefit of the various embodiments of the timers and methods of implementing a timer is that on and off times for implementing a timer are easily selected without having to enter the on and off times. Rather, a timing pattern designated by a timing pattern code can be easily be selected by a user rather than having a user enter the on and off times for the timer. As will be described in more detail below, the timing patterns can be categorized according to a number of broad categories, such as fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, for example, to make it easier to select a desired timing pattern. The timing pattern codes can also be arranged such that similar timing patterns can have similar numbers, and can be arranged in a tree format such that numbers having the same most significant bit will have the same broad category. Timing patterns associated with timing pattern codes having the same second most significant bit may also have a common on or off time, for example.

Referring specifically to FIG. **16**, timing patterns are shown for fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, where the fixed timing patterns having timing pattern codes between 1 and 1xx, DST timing patterns having timing pattern codes between 2 and 2xx, seasonal timing patterns having timing pattern codes between 3 and 3xx, and astronomic timing patterns having timing pattern codes between 4 and 4xx. The fixed time year-round timing patterns as shown have an on time and an off time, where timing pattern codes associated with timing patterns having the same on time have the same first two digits. For example, timing patterns having an on time of 4:00 PM will have a timing pattern code starting with 11X, while timing patterns having an on time of 5:00 PM will have a timing pattern code starting with 12X. The first timing pattern code of any of the any of the groups (i.e. the timing pattern code could be the default timing pattern code for dedicated timing pattern selection buttons as will be described in more detail below.

The second and third timing pattern categories have different timing patterns for different times of the year. In particular, the DST category has two timing patterns, one for standard time and one for daylight savings times, where the different timing pattern codes represent various combinations of on and off times for both of the standard time and daylight savings time. Similarly, the seasonal category has different on and off times for each of the four seasons.

Finally, the astronomic category of timing patterns including timing patterns based upon known dusk and dawn times. While dusk and dawn times are helpful in setting on and off times for a timer because they are close to the times when it becomes dark and light, the use of the known dusk and dawn times often leads to the timer being on at times when a user may not want the timer on. For example, during winter, lights may come on before 4:00 PM, which may be much earlier than desired. Similarly, lights may be on later than desired at dawn. During summer, lights may be on later than desired, which may be after 7:30. Therefore a user may want to use an offset. As will be described in more detail below, a certain time period delay for tuning on the timer may be desired with

on times and a certain time period for turning lights off early may be desired with off times. Further, a user may desire the use of astronomic dusk times (with or without an offset) and the use of a fixed timer for turning the lights off at some time after midnight, for example. It should be understood that astronomic dusk and dawn times could be used with timing patterns in the DST and seasonal categories, or could be limited to the astronomic categories for simplicity. It should alos be noted that while even hour times are shown, on and off times based upon half hours or quarter hours could be provided.

In order to implement astronomic times, it is necessary to consider both locations and the time of year. While it may be possible to store astronomic data any level of granularity of location and time, average astronomic dusk and dawn data could be stored based upon a particular region and a particular time period as will be described in reference to FIG. **18**. In order to store average astronomic dusk and dawn data, it is necessary to identify a location where the timer will be used, and assign that location to a reasonable number of regions for which astronomic timing data is stored. By way of example in FIG. **17**, the 12 regions designated in FIG. **13** could be associated with zipcodes. Accordingly, when a user enters a zip code, data associated with the region having the zip code would be used when implementing a selected timing pattern for the timer. By way of example, the data could be based upon a central location of the region, or an average of the different dusk and dawn times of the region. Alternatively, the average dusk and dawn times could be skewed toward more populated areas of the regions. Not only would average dusk and dawn times for the location be used based upon the zip code, but the correct time in the various time zones based upon the Greenwich Mean Time (GMT) would also be used. Alternatively, three digit telephone area codes could be used.

As shown in FIG. **18**, these average dusk and dawn times are not only based upon location, but also based upon time of year. While daily dusk and dawn times could be used, it would be more efficient to use average dusk and dawn times for given time periods, and particularly time periods associated with time periods for implementing timing patterns, as described in reference to FIGS. **51** and **52**. Accordingly, for each region, an average dusk time and average dawn time for different timer periods during which a particular on time or off time would be applied, shown by way of example in FIG. **8** to include a full year, portions of a year or individual days.

Additional data which could be used in implementing a timer is DST data and corresponding DST codes. In addition to dates at which times are moved back during the fall or moved back during the spring in areas having daylight savings times (where these dates have changed over time and may change in the future), dates for applying a timing pattern for a period having shorter daylight, called a daylight savings time period. While the daylight savings time period could correspond to the times for moving the timer forward and back, a user may like to select a period for applying a daylight savings time timing pattern during a period which is different than the period between moving the clock back and returning the clock to the standard time. Accordingly, a table could be stored which has different daylight savings time data including a DST time period for applying different timing patterns and dates for changing the clock. Each of a plurality of combinations is stored with a corresponding DST code in the table. When the DST code is entered during programming of the timer, on and off times associated with a selected timing pattern will be applied subject to dates and times associated with daylight savings time data associated with the DST code.

It should be noted each of the tables **16-19** are stored in a memory of the timer, such as memory **1006** or a cache memory of the timer of FIG. **10**. The data is preferably stored at the time of manufacture (or at some point before the timer is packaged) and provided to the end user with the timing patterns selectable by a timing pattern code already stored in the memory. Further, data in the tables could be updated using a portable memory device, such as a USB drive, by way of the connector **702**.

Turning now to FIG. **20**, a flow diagram shows the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. While the keypad of FIG. **2** provides an easy way of entering data necessary to implement a timer having pre-stored timing patterns, other user interfaces could be used which take advantage of the pre-stored timing patterns associated with corresponding timing pattern codes. For example, "navigation" keys which enable a user move through a menu can be implemented to enable a user to select a timing pattern code or any other data necessary for implementing a timer as set forth above. Unlike conventional timer user interfaces, the 5 key navigation user interface of FIG. **20** is not only intuitive, but overcomes many of the problems associated with conventional user interfaces by not only showing a current programming category and a current data value for the current programming category, but also previous and following programming categories and previous and following data values which could be selected for the current programming category. That is, as will be described in more detail in reference to FIGS. **21-43**, the arrangement of programming categories and corresponding data values will enable easy navigation through the user interface by indicating where a user is within the menu.

Referring specifically to FIG. **20**, the programming categories **2002** and corresponding data values **2003** could be selected by the 5 key user interface which includes a select key **2004** which could be used to select data associated with a given programming category. In summary, the select key **2004** will enable a user to enter the menu for programming (such as by depressing the key for a predetermined period (e.g. 2 seconds), the left key **2006** will allow moving left along the programming categories, and the right key **2008** will enable moving right along the programming categories. An up key **2010** will enable a user to move up within a column for a current programming category, while a down key **2012** will enable moving down within the current programming category. By way of example, when the display is in an operational mode and shows operational values (such as the operational values shown in FIGS. **3-5**), the first programming mode (i.e. the hour programming mode **2104**) will be shown on the display when the select key **2004** is selected. If the user desires to enter a certain time, the up and down keys can be used to move to a desired data value representing the desired hour, and have that data value selected by using the select key. When a data value is selected for a given programming category, the user interface preferably then automatically moves to the following programming category. A key pad sequence (such as the selection of the select key three times or merely holding the select key for a predetermined period of time (e.g. 2 seconds)) can then be entered at any time to leave the programming mode of the timer.

The programming categories include the following: the hour mode **2014** (having 24 data values from 12 AM to 11 PM), the minute mode **2016** (having 60 data values from 0 to 59 minutes), the month mode **2018** (having 12 data values from JAN to DEC), the day mode **2020** (having 31 data values from 1 to 31), the year mode **2022** (having 10 data values for each of the tens digit of the year from 0x to 9x), the year mode **2024** (having 10 data values from 0 to 9 for the one's digit), the region mode **2026** (having 12 data values for each of the regions shown in FIG. **13**), the timing pattern mode **2028** (having a predetermined number of timing pattern codes associated with a corresponding number of pre-stored timing patterns), the DST mode **2030** (having the number of data values associated with different DST data values, such as the data associated with the DST codes of FIG. **19**), the security mode **2032** (having the number of available security codes, such as 100 codes for a two bit security code or **1000** codes for a 3 bit security code), and optionally an "exit" programming option which will be described in more detail in reference to the programming example of FIGS. **21-43**. While a user can depress and hold the select key for a predetermined period of timer for example to leave the programming mode, the exit option can also be provided to enable a user to leave the programming mode. In either case, a new data that has been selected will be stored and used by the processor of the timer to implement a timing pattern.

FIGS. **21-43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**. While displays may be desirable for some users (because they want to see what data is being entered to program the timer), conventional timers having displays are not only difficult to navigate through a menu for programming the timer (and understand where the user is in the menu), but also are difficult to see the data which is entered in a certain field of a conventional timer because the display is so small. The displays of FIGS. **21-43** show the steps of programming a timer to enable operation of the timer according to a pre-stored timing pattern from the initial, un-programmed state of the timer of FIG. **21** to the final programmed state of the timer of FIG. **43**. As shown in FIG. **21**, various fields which provide information in the normal operating state are shown. The programming mode can be entered when the select key of the 5-key user interface is selected (or some other key sequence such as the select key being selected 3 times, or the select key being depressed for a predetermined period, such as two seconds).

One unique feature of the user interface described in FIGS. **21-43** is that a current selection option (either programming categories or data values) is not only shown, but a "previous" and "next" programming category and data value is also shown. In order to further make the timer easier to program and overcome a significant problem of conventional timers with displays which are difficult to read, the current programming category and data value is larger than the "previous" and "next" programming category and data value. Making the current programming category and data value larger makes it easier to read the programming category and data value while still making it easy to navigate the menu by providing previous and next values.

After a key or key sequence is entered on **5**-key user interface to enter the programming mode, an initial programming state is entered as shown in FIG. **22**. While the initial states for data values in FIGS. **23-42** are shown as the top values of the available data values for a programming mode, the initial states could be some other value, such as a value near the middle of the available data values, or a commonly selected data value. The sequence of FIGS. **21-42** are intended to show the programming of a timer having the following data: a current timer of 10:24 PM and a current data of Oct. 9, 2013, where the timer is operated in the North Central (NC) region having a timing pattern **13**, a DST code **903** and an optional security code **013**. As will be described in more detail below, a security code could be used if a user could reprogram the

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(54) **PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER**

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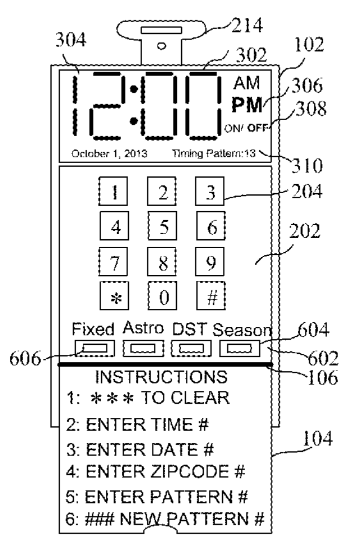
(57) **ABSTRACT**

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time. A method of implementing a timing pattern on a programmable light timer is also described.

20 Claims, 18 Drawing Sheets



timer using a wireless connection to prevent a hacker from changing the operation of the timer (from outside of a building for example).

As shown in FIG. **22**, the initial programming state includes the Hour programming mode, and a initial data value of 1 AM. A user could then use the up and down keys to select the desired time. As shown in FIG. **23**, the user had moved down one data value to 2 AM, and then down to the desired data value of 10 PM as shown in FIG. **24**. When the user reaches the desired data value, the user can select the value using the select key, in which case the display would then display the next programming category, which happens to be the minute programming category. Alternatively, rather than automatically changing, a user could be required to move to the next programming category by selecting the right arrow key. As shown in FIG. **25**, the initial state of the minute programming mode has a "1" in the data value display portion. The up and down keys can then be used to move to the desired "24" minute data value as shown in FIG. **26**, where the month programming category would then be displayed as shown in FIG. **27** in response to the selection of the data in the minute programming mode. After the desired month of October is reached in FIG. **29**, the programming mode is move to the day programming mode as shown in FIG. **29**, where the desired 24^{th} day is selected as shown in FIG. **30**. As shown in each of the displays, a previous programming category is shown above a current programming category, and a next programming category is shown below the current programming category. Similarly, a previous data value of the current programming category is shown above the current data value, and a next data value is shown below the current data value. For example, in selecting the month as shown in FIG. **27**, the previous programming category "minute" in the programming category side of the display is above the current programming category "month," while the next programming category "day" is shown below the current programming category. Similarly, in the data value side of the display, the month of December is above the current data value of January, while the month of February is below the current value. Providing categories and values above and below current categories, a user can more easily navigate through the menu. Also, by providing the current category/value in a larger size, it is easy to read the category/value.

Selecting a desired year can present more of a problem because of the number of available years (e.g. 100 data values from **2000-2099**). While a single year selection mode can be implemented in the same way as selecting 1 of 31 days of a month as described above, the year programming mode can be divided into two operations, enabling the selection of a decade in one step and enabling the selection of a year in another step. As shown in FIG. **31**, it should be noted that the initial state is shown with a year "200?", where the "zeros" decade is provided. The user can then move down one data value to the "tens" decade as shown in FIG. **32**, which, when selected, will lead to the menu option as shown in FIG. **33** enabling the selection of the year for the tens decade. Therefore, the up and down keys are used to select **2013** as shown in FIG. **34**.

Other data for implementing the timer can then be entered. In particular, the region in which the timer is implemented can be selected by going from an initial region option NE as shown in FIG. **35** to desired timing region option of NC as shown in FIG. **36**. The desired timing pattern can then be selected, where an initial timing program **1** shown in FIG. **37** can be changed to the desired timing program **13**, as shown in FIG. **38**. The desired daylight savings time code can then be selected, where an initial daylight savings time code **900** shown in FIG. **39** can be changed to the desired daylight savings time code **903**, as shown in FIG. **40**. Finally, a desired security code can then be selected, where an initial security code of 000 shown in FIG. **41** can be changed to the desired security code of 013, as shown in FIG. **42**. After all of the data is entered, and the exit option is selected, the display of the timer returns to the operating mode, where the display shows some or all of the data (other than a value of a security code which could also be shown) entered during programming. Further, a "key" or "lock" icon could be shown on the display to indicate that a security code has been programmed.

While it is assumed that no data was programmed initially, it should be noted that, if the timer is already programmed and just some data needs to be reprogrammed, the left and right keys can be used to move within the menu to reach a desired programming category to change the data for that category, at which time the select key can be used to select the data, leave the programming mode, and return to the display for the normal operational mode. By way of example, if a timer is already programmed and a user desires to change the timing pattern (by changing the selected timing pattern code), a user would enter the programming mode and use the left and right keys to move along the programming modes until the timing pattern programming mode is reached. The up and down the available data values until the desired timing pattern code is reached. The data value be selected by using select key, at which time the programming category would move to the next programming category. If no other data values need to be changed, a user could move along the programming categories to the "exit" option to return to normal operation or hold the select key for a predetermined period of time. Accordingly, if a timer is already programmed and a user desires to change the timing pattern for example, the user can easily change the timing pattern without having to reprogram anything else.

Turning now to FIG. **44**, a memory shows fields and corresponding stored data associated with the programmed timer of FIG. **43**. All of the data entered using the numeric keypad or 5-key user interface is stored in memory fields of a memory of the timer, such as memory **1006** for example, and is accessed by the timer to implement a selected timing pattern in operating the timer as described above.

Turning now to FIGS. **45-49**, screens of a user interface enabling the wireless programming of a timer are shown according to an embodiment of the present invention. That is, based upon a current time and date, the timer will implement the timing pattern (associated with the selected timing pattern code) by using data of FIGS. **16-19**. As shown in FIG. **45**, a display **4502** of a wireless device, such as a laptop computer, a tablet computer or a cellular telephone having a touch screen or some other data entry element, shows a data entry screen enabling a user to enter the necessary data, including a timing pattern code associated with a desired timing pattern, for implementing the timer. The display also includes a data entry element **4504**, shown here as a touch screen entry portion having an alphabetical entry portion **4506** (such as a "QWERTY" keypad) and a numeric entry portion (having touch screen keys from 0 to 9). Various fields are provided to enter the data stored in the memory of FIG. **44**. For example, a field **4509** enables a user to enter a security code. The security code may be concealed as shown to avoid someone seeing the code. A time field **4510** enables someone to enter the time, shown here as a 4 digit military time. However, because a full QWERTY keypad is provided, the time could be entered as 10:24 PM for example. The date is entered in a date field **4512**. Although shown in a 6 digit DDMMYY format, it could be spelled out using letters and numbers. The desired region, timing pattern and DST code could be entered in fields **4514**, **4516**, and **4518**, respectively. The user could then exit or opt to enter an advanced options mode.

According to one embodiment, the advanced options mode enables a user to select timing patterns to be implemented with the dedicated buttons for selecting timing patterns as shown in FIG. **6** or **7**, or enables entering on and off times to be applied when the timing pattern associated with the dedicated buttons are selected. That is, a screen could have a field for each dedicated button, where a user could enter the timing pattern code in the field which corresponds to the timing pattern which is desired for the field. As shown for example in FIG. **46** which relates to a timing program for a fixed button setting, on and off times which would be applied throughout the year could be entered in data fields, where on and off times for weekdays could be entered in fields **4602** and **4604** respectively, and on and off times for weekends could be entered in fields **4606** and **4608** respectively. "Back" and "Next" selection options enable the user to move through the advanced programming options to finish the programming or exit as desired.

As shown in FIG. **47**, on and off times associated with an astronomic mode of operation applied in response to the selection of the "Astro" button can be entered in fields **4702** and **4704**, where the entries enable the selection of an offset. As will be described in more detail below in reference to FIG. **50**, users may prefer to apply astronomic times with a delay in turning the lights on at dusk, and turning the lights off early at dawn. According to another embodiment, the astronomic timing program associated with a button could include an option of setting the off time to a fixed time. That is, while users may want the on time of the timer to follow the dusk time, they may want the lights to go off at a fixed times (such as 1:00 AM or 6:00 AM for example) rather than be tied to the dawn time.

A screen for programming on and off times for a DST button is shown in FIG. **48**. According to the embodiment of FIG. **48**, on and off times to be applied during a standard time period can be entered in fields **4802** and **4804**, while on and off times to be applied during a daylight savings times period can be entered in fields **4806** and **4808**. A similar arrangement is shown in FIG. **49**, where settings for 4 "seasonal" timing patterns can be applied rather than settings for two timing patterns as described in reference to FIG. **48**. In particular, on and off times to be applied during a spring time period can be entered in fields **4902** and **4904**, on and off times to be applied during a summer time period can be entered in fields **4906** and **4908**, on and off times to be applied during a fall time period can be entered in fields **4910** and **4912**, and on and off times to be applied during a standard time period can be entered in fields **4914** and **4916**.

While specific fields are provided for entering data for applying on and off times during the operation of a timer when a dedicated button is selected, it should be understood that other fields could be implemented with the given programming categories as shown, or other programming categories could be implemented. It should be noted that if no data is entered, default timing patterns would be implemented when a dedicated button is selected, where the default timing patterns could be based upon the 1-4 timing pattern codes associated with the four categories of timing patterns shown in FIG. **16**.

Charts provided in FIGS. **50-52** show dusk and dawn times throughout the year, average dusk and dawn times for periods, and the benefits of implementing certain on and off times during certain periods. Turning first to FIG. **50**, a chart shows dusk and dawn times over a year, and an average time shown by the dashed line. As should be apparent from FIG. **50**,

considerable energy can be saved by setting on and off times at times other than the average dusk and dawn times. While the charts of FIGS. **51** and **52** provide timing patterns having better granularity and therefore provide a more desirable timing pattern, the chart of FIG. **50** provides perspective as to how much energy can be saved by implementing times other than astronomic dusk and dawn times. As is apparent from FIG. **50**, each light controlled by a timer will be off for at least 2 hours longer each day compared to astronomic times by setting the on time for a light at 1 hour after dusk and setting the off time 1 hour before the average dawn.

Turning now to FIG. **51**, a chart shows dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time. As can be seen in FIG. **51**, the average dusk and dawn times are very different for the two time periods, and the timer on and off settings with a one hour offset is very different. By establishing the two time periods to apply two different time settings, it can be seen that different on and off times are much closer to the dusk and dawn times, and therefore provide an overall more desirable timing pattern for the year, while still providing savings by having the timer on less. Additional energy reduction can be achieved by moving the off time of the DST period to a fixed time, such as 5:00 AM and still provide a desirable overall timing pattern. As is apparent from FIG. **51**, the time period for applying a "daylight savings time" timing pattern is different than the period between the "fall back" date for turning back the clock in the fall, and the "spring forward" date for returning the clock to normal time during the spring.

The embodiment of FIG. **52** shows 4 timing patterns associated with the 4 seasons. As can be seen, the average times for dusk and dawn during those periods are different, and selected times relate more closely to the average times, and therefore provide a better overall timing pattern. While DST and seasonal periods are shown, it should be understood that other periods could be defined, such as monthly periods. However, a greater number of periods may require additional memory for storing data and may make it more difficult to select a desirable timing pattern by a user. Accordingly, the number of periods selected (which may provide a better timing pattern) may be a tradeoff with additional memory requirements and reduced user-friendliness. One of the benefits of the various embodiments is that they are user friendly. Therefore, the number timing pattern options available to a user must be selected to ensure that the timer is still user friendly to operate while providing enough options to provide desirable timing patterns for a variety of different users.

Turning now to FIG. **53**, a flow chart shows a method of generating timing characterization data according to an embodiment of the present invention. A plurality of timing patterns are established at a step **5302**. A unique timing pattern code is assigned for each timing pattern of the plurality of timing patterns at a step **5304**. The timing patterns and corresponding timing pattern codes are stored in a memory of the timer at a step **5306**. Geographic regions where the timers will be used are also defined at a step **5308**. Time periods for which average dusk and dawn times may be used defined at a step **5310**. Average dusk and dawn timers associated with the time periods and geographic regions are stored in a memory of the timer at a step **5312**. DST data related to "spring forward" and "fall back" dates and desired dates for applying a DST timing pattern (if different than "spring forward" and "fall back") are stored, by region, in a memory of the timer at a step **5314**. It is then determined whether an input is received at a user interface of the timer at a step **5316**. Data associated with an operational field are stored in a memory of the timer at a step **5318**. It is then determined whether a time out been reached or a stored indication received at a step **5320**. The timer is operated based upon the data stored in the operational field at a step **5322**.

Turning now to FIG. **54**, a flow chart shows a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention. The timing pattern is cleared if necessary or desired by selecting a first predetermined keypad sequence at a step **5402**. The current time is entered followed by a key or keypad sequence to enter the data at a step **5404**. The current date is entered followed by the key or keypad sequence to enter the data at a step **5406**. A geographic region for the timer is entered followed by the key or keypad sequence to enter the data at a step **5408**. A timing pattern code is entered followed by the key or keypad sequence to enter the data at a step **5410**. A DST code is optionally entered followed by a key or keypad sequence to enter the data at a step **5412**. It is then determined whether the last data is entered or a time-out period expired at a step **5414**. All of the data entered is stored at a step **5416**. It is then determined whether the user desires to change the timing pattern code at a step **5418**. A second predetermined keypad sequence is entered to change the timing pattern code only at a step **5420**.

Turning now to FIG. **55**, a flow chart shows a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention. A select key is pressed to enter the programming mode at a step **5502**. It is then determined whether a left or right key is selected to move to a different programming category at a step **5504**. The display will show another programming category as it moves horizontally along a plurality of programming categories at a step **5506**. It is then determined whether an up or down key is selected to enable selecting an option associated with the current programming category at a step **5508**. The display will show another option of a programming category as it moves vertically along options of a current programming category at a step **5510**. It is then determined whether the programming mode ended at a step **5512**.

Turning now to FIG. **56**, a flow chart shows a method of selecting a stored timing pattern using **5** key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. A security code on the timer is optionally set to enable programming the timer using a wireless link at a step **5602**. It is then determined whether a wireless device for programming the timer within range of timer at a step **5604**. It is then determined whether the correct security code entered on the wireless device at a step **5606**. Data entered in fields on the wireless device are downloaded at a step **5608**. The data in the timer is stored at a step **5610**. The timer is operated based upon the stored data at a step **5610**.

It can therefore be appreciated that the new and novel timer and method of implementing a timer has been described. It will be appreciated by those skilled in the art that numerous alternatives and equivalents will be seen to exist which incorporate the disclosed invention. As a result, the invention is not to be limited by the foregoing embodiments, but only by the following claims.

I claim:

1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;

a control circuit coupled to the actuator;

a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;

a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and

a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.

2. The programmable light timer of claim **1** wherein the first button is further programmable to have an off time, and the second button is further programmable to have an on time.

3. The programmable light timer of claim **1** wherein the on time for the first button is a pre-stored on time, and the off time for the second button is a pre-stored off time.

4. The programmable light timer of claim **3** further comprising a third button that is programmable, by way of the actuator, with a user programmable on time.

5. The programmable light timer of claim **1** wherein the on time for the first button is programmable using the actuator, and the off time for the first button is programmable using the actuator.

6. The programmable light timer of claim **1** further comprising a third button having a pre-stored timing pattern.

7. The programmable light timer of claim **1** further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.

8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;

a control circuit coupled to the actuator;

a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;

a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and

a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

9. The programmable light timer of claim **8** further comprising a third button that is user programmable.

10. The programmable light timer of claim **9** wherein the third button is programmable with a user programmable on time.

11. The programmable light timer of claim **10** further comprising a fourth button that is user programmable.

12. The programmable light timer of claim **11** wherein the fourth button is programmable with a user programmable an off time.

13. The programmable light timer of claim **8** wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer.

14. The programmable light timer of claim **8** further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.

15. A method of implementing a timing pattern on a programmable light timer, the method comprising:

enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer;

displaying the time on a display of the programmable light timer;

enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and

enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

16. The method of claim **15** further comprising enabling the first button to be programmed to have an off time, and the second button to be programmed to have an on time.

17. The method of claim **15** wherein the on time for the first button is a pre-stored on time, and the off time for the second button is a pre-stored off time.

18. The method of claim **17** further comprising enabling a third button, provided on the user interface of the programmable light timer, to be programmed by way of an actuator on the user interface.

19. The method of claim **15** wherein the on time for the first button is user programmable, and wherein the off time for the first button is user programmable.

20. The method of claim **15** further comprising providing a switch enabling overriding the timing pattern implemented by the programmable light timer.

* * * * *

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King

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(54) **PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER**

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(58) **Field of Classification Search**
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See application file for complete search history.

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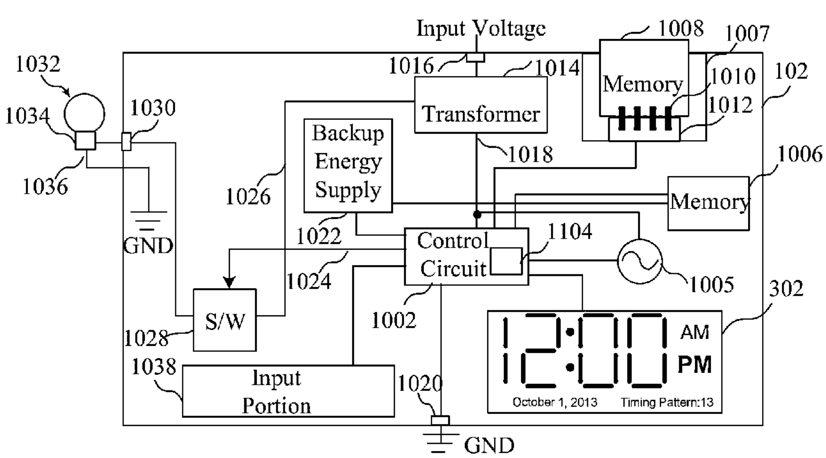
(57) **ABSTRACT**

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises a memory storing a plurality of timing patterns, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and a user interface enabling the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

20 Claims, 18 Drawing Sheets



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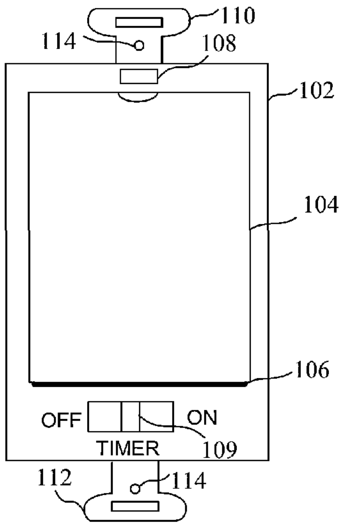

FIG. 1

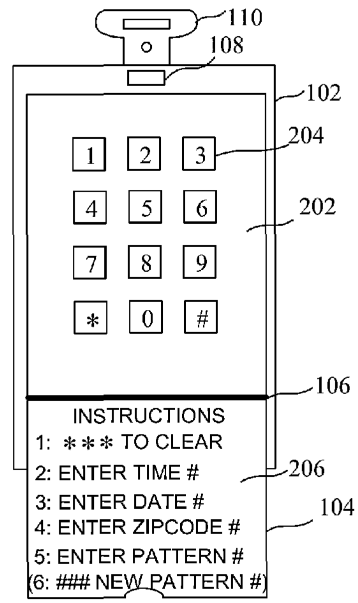

FIG. 2

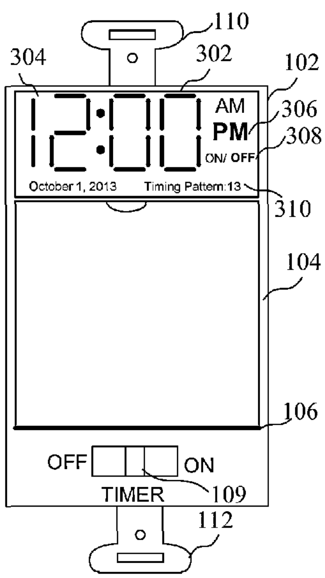

FIG. 3

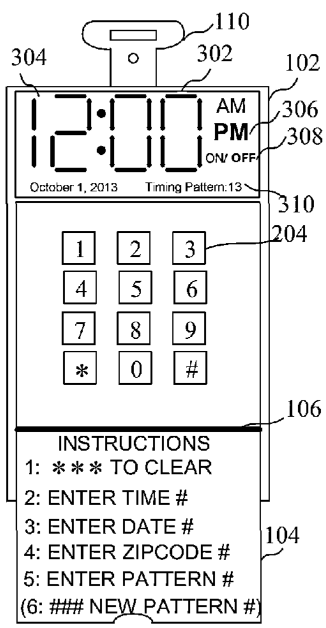

FIG. 4

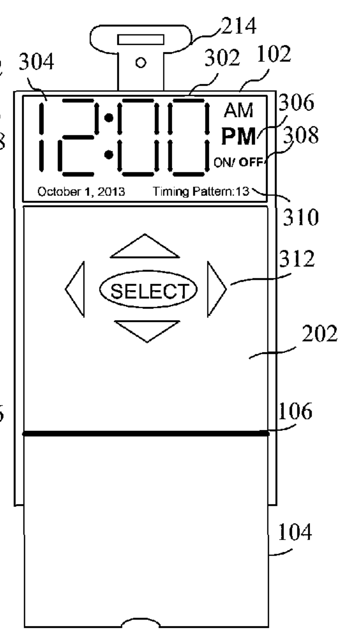

FIG. 5

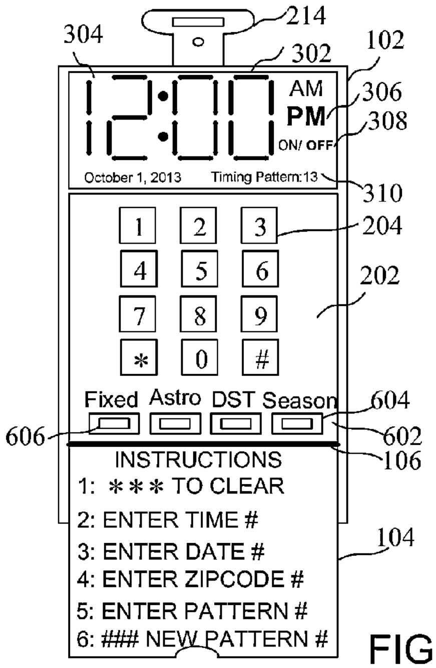

FIG. 6

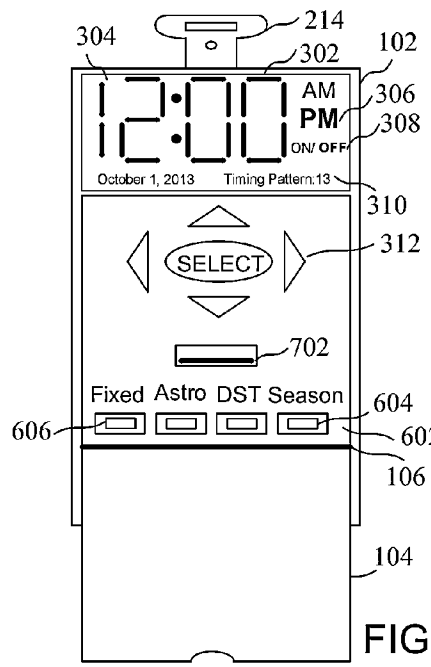

FIG. 7

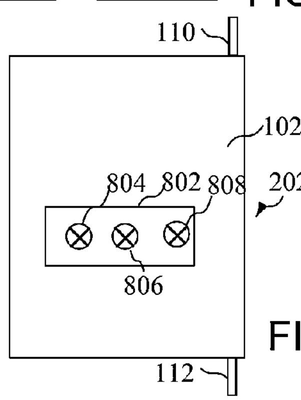

FIG. 8

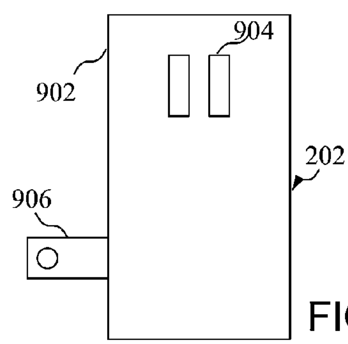

FIG. 9

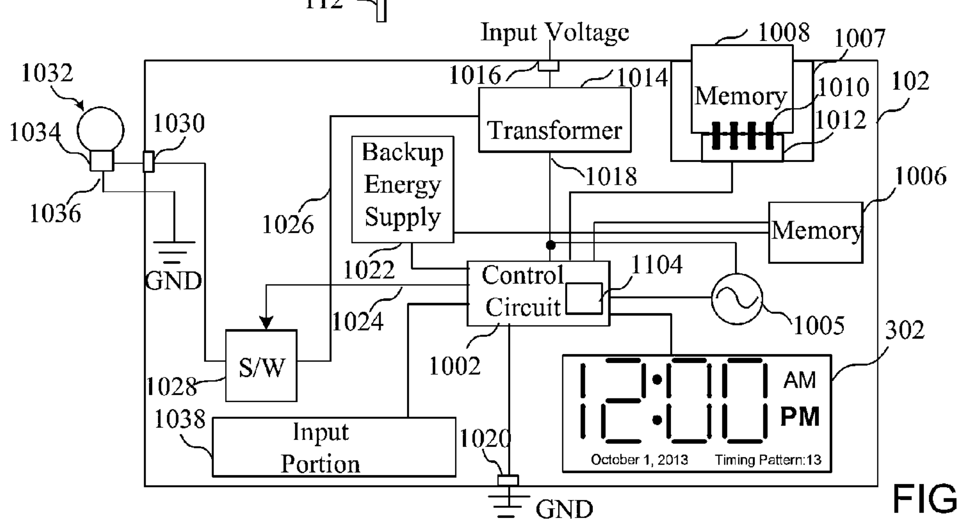

FIG. 10

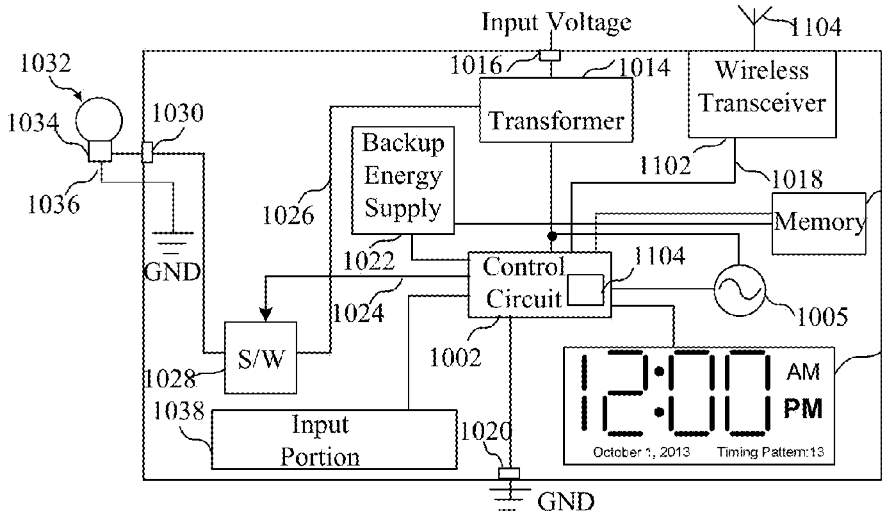

FIG. 11

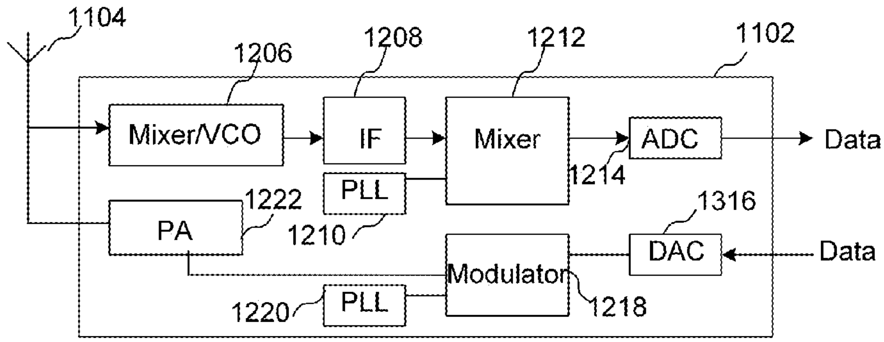

FIG. 12

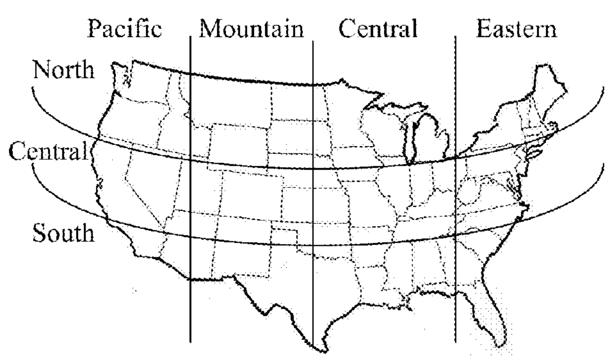

FIG. 13

1402	1404	1406	1408	1410
***	1430#	100513#	60189#	223#

FIG. 14

1402	1404	1406	1408	1410	1502
***	1430#	100513#	60189#	223#	902#

FIG. 15

Zipcode	Region
00501	NE
00502	NE
⋮	⋮
02169	NE
⋮	⋮
60068	NC
60189	NC
60189	NC
⋮	⋮
90210	CP
⋮	⋮
95124	SP

FIG. 17

DST Period Start Date	DST Period End Date	DST Fall Back Time Change	DST Spring Forward Time Change	DST Code
SEP 15	APR 1	Last Sun in OCT	First Sun in MAR	901
SEP 15	APR 1	Last Sun in OCT	2nd Sun in MAR	902
SEP 15	APR 1	First Sun in NOV	First Sun in MAR	903
SEP 15	APR 1	First Sun in Nov	2nd Sun in MAR	904
SEP 15	APR 15	Last Sun in OCT	First Sun in MAR	905
SEP 15	APR 15	Last Sun in OCT	2nd Sun in MAR	906
SEP 15	APR 15	First Sun in NOV	First Sun in MAR	907
SEP 15	APR 15	First Sun in Nov	2nd Sun in MAR	908
SEP 30	APR 1	Last Sun in OCT	First Sun in MAR	909
SEP 30	APR 1	Last Sun in OCT	2nd Sun in MAR	910
SEP 30	APR 1	First Sun in NOV	First Sun in MAR	911
SEP 30	APR 1	First Sun in Nov	2nd Sun in MAR	912
⋮	⋮	⋮	⋮	⋮
OCT 15	APR 1	Last Sun in OCT	First Sun in MAR	938
OCT 15	APR 1	Last Sun in OCT	2nd Sun in MAR	939
OCT 15	APR 1	First Sun in NOV	First Sun in MAR	940
OCT 15	APR 1	First Sun in Nov	2nd Sun in MAR	941

FIG. 19

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	On Time	Off Time	Pattern
Fixed Time Year-round	4:00 PM	1:00 AM	1
	4:00 PM	5:00 AM	111
	4:00 PM	6:00 AM	112
	4:00 PM	7:00 AM	113
	⋮	⋮	⋮
	5:00 PM	1:00 AM	121
	5:00 PM	5:00 AM	122
	5:00 PM	5:00 AM	123
	⋮	⋮	⋮
	6:00 PM	7:00 AM	189

	Standard Time (Long Daylight Hrs)-On/Off	DST (Short Daylight Hours)-On/Off	
Standard/DST	4:00 PM/1:00 AM	7:00 PM/1:00 AM	2
	4:00 PM/5:00 AM	7:00 PM/5:00 AM	211
	4:00 PM/6:00 AM	7:00 PM/6:00 AM	212
	4:00 PM/7:00 AM	7:00 PM/7:00 AM	213
	⋮	⋮	⋮
	5:00 PM/1:00 AM	8:00 PM/5:00 AM	221
	5:00 PM/5:00 AM	8:00 PM/6:00 AM	222
	5:00 PM/6:00 AM	8:00 PM/7:00 AM	223
	⋮	⋮	⋮
	8:00 PM/7:00 AM	9:00 PM/7:00 AM	289

	Spring On/Off	Summer On/Off	Fall On/Off	Winter On/Off	
4 Seasons	4:00 PM/1:00 AM	7:00 PM/1:00 AM	5:00 PM/1:00 AM	4:00 PM/1:00 AM	3
	4:00 PM/5:00 AM	7:00 PM/5:00 AM	5:00 PM/5:00 AM	4:00 PM/5:00 AM	311
	4:00 PM/6:00 AM	7:00 PM/6:00 AM	5:00 PM/6:00 AM	4:00 PM/6:00 AM	312
	4:00 PM/7:00 AM	7:00 PM/7:00 AM	5:00 PM/7:00 AM	4:00 PM/7:00 AM	313
	⋮	⋮	⋮	⋮	⋮
	7:00 PM/5:00 AM	8:00 PM/5:00 AM	6:00 PM/5:00 AM	5:00 PM/5:00 AM	321
	7:00 PM/6:00 AM	8:00 PM/6:00 AM	6:00 PM/6:00 AM	5:00 PM/6:00 AM	322
	7:00 PM/7:00 AM	8:00 PM/7:00 AM	6:00 PM/7:00 AM	5:00 PM/7:00 AM	323
					⋮
	8:00 PM/7:00 AM	9:00 PM/7:00 AM	6:00 PM/7:00 AM	6:00 PM/7:00 AM	389

	On Time/Offset	Off Time/Offset	
Astronomic	Astronomic Dusk/+ 1hr	Astronomic Dawn/-1 hr	4
	Astronomic Dusk/none	Astronomic Dawn/None	411
	Astronomic Dusk/+0.5 hrs	5:00 AM/N/A	412
	Astronomic Dusk/+1.5 hrs	6:00 AM/N/A	413
	⋮	⋮	⋮
	4:00 PM/None	Astronomic Dawn/None	421
	4:00 PM/None	Astronomic Dawn/-0.5 hrs	422
	4:00 PM/None	Astronomic Dawn/-1.0 hrs	423
	⋮	⋮	⋮
	4:00 PM/None	Astronomic Dawn/-2.0 hrs	489

FIG. 16

Region	Time Period of Date	Average Dusk Time	Average Dawn Time
NE	Full Year	7:00 PM	6:00 AM
	Standard Time	7:30 PM	5:30 AM
	Daylight Savings Time	6:30 PM	7:00 AM
	Spring	7:30 PM	6:00 AM
	Summer	8:00 PM	5:30 AM
	Fall	6:30 PM	6:30 AM
	Winter	5:00 PM	7:00 AM
	January	5:30 PM	7:15 AM
	February	4:45 PM	7:10 AM
	⋮	⋮	⋮
	December	5:40 PM	6:55 AM
	January 1, 2013	5:30 PM	7:15 AM
	January 2, 2013	5:31 PM	7:14 AM
	January 3, 2013	5:33 PM	7:11 AM
	⋮	⋮	⋮
	December 31, 2013	5:39 PM	6:49 AM
NC	Full Year	6:55 PM	6:03 AM
	Standard Time	7:25 PM	5:33 AM
	Daylight Savings Time	6:25 PM	7:04 AM
	Spring	7:25 PM	6:03 AM
	Summer	7:55 PM	5:33 AM
	Fall	6:25 PM	6:33 AM
	Winter	4:55 PM	7:03 AM
	January	5:25 PM	7:17 AM
	February	4:40 PM	7:13 AM
	⋮	⋮	⋮
	December	5:35 PM	6:58 AM
	January 1, 2013	5:25 PM	7:18 AM
	January 2, 2013	5:26 PM	7:17 AM
	January 3, 2013	5:28 PM	7:14 AM
	⋮	⋮	⋮
	December 31, 2013	5:34 PM	6:54 AM
⋮	⋮	⋮	⋮
SP	Full Year	7:07 PM	6:05 AM
	Standard Time	7:36 PM	5:36 AM
	⋮	⋮	⋮
	January 3, 2013	5:39 PM	7:16 AM
	⋮	⋮	⋮
	December 31, 2013	5:44 PM	6:54 AM

FIG. 18

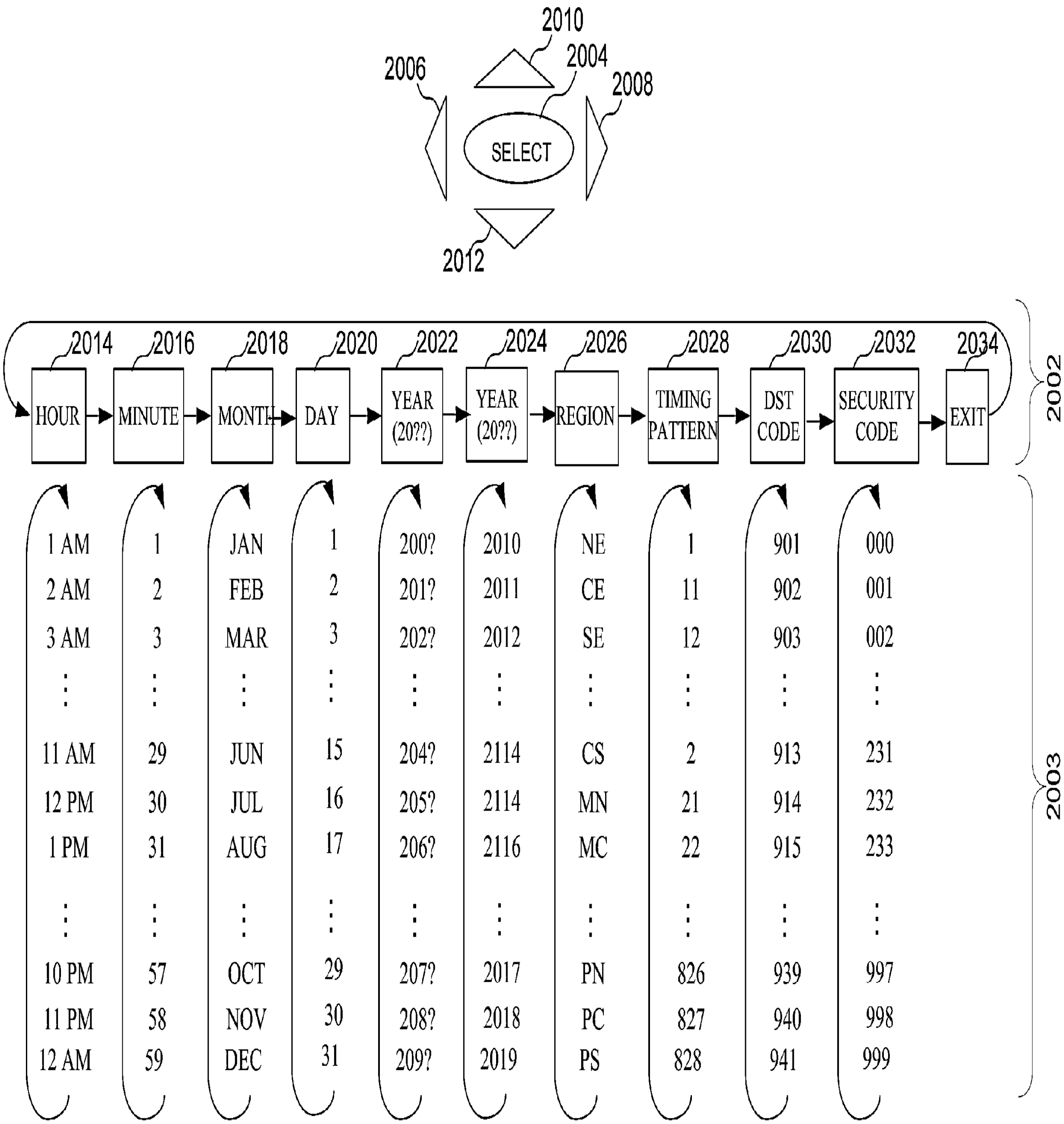
2010
2004
2006
2008
SELECT
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
HOUR
MINUTE
MONTH
DAY
YEAR (20??)
YEAR (20??)
REGION
TIMING PATTERN
DST CODE
SECURITY CODE
EXIT
2002
2003
1 AM 2 AM 3 AM 11 AM 12 PM 1 PM 10 PM 11 PM 12 AM
1 2 3 29 30 31 57 58 59
JAN FEB MAR JUN JUL AUG OCT NOV DEC
1 2 3 15 16 17 29 30 31
200? 201? 202? 204? 205? 206? 207? 208? 209?
2010 2011 2012 2114 2114 2116 2017 2018 2019
NE CE SE CS MN MC PN PC PS
1 11 12 2 21 22 826 827 828
901 902 903 913 914 915 939 940 941
000 001 002 231 232 233 997 998 999

FIG. 20

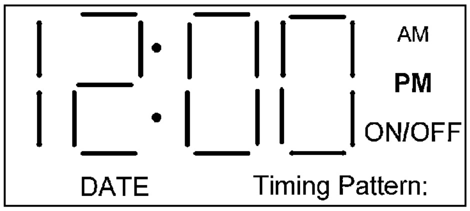

FIG. 21

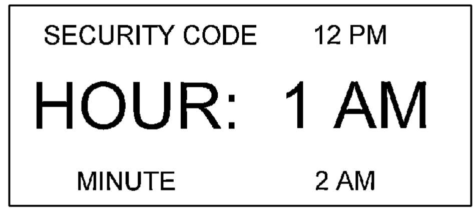

FIG. 22

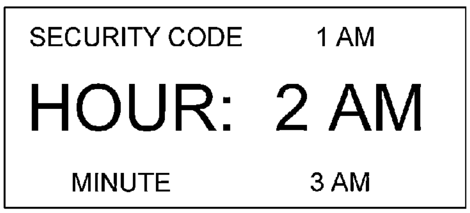

FIG. 23

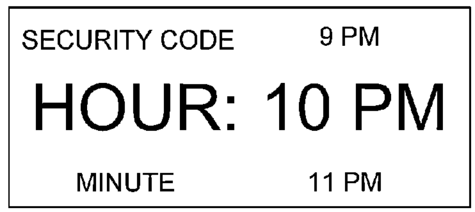

FIG. 24

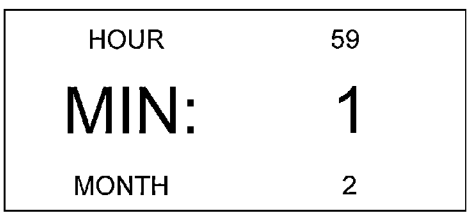

FIG. 25

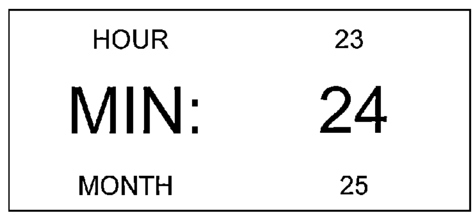

FIG. 26

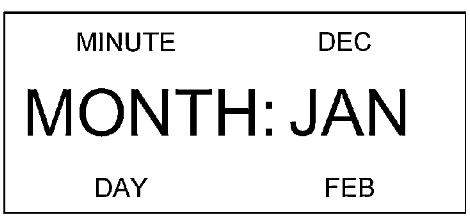

FIG. 27

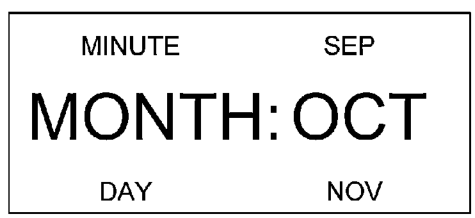

FIG. 28

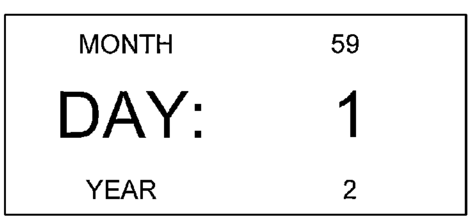

FIG. 29

FIG. 30

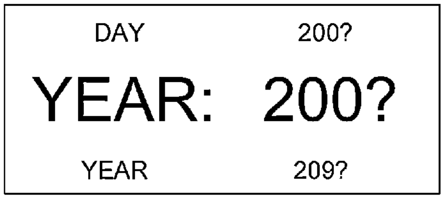

FIG. 31

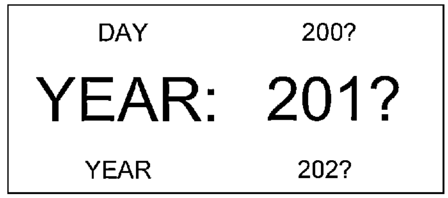

FIG. 32

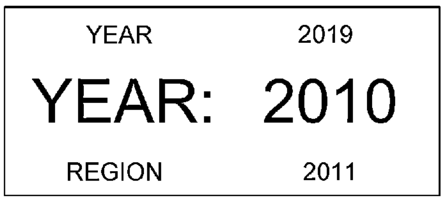

FIG. 33

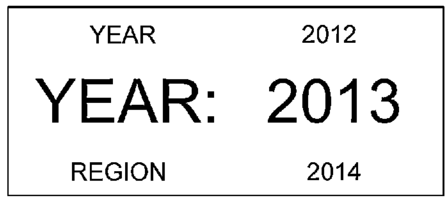

FIG. 34

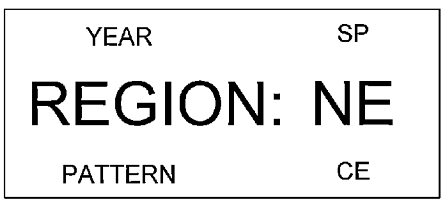

FIG. 35

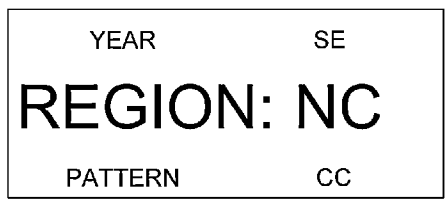

FIG. 36

FIG. 37

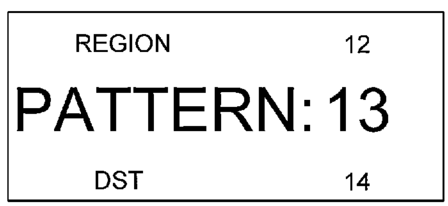

FIG. 38

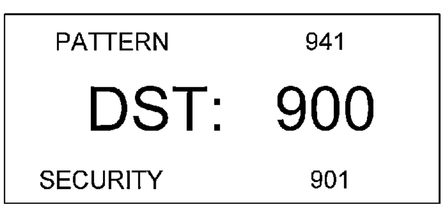

FIG. 39

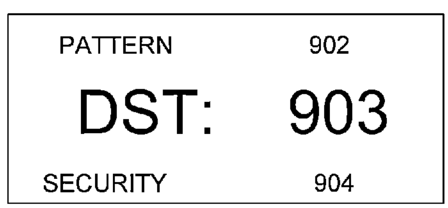

FIG. 40

FIG. 41

FIG. 42

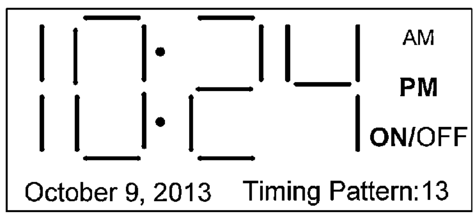

FIG. 43

FIELD	DATA
Time	10:24 PM
Date	October 24, 2013
Region	NC
Timing Pattern	13
DST Code	903
Security Code	013

FIG. 44

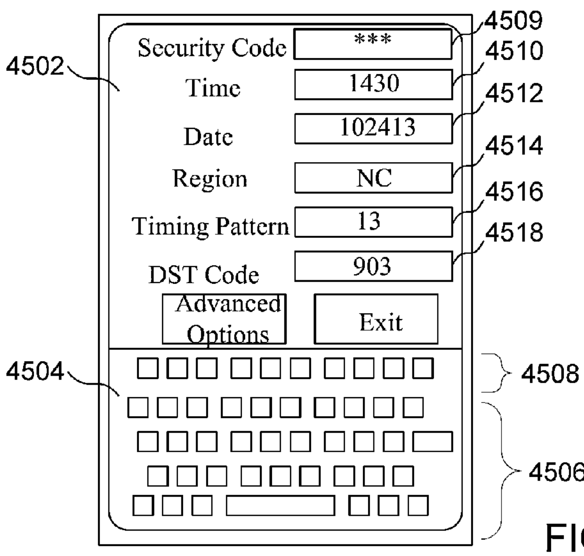

FIG. 45

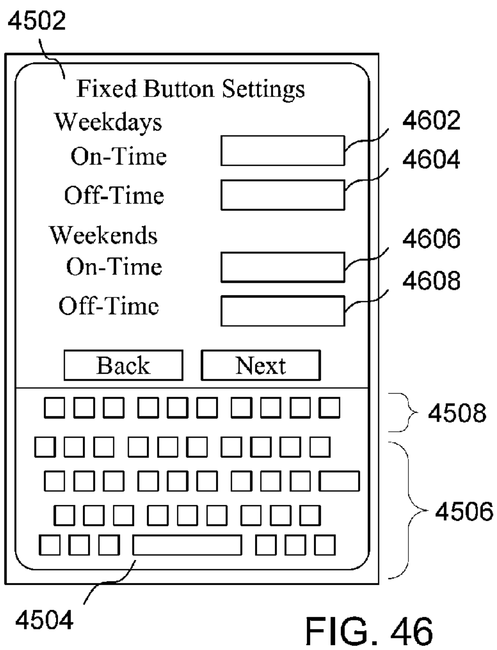

FIG. 46

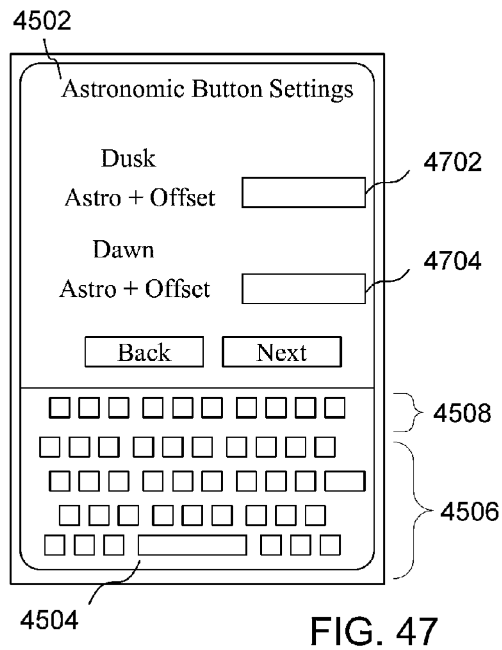

FIG. 47

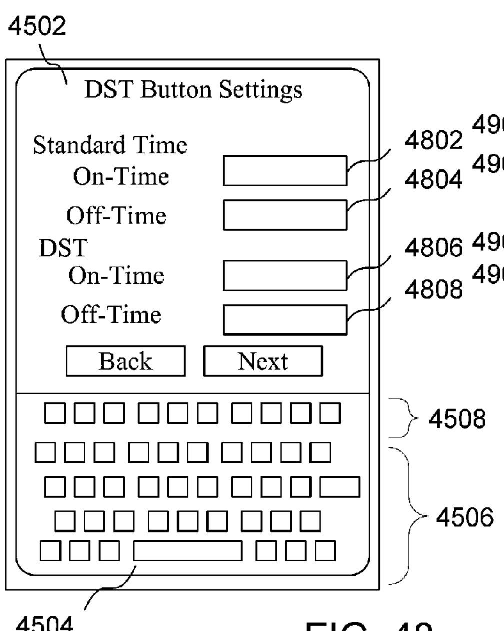

FIG. 48

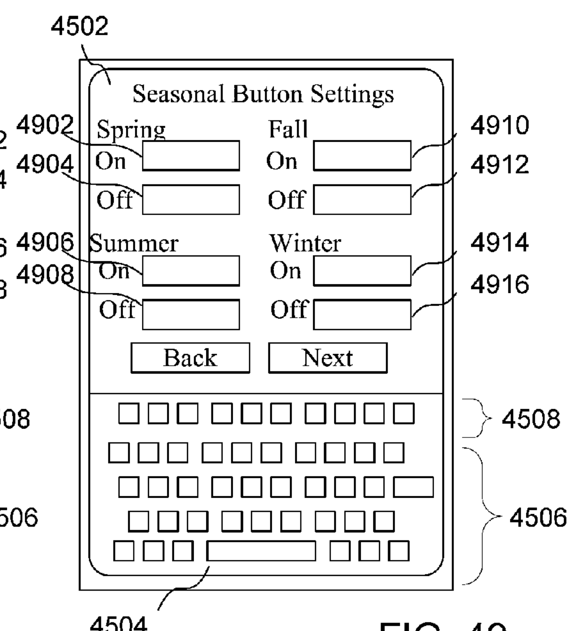

FIG. 49

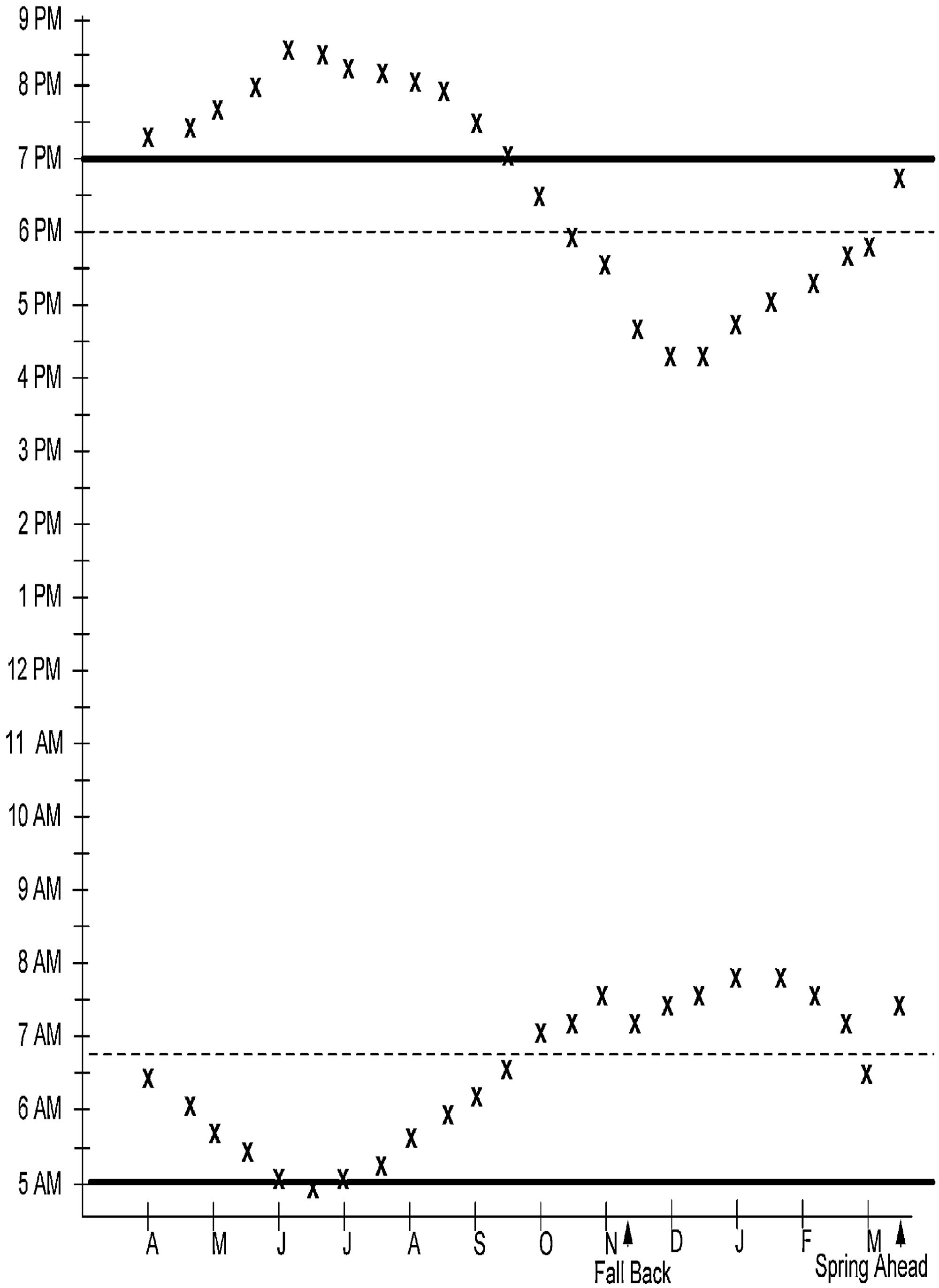
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 50

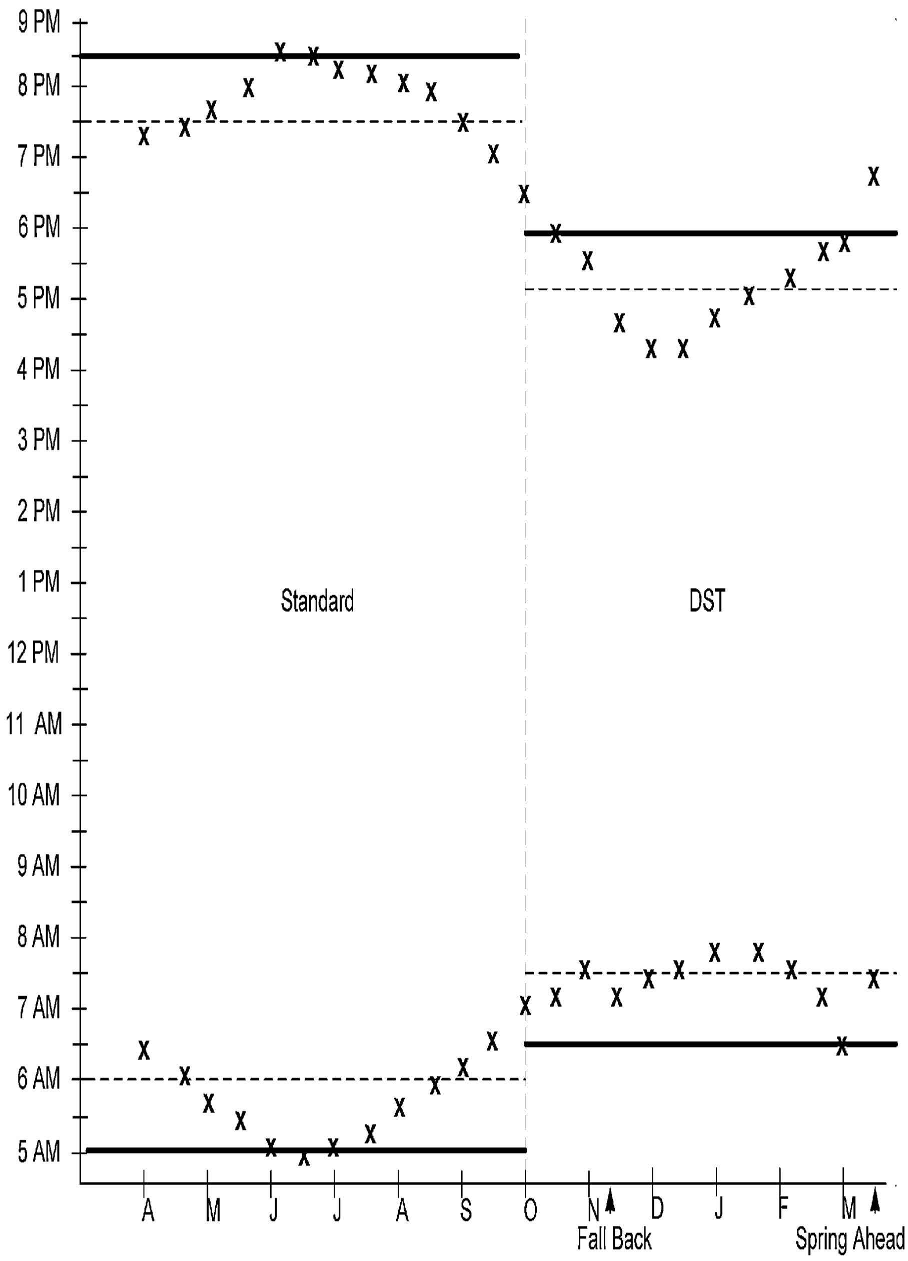
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
Standard
DST
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 51

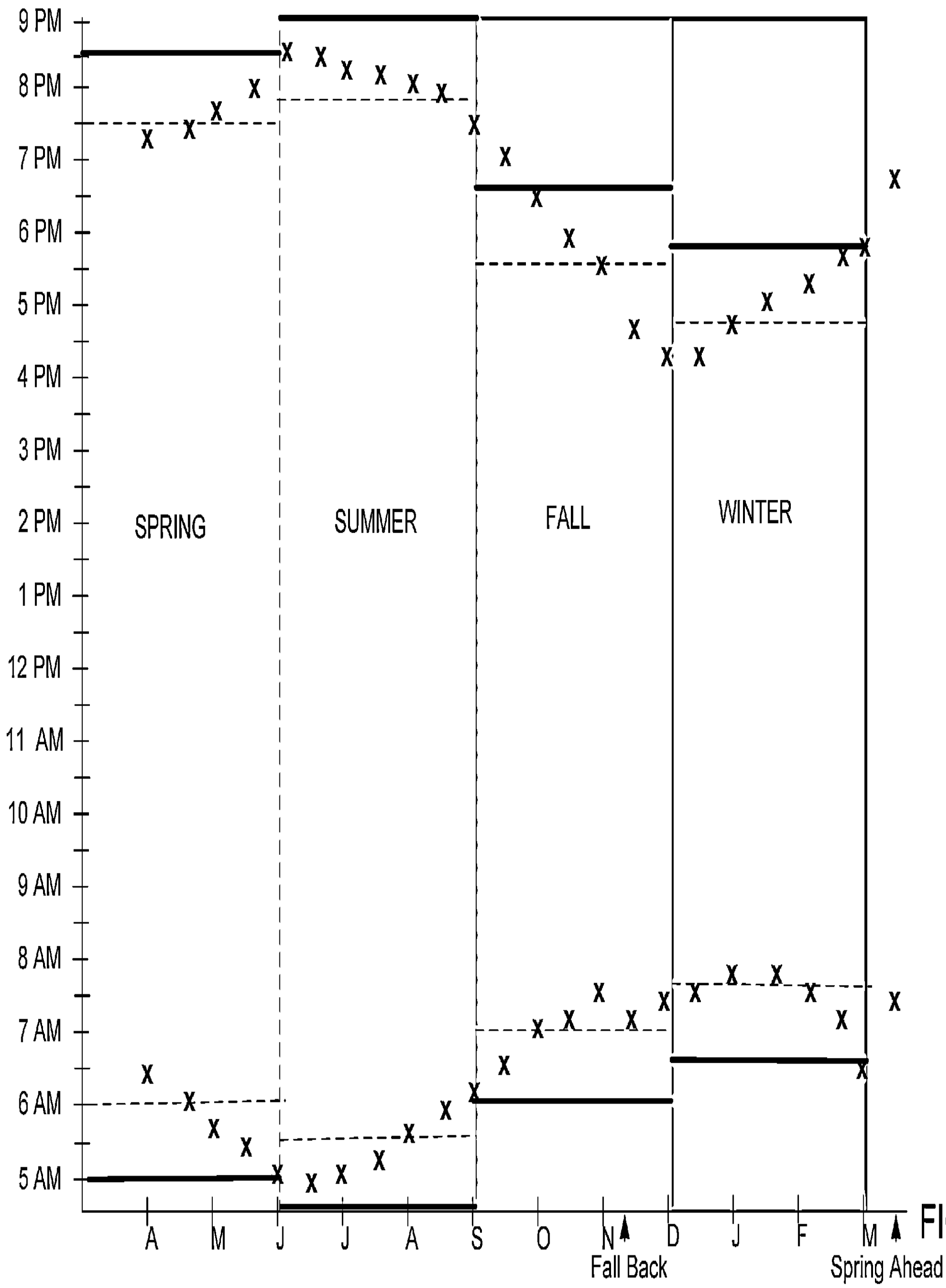
9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
SPRING
SUMMER
FALL
WINTER
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 52

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Woods 2500 Timer, published 2007.
Woods Timer Model 50043, published 2007.
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Defiant Timer Model 49820 User Manual, published 2013.
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Woods Timer Model 50000 24-hour Indoor Mechanical Timer 2-C, Aug. 15, 2013.

* cited by examiner

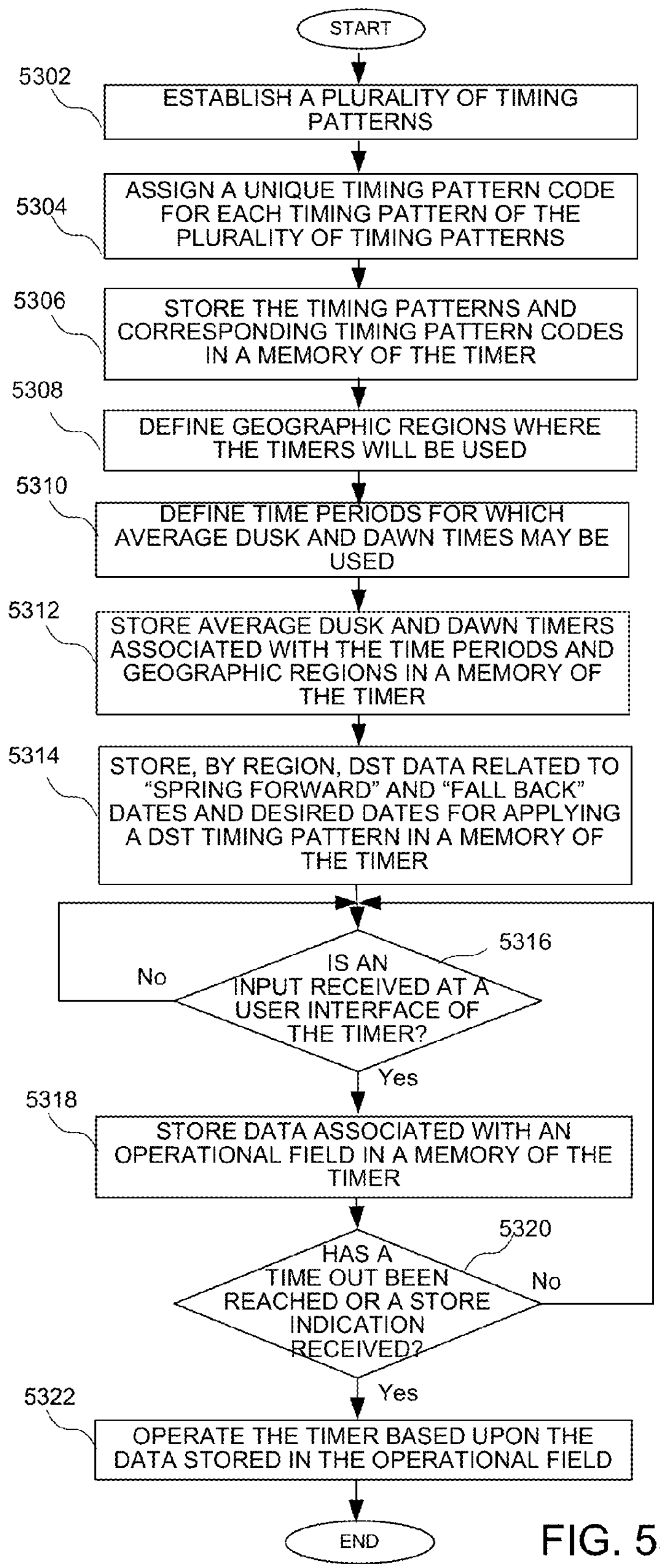
START
5302
ESTABLISH A PLURALITY OF TIMING PATTERNS
5304
ASSIGN A UNIQUE TIMING PATTERN CODE FOR EACH TIMING PATTERN OF THE PLURALITY OF TIMING PATTERNS
5306
STORE THE TIMING PATTERNS AND CORRESPONDING TIMING PATTERN CODES IN A MEMORY OF THE TIMER
5308
DEFINE GEOGRAPHIC REGIONS WHERE THE TIMERS WILL BE USED
5310
DEFINE TIME PERIODS FOR WHICH AVERAGE DUSK AND DAWN TIMES MAY BE USED
5312
STORE AVERAGE DUSK AND DAWN TIMERS ASSOCIATED WITH THE TIME PERIODS AND GEOGRAPHIC REGIONS IN A MEMORY OF THE TIMER
5314
STORE, BY REGION, DST DATA RELATED TO "SPRING FORWARD" AND "FALL BACK" DATES AND DESIRED DATES FOR APPLYING A DST TIMING PATTERN IN A MEMORY OF THE TIMER
5316
IS AN INPUT RECEIVED AT A USER INTERFACE OF THE TIMER?
No
Yes
5318
STORE DATA ASSOCIATED WITH AN OPERATIONAL FIELD IN A MEMORY OF THE TIMER
5320
HAS A TIME OUT BEEN REACHED OR A STORE INDICATION RECEIVED?
No
Yes
5322
OPERATE THE TIMER BASED UPON THE DATA STORED IN THE OPERATIONAL FIELD
END

FIG. 53

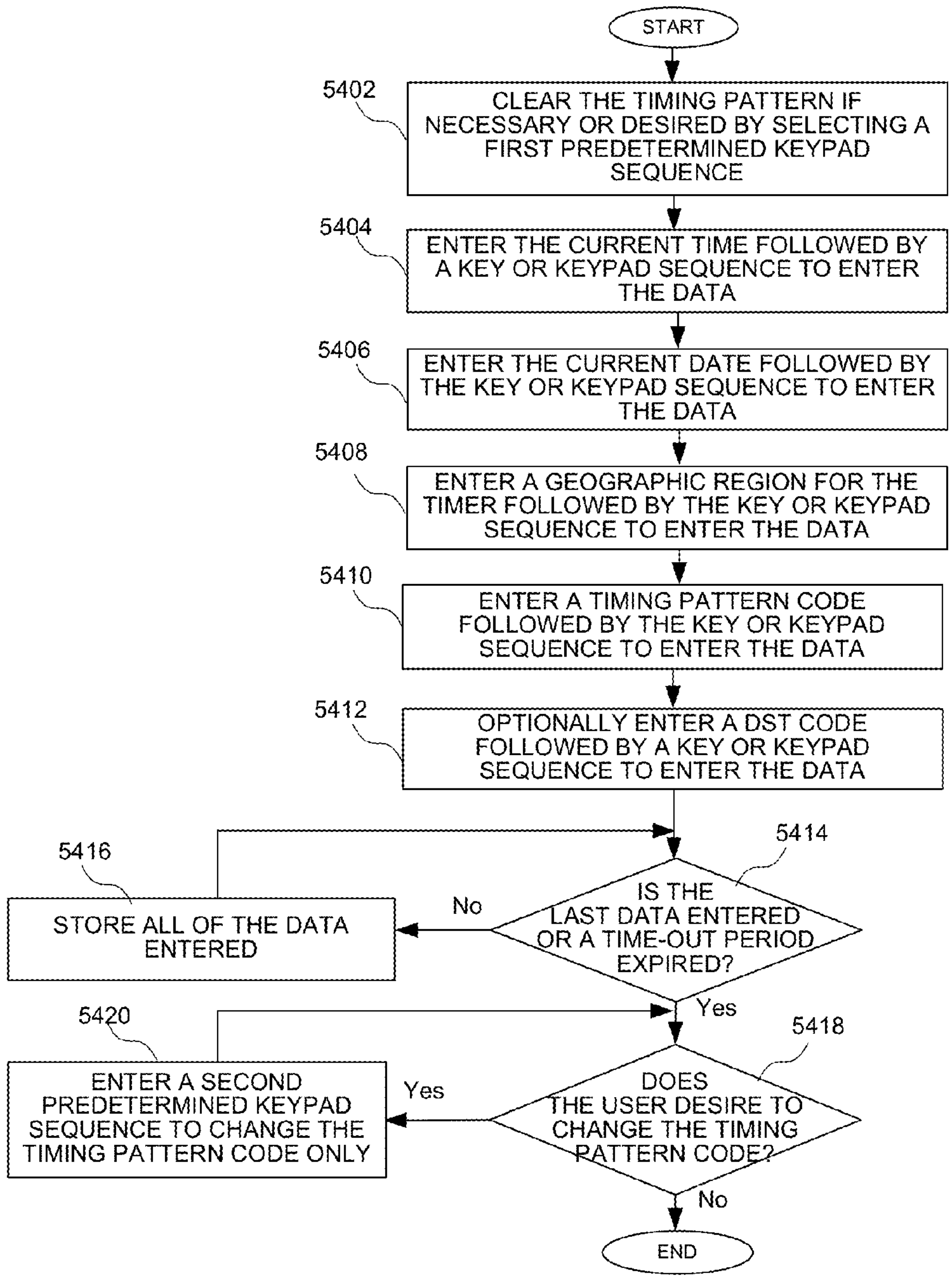
START
5402
CLEAR THE TIMING PATTERN IF NECESSARY OR DESIRED BY SELECTING A FIRST PREDETERMINED KEYPAD SEQUENCE
5404
ENTER THE CURRENT TIME FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5406
ENTER THE CURRENT DATE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5408
ENTER A GEOGRAPHIC REGION FOR THE TIMER FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5410
ENTER A TIMING PATTERN CODE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5412
OPTIONALLY ENTER A DST CODE FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5416
5414
STORE ALL OF THE DATA ENTERED
No
IS THE LAST DATA ENTERED OR A TIME-OUT PERIOD EXPIRED?
Yes
5420
5418
ENTER A SECOND PREDETERMINED KEYPAD SEQUENCE TO CHANGE THE TIMING PATTERN CODE ONLY
Yes
DOES THE USER DESIRE TO CHANGE THE TIMING PATTERN CODE?
No
END

FIG. 54

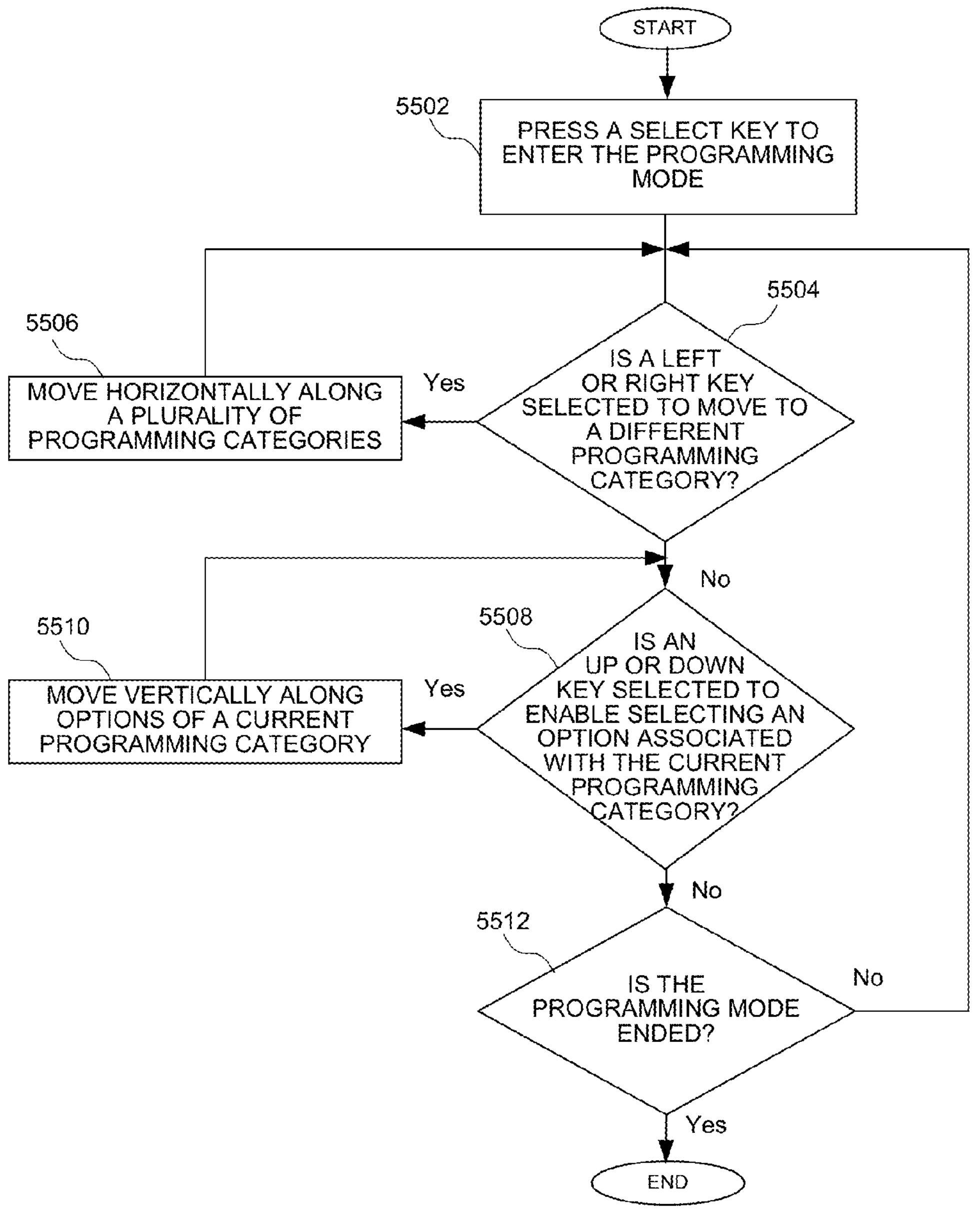
START
5502
PRESS A SELECT KEY TO ENTER THE PROGRAMMING MODE
5504
IS A LEFT OR RIGHT KEY SELECTED TO MOVE TO A DIFFERENT PROGRAMMING CATEGORY?
Yes
5506
MOVE HORIZONTALLY ALONG A PLURALITY OF PROGRAMMING CATEGORIES
No
5508
IS AN UP OR DOWN KEY SELECTED TO ENABLE SELECTING AN OPTION ASSOCIATED WITH THE CURRENT PROGRAMMING CATEGORY?
Yes
5510
MOVE VERTICALLY ALONG OPTIONS OF A CURRENT PROGRAMMING CATEGORY
No
5512
IS THE PROGRAMMING MODE ENDED?
No
Yes
END

FIG. 55

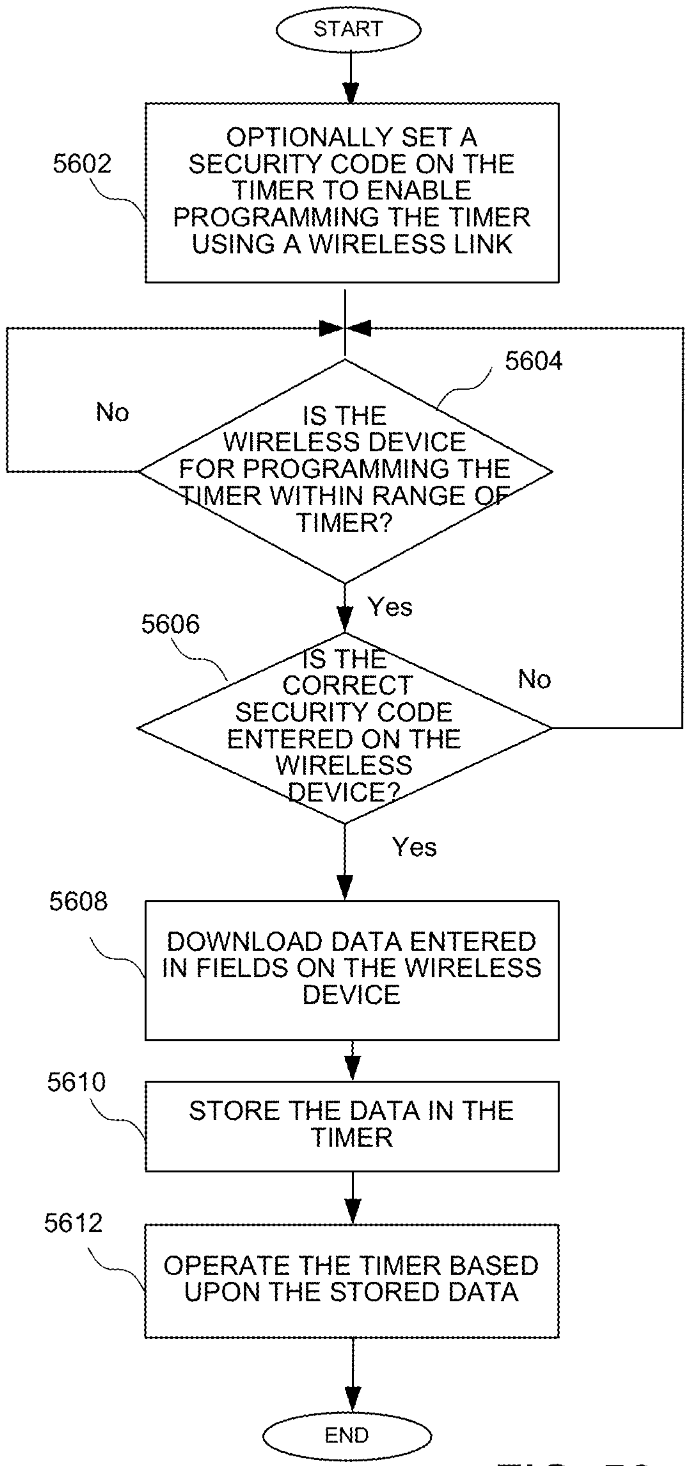
START
5602
OPTIONALLY SET A SECURITY CODE ON THE TIMER TO ENABLE PROGRAMMING THE TIMER USING A WIRELESS LINK
5604
No
IS THE WIRELESS DEVICE FOR PROGRAMMING THE TIMER WITHIN RANGE OF TIMER?
Yes
5606
No
IS THE CORRECT SECURITY CODE ENTERED ON THE WIRELESS DEVICE?
Yes
5608
DOWNLOAD DATA ENTERED IN FIELDS ON THE WIRELESS DEVICE
5610
STORE THE DATA IN THE TIMER
5612
OPERATE THE TIMER BASED UPON THE STORED DATA
END

FIG. 56

PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER

FIELD OF THE INVENTION

The present invention relates generally to lighting control products, and in particular, to a programmable light timer and a method of implementing a programmable light timer.

BACKGROUND OF THE INVENTION

Conventional timers for lights, such as timers for indoor lamps or outdoor lights for example, either provide little functionality, or are difficult to program. Because of the limited size of the conventional timers, the size of the screen and the size of the interface for programming the timer are both relatively small. This is particularly true of an in-wall timer, which must fit in an electrical box, commonly called a junction box. Not only does a user of the in-wall timer have to read a very small display, but the user has to advance through a menu shown on the small display using a very limited interface which is provided on the remaining portion of the timer. Entering data on such a user interface is particularly difficult because the in-wall timer is fixed and generally positioned well below eye level.

Further, conventional timers are often unreliable. For example, conventional mechanical timers often malfunction over time, leaving the user without the use of the timer for some period of time and requiring the user to incur the expense of replacing the timer. Moreover, advanced digital timers having electronic displays may be difficult to operate, providing a barrier to certain groups of people who would otherwise use a timer, but don't want to struggle through a complex interface on the small screen of the timer to properly set the timer. For example, not only is the display very small and difficult to read, but the user interface is difficult to navigate on such a small display. These groups of users are either left with no timing operation for their lights, or timers which do not provide the timing operation that they desire. Without an effective timer for a light for example, the light may be on significantly longer than necessary, not only wasting energy but in many cases increasing pollution as a result. As energy consumption world-wide continues to increase, it is important to reduce or minimize the consumption of energy in any way possible. The timer of the present invention provides significant benefits in reducing energy consumption.

SUMMARY OF THE INVENTION

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises a memory storing a plurality of timing patterns, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and a user interface enabling the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

Another programmable light timer for implementing a timing pattern comprises a memory storing a plurality of timing patterns, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and a numeric keypad enabling the entry of data and the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

A method of implementing a timing pattern in a programmable light timer is also disclosed. The method comprises

storing a plurality of timing patterns in a memory, each timing pattern being associated with a unique timing pattern code and having one or more on/off settings for a time period; and enabling the selection of a timing pattern code associated with a timing pattern of the plurality of timing patterns.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention;

FIG. **2** is a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention;

FIG. **3** is a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention;

FIG. **4** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to an embodiment of the present invention;

FIG. **5** is a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention;

FIG. **6** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to an embodiment of the present invention;

FIG. **7** is a perspective view of the front panel of the in-wall light timer of FIG. **3** having preset buttons according to another embodiment of the present invention;

FIG. **8** is a side view of the in-wall timer enable a connection of the timer to electrical wiring;

FIG. **9** is a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention;

FIG. **10** is a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to an embodiment of the present invention;

FIG. **11** is a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention;

FIG. **12** is a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention;

FIG. **13** is a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention;

FIG. **14** is a diagram showing data fields of data entered by a user according to an embodiment of the present invention;

FIG. **15** is a diagram showing data fields of data entered by a user according to an alternate embodiment of the present invention;

FIG. **16** is table showing timing pattern codes and associated timing characterization data and categories according to an embodiment of the present invention;

FIG. **17** is a table showing the designation of regions associated with a number of geographical locations according to an embodiment of the present invention;

FIG. **18** is a table showing average dusk and dawn times for various regions and periods according to an embodiment of the present invention;

FIG. **19** is a table showing daylight savings time codes and associated daylight savings time characterization data according to an embodiment of the present invention;

FIG. **20** is a flow diagram showing the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention;

FIGS. **21-43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**;

FIG. **44** is a memory showing fields and stored data associated with the programmed timer of FIG. **43**;

FIGS. **45-49** show screens of a user interface enabling the wireless programming of a timer according to an embodiment of the present invention;

FIG. **50** is a chart showing dusk and dawn times over a year;

FIG. **51** is a chart showing dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time;

FIG. **52** is a chart showing dusk and dawn times over a year and which is divided into four periods including four seasons;

FIG. **53** is a flow chart showing a method of generating timing characterization data according to an embodiment of the present invention;

FIG. **54** is a flow chart showing a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention;

FIG. **55** is a flow chart showing a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention; and

FIG. **56** is a flow chart showing a method of selecting a stored timing pattern using 5 key user interface of FIGS. **5** and **7** according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The various embodiments set forth below overcome significant problems with conventional timers of having to use a small display, and navigating a menu on such a small display. Some embodiments eliminate the requirement of having a display by providing pre-programmed timing patterns which can be easily selected by entering a timing pattern code associated with a desired timing pattern. Other embodiments include a display, but benefit from an improved user interface which enables the easy selection of a timing pattern by selecting a desired timing pattern code. In addition to selecting the timing pattern code, the user interfaces for embodiments with or without a display enabling the easy programming of other data which must be entered to operate the timer. By storing the timing patterns which are associated with common or desirable on/off patterns which are likely to be used to operate the timer, a user does not need to enter on/off times for a light for various times during a day or week, or reprogram the timer in response to changes in dusk and dawn times during a calendar year.

Turning first to FIG. **1**, a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention is shown. The timer of FIG. **1** comprises a housing portion **102** having an optional cover **104** (coupled to the timer by way of a hinge **106**) which covers a user interface when in the closed position and enables programming the timer by way of the user interface in the open position. A feedback indicator **108**, such as a light and more particularly a light emitting diode (LED), could be implemented to show the status of the light or other appliance attached to the timer, for example. The feedback indicator could show green when a light attached to the timer is on, and could be or (or show red) when the light is off. An optional switch **109** which is movable between an on or off position, and a timer position for implementing the timer according to a selected timing pattern. While the cover is primarily cosmetic and may generally prevent unintentional changing of the timer, the timer cover is not necessary. Alternatively, the cover may be functional, such as functioning as an on/off override switch for the light or appliance attached to the timer in place of the switch **109**. For example, the state of the light may be toggled (i.e. changed from a current state, such as on, to the other state, such as off) in response to pressing the cover which would activate a switch to change the state of the light if the switch **110** is not included. Flanges **111** and **112**, each having a threaded portion for receiving a screw to attach the timer to a junction box. While the various embodiments are generally described in reference to a timer which is "hard wired" in a junction and may be used for a porch light for example, it should be understood that the user interfaces, circuits and methods set forth in more detail below could be implemented in a timer which is plugged into an outlet (commonly called an light or appliance timer), as will be described in more detail below in reference to FIG. **9**. Further, while some examples are provided in terms of residential-type in-wall timers which are installed in a conventional residential junction box, it should be understood that the user interfaces, circuits and methods could be implemented in commercial timers.

Turning now to FIG. **2**, a perspective view of the front panel of the in-wall light timer of FIG. **1** with a cover open according to an embodiment of the present invention is shown. As shown in FIG. **2**, when the cover **104** is moved to an open position, a user interface comprising a keypad **204** is accessible on an inner surface **202**. Also shown on an inner surface **206** of the cover, instructions can be printed to enable the user to easily program the timer. As will be described in more detail below, a user can program the timer in 5 simple steps (and change a timing pattern using a single step). The keypad **204** of FIG. **2** comprises 0-9 keys and star (*) and pound (#) keys.

According to one embodiment, the timer could be programmed using 5 steps for entering data on the keypad as shown on the inside of the cover. The keypad is used to enter numeric data which is necessary to operate the timer. A key pattern sequence is entered to clear the timer if necessary. For example, the star key could be pressed 3 times to clear the memory. Data necessary to operate the timer according to a user's desired timing pattern is then entered. In particular, a current time is entered followed by the pound key. The pound key may be entered to indicate that all of the data for a given field. Alternatively, all of the data could be considered to be entered after a time-out period. The time is preferably entered as military time (e.g. 2:00 PM would be entered as 1400) to ensure that the correct AM or PM time is stored. Alternatively, a code at the end of the time could be entered to indicate AM or PM. A date is then entered, followed by the pound key. The date is preferably entered as a 6 digit code (e.g. in the DDMMYY format) to ensure that the date is properly interpreted. A location code (such as a zip code) could then be entered followed by the pound key. As will be described in more detail below, the location code can be associated with a region which is used to ensure that the correct daylight savings times and dawn and dusk times (or average values associated with dawn and dusk times) are used to operate the timer. The timing pattern is then entered followed by the pound key. The timing pattern will be used to operate the timer based upon the current time, date and location of the timer. Accordingly, after 5 simple steps, the timer is programmed to follow a timing pattern that meets the user's needs, and operates as it would if on/of times were entered on a user interface in a conventional manner to implement the timing pattern.

In addition to providing simple steps to program the timer, the user interface of FIG. **2** also enables easy reprogramming if desired by the user. Although the selection of a desired timing pattern will eliminate the need to reprogram the timer (such as at the start of spring or fall seasons as is generally required with conventional timers), the user interface enables easy reprogramming is a user decides that they simply want to change the timing pattern. That is, rather than having to clear all of the data and re-enter the current time, date and a zip code, a key sequence could be entered followed by the pound key to change the timing pattern. For example, a user could enter a sequence of three # keys followed by the new timing pattern, followed by the # key. While the use of pre-stored timing patterns which can easily be selected using a timing pattern code, it may be the case that the user may realize that they do not like the pattern that they selected, and decide that they simply want to change the timing pattern that they selected. Alternatively, a user may decide that they want to periodically reprogram the timer. That is, although the use of pre-stored patterns eliminates the need for reprogramming, reprogramming the timer to implement another pre-stored timer is so easy that it is an option for a user of timer implementing the pre-stored timing pattern.

Turning now to FIG. **3**, a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention is shown. According to the embodiment of FIG. **3**, a display **302** could be implemented. While a display may not be necessary to implement the timer with pre-stored timing patterns, the display may be desirable to provide information regarding stored data, including a selected timing pattern for example. That is, even though a display is not necessary in view of the use of pre-stored timing patterns, a user may desire a display for aesthetic reasons, because they are simply used to having a display, or for what information it does provide. As shown in FIG. **3**, the display includes a time field **304** which displays the current time during normal operation, an AM/PM field **306**, an on/off field **308** indicating the state of a light or appliance which is attached to the timer. Finally, an information field **310** includes other information related to the operation of the timer. For example, the information field could include the current date and the timing pattern number. The timing field could include other information, such as DST code or whether a security code is used, as will be described in more detail below. Based upon the current time, date and security code information, a user could determine whether the timer is set with the correct data and should be operating correctly. As shown in FIG. **4** which shows the embodiment of FIG. **3** with the cover in the open position, the user interface could be implemented in with the user interface.

Turning now to FIG. **5**, a perspective view of the front panel of the in-wall light timer of FIG. **3** with a cover open according to another embodiment of the present invention is shown. According to the embodiment of FIG. **5**, a 5-key user interface could be implemented to enter data necessary for implementing a timer using a pre-stored timing pattern. As will be described in more detail below in reference to FIG. **20**, the left and right keys on either side of a select key will allow a user to traverse through programming categories, while the up and down keys above and below the select key will enable a user to move through the available options in a given programming category. As will be further described below, the 5-key user interface will be enable a user to select a timing pattern code so that the timer can be implemented with a pre-stored timing pattern.

Turning now to FIG. **6**, a perspective view of the front panel of the in-wall light timer of FIG. **3** having pre-set buttons according to an embodiment of the present invention is shown. As shown in FIG. **6**, dedicated, pre-set actuators **602**, shown here as buttons **604** which enable the manual selection of a pre-stored timing pattern. Four pre-set buttons are shown in the embodiment of FIG. **6**, including a fixed button (applying a fixed on time and fixed off time when selected), an astronomic button enabling the operation of the timer based upon astronomic data, a DST button enabling the operation of the timer based upon a first timing pattern for a standard time period and a second timing pattern for a daylight savings time period, and a seasonal button for applying different timing patterns for each of the four seasons. Each of the buttons includes a selection indicator (such as an LED light for example) which would indicate when the button is selected. The button could be movable between a depressed, on position (where it is flush with the surface of the timer and the LED lit) and an off position. Alternatively, the selected button would have the LED lit, with all buttons having the same positioning. Only a single button can be selected at a time, where a selected button would be deactivated if another button is selected. The selection of timing patterns for the pre-set actuators **602** will be described in more detail below. While 4 buttons are shown, it should be understood that a greater number of buttons or fewer buttons could be implemented. Further, while examples of the functions of buttons are shown, it could be understood that other functions for the pre-set buttons could be implemented. For example, one button could be dedicated to each season. As will also be described in more detail below, a wireless option would enable the wireless programming of timing patterns for the pre-set buttons.

Turning now to FIG. **7**, a perspective view of the front panel of the in-wall light timer of FIG. **5** according to another embodiment of the present invention is shown. In addition to having pre-set buttons as shown in FIG. **6**, a connector **702** for receiving a portable memory device is provided for downloading data, such as new or different timing patterns or DST data, as will be described in more detail below. While the connector for receiving a portable memory is only shown in connection with FIG. **7**, it should be understood that such a connector could be implemented in any of the embodiments of FIGS. **1-6**.

While user interfaces are provided in the embodiment of FIGS. **6** and **7** for entering data in addition to the dedicated buttons for selecting a predetermined timing pattern, it should be understood that the embodiments of FIGS. **6** and **7** could be implemented without the user interface for entering data or a display, where the only actuators which would be required for selecting a timing pattern would be the dedicated buttons of FIGS. **6** and **7** for selecting pre-stored timing pattern or a timing pattern based upon data selected for the buttons and provided to the timer. That is, the timing patterns of the dedicated buttons could be assigned defined, pre-stored timing patterns, could be downloaded using a portable memory by way of the connector **702**, or could be programmed by a user, as will be described in more detail below in reference to FIGS. **46-49**. That is, embodiments of the timer could be implemented with the pre-set buttons **602**, and not having a keypad **204** or a 5-key interface **312**.

Turning now to FIG. **8**, a side view of the in-wall timer shows connectors enabling a connection of the timer to electrical wiring. The side view of the timer shows a connector panel **802** having coupling elements **804-808**, shown here as screws, for receiving wires of a junction box. Alternatively wires could extend from the timer and be connected to wires of the junction box.

Turning now to FIG. **9**, a side view of a timer having a front panel according to FIGS. **1-7** and adapted to be implemented with a wall outlet according to an embodiment of the present invention is shown. Rather than a timer which is fixedly coupled to a junction box, the various circuits and methods can be implemented in a timer adapted to be used with a wall outlet and adapted to receive a plug of a light or some other appliance. As shown in FIG. **9**, the timer **902** comprises a receptacle **904** for receiving the prongs of a plug of a light or an appliance. The timer **902** also comprises prongs **906** to be inserted to an outlet to enable applying power to the light or appliance. The user interface **202**, shown opposite of the prongs **906**, can be implemented according to any of the user interfaces set forth above.

Turning now to FIG. **10**, a block diagram of a circuit enabling the operation of the embodiments of FIGS. **1-9** according to a first embodiment of the present invention is shown. As shown in FIG. **10**, a circuit for implementing a timer having pre-stored timing patterns comprises a control circuit **1002** adapted to access one or more of a plurality of pre-stored timing patterns. The control circuit **1002** may be a processor having a cache memory **1004** storing timing patterns and other data necessary to implement the timer. A memory **1006** may also be implemented to store timing patterns or other data necessary to implement the timer. The memory **1006** may be implemented as a non-volatile memory, enabling the memory to store the timing patterns and data without loss due to a power loss. A portable memory **1008**, having contacts **1010**, may be received by a connector **1012** (such as the connector **702** of FIG. **7** for example) and coupled to corresponding contacts. A transformer **1014** is coupled to receive an input voltage at an input **1016**, and provide a regulator voltage signal **1018** to various elements of the timers. A second input **1020** is coupled to a ground terminal enabling a ground signal which is coupled various elements of the timer. A backup energy supply **1022**, which could be a battery or a capacitor for example, could be implemented to ensure that data of a memory is not lost during a loss of power. The control circuit provides a control signal by way of signal line **1024** to a switch **1028** which receives a regulated voltage by way of a line **1026**. The switch **1026** controls the application of the regulated voltage to a voltage terminal **1030** which enables power to be applied to an appliance **1032**, such as a light as shown. The appliance has a first terminal **1032** for receiving the regulated voltage from the voltage terminal **1030** and a second terminal **1036** coupled to the ground potential. An input portion **1038**, which may be implement any of the user interface elements described in reference to FIGS. **1-7** is also shown.

Turning now to FIG. **11**, a block diagram of the a circuit enabling the operation of the embodiments of FIGS. **1-9** having a wireless communication circuit according to an embodiment of the present invention is shown. As shown in FIG. **11** comprises a wireless communication circuit **1102** which is adapted to enable the wireless programming of certain data or information by way of a corresponding wireless communication circuit implemented in a computer device, such as a laptop computer, a tablet computer or a "smart phone." An example of a wireless communication circuit is shown by way of example in FIG. **12**.

Turning now to FIG. **12**, a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of FIG. **11** according to an embodiment of the present invention is shown. In particular, the antenna **1104** receives wireless communication signals according to a predetermined wireless communication protocol. The data may be sent to the wireless transceiver **1102** by way of a computer having or in communication with a corresponding wireless transceiver **1102**. The received data is coupled to a combined mixer/voltage controlled oscillator **1206**, the output of which is coupled to an intermediate frequency (IF) circuit **1208**. Based upon outputs of the IF circuit and a phase locked loop (PLL) **1210**, a mixer **1212** generates the received data. An analog-to-digital converter (ADC) **1214** then generates digital data representing the timing characterization data.

The control circuit may also provide data to the data transceiver for transmission to the computer. Data to be transmitted from the data transceiver **1102** is coupled to a digital-to-analog converter (DAC) **1216**, the output of which is coupled to a modulator **1218** which is also coupled to a PLL1220. A power amplifier receives the output of the modulator to drive the antenna **1104** and transmit the data. It should be noted that the wireless communication network could be configured to implement any wireless protocol for communicating with the wireless communication circuit of the timer of FIG. **11**. According to one embodiment, the data transceiver could implement the IEEE Specification 802.11 wireless communication standard, the Bluetooth standard, an infrared protocol, or any other wireless data protocol. While the circuit of FIG. **12** is provided by way of example, other wireless data transceivers could be employed according to the present invention to implement the desired wireless communication standard.

Turning now to FIG. **13**, a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention is shown. The geographic regions enable applying certain data, such a timing pattern, which is suitable for a timer implemented in the geographic area. As shown in FIG. **13**, the geographic area of the continental US is divided into 12 regions identified by a longitudinal designation (shown here as the time zones) or latitudinal designation (shown here as 3 regions designated as north, central and south). According to the embodiment of FIG. **12**, the regions are designated by a two letter code including the first letter of the longitudinal code followed by the first letter of the latitudinal code, by way of example. While 12 regions are shown by way of example, it should be understood that a greater number or fewer number of regions could be designated. Further, while geographic regions, other designation of regions could be implemented, such as zip codes or telephone area codes.

Turning now to FIGS. **14** and **15**, diagrams data fields of data entered by a user according to embodiments of the present invention, including data as entered on a keypad as described in reference to FIG. **2**. According to the embodiment of FIG. **14**, a field **1402** stores the received "clear" code, shown here as three star keys, a time code **1404** (shown here as a 4 digit time entered in military format representing 2:30 PM), a date code **1406** (shown here as a 6 digit date in the DDMMYY format), a location code **1408** (shown here as a zip code), and a timing pattern code **1410** (which will be described in more detail below). While the location is shown as a zip code, other location codes representing larger or smaller geographical errors could be utilized. According to the embodiment of FIG. **15**, an optional daylight savings code **1502** indicating daylight savings time information, such as dates associated with a period for applying a daylight savings time pattern or dates for shifting the current time by 1 hour, as will be described in more detail below. While specific codes are shown in FIGS. **14** and **15**, it should be understood that additional fields could be implemented.

Turning now to FIG. **16**, a table shows timing pattern numbers and associated timing characterization data and categories according to an embodiment of the present invention. A significant benefit of the various embodiments of the timers and methods of implementing a timer is that on and off times for implementing a timer are easily selected without having to enter the on and off times. Rather, a timing pattern designated by a timing pattern code can be easily be selected by a user rather than having a user enter the on and off times for the timer. As will be described in more detail below, the timing patterns can be categorized according to a number of broad categories, such as fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, for example, to make it easier to select a desired timing pattern. The timing pattern codes can also be arranged such that similar timing patterns can have similar numbers, and can be arranged in a tree format such that numbers having the same most significant bit will have the same broad category. Timing patterns associated with timing pattern codes having the same second most significant bit may also have a common on or off time, for example.

Referring specifically to FIG. **16**, timing patterns are shown for fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, where the fixed timing patterns having timing pattern codes between 1 and 1xx, DST timing patterns having timing pattern codes between 2 and 2xx, seasonal timing patterns having timing pattern codes between 3 and 3xx, and astronomic timing patterns having timing pattern codes between 4 and 4xx. The fixed time year-round timing patterns as shown have an on time and an off time, where timing pattern codes associated with timing patterns having the same on time have the same first two digits. For example, timing patterns having an on time of 4:00 PM will have a timing pattern code starting with 11X, while timing patterns having an on time of 5:00 PM will have a timing pattern code starting with 12X. The first timing pattern code of any of the any of the groups (i.e. the timing pattern code could be the default timing pattern code for dedicated timing pattern selection buttons as will be described in more detail below.

The second and third timing pattern categories have different timing patterns for different times of the year. In particular, the DST category has two timing patterns, one for standard time and one for daylight savings times, where the different timing pattern codes represent various combinations of on and off times for both of the standard time and daylight savings time. Similarly, the seasonal category has different on and off times for each of the four seasons.

Finally, the astronomic category of timing patterns including timing patterns based upon known dusk and dawn times. While dusk and dawn times are helpful in setting on and off times for a timer because they are close to the times when it becomes dark and light, the use of the known dusk and dawn times often leads to the timer being on at times when a user may not want the timer on. For example, during winter, lights may come on before 4:00 PM, which may be much earlier than desired. Similarly, lights may be on later than desired at dawn. During summer, lights may be on later than desired, which may be after 7:30. Therefore a user may want to use an offset. As will be described in more detail below, a certain time period delay for tuning on the timer may be desired with on times and a certain time period for turning lights off early may be desired with off times. Further, a user may desire the use of astronomic dusk times (with or without an offset) and the use of a fixed timer for turning the lights off at some time after midnight, for example. It should be understood that astronomic dusk and dawn times could be used with timing patterns in the DST and seasonal categories, or could be limited to the astronomic categories for simplicity. It should also be noted that while even hour times are shown, on and off times based upon half hours or quarter hours could be provided.

In order to implement astronomic times, it is necessary to consider both locations and the time of year. While it may be possible to store astronomic data any level of granularity of location and time, average astronomic dusk and dawn data could be stored based upon a particular region and a particular time period as will be described in reference to FIG. **18**. In order to store average astronomic dusk and dawn data, it is necessary to identify a location where the timer will be used, and assign that location to a reasonable number of regions for which astronomic timing data is stored. By way of example in FIG. **17**, the 12 regions designated in FIG. **13** could be associated with zipcodes. Accordingly, when a user enters a zip code, data associated with the region having the zip code would be used when implementing a selected timing pattern for the timer. By way of example, the data could be based upon a central location of the region, or an average of the different dusk and dawn times of the region. Alternatively, the average dusk and dawn times could be skewed toward more populated areas of the regions. Not only would average dusk and dawn times for the location be used based upon the zip code, but the correct time in the various time zones based upon the Greenwich Mean Time (GMT) would also be used. Alternatively, three digit telephone area codes could be used.

As shown in FIG. **18**, these average dusk and dawn times are not only based upon location, but also based upon time of year. While daily dusk and dawn times could be used, it would be more efficient to use average dusk and dawn times for given time periods, and particularly time periods associated with time periods for implementing timing patterns, as described in reference to FIGS. **51** and **52**. Accordingly, for each region, an average dusk time and average dawn time for different timer periods during which a particular on time or off time would be applied, shown by way of example in FIG. **8** to include a full year, portions of a year or individual days.

Additional data which could be used in implementing a timer is DST data and corresponding DST codes. In addition to dates at which times are moved back during the fall or moved back during the spring in areas having daylight savings times (where these dates have changed over time and may change in the future), dates for applying a timing pattern for a period having shorter daylight, called a daylight savings time period. While the daylight savings time period could correspond to the times for moving the timer forward and back, a user may like to select a period for applying a daylight savings time timing pattern during a period which is different than the period between moving the clock back and returning the clock to the standard time. Accordingly, a table could be stored which has different daylight savings time data including a DST time period for applying different timing patterns and dates for changing the clock. Each of a plurality of combinations is stored with a corresponding DST code in the table. When the DST code is entered during programming of the timer, on and off times associated with a selected timing pattern will be applied subject to dates and times associated with daylight savings time data associated with the DST code.

It should be noted each of the tables **16-19** are stored in a memory of the timer, such as memory **1006** or a cache memory of the timer of FIG. **10**. The data is preferably stored at the time of manufacture (or at some point before the timer is packaged) and provided to the end user with the timing patterns selectable by a timing pattern code already stored in the memory. Further, data in the tables could be updated using a portable memory device, such as a USB drive, by way of the connector **702**.

Turning now to FIG. **20**, a flow diagram shows the operation of the 5-key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. While the keypad of FIG. **2** provides an easy way of entering data necessary to implement a timer having pre-stored timing patterns, other user interfaces could be used which take advantage of the pre-stored timing patterns associated with corresponding timing pattern codes. For example, "navigation" keys which enable a user move through a menu can be implemented to enable a user to select a timing pattern code or any other data necessary for implementing a timer as set forth above. Unlike conventional timer user interfaces, the 5 key navigation user interface of FIG. **20** is not only intuitive, but overcomes many of the problems associated with conventional user interfaces by not only showing a current programming category and a current data value for the current programming category, but also previous and following programming categories and previous and following data values which could be selected for the current programming category. That is, as will be described in more detail in reference to FIGS. **21-43**, the arrangement of programming categories and corresponding data values will enable easy navigation through the user interface by indicating where a user is within the menu.

Referring specifically to FIG. **20**, the programming categories **2002** and corresponding data values **2003** could be selected by the 5 key user interface which includes a select key **2004** which could be used to select data associated with a given programming category. In summary, the select key **2004** will enable a user to enter the menu for programming (such as by depressing the key for a predetermined period (e.g. 2 seconds), the left key **2006** will allow moving left along the programming categories, and the right key **2008** will enable moving right along the programming categories. An up key **2010** will enable a user to move up within a column for a current programming category, while a down key **2012** will enable moving down within the current programming category. By way of example, when the display is in an operational mode and shows operational values (such as the operational values shown in FIGS. **3-5**), the first programming mode (i.e. the hour programming mode **2104**) will be shown on the display when the select key **2004** is selected. If the user desires to enter a certain time, the up and down keys can be used to move to a desired data value representing the desired hour, and have that data value selected by using the select key. When a data value is selected for a given programming category, the user interface preferrably then automatically moves to the following programming category. A key pad sequence (such as the selection of the select key three times or merely holding the select key for a predetermined period of time (e.g. 2 seconds)) can then be entered at any time to leave the programming mode of the timer.

The programming categories include the following: the hour mode **2014** (having 24 data values from 12 AM to 11 PM), the minute mode **2016** (having 60 data values from 0 to 59 minutes), the month mode **2018** (having 12 data values from JAN to DEC), the day mode **2020** (having 31 data values from 1 to 31), the year mode **2022** (having 10 data values for each of the tens digit of the year from 0x to 9x), the year mode **2024** (having 10 data values from 0 to 9 for the one's digit), the region mode **2026** (having 12 data values for each of the regions shown in FIG. **13**), the timing pattern mode **2028** (having a predetermined number of timing pattern codes associated with a corresponding number of pre-stored timing patterns), the DST mode **2030** (having the number of data values associated with different DST data values, such as the data associated with the DST codes of FIG. **19**), the security mode **2032** (having the number of available security codes, such as 100 codes for a two bit security code or 1000 codes for a 3 bit security code), and optionally an "exit" programming option which will be described in more detail in reference to the programming example of FIGS. **21-43**. While a user can depress and hold the select key for a predetermined period of timer for example to leave the programming mode, the exit option can also be provided to enable a user to leave the programming mode. In either case, a new data that has been selected will be stored and used by the processor of the timer to implement a timing pattern.

FIGS. **21-43** shows a series of stages of programming a timer using the 5-key user interface of FIGS. **5** and **7**. While displays may be desirable for some users (because they want to see what data is being entered to program the timer), conventional timers having displays are not only difficult to navigate through a menu for programming the timer (and understand where the user is in the menu), but also are difficult to see the data which is entered in a certain field of a conventional timer because the display is so small. The displays of FIGS. **21-43** show the steps of programming a timer to enable operation of the timer according to a pre-stored timing pattern from the initial, un-programmed state of the timer of FIG. **21** to the final programmed state of the timer of FIG. **43**. As shown in FIG. **21**, various fields which provide information in the normal operating state are shown. The programming mode can be entered when the select key of the 5-key user interface is selected (or some other key sequence such as the select key being selected 3 times, or the select key being depressed for a predetermined period, such as two seconds).

One unique feature of the user interface described in FIGS. **21-43** is that a current selection option (either programming categories or data values) is not only shown, but a "previous" and "next" programming category and data value is also shown. In order to further make the timer easier to program and overcome a significant problem of conventional timers with displays which are difficult to read, the current programming category and data value is larger than the "previous" and "next" programming category and data value. Making the current programming category and data value larger makes it easier to read the programming category and data value while still making it easy to navigate the menu by providing previous and next values.

After a key or key sequence is entered on 5-key user interface to enter the programming mode, an initial programming state is entered as shown in FIG. **22**. While the initial states for data values in FIGS. **23-42** are shown as the top values of the available data values for a programming mode, the initial states could be some other value, such as a value near the middle of the available data values, or a commonly selected data value. The sequence of FIGS. **21-42** are intended to show the programming of a timer having the following data: a current timer of 10:24 PM and a current data of Oct. 9, 2013, where the timer is operated in the North Central (NC) region having a timing pattern 13, a DST code 903 and an optional security code 013. As will be described in more detail below, a security code could be used if a user could reprogram the timer using a wireless connection to prevent a hacker from changing the operation of the timer (from outside of a building for example).

As shown in FIG. **22**, the initial programming state includes the Hour programming mode, and a initial data value of 1 AM. A user could then use the up and down keys to select the desired time. As shown in FIG. **23**, the user had moved down one data value to 2 AM, and then down to the desired data value of 10 PM as shown in FIG. **24**. When the user reaches the desired data value, the user can select the value using the select key, in which case the display would then display the next programming category, which happens to be the minute programming category. Alternatively, rather than automatically changing, a user could be required to move to the next programming category by selecting the right arrow

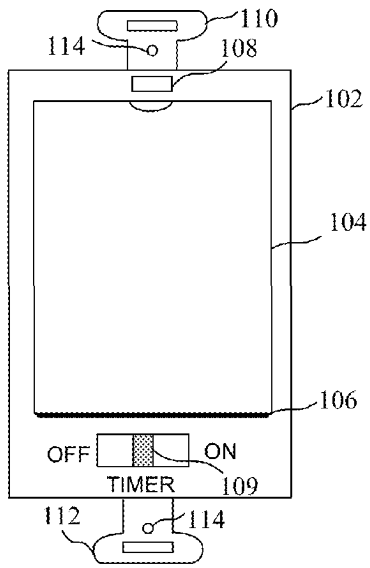

FIG. 1

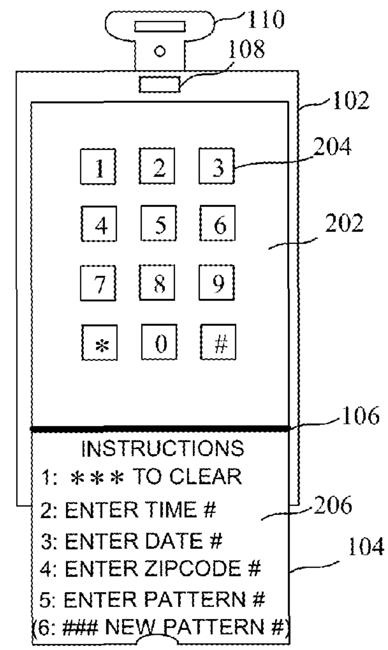

FIG. 2

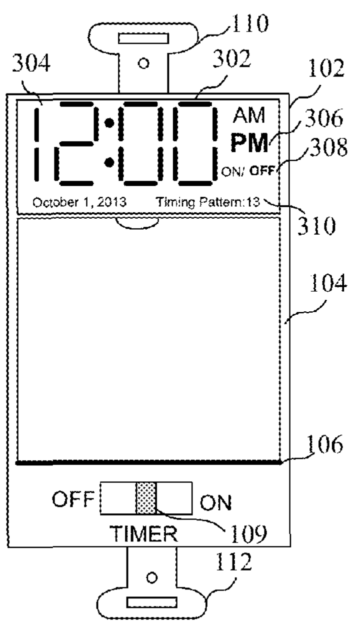

FIG. 3

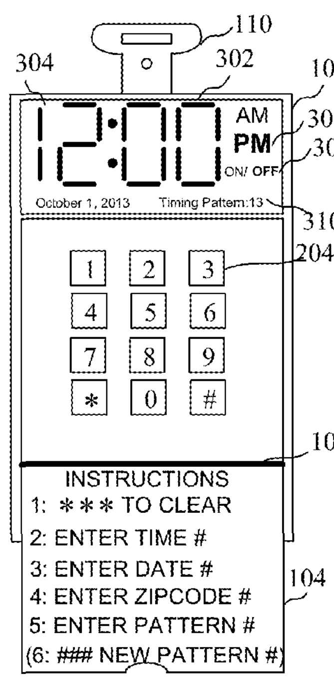

FIG. 4

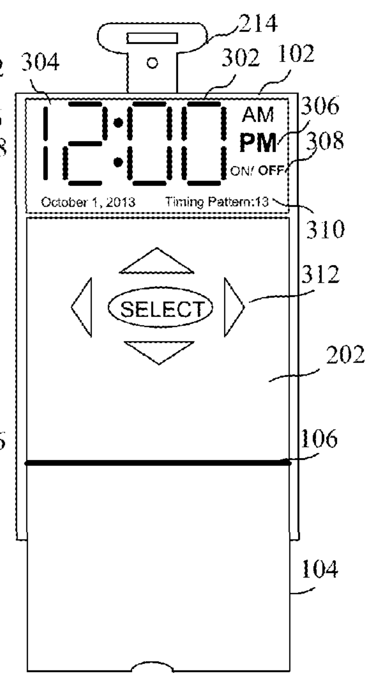

FIG. 5

key. As shown in FIG. **25**, the initial state of the minute programming mode has a "1" in the data value display portion. The up and down keys can then be used to move to the desired "24" minute data value as shown in FIG. **26**, where the month programming category would then be displayed as shown in FIG. **27** in response to the selection of the data in the minute programming mode. After the desired month of October is reached in FIG. **29**, the programming mode is move to the day programming mode as shown in FIG. **29**, where the desired 24^{th} day is selected as shown in FIG. **30**. As shown in each of the displays, a previous programming category is shown above a current programming category, and a next programming category is shown below the current programming category. Similarly, a previous data value of the current programming category is shown above the current data value, and a next data value is shown below the current data value. For example, in selecting the month as shown in FIG. **27**, the previous programming category "minute" in the programming category side of the display is above the current programming category "month," while the next programming category "day" is shown below the current programming category. Similarly, in the data value side of the display, the month of December is above the current data value of January, while the month of February is below the current value. Providing categories and values above and below current categories, a user can more easily navigate through the menu. Also, by providing the current category/value in a larger size, it is easy to read the category/value.

Selecting a desired year can present more of a problem because of the number of available years (e.g. 100 data values from 2000-2099). While a single year selection mode can be implemented in the same way as selecting 1 of 31 days of a month as described above, the year programming mode can be divided into two operations, enabling the selection of a decade in one step and enabling the selection of a year in another step. As shown in FIG. **31**, it should be noted that the initial state is shown with a year "200?", where the "zeros" decade is provided. The user can then move down one data value to the "tens" decade as shown in FIG. **32**, which, when selected, will lead to the menu option as shown in FIG. **33** enabling the selection of the year for the tens decade. Therefore, the up and down keys are used to select **2013** as shown in FIG. **34**.

Other data for implementing the timer can then be entered. In particular, the region in which the timer is implemented can be selected by going from an initial region option NE as shown in FIG. **35** to desired timing region option of NC as shown in FIG. **36**. The desired timing pattern can then be selected, where an initial timing program 1 shown in FIG. **37** can be changed to the desired timing program 13, as shown in FIG. **38**. The desired daylight savings time code can then be selected, where an initial daylight savings time code 900 shown in FIG. **39** can be changed to the desired daylight savings time code 903, as shown in FIG. **40**. Finally, a desired security code can then be selected, where an initial security code of 000 shown in FIG. **41** can be changed to the desired security code of 013, as shown in FIG. **42**. After all of the data is entered, and the exit option is selected, the display of the timer returns to the operating mode, where the display shows some or all of the data (other than a value of a security code which could also be shown) entered during programming. Further, a "key" or "lock" icon could be shown on the display to indicate that a security code has been programmed.

While it is assumed that no data was programmed initially, it should be noted that, if the timer is already programmed and just some data needs to be reprogrammed, the left and right keys can be used to move within the menu to reach a desired programming category to change the data for that category, at which time the select key can be used to select the data, leave the programming mode, and return to the display for the normal operational mode. By way of example, if a timer is already programmed and a user desires to change the timing pattern (by changing the selected timing pattern code), a user would enter the programming mode and use the left and right keys to move along the programming modes until the timing pattern programming mode is reached. The up and down the available data values until the desired timing pattern code is reached. The data value be selected by using select key, at which time the programming category would move to the next programming category. If no other data values need to be changed, a user could move along the programming categories to the "exit" option to return to normal operation or hold the select key for a predetermined period of time. Accordingly, if a timer is already programmed and a user desires to change the timing pattern for example, the user can easily change the timing pattern without having to reprogram anything else.

Turning now to FIG. **44**, a memory shows fields and corresponding stored data associated with the programmed timer of FIG. **43**. All of the data entered using the numeric keypad or 5-key user interface is stored in memory fields of a memory of the timer, such as memory **1006** for example, and is accessed by the timer to implement a selected timing pattern in operating the timer as described above.

Turning now to FIGS. **45-49**, screens of a user interface enabling the wireless programming of a timer are shown according to an embodiment of the present invention. That is, based upon a current time and date, the timer will implement the timing pattern (associated with the selected timing pattern code) by using data of FIGS. **16-19**. As shown in FIG. **45**, a display **4502** of a wireless device, such as a laptop computer, a tablet computer or a cellular telephone having a touch screen or some other data entry element, shows a data entry screen enabling a user to enter the necessary data, including a timing pattern code associated with a desired timing pattern, for implementing the timer. The display also includes a data entry element **4504**, shown here as a touch screen entry portion having an alphabetical entry portion **4506** (such as a "QWERTY" keypad) and a numeric entry portion (having touch screen keys from 0 to 9). Various fields are provided to enter the data stored in the memory of FIG. **44**. For example, a field **4509** enables a user to enter a security code. The security code may be concealed as shown to avoid someone seeing the code. A time field **4510** enables someone to enter the time, shown here as a 4 digit military time. However, because a full QWERTY keypad is provided, the time could be entered as 10:24 PM for example. The date is entered in a date field **4512**. Although shown in a 6 digit DDMMYY format, it could be spelled out using letters and numbers. The desired region, timing pattern and DST code could be entered in fields **4514**, **4516**, and **4518**, respectively. The user could then exit or opt to enter an advanced options mode.

According to one embodiment, the advanced options mode enables a user to select timing patterns to be implemented with the dedicated buttons for selecting timing patterns as shown in FIG. **6** or **7**, or enables entering on and off times to be applied when the timing pattern associated with the dedicated buttons are selected. That is, a screen could have a field for each dedicated button, where a user could enter the timing pattern code in the field which corresponds to the timing pattern which is desired for the field. As shown for example in FIG. **46** which relates to a timing program for a fixed button setting, on and off times which would be applied throughout the year could be entered in data fields, where on and off times for weekdays could be entered in fields **4602** and **4604** respectively, and on and off times for weekends could be entered in fields **4606** and **4608** respectively. "Back" and "Next" selection options enable the user to move through the advanced programming options to finish the programming or exit as desired.

As shown in FIG. **47**, on and off times associated with an astronomic mode of operation applied in response to the selection of the "Astro" button can be entered in fields **4702** and **4704**, where the entries enable the selection of an offset. As will be described in more detail below in reference to FIG. **50**, users may prefer to apply astronomic times with a delay in turning the lights on at dusk, and turning the lights off early at dawn. According to another embodiment, the astronomic timing program associated with a button could include an option of setting the off time to a fixed time. That is, while users may want the on time of the timer to follow the dusk time, they may want the lights to go off at a fixed times (such as 1:00 AM or 6:00 AM for example) rather than be tied to the dawn time.

A screen for programming on and off times for a DST button is shown in FIG. **48**. According to the embodiment of FIG. **48**, on and off times to be applied during a standard time period can be entered in fields **4802** and **4804**, while on and off times to be applied during a daylight savings times period can be entered in fields **4806** and **4808**. A similar arrangement is shown in FIG. **49**, where settings for 4 "seasonal" timing patterns can be applied rather than settings for two timing patterns as described in reference to FIG. **48**. In particular, on and off times to be applied during a spring time period can be entered in fields **4902** and **4904**, on and off times to be applied during a summer time period can be entered in fields **4906** and **4908**, on and off times to be applied during a fall time period can be entered in fields **4910** and **4912**, and on and off times to be applied during a standard time period can be entered in fields **4914** and **4916**.

While specific fields are provided for entering data for applying on and off times during the operation of a timer when a dedicated button is selected, it should be understood that other fields could be implemented with the given programming categories as shown, or other programming categories could be implemented. It should be noted that if no data is entered, default timing patterns would be implemented when a dedicated button is selected, where the default timing patterns could be based upon the 1-4 timing pattern codes associated with the four categories of timing patterns shown in FIG. **16**.

Charts provided in FIGS. **50-52** show dusk and dawn times throughout the year, average dusk and dawn times for periods, and the benefits of implementing certain on and off times during certain periods. Turning first to FIG. **50**, a chart shows dusk and dawn times over a year, and an average time shown by the dashed line. As should be apparent from FIG. **50**, considerable energy can be saved by setting on and off times at times other than the average dusk and dawn times. While the charts of FIGS. **51** and **52** provide timing patterns having better granularity and therefore provide a more desirable timing pattern, the chart of FIG. **50** provides perspective as to how much energy can be saved by implementing times other than astronomic dusk and dawn times. As is apparent from FIG. **50**, each light controlled by a timer will be off for at least 2 hours longer each day compared to astronomic times by setting the on time for a light at 1 hour after dusk and setting the off time 1 hour before the average dawn.

Turning now to FIG. **51**, a chart shows dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time. As can be seen in FIG. **51**, the average dusk and dawn times are very different for the two time periods, and the timer on and off settings with a one hour offset is very different. By establishing the two time periods to apply two different time settings, it can be seen that different on and off times are much closer to the dusk and dawn times, and therefore provide an overall more desirable timing pattern for the year, while still providing savings by having the timer on less. Additional energy reduction can be achieved by moving the off time of the DST period to a fixed time, such as 5:00 AM and still provide a desirable overall timing pattern. As is apparent from FIG. **51**, the time period for applying a "daylight savings time" timing pattern is different than the period between the "fall back" date for turning back the clock in the fall, and the "spring forward" date for returning the clock to normal time during the spring.

The embodiment of FIG. **52** shows 4 timing patterns associated with the 4 seasons. As can be seen, the average times for dusk and dawn during those periods are different, and selected times relate more closely to the average times, and therefore provide a better overall timing pattern. While DST and seasonal periods are shown, it should be understood that other periods could be defined, such as monthly periods. However, a greater number of periods may require additional memory for storing data and may make it more difficult to select a desirable timing pattern by a user. Accordingly, the number of periods selected (which may provide a better timing pattern) may be a tradeoff with additional memory requirements and reduced user-friendliness. One of the benefits of the various embodiments is that they are user friendly. Therefore, the number timing pattern options available to a user must be selected to ensure that the timer is still user friendly to operate while providing enough options to provide desirable timing patterns for a variety of different users.

Turning now to FIG. **53**, a flow chart shows a method of generating timing characterization data according to an embodiment of the present invention. A plurality of timing patterns are established at a step **5302**. A unique timing pattern code is assigned for each timing pattern of the plurality of timing patterns at a step **5304**. The timing patterns and corresponding timing pattern codes are stored in a memory of the timer at a step **5306**. Geographic regions where the timers will be used are also defined at a step **5308**. Time periods for which average dusk and dawn times may be used defined at a step **5310**. Average dusk and dawn timers associated with the time periods and geographic regions are stored in a memory of the timer at a step **5312**. DST data related to "spring forward" and "fall back" dates and desired dates for applying a DST timing pattern (if different than "spring forward" and "fall back") are stored, by region, in a memory of the timer at a step **5314**. It is then determined whether an input is received at a user interface of the timer at a step **5316**. Data associated with an operational field are stored in a memory of the timer at a step **5318**. It is then determined whether a time out been reached or a stored indication received at a step **5320**. The timer is operated based upon the data stored in the operational field at a step **5322**.

Turning now to FIG. **54**, a flow chart shows a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention. The timing pattern is cleared if necessary or desired by selecting a first predetermined keypad sequence at a step **5402**. The current time is entered followed by a key or keypad sequence to enter the data at a step **5404**. The current date is entered followed by the key or keypad sequence to enter the data at a step **5406**. A geographic region for the timer is entered followed by the key or keypad sequence to enter the data at a step **5408**. A timing pattern code is entered followed by the key or keypad sequence to enter the data at a step **5410**. A DST code is optionally entered followed by a key or keypad sequence to enter the data at a step **5412**. It is then determined whether the last data is entered or a time-out period expired at a step **5414**. All of the data entered is stored at a step **5416**. It is then determined whether the user desires to change the timing pattern code at a step **5418**. A second predetermined keypad sequence is entered to change the timing pattern code only at a step **5420**.

Turning now to FIG. **55**, a flow chart shows a method of selecting a stored timing pattern using the keypad of FIGS. **2** and **4** according to an embodiment of the present invention. A select key is pressed to enter the programming mode at a step **5502**. It is then determined whether a left or right key is selected to move to a different programming category at a step **5504**. The display will show another programming category as it moves horizontally along a plurality of programming categories at a step **5506**. It is then determined whether an up or down key is selected to enable selecting an option associated with the current programming category at a step **5508**. The display will show another option of a programming category as it moves vertically along options of a current programming category at a step **5510**. It is then determined whether the programming mode ended at a step **5512**.

Turning now to FIG. **56**, a flow chart shows a method of selecting a stored timing pattern using 5 key user interface of FIGS. **5** and **7** according to an embodiment of the present invention. A security code on the timer is optionally set to enable programming the timer using a wireless link at a step **5602**. It is then determined whether a wireless device for programming the timer within range of timer at a step **5604**. It is then determined whether the correct security code entered on the wireless device at a step **5606**. Data entered in fields on the wireless device are downloaded at a step **5608**. The data in the timer is stored at a step **5610**. The timer is operated based upon the stored data at a step **5610**.

It can therefore be appreciated that the new and novel timer and method of implementing a timer has been described. It will be appreciated by those skilled in the art that numerous alternatives and equivalents will be seen to exist which incorporate the disclosed invention. As a result, the invention is not to be limited by the foregoing embodiments, but only by the following claims.

I claim:

1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

a memory storing at least one timing pattern, the at least one timing pattern having one or more on/off settings for a time period; and

a wireless communication circuit configured to receive, using a wireless communication protocol, the at least one timing pattern selected on a user interface of a wireless device having a corresponding wireless communication circuit, the user interface enabling the selection of the at least one timing pattern;

wherein the user interface is configured to receive a security code enabling the downloading of the timing pattern to the memory using the wireless communication protocol.

2. The programmable light timer of claim **1** wherein the at least one timing pattern has at least a first set of on and off times for a first time period and a second set of on and off times for a second time period.

3. The programmable light timer of claim **1** wherein the user interface enables the selection of dusk as an on time of the at least one timing pattern.

4. The programmable light timer of claim **1** wherein the programmable light timer does not include a display.

5. The programmable light timer of claim **1** wherein the user interface enables the selection of a first on time and a first off time for a first plurality of days of the week.

6. The programmable light timer of claim **5** wherein the user interface enables the selection of a second on time and a second off time for a second plurality of days of the week.

7. The programmable light timer of claim **1** wherein the user interface enables an astronomic time for one of the on time or the off time.

8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

a memory storing at least one timing pattern, the at least one timing pattern having one or more on/off settings for a time period;

a wireless communication circuit coupled to receive the at least one timing pattern; and

a control circuit coupled to the wireless communication circuit and enabling receiving the at least one timing pattern from a wireless device, wherein the wireless device comprises a user interface configured to receive a security code enabling the downloading of the timing pattern from the wireless device to the programmable light timer.

9. The programmable light timer of claim **8** wherein the at least one timing pattern has at least a first set of on and off times for a first time period and a second set of on and off times for a second time period.

10. The programmable light timer of claim **9** wherein the user interface enables the selection of dusk as an on time of the at least one timing pattern.

11. The programmable light timer of claim **10** wherein the user interface enables the selection of dawn as an off time of the at least one timing pattern.

12. The programmable light timer of claim **8** wherein the user interface enables the selection of a first on time and a first off time for a first plurality of days of the week.

13. The programmable light timer of claim **12** wherein the user interface enables the selection of a second on time and a second off time for a second plurality of days of the week.

14. The programmable light timer of claim **8** wherein the user interface enables the selection of an astronomic time for one of the on time or the off time and a fixed time for the other of the on time and the off time.

15. A method of implementing a timing pattern in a programmable light timer, the method comprising:

implementing a wireless communication circuit in the programmable light timer;

storing at least one timing pattern in a memory, the at least one timing pattern having one or more on/off settings for a time period;

enabling the entry of a security code on a user interface of a wireless device having a wireless communication circuit in communication with the wireless communication circuit of the programmable light timer;

enabling the selection of a timing pattern on the user interface of the wireless device; and

downloading the selected timing pattern from the wireless device to the programmable light timer.

16. The method of claim **15** wherein storing at least one timing pattern comprises storing at least one timing pattern comprises storing a timing pattern having at least a first set of on and off times for a first time period and a second set of on and off timers for a second time period.

17. The method of claim **16** further comprising enabling the selection of dusk as an on time of the at least one timing pattern.

18. The method of claim **15** further comprising enabling the programming of the programmable light timer without a display.

19. The method of claim **15** further comprising enabling the selection of a first on time and a first off time for a first plurality of days of the week.

20. The method of claim **15** further comprising enabling the selection of an astronomic time for one of the on time or the off time and a fixed time for the other of the on time and the off time.

* * * * *

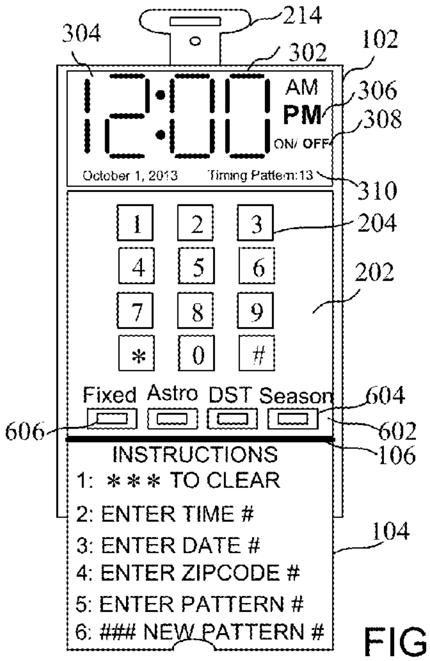

FIG. 6

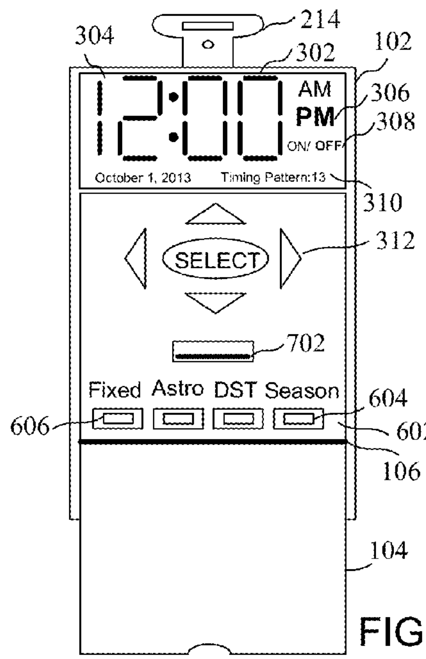

FIG. 7

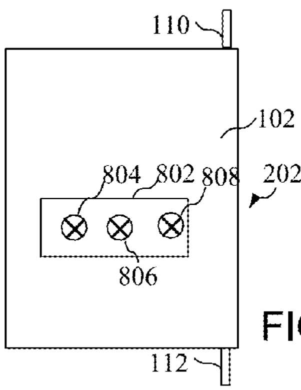

FIG. 8

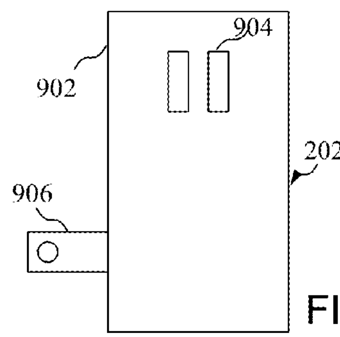

FIG. 9

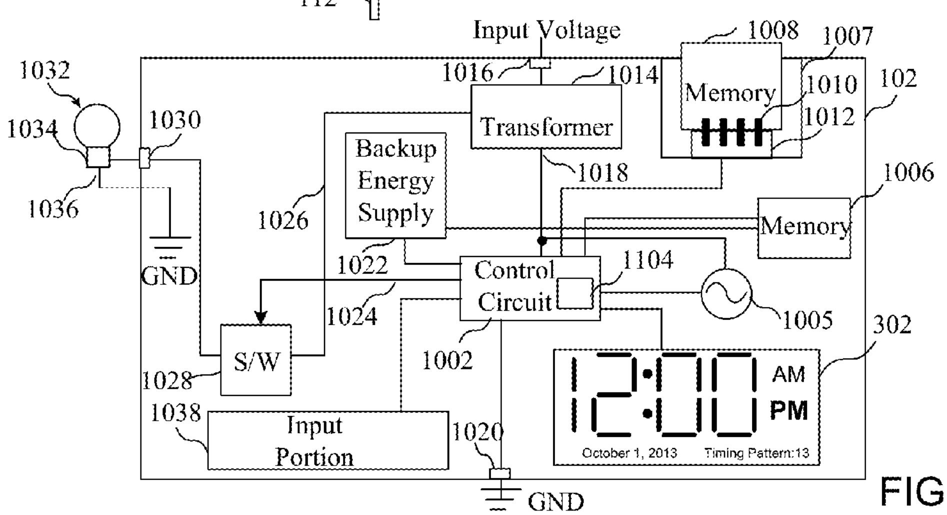

FIG. 10

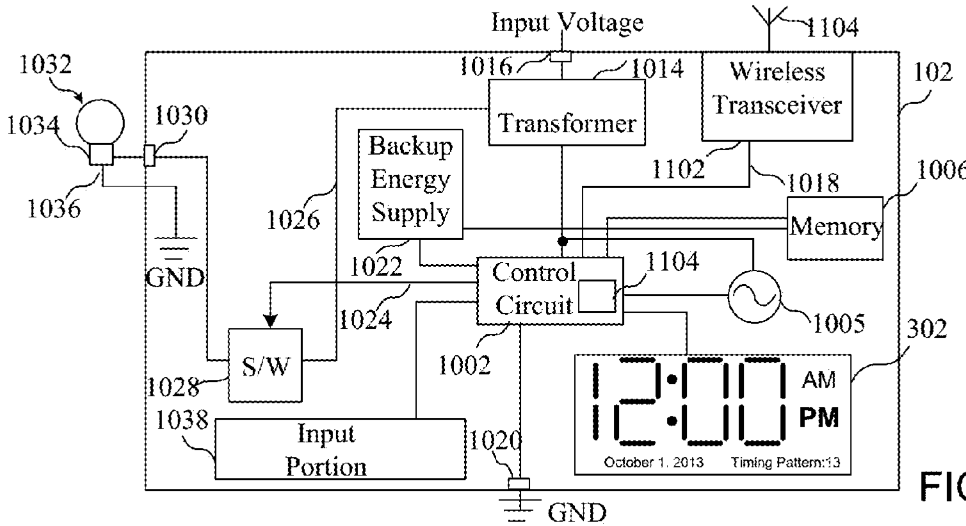

FIG. 11

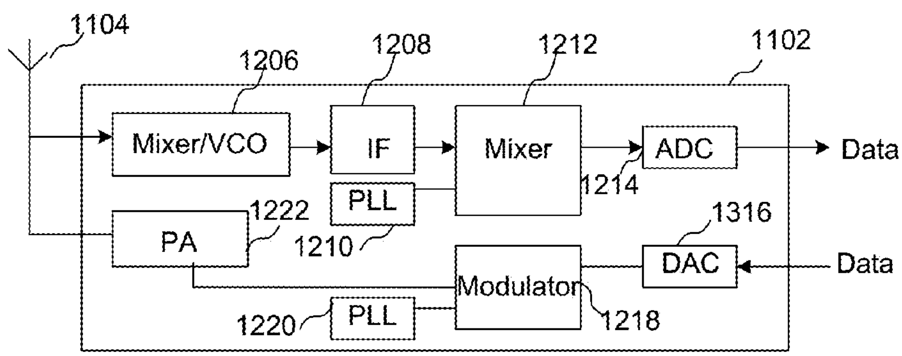

FIG. 12

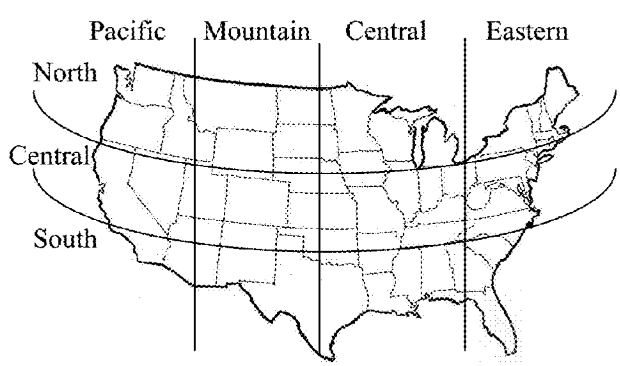

FIG. 13

1402	1404	1406	1408	1410
***	1430#	100513#	60189#	223#

FIG. 14

1402	1404	1406	1408	1410	1502
***	1430#	100513#	60189#	223#	902#

FIG. 15

Zipcode	Region
00501	NE
00502	NE
⋮	⋮
02169	NE
⋮	⋮
60068	NC
60189	NC
60189	NC
⋮	⋮
90210	CP
⋮	⋮
95124	SP

FIG. 17

DST Period Start Date	DST Period End Date	DST Fall Back Time Change	DST Spring Forward Time Change	DST Code
SEP 15	APR 1	Last Sun in OCT	First Sun in MAR	901
SEP 15	APR 1	Last Sun in OCT	2nd Sun in MAR	902
SEP 15	APR 1	First Sun in NOV	First Sun in MAR	903
SEP 15	APR 1	First Sun in Nov	2nd Sun in MAR	904
SEP 15	APR 15	Last Sun in OCT	First Sun in MAR	905
SEP 15	APR 15	Last Sun in OCT	2nd Sun in MAR	906
SEP 15	APR 15	First Sun in NOV	First Sun in MAR	907
SEP 15	APR 15	First Sun in Nov	2nd Sun in MAR	908
SEP 30	APR 1	Last Sun in OCT	First Sun in MAR	909
SEP 30	APR 1	Last Sun in OCT	2nd Sun in MAR	910
SEP 30	APR 1	First Sun in NOV	First Sun in MAR	911
SEP 30	APR 1	First Sun in Nov	2nd Sun in MAR	912
⋮	⋮	⋮	⋮	⋮
OCT 15	APR 1	Last Sun in OCT	First Sun in MAR	938
OCT 15	APR 1	Last Sun in OCT	2nd Sun in MAR	939
OCT 15	APR 1	First Sun in NOV	First Sun in MAR	940
OCT 15	APR 1	First Sun in Nov	2nd Sun in MAR	941

FIG. 19

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	04/19/2016	9320122	CEIC401D1	6303

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ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

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Cantigny Lighting Control, LLC, Wheaton, IL;

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

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	Application Number	14944302
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	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
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CONFIRMATION NO. 6303

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PUBLICATION NOTICE

OC000000081483196

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Publication No.US-2016-0081170-A1
Publication Date:03/17/2016

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	11/18/2015	John Joseph King	CEIC401D1	6303

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EXAMINER	
LE, DON P	

ART UNIT	PAPER NUMBER
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NOTIFICATION DATE	DELIVERY MODE
03/14/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JOHN.KING@JKINGLAWOFFICE.COM

Supplemental Notice of Allowability	Application No. 14/944,302	Applicant(s) KING, JOHN JOSEPH	
	Examiner DON LE	Art Unit 2844	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *IDS filed 2/27/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on______.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-20*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)
1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 2/27/2016
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/DON LE/
Primary Examiner, Art Unit 2844
3/7/2016

Index of Claims	**Application/Control No.** 14944302	**Applicant(s)/Patent Under Reexamination** KING, JOHN JOSEPH
	Examiner DON LE	**Art Unit** 2844

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

CLAIM		DATE								
Final	Original	02/08/2016	02/21/2016	03/07/2016						
	1	=	=	=						
	2	=	=	=						
	3	=	=	=						
	4	=	=	=						
	5	=	=	=						
	6	=	=	=						
	7	=	=	=						
	8	=	=	=						
	9	=	=	=						
	10	=	=	=						
	11	=	=	=						
	12	=	=	=						
	13	=	=	=						
	14	=	=	=						
	15	=	=	=						
	16	=	=	=						
	17	=	=	=						
	18	=	=	=						
	19	=	=	=						
	20	=	=	=						

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8531134		2013-09-10	Johnston	
	2	8513891		2013-08-20	Hsieh	
	3	8508148		2013-08-13	Carley et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code1	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number3	Country Code2 i	Kind Code4	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T5
	1							

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	GE Wall Box Time Switch Instructions, Model 15303, January 2013.	
	2	Defiant Timer Item 1001-524-883 Use and Care Guide Push Button Countdown Timer, July 5, 2011.	
	3	Woods Timer Model 50000 24-hour Indoor Mechanical Timer 2-C, August 15, 2013.	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/Don Le/	Date Considered	03/04/2016

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/john j. king/	Date (YYYY-MM-DD)	2016-02-27
Name/Print	John J. King	Registration Number	35,918

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

62081 7590 03/01/2016
THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	11/18/2015	John Joseph King	CEIC401D1	6303

TITLE OF INVENTION: PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/01/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
LE, DON P	2844	315-360000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
   (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
   (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
   1 ____
   2 ____
   3 ____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies ____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number ____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☒ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature ____ Date 2/12/16

Typed or printed name JOHN J. KING Registration No. 35,918

Electronic Patent Application Fee Transmittal

Application Number:	14944302
Filing Date:	18-Nov-2015
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Filer:	John Joseph King
Attorney Docket Number:	CEIC401D1

Filed as Small Entity

Filing Fees for **Utility under 35 USC 111(a)**

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	480	480

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**480**

Electronic Acknowledgement Receipt

EFS ID:	25077327
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	02-MAR-2016
Filing Date:	18-NOV-2015
Time Stamp:	14:15:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$480
RAM confirmation Number	546
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	CEIC401Dissuefeecute.pdf	55692 48e9e9c96a57dfa3d782b3496a7cd0b9e5e9b01f	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30430 8f9f177dc17f8b7fe8637204b2541a112ffd0bff	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	86122		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

62081 7590 03/01/2016

THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555

EXAMINER	
LE, DON P	
ART UNIT	**PAPER NUMBER**
2844	

DATE MAILED: 03/01/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	11/18/2015	John Joseph King	CEIC401D1	6303

TITLE OF INVENTION: PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/01/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

62081 7590 03/01/2016

THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	11/18/2015	John Joseph King	CEIC401D1	6303

TITLE OF INVENTION: PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	06/01/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
LE, DON P	2844	315-360000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

   (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

   (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

   1____________________
   2____________________
   3____________________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

   PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

   (A) NAME OF ASSIGNEE

   (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies __________

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number ________ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29

  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27

  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status.

  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature ____________________ Date ____________________

Typed or printed name ____________________ Registration No. ____________________

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/944,302	11/18/2015	John Joseph King	CEIC401D1	6303

62081 7590 03/01/2016
THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555

EXAMINER	
LE, DON P	
ART UNIT	**PAPER NUMBER**
2844	

DATE MAILED: 03/01/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/944,302	Applicant(s) KING, JOHN JOSEPH	
	Examiner DON LE	Art Unit 2844	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *document filed 11/18/2015*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on______.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-20*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. ______ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)
1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 2/10/2016
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Claim 6, line 1 change "6" to - - 1 - -.

Allowable Subject Matter

2. Claims 1-20 are allowed.

3. The following is an examiner's statement of reasons for allowance:

With respect to claim 1, the prior art does not teach a programmable light timer for implementing a timing pattern, the programmable light timer comprising: an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time .

With respect to claim 8, the prior art does not teach a programmable light timer for implementing a timing pattern, the programmable light timer comprising: an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and
a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

With respect to claim 15, the prior art does not teach a method of implementing a timing pattern on a programmable light timer, the method comprising: enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer; displaying the time on a display of the programmable light timer; enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DON LE whose telephone number is (571)272-1806. The examiner can normally be reached on 7AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexander Taningco can be reached on 571-272-8048. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DON LE/
Primary Examiner, Art Unit 2844
2/8/2016

Notice of References Cited	Application/Control No. 14/944,302	Applicant(s)/Patent Under Reexamination KING, JOHN JOSEPH	
	Examiner DON LE	Art Unit 2844	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2010/0025210 A1	02-2010	Simard; Pierre	G04C23/347	200/33R
*	B	US-7,579,717 B2	08-2009	Blair; Edward J.	H05B37/0281	307/141
*	C	US-8,084,700 B1	12-2011	Massaro; Michael James	H01H3/26	200/38R
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	E	US-				
	F	US-				
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	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

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	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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BIB DATA SHEET

CONFIRMATION NO. 6303

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/944,302	11/18/2015 RULE	315	2844	CEIC401D1

APPLICANTS
Cantigny Lighting Control, LLC, Wheaton, IL;

INVENTORS
John Joseph King, Wheaton, IL;

** **CONTINUING DATA** *************************
This application is a DIV of 14/066,724 10/30/2013 PAT 9226373 *
(*)Data provided by applicant is not consistent with PTO records.

** **FOREIGN APPLICATIONS** *************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** ** ** SMALL ENTITY **
12/08/2015

Foreign Priority claimed ❑ Yes ☑ No 35 USC 119(a-d) conditions met ❑ Yes ☑ No Verified and Acknowledged /DON P LE/ Examiner's Signature	❑ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		IL	18	20	3

ADDRESS

THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555
UNITED STATES

TITLE

PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

FILING FEE RECEIVED	FEES: Authority has been given in Paper No.____________ to charge/credit DEPOSIT ACCOUNT No.____________ for following:	
730		❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue) ❑ Other ________________ ❑ Credit

BIB (Rev. 05/07).

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14944302	KING, JOHN JOSEPH
	Examiner	**Art Unit**
	DON LE	2844

CPC- SEARCHED

Symbol	Date	Examiner
H05B 37/0281	2/5/2016	DL

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner
315	292, 360	2/5/2016	dl

SEARCH NOTES

Search Notes	Date	Examiner
east + interference	2/8/2016	dl

INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	see search notes	2/8/2016	dl

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

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Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060239123		2006-10-26	Chen	
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

	32	20140265836		2014-09-18	Nourbakhsh et al.	
	33	20140254829		2014-09-11	WANG et al.	
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	57	20140043544		2014-02-13	Kasuga Hirofumi	
	58	20060012312		2006-01-19	Lyle Jr. et al.	
	59	20110101868		2011-05-05	Weiss, William	
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	61					
	62					

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

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	Attorney Docket Number	CEIC 401D1

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	Intermatic ST01 Series Timer User Manual, published July 1, 2009.	
	2	GE 7 Day Digital Timer User Instructions, published July 30, 2010.	
	3	GE Smart Digital Timer, published July, 2010.	
	4	GE Digital Time Switch, published November 24, 2009.	
	5	SmartLink-INSTEON Smarthome, published August 27, 2008.	
	6	3COM IEEE 802.11 Wireless LANs, published January 2000.	
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	9	GE Wireless Lighting Control 45631 Keypad Controller User Manual, published April 2010.	
	10	Grasslin Talento Plus Product Catalogue, published April 1, 2008.	
	11	Aube Technologies T1033 Installation and Instruction Guide, Programmable Wall Switch, published November 30, 2006.	
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	16	Hydrofarm Digital Grounded 7 Day Timer User Manual, published September, 2009.	
	17	Honeywell RPLS 740A User Manual, published May 17, 2010.	
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	20	Leviton Indoor Plug-In Timer, PK93194-10-00-2A, published 2010.	
	21	Tork Digtial Time Switch Instruction Manual DMZ200 BP, published March 27, 2007.	
	22	Tork Digital Lighting Control Instruction Manual, DLC400BP, published June 1, 2007	
	23	Aube T1062 User Manual, published 7/04/08.	
	24	Sylvania SA 170 User Manual, published August 17, 2005.	
	25	Intermatic SS5 User Manual, published April 20, 2009.	
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	31	Leviton LT112-10W User Manual, published 2010.	
	32	Leviton In-Wall Timer VPT20 User Manual, published 2010.	
	33	NEXTGEN programming software, published 2004	
	34	Intermatic ET90000 Help Support, published 2013.	
	35	Belkin WeMo Support - Setting Up WeMo, published 2013.	
	36	Belkin WeMo Support - How to create or edit Rules for WeMo using a mobile device, published 2013.	
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	39	Sylvania Model SA135, published 2010	
	40	Setting up Zigbee Ethernet Gateway, published December 17, 2008	
	41	US Cellular LG Wine, published December 12, 2008	

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	44	Woods TM16R Series Timers, published September 6. 2007	
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	47	Woods Timer Model 50043, published 2007	
	48	Guide to Obelisk Top2 Software V3.6 published 2012	
	49	Defiant Timer Model 49820 User Manual, published 2013	

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EXAMINER SIGNATURE

Examiner Signature	/Don Le/	Date Considered	02/17/2016

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/john j. king/	Date (YYYY-MM-DD)	2016-02-10
Name/Print	John J. King	Registration Number	35918

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L./

Index of Claims	**Application/Control No.** 14944302	**Applicant(s)/Patent Under Reexamination** KING, JOHN JOSEPH
	Examiner DON LE	**Art Unit** 2844

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	02/08/2016	02/21/2016							
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4	("9226373").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/02/07 23:31
L2	1	1 and actuator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:32
L3	1	2 and (button same time)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:34
L4	0	2 and (on adj time) and (off adj time)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:37
L5	1	2 and time	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:37
L6	0	2 and ('on' adj time) and ('off' adj time)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:40
L7	0	(on adj time) and (off adj time) and 1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:40
L8	1	2 and 5	US-PGPUB;	OR	ON	2016/02/07

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			23:41
L9	0	(first adj button) and (second adj button) and 1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:44
L10	1	2 and button	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:44
L11	6099	(programmable adj timer)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:50
L12	475	11 and actuator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:50
L13	2	12 and (light adj timer)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:50
L14	94	actuator and (light adj timer)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/02/07 23:51
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		OR ("8344667").URPN.				
L16	11	15 and actuator	US-PGPUB; USPAT; USOCR	OR	ON	2016/02/07 23:54

EAST Search History (Interference)

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Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
14944302	KING, JOHN JOSEPH
Examiner	**Art Unit**
DON LE	2844

CPC					
Symbol				**Type**	**Version**
H05B		37	/ 0281	F	2013-01-01
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CPC Combination Sets							
Symbol				**Type**	**Set**	**Ranking**	**Version**
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NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/DON LE/ Primary Examiner.Art Unit 2844 (Primary Examiner)	02/21/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6

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	Examiner	**Art Unit**
	DON LE	2844

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
315	360	H	0	5	B	37 / 02 (2006.0)					

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
315	292				

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20
/DON LE/ Primary Examiner.Art Unit 2844 (Primary Examiner)	02/21/2016 (Date)	O.G. Print Claim(s): 1 O.G. Print Figure: 6

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	DON LE	2844

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/DON LE/ Primary Examiner.Art Unit 2844 (Primary Examiner)	02/21/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6

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	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

U.S.PATENTS

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	1	8531134		2013-09-10	Johnston	
	2	8513891		2013-08-20	Hsieh	
	3	8508148		2013-08-13	Carley et al.	

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	1							

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	1	GE Wall Box Time Switch Instructions, Model 15303, January 2013.	
	2	Defiant Timer Item 1001-524-883 Use and Care Guide Push Button Countdown Timer, July 5, 2011.	
	3	Woods Timer Model 50000 24-hour Indoor Mechanical Timer 2-C, August 15, 2013.	

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/john j. king/	Date (YYYY-MM-DD)	2016-02-27
Name/Print	John J. King	Registration Number	35,918

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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Electronic Acknowledgement Receipt

EFS ID:	25041417
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	27-FEB-2016
Filing Date:	18-NOV-2015
Time Stamp:	13:21:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	CEIC401D1IDS2.pdf	26419 940acb7659d2f53da67a93cc87ea71e07b375a9a	no	1

Warnings:

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2	Non Patent Literature	50GEModel15303Timer.pdf	370886 a10544c8a3ce69bd3733840b7198dd5ea59315e1	no	3
Warnings:					
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3	Non Patent Literature	52Woods50000InstrMan.pdf	1239598 a06644dd3fd33143aa9070e6c75599cf894fa0fa	no	1
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4	Non Patent Literature	51DefiantCountdowntimer.pdf	683331 c09217e17b07496b757d57273a83270906d11936	no	1
Warnings:					
Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	CEIC401D1IDS2form1449.pdf	1036820 278c989c3ada58bea2cfab27af6519bdf7f84efe	no	4
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		Total Files Size (in bytes):	3357054		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT OFFICE

Inventor:	John Joseph King		
Title:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER		
Serial No.:	14/944,302	Filing Date:	11/18/2015
Examiner:	Le, Don P.	Art Unit:	2844
Docket No.:	CEIC 401D1	Conf. No.:	6303

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Pursuant to 37 C.F.R. 1.56, Applicant brings to the attention of the Examiner the references listed in the attached Form PTO-1449. This Information Disclosure Statement is being filed under 37 CFR 1.97(b) prior to the receipt of a first Office Action.

Citation of the documents shall not be construed as an admission that the documents are necessarily prior art with respect to the instant invention. Citation of the above documents shall not be construed as a representation that a search has been made other than as described above. Also, the citation of the above document shall not be construed as an admission that the information cited herein is, or is considered to be, material to patentability as defined in §1.56(b).

Respectfully submitted,

/ John J. King /

Attorney for Applicant
Reg. No. 35,918

I hereby certify that this correspondence is being submitted to the US PTO by EFS-Web, on February 27, 2016.

/ John J. King /

John J. King

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	Attorney Docket Number	CEIC 401D1

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	10	5160853		1992-11-03	Simon et al.	
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	16	6965801		2005-11-12	Hall	
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number		14944302
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number	14944302
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	1	Intermatic ST01 Series Timer User Manual, published July 1, 2009.	
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	31	Leviton LT112-10W User Manual, published 2010.	
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	48	Guide to Obelisk Top2 Software V3.6 published 2012	
	49	Defiant Timer Model 49820 User Manual, published 2013	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	14944302
	Filing Date	2015-11-18
	First Named Inventor	John Joseph King
	Art Unit	2844
	Examiner Name	Le, Don P.
	Attorney Docket Number	CEIC 401D1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/john j. king/	Date (YYYY-MM-DD)	2016-02-10
Name/Print	John J. King	Registration Number	35918

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	24882025
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	10-FEB-2016
Filing Date:	18-NOV-2015
Time Stamp:	17:08:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	CEIC401D1IDS.pdf	26346 c24cd8d0fa2d596674642ef788ab333c135bb431	no	1

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	CEIC401D1FORM1449.pdf	628196 3ffdd96804390d176223ce69717fe918bf6320ca	no	18
Warnings:					
Information:					
A U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form. You may remove the form to add the required data in order to correct the Informational Message or if you chose not to, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
3	Non Patent Literature	1IntermaticST01Seriesfinal.pdf	526445 fb6c2e56d89fdde8ff2c70195945efb6ad2bd1ff	no	2
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Information:					
4	Non Patent Literature	2GE7DayDigitalTimer.pdf	357284 c66be324e4541e864486761b2cc07f51fd35dce0	no	1
Warnings:					
Information:					
5	Non Patent Literature	3GEDigitalTimerSwitch.pdf	248566 121c591f4f28d2d9cbc3bbb839a3d91a8c014018	no	3
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Information:					
6	Non Patent Literature	4GESmartDigitalTimer.pdf	364113 05f0c16d90435a3f49a8d5bbc3901657ba3a0609	no	1
Warnings:					
Information:					
7	Non Patent Literature	5InsteonCentralControllerSmartHomefinal.pdf	533936 5117db9d56ea4d9bdfcaf7a7d7dca9a0b9570c69	no	5
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9	Non Patent Literature	7Sclage-LiNK-RP200final.pdf	246403 2d145cb894f0ae2d3881d661f1600ec73497ae64	no	2
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Information:					

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Information:					
12	Non Patent Literature	10GrasslinTalentoPlusProductBrochurepdf.pdf	2068561 11be9ad1d2c46d8970b3380a8747e2aae07c7f76	no	6
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13	Non Patent Literature	11AubetimerT1033UserManual.pdf	333451 03567d683180dfde31a5bead053281a5cd737cb7	no	2
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Warnings:					
Information:					
15	Non Patent Literature	13TalentoDialogSwitchingProgramUserManual.pdf	1388608 188197f21efa7f75e621a0d46aa6a982a038f7d6	no	78
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Warnings:					
Information:					
17	Non Patent Literature	15DiehlControlsSeries884Timer.pdf	1409688 89aa570e3027e0b3add608a801a04eed2bfdba24	no	17
Warnings:					
Information:					
		Total Files Size (in bytes):	13457149		

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT OFFICE

Inventor:	John Joseph King		
Title:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER		
Serial No.:	14/944,302	Filing Date:	11/18/2015
Examiner:	Le, Don P.	Art Unit:	2844
Docket No.:	CEIC 401D1	Conf. No.:	6303

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Pursuant to 37 C.F.R. 1.56, Applicant brings to the attention of the Examiner the references listed in the attached Form PTO-1449. This Information Disclosure Statement is being filed under 37 CFR 1.97(b) prior to the receipt of a first Office Action.

Citation of the documents shall not be construed as an admission that the documents are necessarily prior art with respect to the instant invention. Citation of the above documents shall not be construed as a representation that a search has been made other than as described above. Also, the citation of the above document shall not be construed as an admission that the information cited herein is, or is considered to be, material to patentability as defined in §1.56(b).

Respectfully submitted,

/ John J. King /

Attorney for Applicant
Reg. No. 35,918

I hereby certify that this correspondence is being submitted to the US PTO by EFS-Web, on February 10, 2016.

/ John J. King /

John J. King

Electronic Acknowledgement Receipt

EFS ID:	24882274
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	10-FEB-2016
Filing Date:	18-NOV-2015
Time Stamp:	17:20:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	16HydrofarmDigitalGrounded7DayTimer.pdf	56428 1907980ed9cde2522dd1620ee71a07ecd2ab0b88	no	1

Warnings:

Information:

2	Non Patent Literature	17HoneywellProgrammableDigitalTimerRPLS740A.pdf	7200 dc2315098c6e05876043cfd4fd4a16b6e1a8fe7d	no	2
Warnings:					
Information:					
3	Non Patent Literature	18HeathZenithMotionSensorLightControlModelSL5408.pdf	543193 58214949c2846be696606aa7e383b20c95f46616	no	4
Warnings:					
Information:					
4	Non Patent Literature	19Honeywell540Ausermanual.pdf	1377663 479b62b7bd99805a88280874252ba66b87edaf10	no	8
Warnings:					
Information:					
5	Non Patent Literature	20LevitonIndoorPlug-InTimerLT111.pdf	163658 43b2842ebe76c2a9053381ab06ed1bc2e920003d	no	2
Warnings:					
Information:					
6	Non Patent Literature	21TorkDZM200BPusermanual.pdf	234424 e13e37a19901b9ee03528afb147ca810031d341e	no	10
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Information:					
7	Non Patent Literature	22TorkDLC400BPusermanual.pdf	483246 d06ee6f86c276f35c29669306f85c18ae07570a1	no	6
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8	Non Patent Literature	23AubeTI062Timerusermanual.pdf	5354 9fd408aff1585e3875957be2ab8e400170753b0b	no	2
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Information:					
9	Non Patent Literature	24Sylvania_sa-170UserManual.pdf	7061504 24e82e9b57e99ecf63fd4fa9d89e287acf25a612	no	4
Warnings:					
Information:					
10	Non Patent Literature	25IntrematicSS5Instuctions.pdf	267062 8bffa50be7a5a5a42aa170264c1c3359b8db6114	no	8
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11	Non Patent Literature	26IntermaticHA07MasterController.pdf	893585 82190d93472d73c2fe1216c7c6ff1fc3c263783a	no	48
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Information:					
12	Non Patent Literature	27IntermaticSS8InwallTimerUserManual.pdf	224062 c2ee6241a54a64b594fec85d27a39c29bfb6ddb6	no	4
Warnings:					
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13	Non Patent Literature	28Intermatic_in-wall_timer_EJ500C.pdf	232715 175285ac818ba03959b3ebc79b784bdf9f353381	no	4
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14	Non Patent Literature	29SwyliteLST100UserManual.pdf	343577 20b0cf65f65c01efe8522d2fea47a3a8c57dbb42	no	2
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15	Non Patent Literature	30WestekTE02DHBIndoor1outlettimerUserManual2010.pdf	745997 be785d8998cc5f9e049ee0992404fec8469b6bf2	no	1
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Information:					
16	Non Patent Literature	31LevitonLT112-10Wusermanual.pdf	339024 313ea234e812ce46b37704ee04024c01f01b989f	no	2
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Information:					
17	Non Patent Literature	32LevitonVPT20timermanual.pdf	397249 831f5a4164a9e1175456589e95eb35216dbd80ce	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	13375941	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	24882750
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	10-FEB-2016
Filing Date:	18-NOV-2015
Time Stamp:	17:44:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	33Nextgensoftware2.pdf	991275 560aa6378126cc67fe17028df55339ebef6c72a4	no	8

Warnings:

Information:

2	Non Patent Literature	34SylvaniaDigitalTimerModelSA135.pdf	472209 ce50be51fc0e76a164694babe6be4cd05fff4abf	no	4
Warnings:					
Information:					
3	Non Patent Literature	35GESunsmartDigitalTimer.pdf	392057 27c3dd91ff515aa19f402dc45dbc5b6a4453424f	no	2
Warnings:					
Information:					
4	Non Patent Literature	36LevitonWirelessInfraredOccupancySensor.pdf	294645 60d7a42e8839fc5db4428183260aecfdbfe0531d	no	2
Warnings:					
Information:					
5	Non Patent Literature	37BelkinWemoSupportCreatingRulesforWemo.pdf	880134 7dcee9cb2940009286cc062169eb88b004aec8fa	no	15
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Information:					
6	Non Patent Literature	38BelkinWemoSupportSettingupWeMo.pdf	1208928 d14192bdc28970584185383aa38e132c2e80fa94	no	14
Warnings:					
Information:					
7	Non Patent Literature	39IntermaticET9000UserManual.pdf	3518233 64c465a49e11b8bcb72e47b81b6872e151c85214	no	38
Warnings:					
Information:					
8	Non Patent Literature	40SolarEdgeapplicationzigbeegateway.pdf	1213676 b928e3b189aafdc93cbec543dbe061f5a0f49007	no	20
Warnings:					
Information:					
9	Non Patent Literature	41USCellularLGWineQuickSartGuide.pdf	1771979 392e1405e71eb6e2522f97d8e666eb74d6f2276d	no	6
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Information:					
10	Non Patent Literature	42THEBEN2008Products.pdf	2624537 091b5a492109192e27383e009392fdab08568110	no	20
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Information:					

11	Non Patent Literature	43ThebenSelecta.pdf	8625728 d61a7650b6a6e319c1ad0d08dcc5bc5190ee6a41	no	20
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Information:					
12	Non Patent Literature	44WoodsTM16RCSeriesTimer.pdf	543407 569d2683e77acb4910e5151bc01268fb7a1a392e	no	2
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Information:					
13	Non Patent Literature	45WoodsTD2500-2SeriesIndoorTimer.pdf	363171 61415329b3a543524d175cf3ff7d3c180d9fa660	no	2
Warnings:					
Information:					
14	Non Patent Literature	46WoodsTM29HRTimer.pdf	317102 f92262afd2828fec1d3fc5eea29ad0490431d885	no	1
Warnings:					
Information:					
15	Non Patent Literature	47WoodsTimerModel50043.pdf	262037 1e7464c372fdc9ddbc5cfe460fdbb68a1dcbe9de	no	2
Warnings:					
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16	Non Patent Literature	49DefiantTimerModel49820UserManual.pdf	320858 e4e869106ca9d24bed0918933f3b3654ab2d6e49	no	2
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Information:					
		Total Files Size (in bytes):	23799976		

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	24882873
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC401D1
Receipt Date:	10-FEB-2016
Filing Date:	18-NOV-2015
Time Stamp:	17:53:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	48Obelisk.pdf	4402981 b7564642d2fcf2334bb0fb9eed76dc41a01336c4	no	68

Warnings:

Information:

Total Files Size (in bytes):	4402981

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/944,302

APPLICATION AS FILED - PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/944,302	11/18/2015	2844	730	CEIC401D1	20	3

CONFIRMATION NO. 6303

FILING RECEIPT

OC000000079204753

62081
THE LAW OFFICE OF JOHN J. KING, P.C.
P.O. BOX 1555
WHEATON, IL 60187-1555

Date Mailed: 12/10/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

John Joseph King, Wheaton, IL;

Applicant(s)

Cantigny Lighting Control, LLC, Wheaton, IL;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a DIV of 14/066,724 10/30/2013 *
(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/08/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/944,302**

Projected Publication Date: 03/17/2016

Non-Publication Request: No

Early Publication Request: Yes
**** SMALL ENTITY ****
Title

PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

Preliminary Class

315

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CEIC401D1
	Application Number	
Title of Invention	A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	John	Joseph	King	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Wheaton	State/Province	IL	Country of Residence i	US

Mailing Address of Inventor:

Address 1	PO Box 1555		
Address 2			
City	Wheaton	State/Province	IL
Postal Code	60187	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	62081
Email Address	john.king@jkinglawoffice.com

Add Email Remove Email

Application Information:

Title of the Invention	A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER		
Attorney Docket Number	CEIC401D1	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	56	Suggested Figure for Publication (if any)	7

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CEIC401D1
	Application Number	
Title of Invention	A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER	

Publication Information:

☒ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	62081		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Division of	14066724	2015-10-30

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) i the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country i	Filing Date (YYYY-MM-DD)	Access Code i (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CEIC401D1
	Application Number	
Title of Invention	A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CEIC401D1
	Application Number	

Title of Invention	A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

- (●) Assignee
- ( ) Legal Representative under 35 U.S.C. 117
- ( ) Joint Inventor
- ( ) Person to whom the inventor is obligated to assign.
- ( ) Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. [X]

Organization Name	Cantigny Lighting Control, LLC

Mailing Address Information:

Address 1	2018 Dorset Drive		
Address 2			
City	Wheaton	**State/Province**	IL
Country i	US	Postal Code	60189
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee is an Organization check here. [ ]

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	CEIC401D1
	Application Number	

Title of Invention	A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGAMMABLE LIGHT TIMER

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/john j. king/			Date (YYYY-MM-DD)	2015-11-18
First Name	John	Last Name	King	Registration Number	35918

Additional Signature may be generated within this form by selecting the Add button. Add

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DECLARATION (37 CFR 1.63)
FOR UTILITY APPLICATION

Title : A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER

As the below named inventor(s), I declare that:

This declaration is directed to CEIC401D1 filed on November 18, 2015.

I believe that I am the original and first inventor of the subject matter which is claimed and for which a patent is sought;

The application was made or authorized to be made by me. I have reviewed and understand the contents of the above-identified application, including the claims.

Applicant claims priority to US Application Serial No. 14/066,724 filed on October 30, 2013 and entitled Programmable Timer and Method of Implementing a Programmable Light Timer (Docket No. CEIC 401).

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

All statements made herein of my own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application and any patent issuing thereon.

FULL NAME OF INVENTOR:

Name: John Joseph King

Citizenship: US

Residence: Wheaton, IL, USA

Mailing Address: P.O. Box 1555
Wheaton, IL 61087

Signature: / John J. King /
Date: November 18, 2015

A PROGRAMMABLE LIGHT TIMER AND A METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER

FIELD OF THE INVENTION

[0001] The present invention relates generally to lighting control products, and in particular, to a programmable light timer and a method of implementing a programmable light timer. Applicant claims priority on co-pending US Application Serial No. 14/066,724, filed on October 20, 2013.

BACKGROUND OF THE INVENTION

[0002] Conventional timers for lights, such as timers for indoor lamps or outdoor lights for example, either provide little functionality, or are difficult to program. Because of the limited size of the conventional timers, the size of the screen and the size of the interface for programming the timer are both relatively small. This is particularly true of an in-wall timer, which must fit in an electrical box, commonly called a junction box. Not only does a user of the in-wall timer have to read a very small display, but the user has to advance through a menu shown on the small display using a very limited interface which is provided on the remaining portion of the timer. Entering data on such a user interface is particularly difficult because the in-wall timer is fixed and generally positioned well below eye level.

[0003] Further, conventional timers are often unreliable. For example, conventional mechanical timers often malfunction over time, leaving the user without the use of the timer for some period of time and requiring the user to incur the expense of replacing the timer. Moreover, advanced digital timers having electronic displays may be difficult to operate, providing a barrier to certain groups of people who would otherwise use a timer, but don’t want to struggle through a complex interface on the small screen of the timer to properly set the timer. For example, not only is the display very small and difficult to read, but the user interface is difficult to navigate on such a small display. These groups of users are either left with no timing operation for their lights, or timers which do not provide the timing operation that they desire. Without an effective timer for a light for example, the light may be on significantly longer than necessary, not only wasting energy but in many cases increasing pollution as a result. As energy consumption world-wide continues to increase, it is important to reduce or minimize the consumption of energy in any way possible. The timer of the present invention provides significant benefits in reducing energy consumption.

SUMMARY OF THE INVENTION

[0004] A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.

[0005] Another programmable light timer for implementing a timing pattern comprises an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

[0006] A method of implementing a timing pattern on a programmable light timer is also described. The method comprises enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer; displaying the time on a display of the programmable light timer; enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Fig. 1 is a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention;

[0008] Fig. 2 is a perspective view of the front panel of the in-wall light timer of Fig. 1 with a cover open according to an embodiment of the present invention;

[0009] Fig. 3 is a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention;

[0010] Fig. 4 is a perspective view of the front panel of the in-wall light timer of Fig. 3 with a cover open according to an embodiment of the present invention;

[0011] Fig. 5 is a perspective view of the front panel of the in-wall light timer of Fig. 3 with a cover open according to another embodiment of the present invention;

[0012] Fig. 6 is a perspective view of the front panel of the in-wall light timer of Fig. 3 having preset buttons according to an embodiment of the present invention;

[0013] Fig. 7 is a perspective view of the front panel of the in-wall light timer of Fig. 3 having preset buttons according to another embodiment of the present invention;

[0014] Fig. 8 is a side view of the in-wall timer enable a connection of the timer to electrical wiring;

[0015] Fig. 9 is a side view of a timer having a front panel according to Figs. 1-7 and adapted to be implemented with a wall outlet according to an embodiment of the present invention;

[0016] Fig. 10 is a block diagram of a circuit enabling the operation of the embodiments of Figs. 1-9 according to an embodiment of the present invention;

[0017] Fig. 11 is a block diagram of the a circuit enabling the operation of the embodiments of Figs. 1-9 having a wireless communication circuit according to an embodiment of the present invention;

[0018] Fig. 12 is a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of Fig. 11 according to an embodiment of the present invention;

[0019] Fig. 13 is a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention;

[0020] Fig. 14 is a diagram showing data fields of data entered by a user according to an embodiment of the present invention;

[0021] Fig. 15 is a diagram showing data fields of data entered by a user according to an alternate embodiment of the present invention;

[0022] Fig. 16 is table showing timing pattern codes and associated timing characterization data and categories according to an embodiment of the present invention;

[0023] Fig. 17 is a table showing the designation of regions associated with a number of geographical locations according to an embodiment of the present invention;

[0024] Fig. 18 is a table showing average dusk and dawn times for various regions and periods according to an embodiment of the present invention;

[0025] Fig. 19 is a table showing daylight savings time codes and associated daylight savings time characterization data according to an embodiment of the present invention;

[0026] Fig. 20 is a flow diagram showing the operation of the 5-key user interface of Figs. 5 and 7 according to an embodiment of the present invention;

[0027] Figs. 21-43 shows a series of stages of programming a timer using the 5-key user interface of Figs. 5 and 7;

[0028] Fig. 44 is a memory showing fields and stored data associated with the programmed timer of Fig. 43;

[0029] Figs. 45-49 show screens of a user interface enabling the wireless programming of a timer according to an embodiment of the present invention;

[0030] Fig. 50 is a chart showing dusk and dawn times over a year;

[0031] Fig. 51 is a chart showing dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time;

[0032] Fig. 52 is a chart showing dusk and dawn times over a year and which is divided into four periods including four seasons;

[0033] Fig. 53 is a flow chart showing a method of generating timing characterization data according to an embodiment of the present invention;

[0034] Fig. 54 is a flow chart showing a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention;

[0035] Fig. 55 is a flow chart showing a method of selecting a stored timing pattern using the keypad of Figs. 2 and 4 according to an embodiment of the present invention; and

[0036] Fig. 56 is a flow chart showing a method of selecting a stored timing pattern using 5 key user interface of Figs. 5 and 7 according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0037] The various embodiments set forth below overcome significant problems with conventional timers of having to use a small display, and navigating a menu on such a small display. Some embodiments eliminate the requirement of having a display by providing pre-programmed timing patterns which can be easily selected by entering a timing pattern code associated with a desired timing pattern. Other embodiments include a display, but benefit from an improved user interface which enables the easy selection of a timing pattern by selecting a desired timing pattern code. In addition to selecting the timing pattern code, the user interfaces for embodiments with or without a display enabling the easy programming of other data which must be entered to operate the timer. By storing the timing patterns which are associated with common or desirable on/off patterns which are likely to be used to operate the timer, a user does not need to enter on/off times for a light for various times during a day or week, or reprogram the timer in response to changes in dusk and dawn times during a calendar year.

[0038] Turning first to Fig. 1, a perspective view of a front panel of an in-wall light timer according to an embodiment of the present invention is shown. The timer of Fig. 1 comprises a housing portion 102 having an optional cover 104 (coupled to the timer by way of a hinge 106) which covers a user interface when in the closed position and enables programming the timer by way of the user interface in the open position. A feedback indicator 108, such as a light and more particularly a light emitting diode (LED), could be implemented to show the status of the light or other appliance attached to the timer, for example. The feedback indicator could show green when a light attached to the timer is on, and could be or (or show red) when the light is off. An optional switch 109 which is movable between an on or off position, and a timer position for implementing the timer according to a selected timing pattern. While the cover is primarily cosmetic and may generally prevent unintentional changing of the timer, the timer cover is not necessary. Alternatively, the cover may be functional, such as functioning as an on/off override switch for the light or appliance attached to the timer in place of the switch 109. For example, the state of the light may be toggled (i.e. changed from a current state, such as on, to the other state, such as off) in response to pressing the cover which would activate a switch to change the state of the light if the switch 110 is not included. Flanges 111 and 112, each having a threaded portion for receiving a screw to attach the timer to a junction box. While the various embodiments are generally described in reference to a timer which is “hard wired” in a junction and may be used for a porch light for example, it should be understood that the user interfaces, circuits and methods set forth in more detail below could be implemented in a timer which is plugged into an outlet (commonly called an light or appliance timer), as will be described in more detail below in reference to Fig. 9. Further, while some examples are provided in terms of residential-type in-wall timers which are installed in a conventional residential junction box, it should be understood that the user interfaces, circuits and methods could be implemented in commercial timers.

[0039] Turning now to Fig. 2, a perspective view of the front panel of the in-wall light timer of Fig. 1 with a cover open according to an embodiment of the present invention is shown. As shown in Fig. 2, when the cover 104 is moved to an open position, a user interface comprising a keypad 204 is accessible on an inner surface 202. Also shown on an inner surface 206 of the cover, instructions can be printed to enable the user to easily program the timer. As will be described in more detail below, a user can program the timer in 5 simple steps (and change a timing pattern using a single step). The keypad 204 of Fig. 2 comprises 0-9 keys and star (*) and pound (#) keys.

[0040] According to one embodiment, the timer could be programmed using 5 steps for entering data on the keypad as shown on the inside of the cover. The keypad is used to enter numeric data which is necessary to operate the timer. A key pattern sequence is entered to clear the timer if necessary. For example, the star key could be pressed 3 times to clear the memory. Data necessary to operate the timer according to a user’s desired timing pattern is then entered. In particular, a current time is entered followed by the pound key. The pound key may be entered to indicate that all of the data for a given field. Alternatively, all of the data could be considered to be entered after a time-out period. The time is preferably entered as military time (e.g. 2:00 PM would be entered as 1400) to ensure that the correct AM or PM time is stored. Alternatively, a code at the end of the time could be entered to indicate AM or PM. A date is then entered, followed by the pound key. The date is preferably entered as a 6 digit code (e.g. in the DDMMYY format) to ensure that the date is properly interpreted. A location code (such as a zip code) could then be entered followed by the pound key. As will be described in more detail below, the location code can be associated with a region which is used to ensure that the correct daylight savings times and dawn and dusk times (or average values associated with dawn and dusk times) are used to operate the timer. The timing pattern is then entered followed by the pound key. The timing pattern will be used to operate the timer based upon the current time, date and location of the timer. Accordingly, after 5 simple steps, the timer is programmed to follow a timing pattern that meets the user's needs, and operates as it would if on/of times were entered on a user interface in a conventional manner to implement the timing pattern.

[0041] In addition to providing simple steps to program the timer, the user interface of Fig. 2 also enables easy reprogramming if desired by the user. Although the selection of a desired timing pattern will eliminate the need to reprogram the timer (such as at the start of spring or fall seasons as is generally required with conventional timers), the user interface enables easy reprogramming is a user decides that they simply want to change the timing pattern. That is, rather than having to clear all of the data and re-enter the current time, date and a zip code, a key sequence could be entered followed by the pound key to change the timing pattern. For example, a user could enter a sequence of three # keys followed by the new timing pattern, followed by the # key. While the use of pre-stored timing patterns which can easily be selected using a timing pattern code, it may be the case that the user may realize that they do not like the pattern that they selected, and decide that they simply want to change the timing pattern that they selected. Alternatively, a user may decide that they want to periodically reprogram the timer. That is, although the use of pre-stored patterns eliminates the need for reprogramming, reprogramming the timer to implement another pre-stored timer is so easy that it is an option for a user of timer implementing the pre-stored timing pattern.

[0042] Turning now to Fig. 3, a perspective view of a front panel of an in-wall light timer having a display according to another embodiment of the present invention is shown. According to the embodiment of Fig. 3, a display 302 could be implemented. While a display may not be necessary to implement the timer with pre-stored timing patterns, the display may be desirable to provide information regarding stored data, including a selected timing pattern for example. That is, even though a display is not necessary in view of the use of pre-stored timing patterns, a user may desire a display for aesthetic reasons, because they are simply used to having a display, or for what information it does provide. As shown in Fig. 3, the display includes a time field 304 which displays the current time during normal operation, an AM/PM field 306, an on/off field 308 indicating the state of a light or appliance which is attached to the timer. Finally, an information field 310 includes other information related to the operation of the timer. For example, the information field could include the current date and the timing pattern number. The timing field could include other information, such as DST code or whether a security code is used, as will be described in more detail below. Based upon the current time, date and security code information, a user could determine whether the timer is set with the correct data and should be operating correctly. As shown in Fig. 4 which shows the embodiment of Fig. 3 with the cover in the open position, the user interface could be implemented in with the user interface.

[0043] Turning now to Fig. 5, a perspective view of the front panel of the in-wall light timer of Fig. 3 with a cover open according to another embodiment of the present invention is shown. According to the embodiment of Fig. 5, a 5-key user interface could be implemented to enter data necessary for implementing a timer using a pre-stored timing pattern. As will be described in more detail below in reference to Fig. 20, the left and right keys on either side of a select key will allow a user to traverse through programming categories, while the up and down keys above and below the select key will enable a user to move through the available options in a given programming category. As will be further described below, the 5-key user interface will be enable a user to select a timing pattern code so that the timer can be implemented with a pre-stored timing pattern.

[0044] Turning now to Fig. 6, a perspective view of the front panel of the in-wall light timer of Fig. 3 having pre-set buttons according to an embodiment of the present invention is shown. As shown in Fig. 6, dedicated, pre-set actuators 602, shown here as buttons 604 which enable the manual selection of a pre-stored timing pattern. Four pre-set buttons are shown in the embodiment of Fig. 6, including a fixed button (applying a fixed on time and fixed off time when selected), an astronomic button enabling the operation of the timer based upon astronomic data, a DST button enabling the operation of the timer based upon a first timing pattern for a standard time period and a second timing pattern for a daylight savings time period, and a seasonal button for applying different timing patterns for each of the four seasons. Each of the buttons includes a selection indicator (such as an LED light for example) which would indicate when the button is selected. The button could be movable between a depressed, on position (where it is flush with the surface of the timer and the LED lit) and an off position. Alternatively, the selected button would have the LED lit, with all buttons having the same positioning. Only a single button can be selected at a time, where a selected button would be deactivated if another button is selected. The selection of timing patterns for the pre-set actuators 602 will be described in more detail below. While 4 buttons are shown, it should be understood that a greater number of buttons or fewer buttons could be implemented. Further, while examples of the functions of buttons are shown, it could be understood that other functions for the pre-set buttons could be implemented. For example, one button could be dedicated to each season. As will also be described in more detail below, a wireless option would enable the wireless programming of timing patterns for the pre-set buttons.

[0045] Turning now to Fig. 7, a perspective view of the front panel of the in-wall light timer of Fig. 5 according to another embodiment of the present invention is shown. In addition to having pre-set buttons as shown in Fig. 6, a connector 702 for receiving a portable memory device is provided for downloading data, such as new or different timing patterns or DST data, as will be described in more detail below. While the connector for receiving a portable memory is only shown in connection with Fig. 7, it should be understood that such a connector could be implemented in any of the embodiments of Figs. 1-6.

[0046] While user interfaces are provided in the embodiment of Figs. 6 and 7 for entering data in addition to the dedicated buttons for selecting a predetermined timing pattern, it should be understood that the embodiments of Figs. 6 and 7 could be implemented without the user interface for entering data or a display, where the only actuators which would be required for selecting a timing pattern would be the dedicated buttons of Figs. 6 and 7 for selecting pre-stored timing pattern or a timing pattern based upon data selected for the buttons and provided to the timer. That is, the timing patterns of the dedicated buttons could be assigned defined, pre-stored timing patterns, could be downloaded using a portable memory by way of the connector 702, or could be programmed by a user, as will be described in more detail below in reference to Figs. 46-49. That is, embodiments of the timer could be implemented with the pre-set buttons 602, and not having a keypad 204 or a 5-key interface 312.

[0047] Turning now to Fig. 8, a side view of the in-wall timer shows connectors enabling a connection of the timer to electrical wiring. The side view of the timer shows a connector panel 802 having coupling elements 804-808, shown here as screws, for receiving wires of a junction box. Alternatively wires could extend from the timer and be connected to wires of the junction box.

[0048] Turning now to Fig. 9, a side view of a timer having a front panel according to Figs. 1-7 and adapted to be implemented with a wall outlet according to an embodiment of the present invention is shown. Rather than a timer which is fixedly coupled to a junction box, the various circuits and methods can be implemented in a timer adapted to be used with a wall outlet and adapted to receive a plug of a light or some other appliance. As shown in Fig. 9, the timer 902 comprises a receptacle 904 for receiving the prongs of a plug of a light or an appliance. The timer 902 also comprises prongs 906 to be inserted to an outlet to enable applying power to the light or appliance. The user interface 202, shown opposite of the prongs 906, can be implemented according to any of the user interfaces set forth above.

[0049] Turning now to Fig. 10, a block diagram of a circuit enabling the operation of the embodiments of Figs. 1-9 according to a first embodiment of the present invention is shown. As shown in Fig. 10, a circuit for implementing a timer having pre-stored timing patterns comprises a control circuit 1002 adapted to access one or more of a plurality of pre-stored timing patterns. The control circuit 1002 may be a processor having a cache memory 1004 storing timing patterns and other data necessary to implement the timer. A memory 1006 may also be implemented to store timing patterns or other data necessary to implement the timer. The memory 1006 may be implemented as a non-volatile memory, enabling the memory to store the timing patterns and data without loss due to a power loss. A portable memory 1008, having contacts 1010, may be received by a connector 1012 (such as the connector 702 of Fig. 7 for example) and coupled to corresponding contacts. A transformer 1014 is coupled to receive an input voltage at an input 1016, and provide a regulator voltage signal 1018 to various elements of the timers. A second input 1020 is coupled to a ground terminal enabling a ground signal which is coupled various elements of the timer. A backup energy supply 1022, which could be a battery or a capacitor for example, could be implemented to ensure that data of a memory is not lost during a loss of power. The control circuit provides a control signal by way of signal line 1024 to a switch 1028 which receives a regulated voltage by way of a line 1026. The switch 1026 controls the application of the regulated voltage to a voltage terminal 1030 which enables power to be applied to an appliance 1032, such as a light as shown. The appliance has a first terminal 1032 for receiving the regulated voltage from the voltage terminal 1030 and a second terminal 1036 coupled to the ground potential. An input portion 1038, which may be implement any of the user interface elements described in reference to Figs. 1-7 is also shown.

[0050] Turning now to Fig. 11, a block diagram of the a circuit enabling the operation of the embodiments of Figs. 1-9 having a wireless communication circuit according to an embodiment of the present invention is shown. As shown in Fig. 11 comprises a wireless communication circuit 1102 which is adapted to enable the wireless programming of certain data or information by way of a corresponding wireless communication circuit implemented in a computer device, such as a laptop computer, a tablet computer or a “smart phone.” An example of a wireless communication circuit is shown by way of example in Fig. 12.

[0051] Turning now to Fig. 12, a block diagram of an exemplary wireless communication circuit enabling the operation of the circuit of Fig. 11 according to an embodiment of the present invention is shown. In particular, the antenna 1104 receives wireless communication signals according to a predetermined wireless communication protocol. The data may be sent to the wireless transceiver 1102 by way of a computer having or in communication with a corresponding wireless transceiver 1102. The received data is coupled to a combined mixer/voltage controlled oscillator 1206, the output of which is coupled to an intermediate frequency (IF) circuit 1208. Based upon outputs of the IF circuit and a phase locked loop (PLL) 1210, a mixer 1212 generates the received data. An analog-to-digital converter (ADC) 1214 then generates digital data representing the timing characterization data.

[0052] The control circuit may also provide data to the data transceiver for transmission to the computer. Data to be transmitted from the data transceiver 1102 is coupled to a digital-to-analog converter (DAC) 1216, the output of which is coupled to a modulator 1218 which is also coupled to a PLL1220. A power amplifier receives the output of the modulator to drive the antenna 1104 and transmit the data. It should be noted that the wireless communication network could be configured to implement any wireless protocol for communicating with the wireless communication circuit of the timer of Fig. 11. According to one embodiment, the data transceiver could implement the IEEE Specification 802.11 wireless communication standard, the Bluetooth standard, an infrared protocol, or any other wireless data protocol. While the circuit of Fig. 12 is provided by way of example, other wireless data transceivers could be employed according to the present invention to implement the desired wireless communication standard.

[0053] Turning now to Fig. 13, a segmented map showing geographic regions of operation for a timer according to an embodiment of the present invention is shown. The geographic regions enable applying certain data, such a timing pattern, which is suitable for a timer implemented in the geographic area. As shown in Fig. 13, the geographic area of the continental US is divided into 12 regions identified by a longitudinal designation (shown here as the time zones) or latitudinal designation (shown here as 3 regions designated as north, central and south). According to the embodiment of Fig. 13, the regions are designated by a two letter code including the first letter of the longitudinal code followed by the first letter of the latitudinal code, by way of example. While 12 regions are shown by way of example, it should be understood that a greater number or fewer number of regions could be designated. Further, while geographic regions, other designation of regions could be implemented, such as zip codes or telephone area codes.

[0054] Turning now to Figs. 14 and 15, diagrams data fields of data entered by a user according to embodiments of the present invention, including data as entered on a keypad as described in reference to Fig. 2. According to the embodiment of Fig. 14, a field 1402 stores the received “clear” code, shown here as three star keys, a time code 1404 (shown here as a 4 digit time entered in military format representing 2:30 PM), a date code 1406 (shown here as a 6 digit date in the DDMMYY format), a location code 1408 (shown here as a zip code), and a timing pattern code 1410 (which will be described in more detail below). While the location is shown as a zip code, other location codes representing larger or smaller geographical errors could be utilized. According to the embodiment of Fig. 15, an optional daylight savings code 1502 indicating daylight savings time information, such as dates associated with a period for applying a daylight savings time pattern or dates for shifting the current time by 1 hour, as will be described in more detail below. While specific codes are shown in Figs. 14 and 15, it should be understood that additional fields could be implemented.

[0055] Turning now to Fig. 16, a table shows timing pattern numbers and associated timing characterization data and categories according to an embodiment of the present invention. A significant benefit of the various embodiments of the timers and methods of implementing a timer is that on and off times for implementing a timer are easily selected without having to enter the on and off times. Rather, a timing pattern designated by a timing pattern code can be easily be selected by a user rather than having a user enter the on and off times for the timer. As will be described in more detail below, the timing patterns can be categorized according to a number of broad categories, such as fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, for example, to make it easier to select a desired timing pattern. The timing pattern codes can also be arranged such that similar timing patterns can have similar numbers, and can be arranged in a tree format such that numbers having the same most significant bit will have the same broad category. Timing patterns associated with timing pattern codes having the same second most significant bit may also have a common on or off time, for example.

[0056] Referring specifically to Fig. 16, timing patterns are shown for fixed timing patterns, DST timing patterns, seasonal timing patterns, and astronomic timing patterns, where the fixed timing patterns having timing pattern codes between 1 and 1xx, DST timing patterns having timing pattern codes between 2 and 2xx, seasonal timing patterns having timing pattern codes between 3 and 3xx, and astronomic timing patterns having timing pattern codes between 4 and 4xx. The fixed time year-round timing patterns as shown have an on time and an off time, where timing pattern codes associated with timing patterns having the same on time have the same first two digits. For example, timing patterns having an on time of 4:00 PM will have a timing pattern code starting with 11X, while timing patterns having an on time of 5:00 PM will have a timing pattern code starting with 12X. The first timing pattern code of any of the any of the groups (i.e. the timing pattern code could be the default timing pattern code for dedicated timing pattern selection buttons as will be described in more detail below.

[0057] The second and third timing pattern categories have different timing patterns for different times of the year. In particular, the DST category has two timing patterns, one for standard time and one for daylight savings times, where the different timing pattern codes represent various combinations of on and off times for both of the standard time and daylight savings time. Similarly, the seasonal category has different on and off times for each of the four seasons.

[0058] Finally, the astronomic category of timing patterns including timing patterns based upon known dusk and dawn times. While dusk and dawn times are helpful in setting on and off times for a timer because they are close to the times when it becomes dark and light, the use of the known dusk and dawn times often leads to the timer being on at times when a user may not want the timer on. For example, during winter, lights may come on before 4:00 PM, which may be much earlier than desired. Similarly, lights may be on later than desired at dawn. During summer, lights may be on later than desired, which may be after 7:30. Therefore a user may want to use an offset. As will be described in more detail below, a certain time period delay for tuning on the timer may be desired with on times and a certain time period for turning lights off early may be desired with off times. Further, a user may desire the use of astronomic dusk times (with or without an offset) and the use of a fixed timer for turning the lights off at some time after midnight, for example. It should be understood that astronomic dusk and dawn times could be used with timing patterns in the DST and seasonal categories, or could be limited to the astronomic categories for simplicity. It should alos be noted that while even hour times are shown, on and off times based upon half hours or quarter hours could be provided.

[0059] In order to implement astronomic times, it is necessary to consider both locations and the time of year. While it may be possible to store astronomic data any level of granularity of location and time, average astronomic dusk and dawn data could be stored based upon a particular region and a particular time period as will be described in reference to Fig.18. In order to store average astronomic dusk and dawn data, it is necessary to identify a location where the timer will be used, and assign that location to a reasonable number of regions for which astronomic timing data is stored. By way of example in Fig. 17, the 12 regions designated in Fig. 13 could be associated with zipcodes. Accordingly, when a user enters a zip code, data associated with the region having the zip code would be used when implementing a selected timing pattern for the timer. By way of example, the data could be based upon a central location of the region, or an average of the different dusk and dawn times of the region. Alternatively, the average dusk and dawn times could be skewed toward more populated areas of the regions. Not only would average dusk and dawn times for the location be used based upon the zip code, but the correct time in the various time zones based upon the Greenwich Mean Time (GMT) would also be used. Alternatively, three digit telephone area codes could be used.

[0060] As shown in Fig. 18, these average dusk and dawn times are not only based upon location, but also based upon time of year. While daily dusk and dawn times could be used, it would be more efficient to use average dusk and dawn times for given time periods, and particularly time periods associated with time periods for implementing timing patterns, as described in reference to Figs. 51 and 52. Accordingly, for each region, an average dusk time and average dawn time for different timer periods during which a particular on time or off time would be applied, shown by way of example in Fig. 8 to include a full year, portions of a year or individual days.

[0061] Additional data which could be used in implementing a timer is DST data and corresponding DST codes. In addition to dates at which times are moved back during the fall or moved back during the spring in areas having daylight savings times (where these dates have changed over time and may change in the future), dates for applying a timing pattern for a period having shorter daylight, called a daylight savings time period. While the daylight savings time period could correspond to the times for moving the timer forward and back, a user may like to select a period for applying a daylight savings time timing pattern during a period which is different than the period between moving the clock back and returning the clock to the standard time. Accordingly, a table could be stored which has different daylight savings time data including a DST time period for applying different timing patterns and dates for changing the clock. Each of a plurality of combinations is stored with a corresponding DST code in the table. When the DST code is entered during programming of the timer, on and off times associated with a selected timing pattern will be applied subject to dates and times associated with daylight savings time data associated with the DST code.

[0062] It should be noted each of the tables 16-19 are stored in a memory of the timer, such as memory 1006 or a cache memory of the timer of Fig. 10. The data is preferably stored at the time of manufacture (or at some point before the timer is packaged) and provided to the end user with the timing patterns selectable by a timing pattern code already stored in the memory. Further, data in the tables could be updated using a portable memory device, such as a USB drive, by way of the connector 702.

[0063] Turning now to Fig. 20, a flow diagram shows the operation of the 5-key user interface of Figs. 5 and 7 according to an embodiment of the present invention. While the keypad of Fig. 2 provides an easy way of entering data necessary to implement a timer having pre-stored timing patterns, other user interfaces could be used which take advantage of the pre-stored timing patterns associated with corresponding timing pattern codes. For example, “navigation” keys which enable a user move through a menu can be implemented to enable a user to select a timing pattern code or any other data necessary for implementing a timer as set forth above. Unlike conventional timer user interfaces, the 5 key navigation user interface of Fig. 20 is not only intuitive, but overcomes many of the problems associated with conventional user interfaces by not only showing a current programming category and a current data value for the current programming category, but also previous and following programming categories and previous and following data values which could be selected for the current programming category. That is, as will be described in more detail in reference to Figs. 21-43, the arrangement of programming categories and corresponding data values will enable easy navigation through the user interface by indicating where a user is within the menu.

[0064] Referring specifically to Fig. 20, the programming categories 2002 and corresponding data values 2003 could be selected by the 5 key user interface which includes a select key 2004 which could be used to select data associated with a given programming category. In summary, the select key 2004 will enable a user to enter the menu for programming (such as by depressing the key for a predetermined period (e.g. 2 seconds), the left key 2006 will allow moving left along the programming categories, and the right key 2008 will enable moving right along the programming categories. An up key 2010 will enable a user to move up within a column for a current programming category, while a down key

2012 will enable moving down within the current programming category. By way of example, when the display is in an operational mode and shows operational values (such as the operational values shown in Figs. 3-5), the first programming mode (i.e. the hour programming mode 2104) will be shown on the display when the select key 2004 is selected. If the user desires to enter a certain time, the up and down keys can be used to move to a desired data value representing the desired hour, and have that data value selected by using the select key. When a data value is selected for a given programming category, the user interface preferrably then automatically moves to the following programming category. A key pad sequence (such as the selection of the select key three times or merely holding the select key for a predetermined period of time (e.g. 2 seconds)) can then be entered at any time to leave the programming mode of the timer.

[0065] The programming categories include the following: the hour mode 2014 (having 24 data values from 12 AM to 11 PM), the minute mode 2016 (having 60 data values from 0 to 59 minutes), the month mode 2018 (having 12 data values from JAN to DEC), the day mode 2020 (having 31 data values from 1 to 31), the year mode 2022 (having 10 data values for each of the tens digit of the year from 0x to 9x), the year mode 2024 (having 10 data values from 0 to 9 for the one's digit), the region mode 2026 (having 12 data values for each of the regions shown in Fig. 13), the timing pattern mode 2028 (having a predetermined number of timing pattern codes associated with a corresponding number of pre-stored timing patterns), the DST mode 2030 (having the number of data values associated with different DST data values, such as the data associated with the DST codes of Fig. 19), the security mode 2032 (having the number of available security codes, such as 100 codes for a two bit security code or 1000 codes for a 3 bit security code), and optionally an "exit" programming option which will be described in more detail in reference to the programming example of Figs. 21-43. While a user can depress and hold the select key for a predetermined period of timer for example to leave the programming mode, the exit option can also be provided to enable a user to leave the programming mode. In either case, a new data that has been selected will be stored and used by the processor of the timer to implement a timing pattern.

[0066] Figs. 21-43 showsa series of stages of programming a timer using the 5-key user interface of Figs. 5 and 7. While displays may be desirable for some users (because they want to see what data is being entered to program the timer), conventional timers having displays are not only difficult to navigate through a menu for programming the timer (and understand where the user is in the menu), but also are difficult to see the data which is entered in a certain field of a conventional timer because the display is so small. The displays of Figs. 21-43 show the steps of programming a timer to enable operation of the timer according to a pre-stored timing pattern from the initial, un-programmed state of the timer of Fig. 21 to the final programmed state of the timer of Fig. 43. As shown in Fig. 21, various fields which provide information in the normal operating state are shown. The programming mode can be entered when the select key of the 5-key user interface is selected (or some other key sequence such as the select key being selected 3 times, or the select key being depressed for a predetermined period, such as two seconds).

[0067] One unique feature of the user interface described in Figs. 21-43 is that a current selection option (either programming categories or data values) is not only shown, but a “previous” and “next” programming category and data value is also shown. In order to further make the timer easier to program and overcome a significant problem of conventional timers with displays which are difficult to read, the current programming category and data value is larger than the “previous” and “next” programming category and data value. Making the current programming category and data value larger makes it easier to read the programming category and data value while still making it easy to navigate the menu by providing previous and next values.

[0068] After a key or key sequence is entered on 5-key user interface to enter the programming mode, an initial programming state is entered as shown in Fig. 22. While the initial states for data values in Figs. 23-42 are shown as the top values of the available data values for a programming mode, the initial states could be some other value, such as a value near the middle of the available data values, or a commonly selected data value. The sequence of Figs. 21-42 are intended to show the programming of a timer having the following data: a current timer of 10:24 PM and a current data of October 9, 2013, where the timer is operated in the North Central (NC) region having a timing pattern 13, a DST code 903 and an optional security code 013. As will be described in more detail below, a security code could be used if a user could reprogram the timer using a wireless connection to prevent a hacker from changing the operation of the timer (from outside of a building for example).

[0069] As shown in Fig. 22, the initial programming state includes the Hour programming mode, and a initial data value of 1 AM. A user could then use the up and down keys to select the desired time. As shown in Fig. 23, the user had moved down one data value to 2 AM, and then down to the desired data value of 10 PM as shown in Fig. 24. When the user reaches the desired data value, the user can select the value using the select key, in which case the display would then display the next programming category, which happens to be the minute programming category. Alternatively, rather than automatically changing, a user could be required to move to the next programming category by selecting the right arrow key. As shown in Fig. 25, the initial state of the minute programming mode has a "1" in the data value display portion. The up and down keys can then be used to move to the desired "24" minute data value as shown in Fig. 26, where the month programming category would then be displayed as shown in Fig. 27 in response to the selection of the data in the minute programming mode. After the desired month of October is reached in Fig.29, the programming mode is move to the day programming mode as shown in Fig. 29, where the desired

24th day is selected as shown in Fig. 30. As shown in each of the displays, a previous programming category is shown above a current programming category, and a next programming category is shown below the current programming category. Similarly, a previous data value of the current programming category is shown above the current data value, and a next data value is shown below the current data value. For example, in selecting the month as shown in Fig. 27, the previous programming category "minute" in the programming category side of the display is above the current programming category "month," while the next programming category "day" is shown below the current programming category. Similarly, in the data value side of the display, the month of December is above the current data value of January, while the month of February is below the current value. Providing categories and values above and below current categories, a user can more easily navigate through the menu. Also, by providing the current category/value in a larger size, it is easy to read the category/value.

[0070] Selecting a desired year can present more of a problem because of the number of available years (e.g. 100 data values from 2000-2099). While a single year selection mode can be implemented in the same way as selecting 1 of 31 days of a month as described above, the year programming mode can be divided into two operations, enabling the selection of a decade in one step and enabling the selection of a year in another step. As shown in Fig. 31, it should be noted that the initial state is shown with a year "200?", where the "zeros" decade is provided. The user can then move down one data value to the "tens" decade as shown in Fig. 32, which, when selected, will lead to the menu option as shown in Fig. 33 enabling the selection of the year for the tens decade. Therefore, the up and down keys are used to select 2013 as shown in Fig. 34.

[0071] Other data for implementing the timer can then be entered. In particular, the region in which the timer is implemented can be selected by going from an initial region option NE as shown in Fig. 35 to desired timing region option of NC as shown in Fig. 36. The desired timing pattern can then be selected, where an initial timing program 1 shown in Fig. 37 can be changed to the desired timing program 13, as shown in Fig. 38. The desired daylight savings time code can then be selected, where an initial daylight savings time code 900 shown in Fig. 39 can be changed to the desired daylight savings time code 903, as shown in Fig. 40. Finally, a desired security code can then be selected, where an initial security code of 000 shown in Fig. 41 can be changed to the desired security code of 013, as shown in Fig. 42. After all of the data is entered, and the exit option is selected, the display of the timer returns to the operating mode, where the display shows some or all of the data (other than a value of a security code which could also be shown) entered during programming. Further, a "key" or "lock" icon could be shown on the display to indicate that a security code has been programmed.

[0072] While it is assumed that no data was programmed initially, it should be noted that, if the timer is already programmed and just some data needs to be reprogrammed, the left and right keys can be used to move within the menu to reach a desired programming category to change the data for that category, at which time the select key can be used to select the data, leave the programming mode, and return to the display for the normal operational mode. By way of example, if a timer is already programmed and a user desires to change the timing pattern (by changing the selected timing pattern code), a user would enter the programming mode and use the left and right keys to move along the programming modes until the timing pattern programming mode is reached. The up and down the available data values until the desired timing pattern code is reached. The data value be selected by using select key, at which time the programming category would move to the next programming category. If no other data values need to be changed, a user could move along the programming categories to the "exit" option to return to normal operation or hold the select key for a predetermined period of time. Accordingly, if a timer is already programmed and a user desires to change the timing pattern for example, the user can easily change the timing pattern without having to reprogram anything else.

[0073] Turning now to Fig. 44, a memory shows fields and corresponding stored data associated with the programmed timer of Fig. 43. All of the data entered using the numeric keypad or 5-key user interface is stored in memory fields of a memory of the timer, such as memory 1006 for example, and is accessed by the timer to implement a selected timing pattern in operating the timer as described above.

[0074] Turning now to Figs. 45-49, screens of a user interface enabling the wireless programming of a timer are shown according to an embodiment of the present invention. That is, based upon a current time and date, the timer will implement the timing pattern (associated with the selected timing pattern code) by using data of Figs. 16-19. As shown in Fig. 45, a display 4502 of a wireless device, such as a laptop computer, a tablet computer or a cellular telephone having a touch screen or some other data entry element, shows a data entry screen enabling a user to enter the necessary data, including a timing pattern code associated with a desired timing pattern, for implementing the timer. The display also includes a data entry element 4504, shown here as a touch screen entry portion having an alphabetical entry portion 4506 (such as a “QWERTY” keypad) and a numeric entry portion (having touch screen keys from 0 to 9). Various fields are provided to enter the data stored in the memory of Fig. 44. For example, a field 4509 enables a user to enter a security code. The security code may be concealed as shown to avoid someone seeing the code. A time field 4510 enables someone to enter the time, shown here as a 4 digit military time. However, because a full QWERTY keypad is provided, the time could be entered as 10:24 PM for example. The date is entered in a date field 4512. Although shown in a 6 digit DDMMYY format, it could be spelled out using letters and numbers. The desired region, timing pattern and DST code could be entered in fields 4514, 4516, and 4518, respectively. The user could then exit or opt to enter an advanced options mode.

[0075] According to one embodiment, the advanced options mode enables a user to select timing patterns to be implemented with the dedicated buttons for selecting timing patterns as shown in Figs. 6 or 7, or enables entering on and off times to be applied when the timing pattern associated with the dedicated buttons are selected. That is, a screen could have a field for each dedicated button, where a user could enter the timing pattern code in the field which corresponds to the timing pattern which is desired for the field. As shown for example in Fig. 46 which relates to a timing program for a fixed button setting, on and off times which would be applied throughout the year could be entered in data fields, where on and off times for weekdays could be entered in fields 4602 and 4604 respectively, and on and off times for weekends could be entered in fields 4606 and 4608 respectively. “Back” and “Next” selection options enable the user to move through the advanced programming options to finish the programming or exit as desired.

[0076] As shown in Fig. 47, on and off times associated with an astronomic mode of operation applied in response to the selection of the “Astro” button can be entered in fields 4702 and 4704, where the entries enable the selection of an offset. As will be described in more detail below in reference to Fig. 50, users may prefer to apply astronomic times with a delay in turning the lights on at dusk, and turning the lights off early at dawn. According to another embodiment, the astronomic timing program associated with a button could include an option of setting the off time to a fixed time. That is, while users may want the on time of the timer to follow the dusk time, they may want the lights to go off at a fixed times (such as 1:00 AM or 6:00 AM for example) rather than be tied to the dawn time.

[0077] A screen for programming on and off times for a DST button is shown in Fig. 48. According to the embodiment of Fig. 48, on and off times to be applied during a standard time period can be entered in fields 4802 and 4804, while on and off times to be applied during a daylight savings times period can be entered in fields 4806 and 4808. A similar arrangement is shown in Fig. 49, where settings for 4 "seasonal" timing patterns can be applied rather than settings for two timing patterns as described in reference to Fig. 48. In particular, on and off times to be applied during a spring time period can be entered in fields 4902 and 4904, on and off times to be applied during a summer time period can be entered in fields 4906 and 4908, on and off times to be applied during a fall time period can be entered in fields 4910 and 4912, and on and off times to be applied during a standard time period can be entered in fields 4914 and 4916.

[0078] While specific fields are provided for entering data for applying on and off times during the operation of a timer when a dedicated button is selected, it should be understood that other fields could be implemented with the given programming categories as shown, or other programming categories could be implemented. It should be noted that if no data is entered, default timing patterns would be implemented when a dedicated button is selected, where the default timing patterns could be based upon the 1-4 timing pattern codes associated with the four categories of timing patterns shown in Fig. 16.

[0079] Charts provided in Figs. 50-52 show dusk and dawn times throughout the year, average dusk and dawn times for periods, and the benefits of implementing certain on and off times during certain periods. Turning first to Fig. 50, a chart shows dusk and dawn times over a year, and an average time shown by the dashed line. As should be apparent from Fig. 50, considerable energy can be saved by setting on and off times at times other than the average dusk and dawn times. While the charts of Figs. 51 and 52 provide timing patterns having better granularity and therefore provide a more desirable timing pattern, the chart of Fig. 50 provides perspective as to how much energy can be saved by implementing times other than astronomic dusk and dawn times. As is apparent from Fig. 50, each light controlled by a timer will be off for at least 2 hours longer each day compared to astronomic times by setting the on time for a light at 1 hour after dusk and setting the off time 1 hour before the average dawn.

[0080] Turning now to Fig. 51, a chart shows dusk and dawn times over a year and which is divided into two periods including standard time and daylight savings time. As can be seen in Fig. 51, the average dusk and dawn times are very different for the two time periods, and the timer on and off settings with a one hour offset is very different. By establishing the two time periods to apply two different time settings, it can be seen that different on and off times are much closer to the dusk and dawn times, and therefore provide an overall more desirable timing pattern for the year, while still providing savings by having the timer on less. Additional energy reduction can be achieved by moving the off time of the DST period to a fixed time, such as 5:00 AM and still provide a desirable overall timing pattern. As is apparent from Fig. 51, the time period for applying a “daylight savings time” timing pattern is different than the period between the “fall back” date for turning back the clock in the fall, and the “spring forward” date for returning the clock to normal time during the spring.

[0081] The embodiment of Fig. 52 shows 4 timing patterns associated with the 4 seasons. As can be seen, the average times for dusk and dawn during those periods are different, and selected times relate more closely to the average times, and therefore provide a better overall timing pattern. While DST and seasonal periods are shown, it should be understood that other periods could be defined, such as monthly periods. However, a greater number of periods may require additional memory for storing data and may make it more difficult to select a desirable timing pattern by a user. Accordingly, the number of periods selected (which may provide a better timing pattern) may be a tradeoff with additional memory requirements and reduced user-friendliness. One of the benefits of the various embodiments is that they are user friendly. Therefore, the number timing pattern options available to a user must be selected to ensure that the timer is still user friendly to operate while providing enough options to provide desirable timing patterns for a variety of different users.

[0082] Turning now to Fig. 53, a flow chart shows a method of generating timing characterization data according to an embodiment of the present invention. A plurality of timing patterns are established at a step 5302. A unique timing pattern code is assigned for each timing pattern of the plurality of timing patterns at a step 5304. The timing patterns and corresponding timing pattern codes are stored in a memory of the timer at a step 5306. Geographic regions where the timers will be used are also defined at a step 5308. Time periods for which average dusk and dawn times may be used defined at a step 5310. Average dusk and dawn timers associated with the time periods and geographic regions are stored in a memory of the timer at a step 5312. DST data related to "spring forward" and "fall back" dates and desired dates for applying a DST timing pattern (if different than "spring forward" and "fall back") are stored, by region, in a memory of the timer at a step 5314. It is then determined whether an input is received at a user interface of the timer at a step 5316. Data associated with an operational field are stored in a memory of the timer at a step 5318. It is then determined whether a time out been reached or a stored indication received at a step 5320. The timer is operated based upon the data stored in the operational field at a step 5322.

[0083] Turning now to Fig. 54, a flow chart shows a method of implementing a timer with a plurality of timing patterns according to an embodiment of the present invention. The timing pattern is cleared if necessary or desired by selecting a first predetermined keypad sequence at a step 5402. The current time is entered followed by a key or keypad sequence to enter the data at a step 5404. The current date is entered followed by the key or keypad sequence to enter the data at a step 5406. A geographic region for the timer is entered followed by the key or keypad sequence to enter the data at a step 5408. A timing pattern code is entered followed by the key or keypad sequence to enter the data at a step 5410. A DST code is optionally entered followed by a key or keypad sequence to enter the data at a step 5412. It is then determined whether the last data is entered or a time-out period expired at a step 5414. All of the data entered is stored at a step 5416. It is then determined whether the user desires to change the timing pattern code at a step 5418. A second predetermined keypad sequence is entered to change the timing pattern code only at a step 5420.

[0084] Turning now to Fig. 55, a flow chart shows a method of selecting a stored timing pattern using the keypad of Figs. 2 and 4 according to an embodiment of the present invention. A select key is pressed to enter the programming mode at a step 5502. It is then determined whether a left or right key is selected to move to a different programming category at a step 5504. The display will show another programming category as it moves horizontally along a plurality of programming categories at a step 5506. It is then determined whether an up or down key is selected to enable selecting an option associated with the current programming category at a step 5508. The display will show another option of a programming category as it moves vertically along options of a current programming category at a step 5510. It is then determined whether the programming mode ended at a step 5512.

[0085] Turning now to Fig. 56, a flow chart shows a method of selecting a stored timing pattern using 5 key user interface of Figs. 5 and 7 according to an embodiment of the present invention. A security code on the timer is optionally set to enable programming the timer using a wireless link at a step 5602. It is then determined whether a wireless device for programming the timer within range of timer at a step 5604. It is then determined whether the correct security code entered on the wireless device at a step 5606. Data entered in fields on the wireless device are downloaded at a step 5608. The data in the timer is stored at a step 5610. The timer is operated based upon the stored data at a step 5610.

[0086] It can therefore be appreciated that the new and novel timer and method of implementing a timer has been described. It will be appreciated by those skilled in the art that numerous alternatives and equivalents will be seen to exist which incorporate the disclosed invention. As a result, the invention is not to be limited by the foregoing embodiments, but only by the following claims.

I Claim:

CLAIMS

1. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer;

a control circuit coupled to the actuator;

a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;

a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and

a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time.

2. The programmable light timer of claim 1 wherein the first button is further programmable to have an off time, and the second button is further programmable to have an on time.

3. The programmable light timer of claim 1 wherein the on time for the first button is a pre-stored on time, and the off time for the second button is a pre-stored off time.

4. The programmable light timer of claim 3 further comprising a third button that is programmable, by way of the actuator, with a user programmable on time.

5. The programmable light timer of claim 1 wherein the on time for the first button is programmable using the actuator, and the off time for the first button is programmable using the actuator.

6. The programmable light timer of claim 6 further comprising a third button having a pre-stored timing pattern.

7. The programmable light timer of claim 1 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.

8. A programmable light timer for implementing a timing pattern, the programmable light timer comprising:

an actuator on a user interface of the programmable light timer, the actuator enabling a selection of a time for the programmable light timer;

a control circuit coupled to the actuator;

a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display;

a first button on the user interface of the programmable light timer, the first button enabling the selection of a first pre-stored timing pattern; and

a second button on the user interface of the programmable light timer, the second button enabling the selection of a second pre-stored timing pattern.

9. The programmable light timer of claim 8 further comprising a third button that is user programmable.

10. The programmable light timer of claim 9 wherein the third button is programmable with a user programmable on time.

11. The programmable light timer of claim 10 further comprising a fourth button that is user programmable.

12. The programmable light timer of claim 11 wherein the fourth button is programmable with a user programmable an off time.

13. The programmable light timer of claim 8 wherein the actuator enables an up or down operation for selecting a time used by the programmable light timer.

14. The programmable light timer of claim 8 further comprising a switch enabling overriding the timing pattern implemented by the programmable light timer.

15. A method of implementing a timing pattern on a programmable light timer, the method comprising:

enabling, on a user interface of the programmable light timer, a selection of a time for the programmable light timer;

displaying the time on a display of the programmable light timer;

enabling a first button, provided on the user interface of the programmable light timer, to be programmed to have an on time; and

enabling a second button, provided on the user interface of the programmable light timer, to be programmed to have an off time.

16. The method of claim 15 further comprising enabling the first button to be programmed to have an off time, and the second button to be programmed to have an on time.

17. The method of claim 15 wherein the on time for the first button is a pre-stored on time, and the off time for the second button is a pre-stored off time.

18. The method of claim 17 further comprising enabling a third button, provided on the user interface of the programmable light timer, to be programmed by way of an actuator on the user interface.

19. The method of claim 15 wherein the on time for the first button is user programmable, and wherein the off time for the first button is user programmable.

20. The method of claim 15 further comprising providing a switch enabling overriding the timing pattern implemented by the programmable light timer.

ABSTRACT

A programmable light timer for implementing a timing pattern is described. The programmable light timer comprises an actuator on a user interface of the programmable light timer enabling a selection of a time for the programmable light timer; a control circuit coupled to the actuator; a display coupled to the control circuit, wherein a time selected by the actuator is provided on the display; a first button on the user interface of the programmable light timer, wherein the first button is programmable to have an on time; and a second button on the user interface of the programmable light timer, wherein the second button is programmable to have an off time. A method of implementing a timing pattern on a programmable light timer is also described.

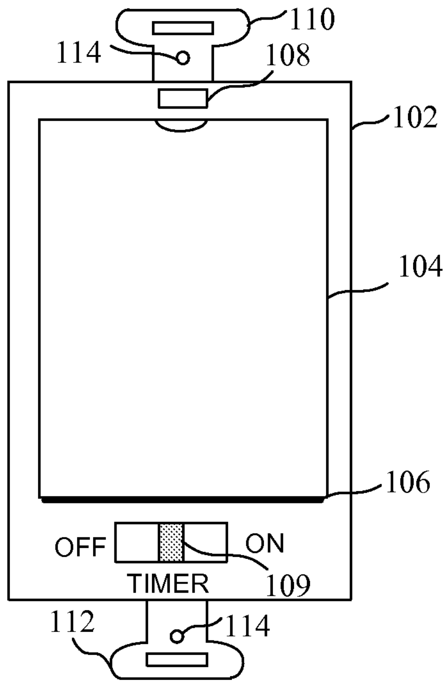


FIG. 1

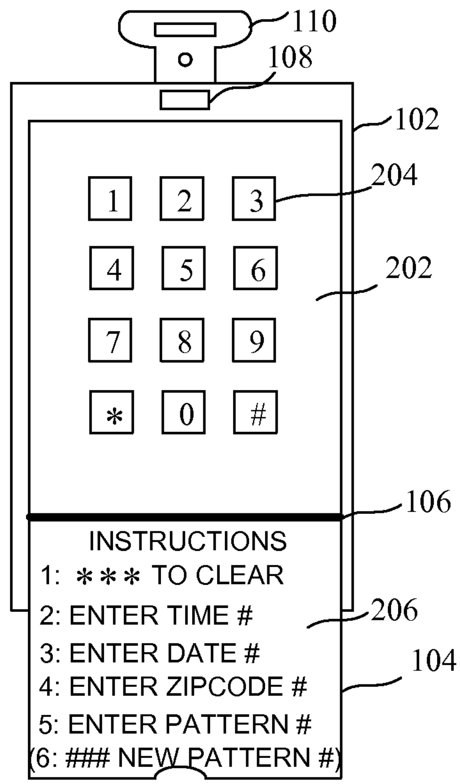


FIG. 2

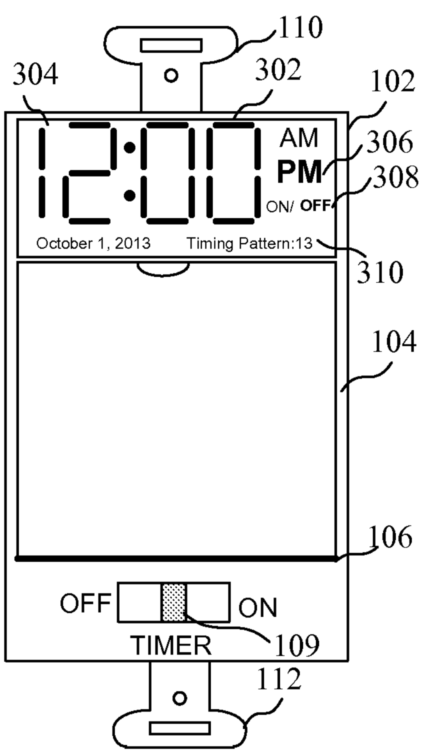


FIG. 3

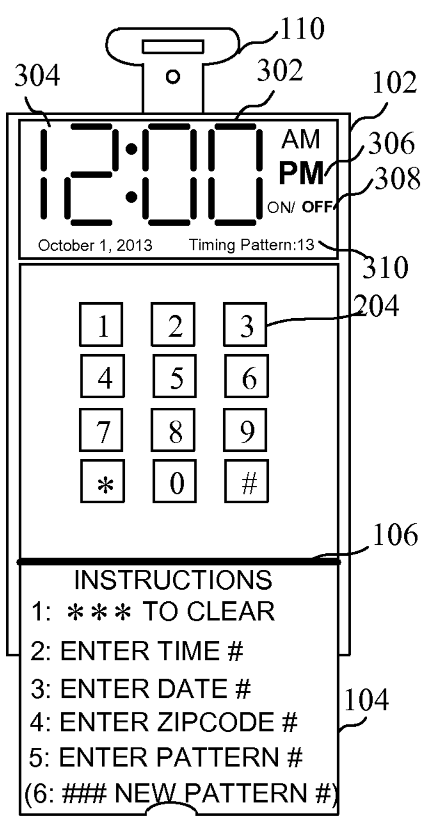


FIG. 4

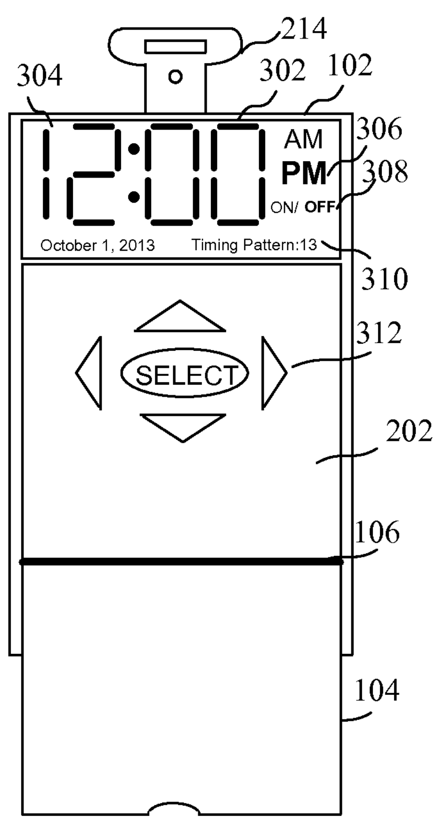


FIG. 5

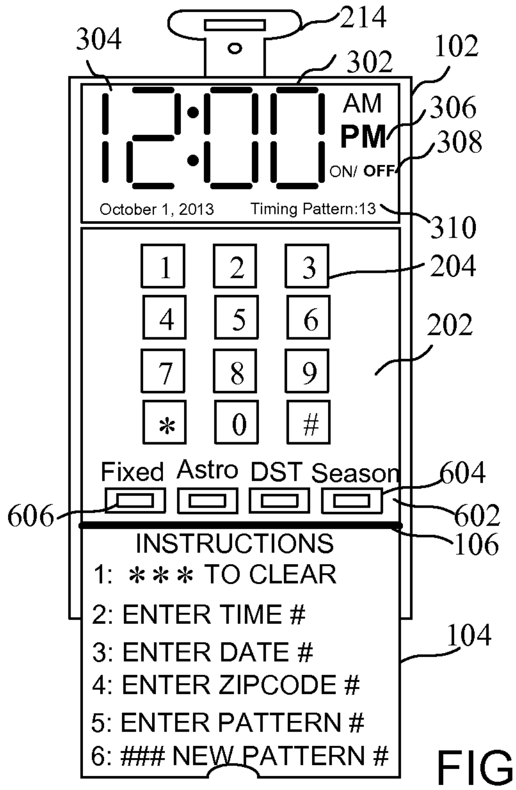


FIG. 6

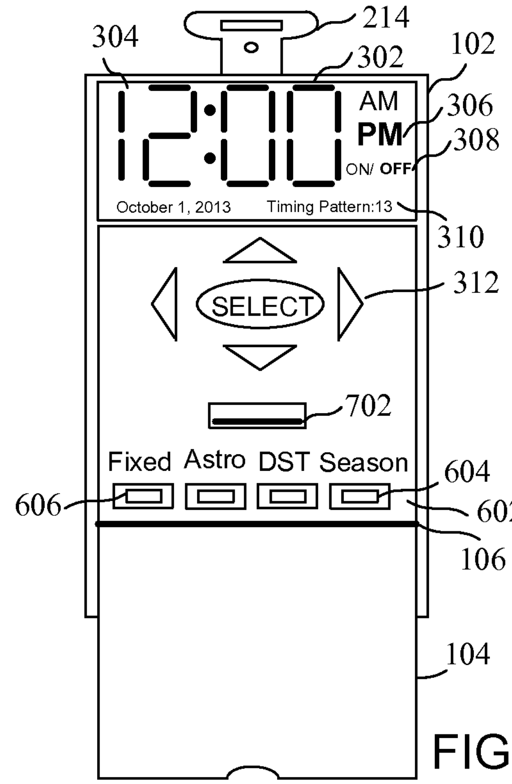


FIG. 7

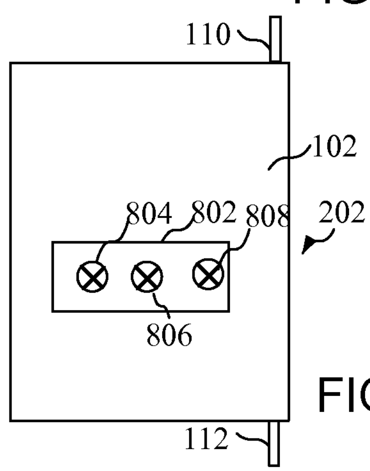


FIG. 8

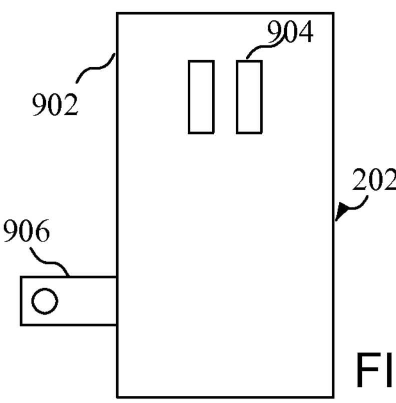


FIG. 9

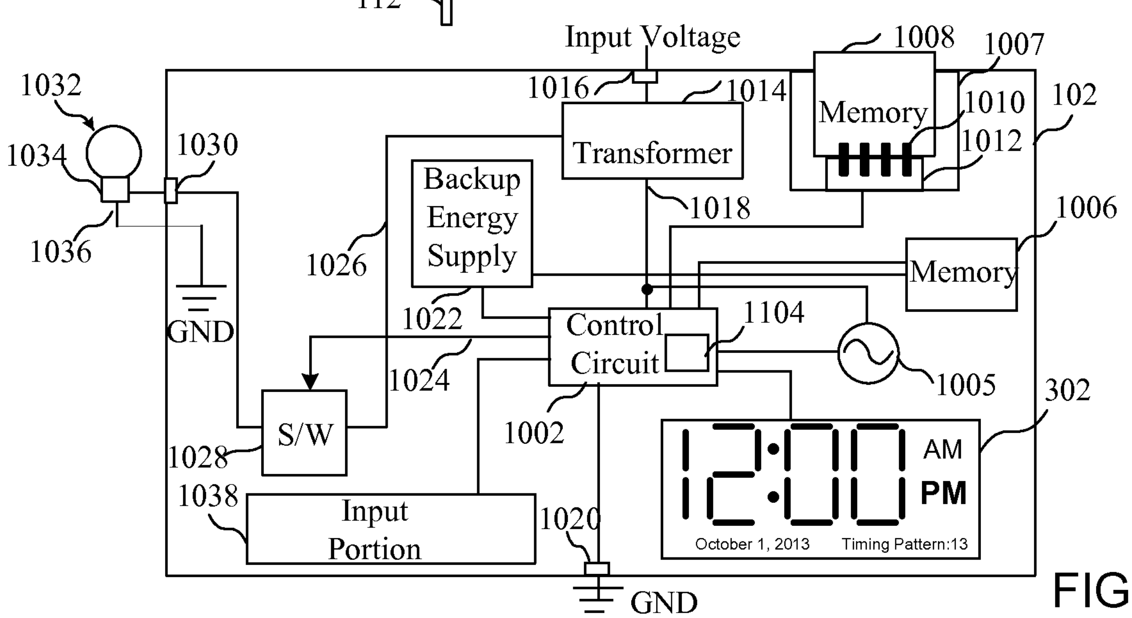


FIG. 10

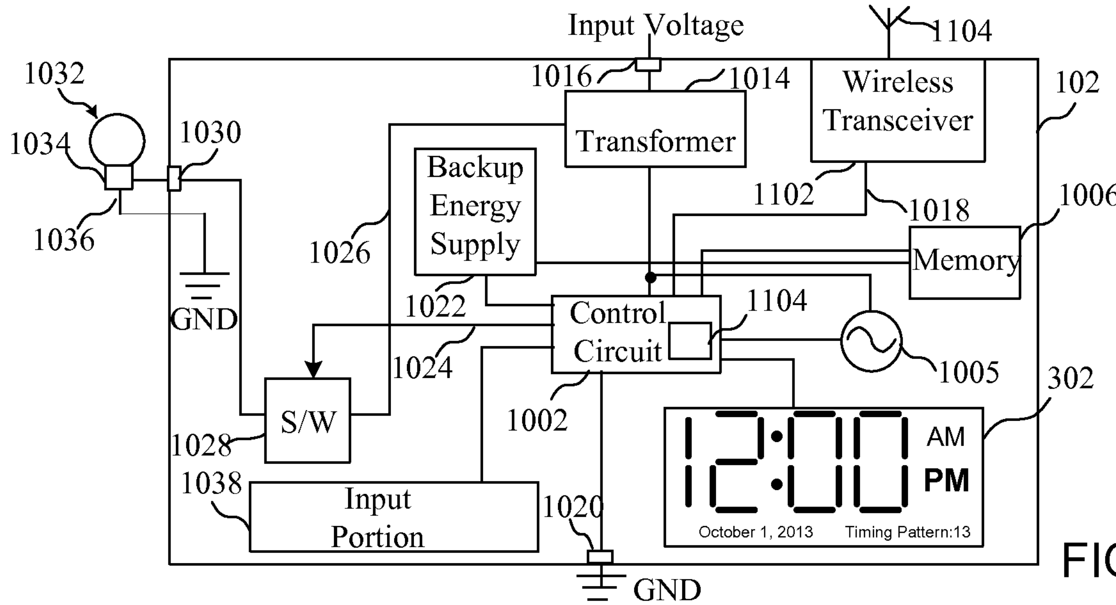


FIG. 11

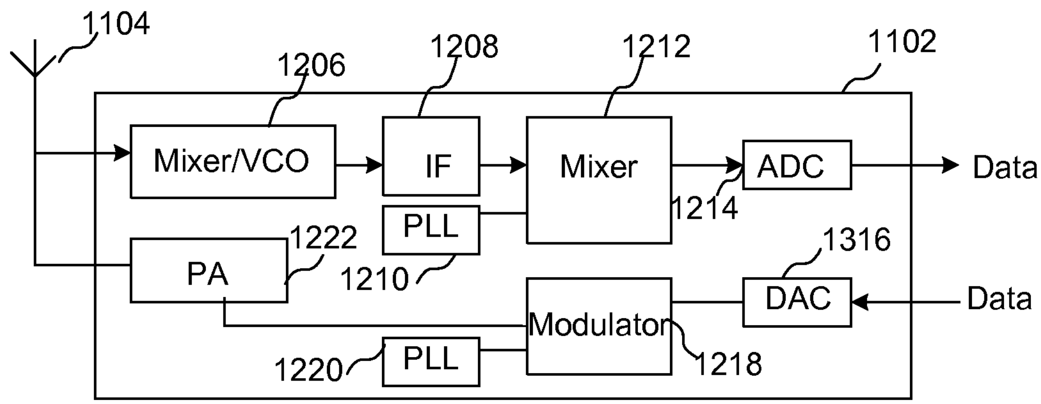


FIG. 12

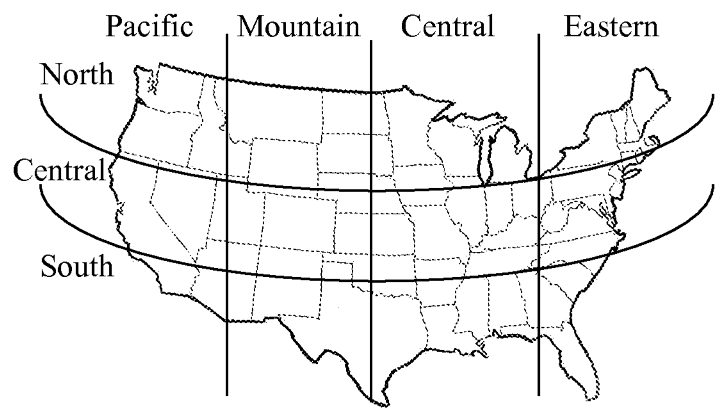


FIG. 13

1402	1404	1406	1408	1410
***	1430#	100513#	60189#	223#

FIG. 14

1402	1404	1406	1408	1410	1502
***	1430#	100513#	60189#	223#	902#

FIG. 15

Zipcode	Region
00501	NE
00502	NE
⋮	⋮
02169	NE
⋮	⋮
60068	NC
60189	NC
60189	NC
⋮	⋮
90210	CP
⋮	⋮
95124	SP

FIG. 17

DST Period Start Date	DST Period End Date	DST Fall Back Time Change	DST Spring Forward Time Change	DST Code
SEP 15	APR 1	Last Sun in OCT	First Sun in MAR	901
SEP 15	APR 1	Last Sun in OCT	2nd Sun in MAR	902
SEP 15	APR 1	First Sun in NOV	First Sun in MAR	903
SEP 15	APR 1	First Sun in Nov	2nd Sun in MAR	904
SEP 15	APR 15	Last Sun in OCT	First Sun in MAR	905
SEP 15	APR 15	Last Sun in OCT	2nd Sun in MAR	906
SEP 15	APR 15	First Sun in NOV	First Sun in MAR	907
SEP 15	APR 15	First Sun in Nov	2nd Sun in MAR	908
SEP 30	APR 1	Last Sun in OCT	First Sun in MAR	909
SEP 30	APR 1	Last Sun in OCT	2nd Sun in MAR	910
SEP 30	APR 1	First Sun in NOV	First Sun in MAR	911
SEP 30	APR 1	First Sun in Nov	2nd Sun in MAR	912
⋮	⋮	⋮	⋮	⋮
OCT 15	APR 1	Last Sun in OCT	First Sun in MAR	938
OCT 15	APR 1	Last Sun in OCT	2nd Sun in MAR	939
OCT 15	APR 1	First Sun in NOV	First Sun in MAR	940
OCT 15	APR 1	First Sun in Nov	2nd Sun in MAR	941

FIG. 19

	On Time		Off Time		Pattern
Fixed Time Year-round	4:00 PM		1:00 AM		1
	4:00 PM		5:00 AM		111
	4:00 PM		6:00 AM		112
	4:00 PM		7:00 AM		113
	⋮		⋮		⋮
	5:00 PM		1:00 AM		121
	5:00 PM		5:00 AM		122
	5:00 PM		5:00 AM		123
	⋮		⋮		⋮
	6:00 PM		7:00 AM		189
	Standard Time (Long Daylight Hrs)-On/Off		DST (Short Daylight Hours)-On/Off		
Standard/DST	4:00 PM/1:00 AM		7:00 PM/1:00 AM		2
	4:00 PM/5:00 AM		7:00 PM/5:00 AM		211
	4:00 PM/6:00 AM		7:00 PM/6:00 AM		212
	4:00 PM/7:00 AM		7:00 PM/7:00 AM		213
	⋮		⋮		⋮
	5:00 PM/1:00 AM		8:00 PM/5:00 AM		221
	5:00 PM/5:00 AM		8:00 PM/6:00 AM		222
	5:00 PM/6:00 AM		8:00 PM/7:00 AM		223
	⋮		⋮		⋮
	8:00 PM/7:00 AM		9:00 PM/7:00 AM		289
	Spring On/Off	Summer On/Off	Fall On/Off	Winter On/Off	
4 Seasons	4:00 PM/1:00 AM	7:00 PM/1:00 AM	5:00 PM/1:00 AM	4:00 PM/1:00 AM	3
	4:00 PM/5:00 AM	7:00 PM/5:00 AM	5:00 PM/5:00 AM	4:00 PM/5:00 AM	311
	4:00 PM/6:00 AM	7:00 PM/6:00 AM	5:00 PM/6:00 AM	4:00 PM/6:00 AM	312
	4:00 PM/7:00 AM	7:00 PM/7:00 AM	5:00 PM/7:00 AM	4:00 PM/7:00 AM	313
	⋮	⋮	⋮	⋮	⋮
	7:00 PM/5:00 AM	8:00 PM/5:00 AM	6:00 PM/5:00 AM	5:00 PM/5:00 AM	321
	7:00 PM/6:00 AM	8:00 PM/6:00 AM	6:00 PM/6:00 AM	5:00 PM/6:00 AM	322
	7:00 PM/7:00 AM	8:00 PM/7:00 AM	6:00 PM/7:00 AM	5:00 PM/7:00 AM	323
					⋮
	8:00 PM/7:00 AM	9:00 PM/7:00 AM	6:00 PM/7:00 AM	6:00 PM/7:00 AM	389
Astronomic	On Time/Offset		Off Time/Offset		
	Astronomic Dusk/+ 1hr		Astronomic Dawn/-1 hr		4
	Astronomic Dusk/none		Astronomic Dawn/None		411
	Astronomic Dusk/+0.5 hrs		5:00 AM/N/A		412
	Astronomic Dusk/+1.5 hrs		6:00 AM/N/A		413
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/None		421
	4:00 PM/None		Astronomic Dawn/-0.5 hrs		422
	4:00 PM/None		Astronomic Dawn/-1.0 hrs		423
	⋮		⋮		⋮
	4:00 PM/None		Astronomic Dawn/-2.0 hrs		489

FIG. 16

Region	Time Period of Date	Average Dusk Time	Average Dawn Time
NE	Full Year	7:00 PM	6:00 AM
	Standard Time	7:30 PM	5:30 AM
	Daylight Savings Time	6:30 PM	7:00 AM
	Spring	7:30 PM	6:00 AM
	Summer	8:00 PM	5:30 AM
	Fall	6:30 PM	6:30 AM
	Winter	5:00 PM	7:00 AM
	January	5:30 PM	7:15 AM
	February	4:45 PM	7:10 AM
	⋮	⋮	⋮
	December	5:40 PM	6:55 AM
	January 1, 2013	5:30 PM	7:15 AM
	January 2, 2013	5:31 PM	7:14 AM
	January 3, 2013	5:33 PM	7:11 AM
	⋮	⋮	⋮
	December 31, 2013	5:39 PM	6:49 AM
NC	Full Year	6:55 PM	6:03 AM
	Standard Time	7:25 PM	5:33 AM
	Daylight Savings Time	6:25 PM	7:04 AM
	Spring	7:25 PM	6:03 AM
	Summer	7:55 PM	5:33 AM
	Fall	6:25 PM	6:33 AM
	Winter	4:55 PM	7:03 AM
	January	5:25 PM	7:17 AM
	February	4:40 PM	7:13 AM
	⋮	⋮	⋮
	December	5:35 PM	6:58 AM
	January 1, 2013	5:25 PM	7:18 AM
	January 2, 2013	5:26 PM	7:17 AM
	January 3, 2013	5:28 PM	7:14 AM
	⋮	⋮	⋮
	December 31, 2013	5:34 PM	6:54 AM
⋮	⋮	⋮	⋮
SP	Full Year	7:07 PM	6:05 AM
	Standard Time	7:36 PM	5:36 AM
	⋮	⋮	⋮
	January 3, 2013	5:39 PM	7:16 AM
	⋮	⋮	⋮
	December 31, 2013	5:44 PM	6:54 AM

FIG. 18

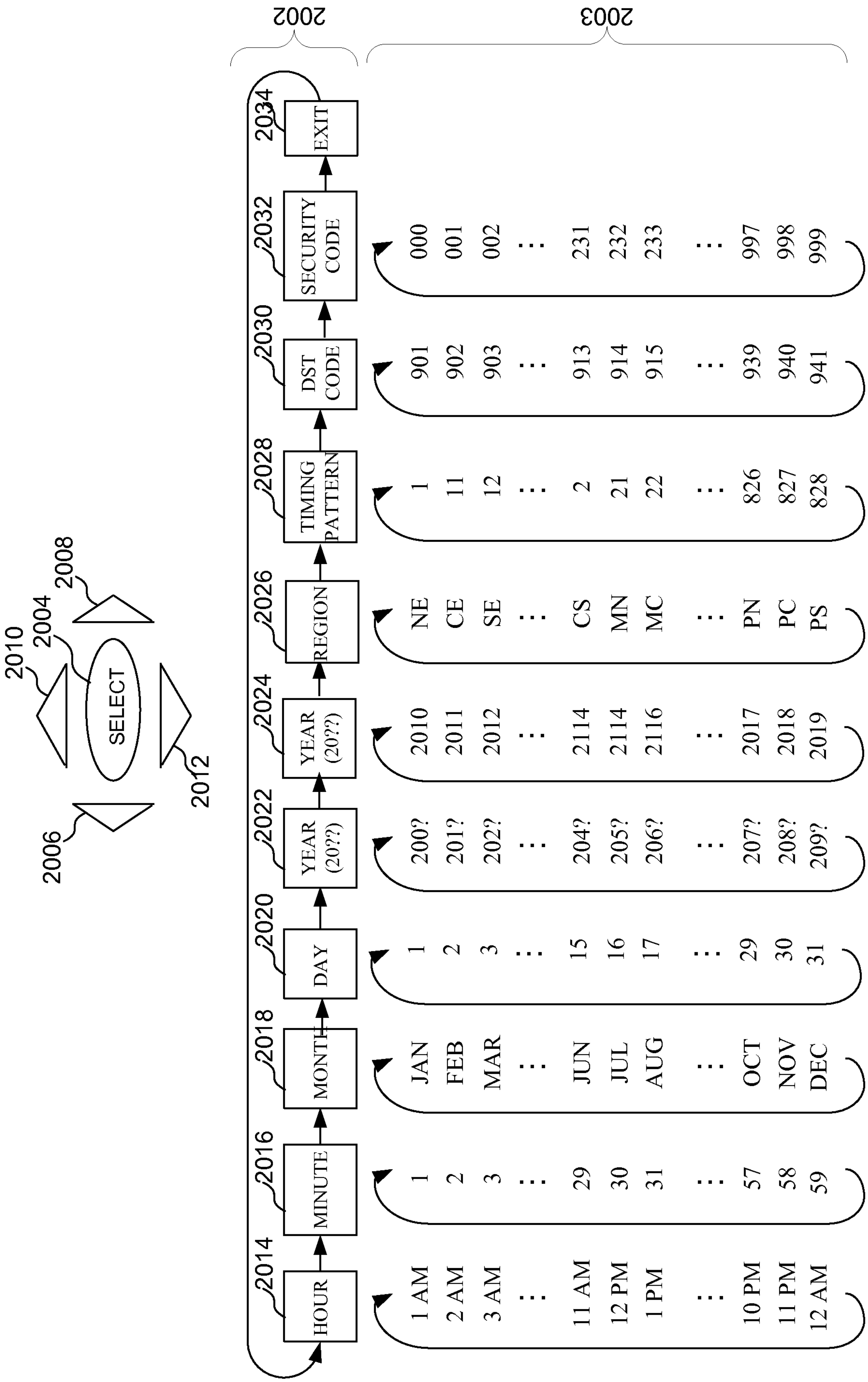

2002
2003
2006
2010
2004
2008
2012
SELECT
2014
HOUR
2016
MINUTE
2018
MONTH
2020
DAY
2022
YEAR (20??)
2024
YEAR (20??)
2026
REGION
2028
TIMING PATTERN
2030
DST CODE
2032
SECURITY CODE
2034
EXIT
1 AM 2 AM 3 AM ... 11 AM 12 PM 1 PM ... 10 PM 11 PM 12 AM
1 2 3 ... 29 30 31 ... 57 58 59
JAN FEB MAR ... JUN JUL AUG ... OCT NOV DEC
1 2 3 ... 15 16 17 ... 29 30 31
200? 201? 202? ... 204? 205? 206? ... 207? 208? 209?
2010 2011 2012 ... 2114 2114 2116 ... 2017 2018 2019
NE CE SE ... CS MN MC ... PN PC PS
1 11 12 ... 2 21 22 ... 826 827 828
901 902 903 ... 913 914 915 ... 939 940 941
000 001 002 ... 231 232 233 ... 997 998 999

FIG. 20

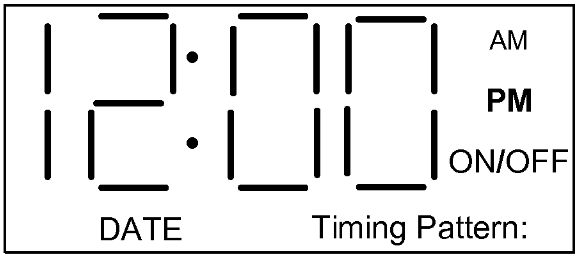


FIG. 21

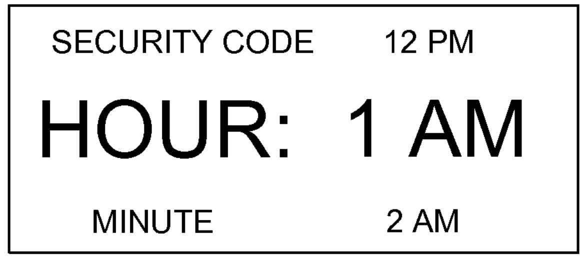


FIG. 22

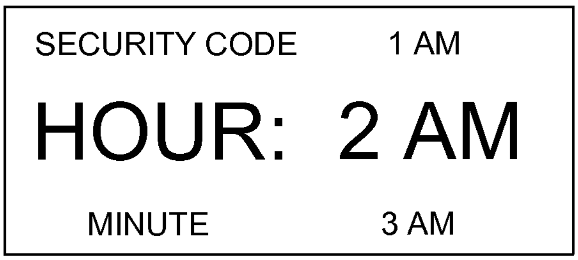


FIG. 23

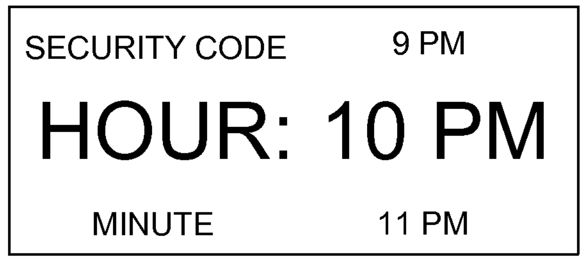


FIG. 24

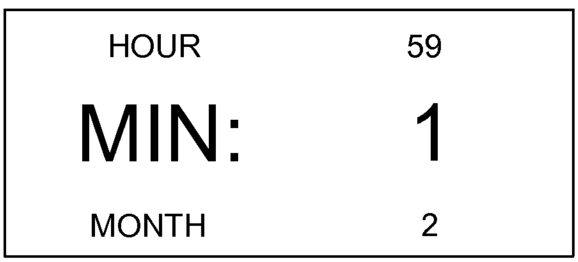


FIG. 25

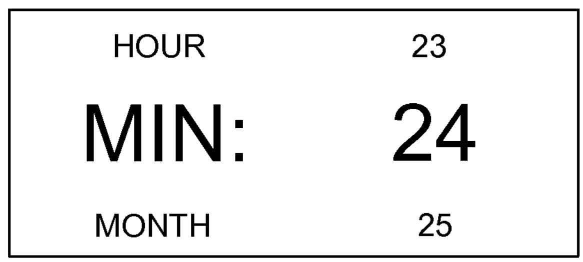


FIG. 26

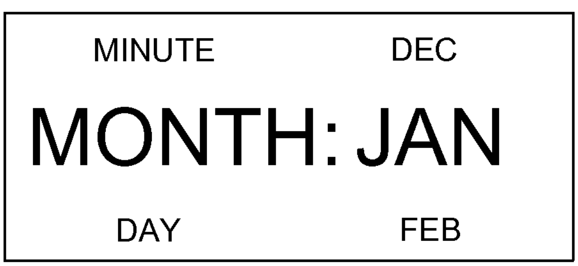


FIG. 27

FIG. 28

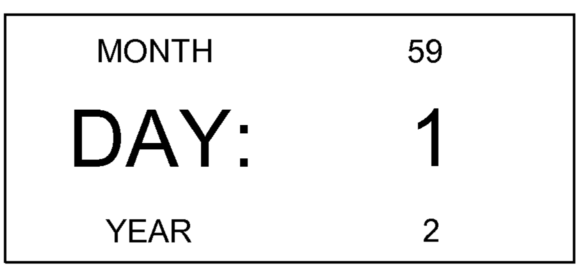


FIG. 29

FIG. 30

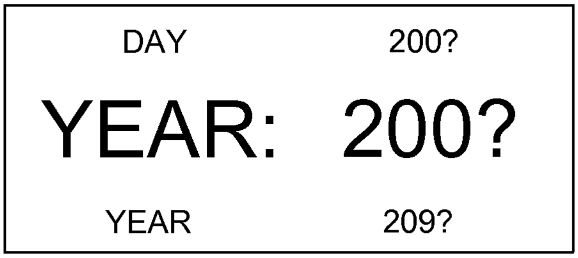


FIG. 31

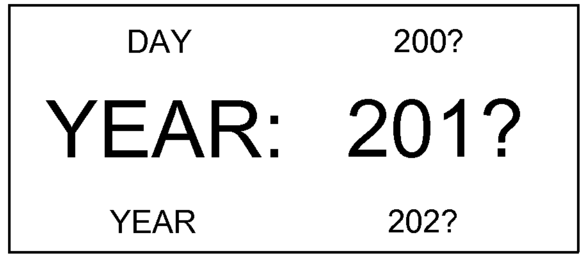


FIG. 32

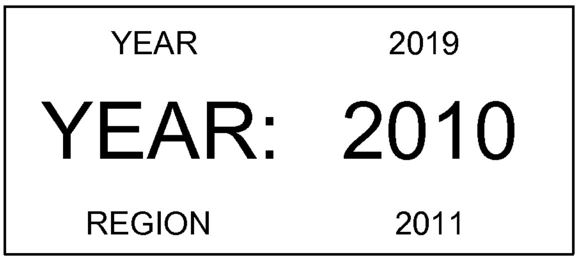


FIG. 33

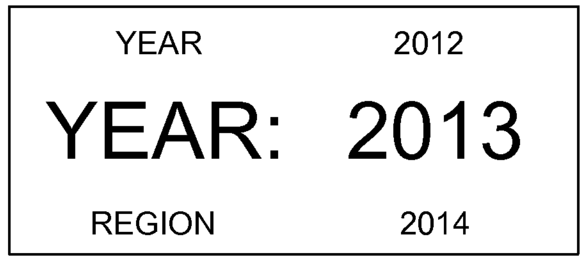


FIG. 34

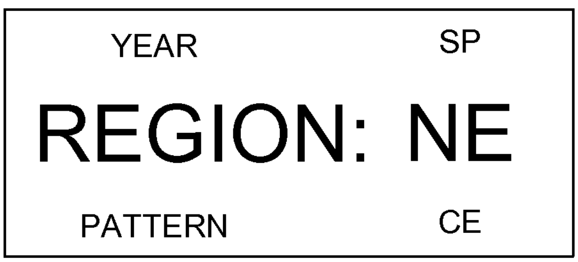


FIG. 35

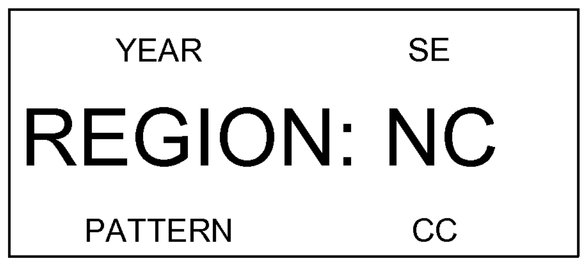


FIG. 36

FIG. 37

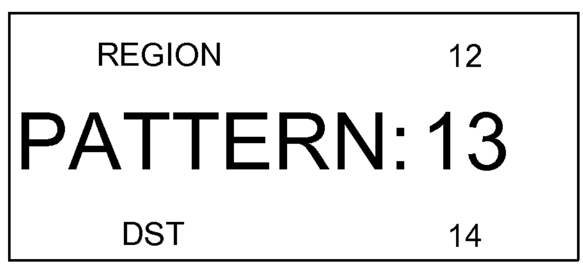


FIG. 38

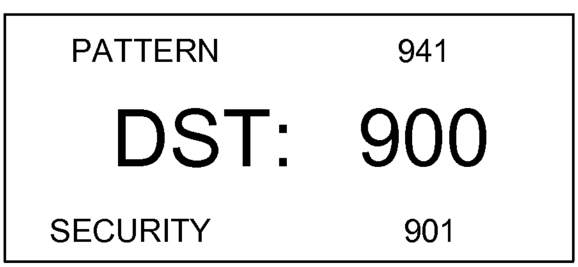


FIG. 39

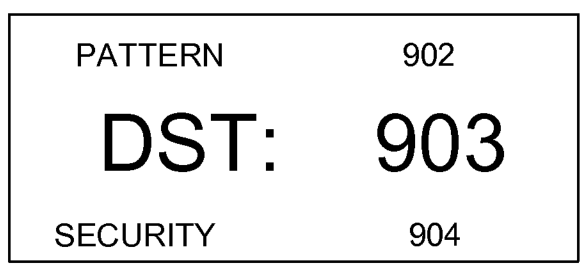


FIG. 40

FIG. 41

FIG. 42

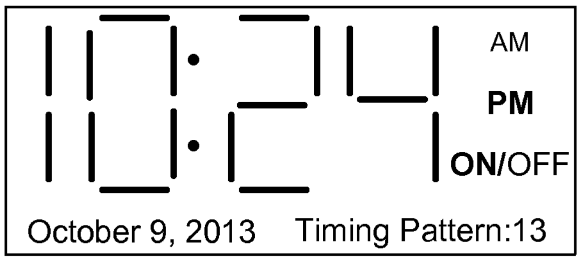


FIG. 43

FIELD	DATA
Time	10:24 PM
Date	October 24, 2013
Region	NC
Timing Pattern	13
DST Code	903
Security Code	013

FIG. 44

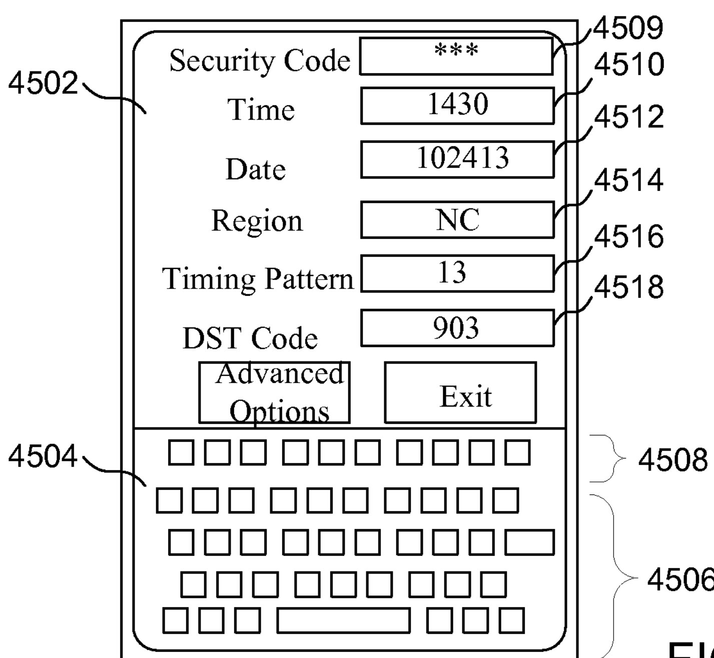


FIG. 45

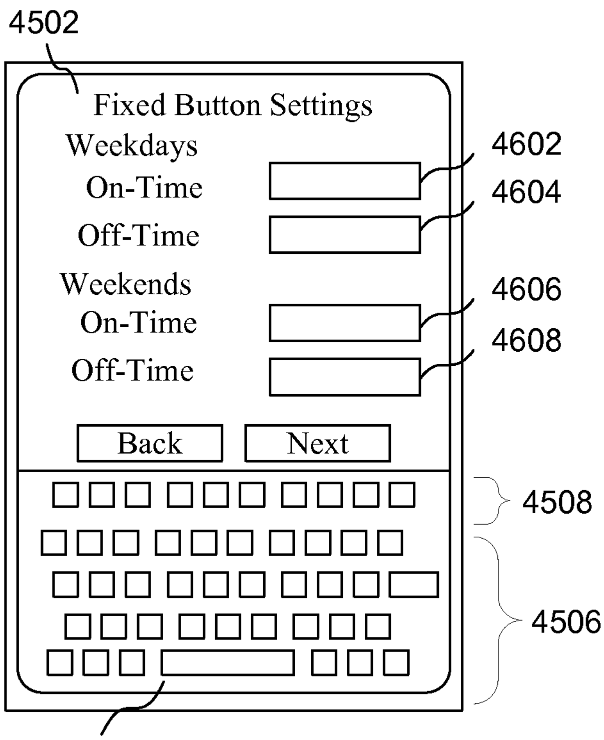


FIG. 46

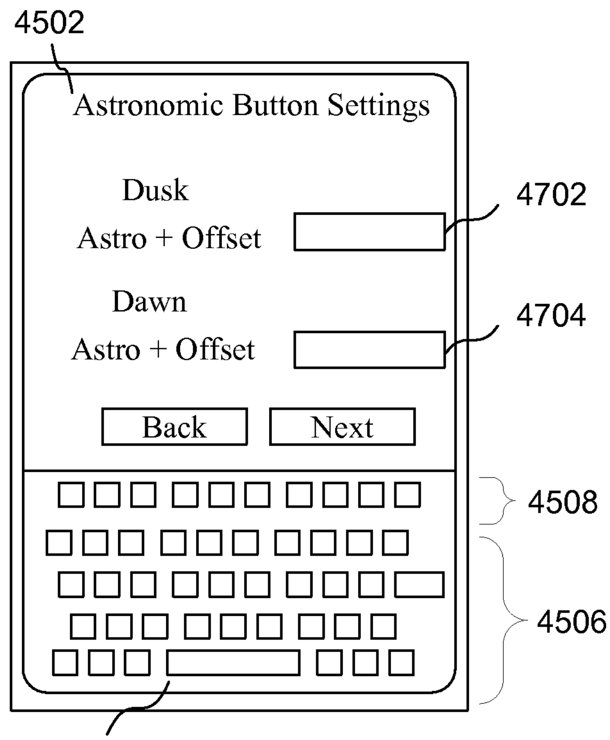


FIG. 47

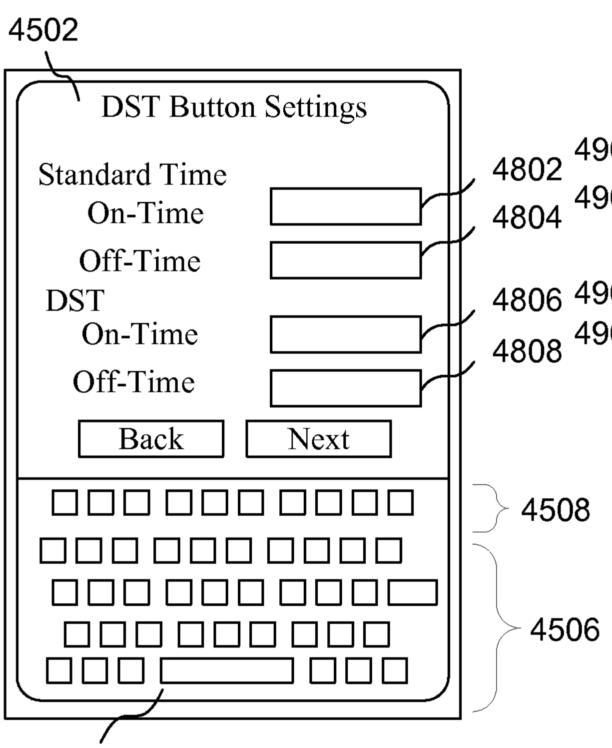


FIG. 48

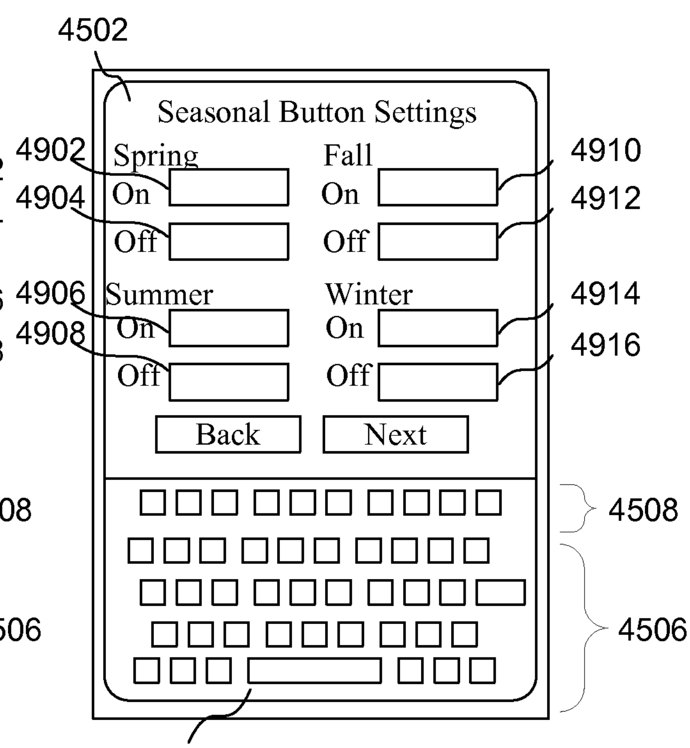
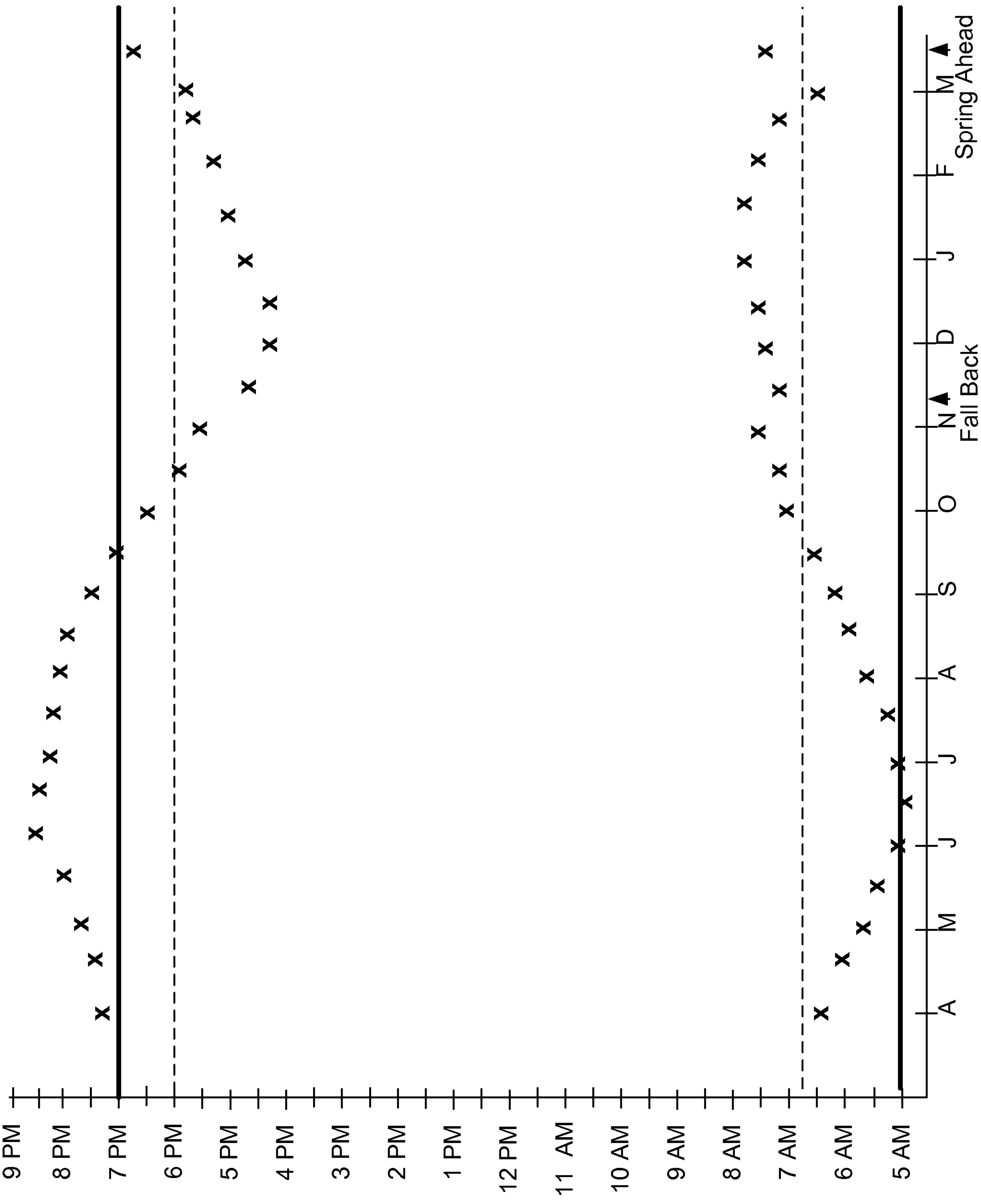


FIG. 49

FIG. 50


9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

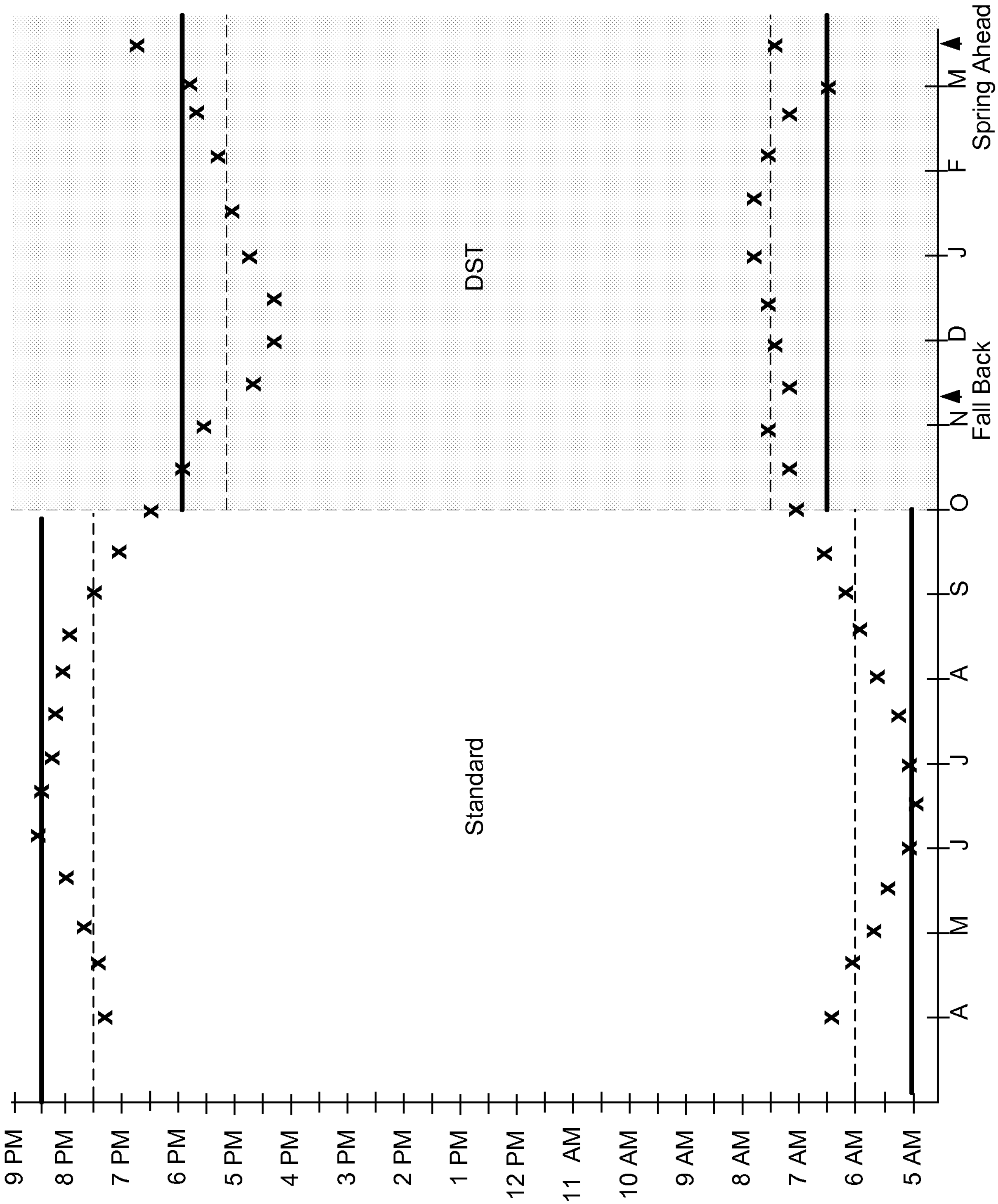

9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
Standard
DST
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 51

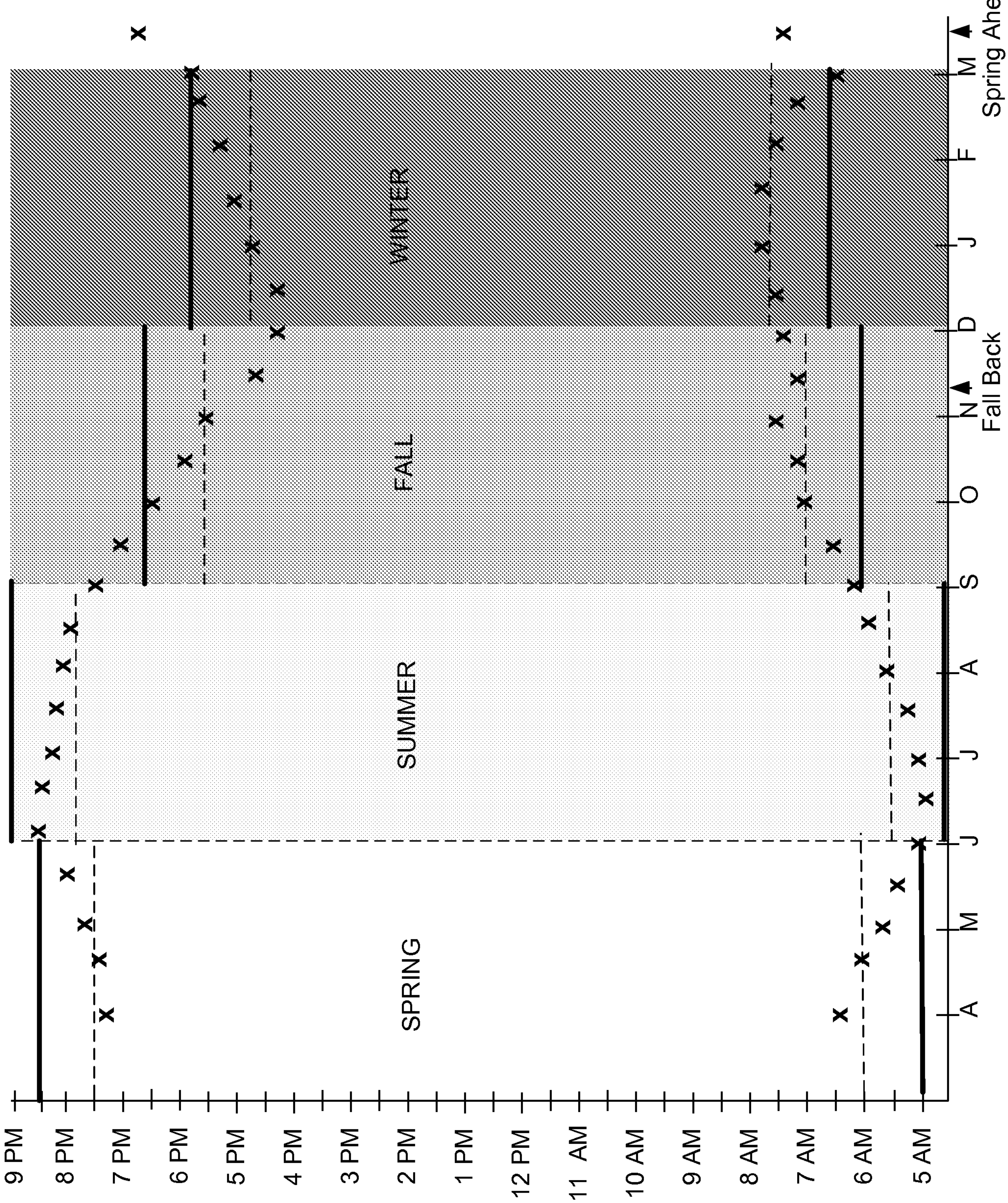

9 PM
8 PM
7 PM
6 PM
5 PM
4 PM
3 PM
2 PM
1 PM
12 PM
11 AM
10 AM
9 AM
8 AM
7 AM
6 AM
5 AM
SPRING
SUMMER
FALL
WINTER
A
M
J
J
A
S
O
N
D
J
F
M
Fall Back
Spring Ahead

FIG. 52

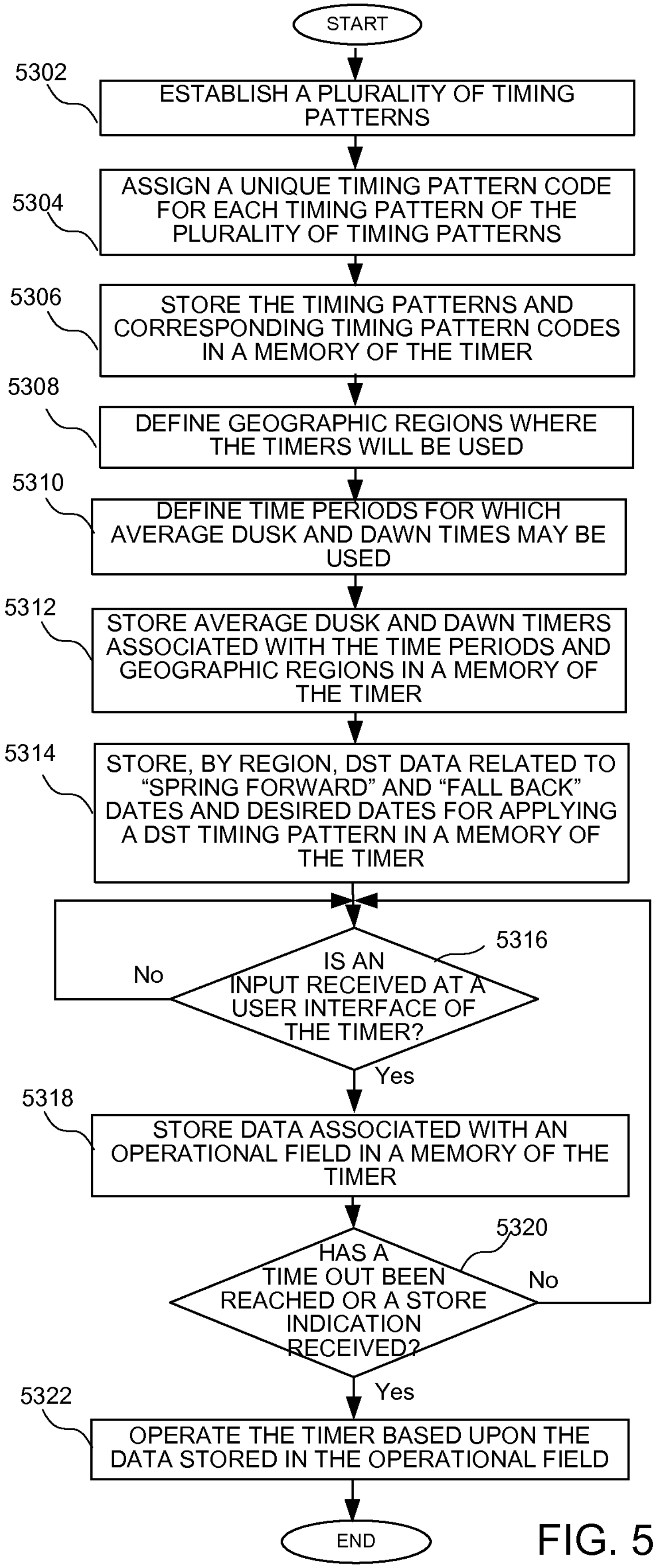

START
5302
ESTABLISH A PLURALITY OF TIMING PATTERNS
5304
ASSIGN A UNIQUE TIMING PATTERN CODE FOR EACH TIMING PATTERN OF THE PLURALITY OF TIMING PATTERNS
5306
STORE THE TIMING PATTERNS AND CORRESPONDING TIMING PATTERN CODES IN A MEMORY OF THE TIMER
5308
DEFINE GEOGRAPHIC REGIONS WHERE THE TIMERS WILL BE USED
5310
DEFINE TIME PERIODS FOR WHICH AVERAGE DUSK AND DAWN TIMES MAY BE USED
5312
STORE AVERAGE DUSK AND DAWN TIMERS ASSOCIATED WITH THE TIME PERIODS AND GEOGRAPHIC REGIONS IN A MEMORY OF THE TIMER
5314
STORE, BY REGION, DST DATA RELATED TO "SPRING FORWARD" AND "FALL BACK" DATES AND DESIRED DATES FOR APPLYING A DST TIMING PATTERN IN A MEMORY OF THE TIMER
5316
IS AN INPUT RECEIVED AT A USER INTERFACE OF THE TIMER?
No
Yes
5318
STORE DATA ASSOCIATED WITH AN OPERATIONAL FIELD IN A MEMORY OF THE TIMER
5320
HAS A TIME OUT BEEN REACHED OR A STORE INDICATION RECEIVED?
No
Yes
5322
OPERATE THE TIMER BASED UPON THE DATA STORED IN THE OPERATIONAL FIELD
END

FIG. 53

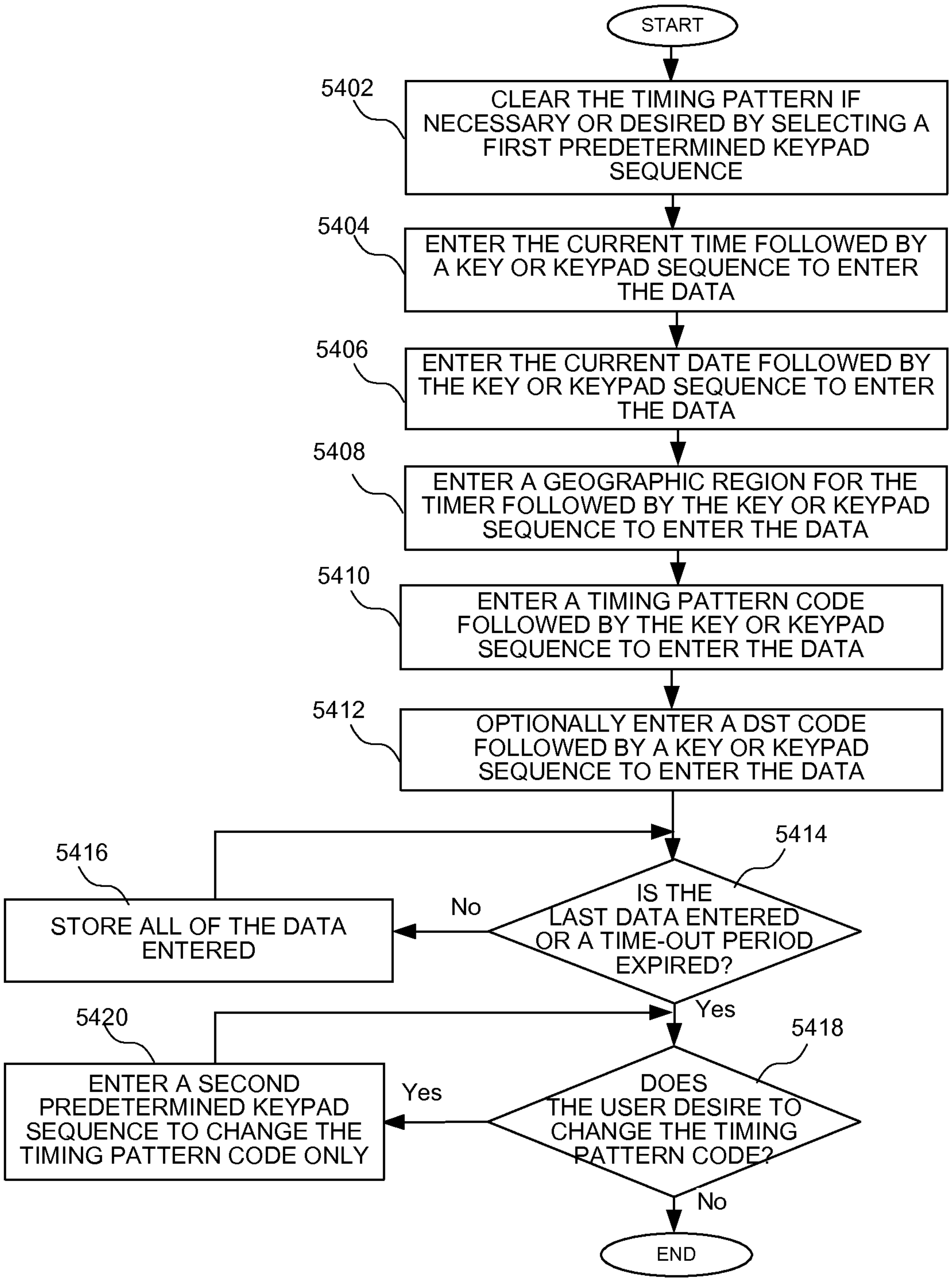

START
5402
CLEAR THE TIMING PATTERN IF NECESSARY OR DESIRED BY SELECTING A FIRST PREDETERMINED KEYPAD SEQUENCE
5404
ENTER THE CURRENT TIME FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5406
ENTER THE CURRENT DATE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5408
ENTER A GEOGRAPHIC REGION FOR THE TIMER FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5410
ENTER A TIMING PATTERN CODE FOLLOWED BY THE KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5412
OPTIONALLY ENTER A DST CODE FOLLOWED BY A KEY OR KEYPAD SEQUENCE TO ENTER THE DATA
5414
IS THE LAST DATA ENTERED OR A TIME-OUT PERIOD EXPIRED?
No
5416
STORE ALL OF THE DATA ENTERED
Yes
5418
DOES THE USER DESIRE TO CHANGE THE TIMING PATTERN CODE?
Yes
5420
ENTER A SECOND PREDETERMINED KEYPAD SEQUENCE TO CHANGE THE TIMING PATTERN CODE ONLY
No
END

FIG. 54

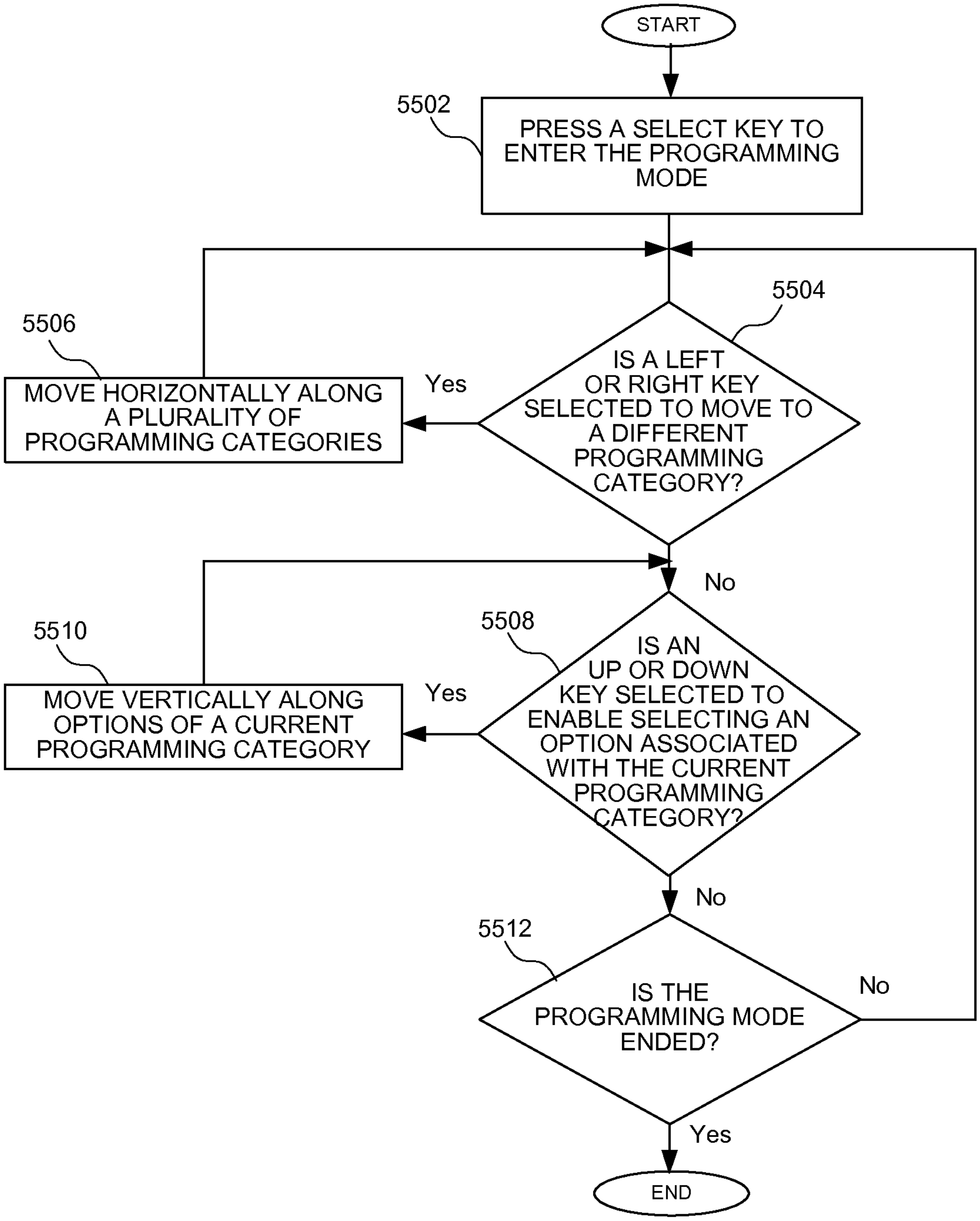

START
5502
PRESS A SELECT KEY TO ENTER THE PROGRAMMING MODE
5504
IS A LEFT OR RIGHT KEY SELECTED TO MOVE TO A DIFFERENT PROGRAMMING CATEGORY?
Yes
5506
MOVE HORIZONTALLY ALONG A PLURALITY OF PROGRAMMING CATEGORIES
No
5508
IS AN UP OR DOWN KEY SELECTED TO ENABLE SELECTING AN OPTION ASSOCIATED WITH THE CURRENT PROGRAMMING CATEGORY?
Yes
5510
MOVE VERTICALLY ALONG OPTIONS OF A CURRENT PROGRAMMING CATEGORY
No
5512
IS THE PROGRAMMING MODE ENDED?
No
Yes
END

FIG. 55

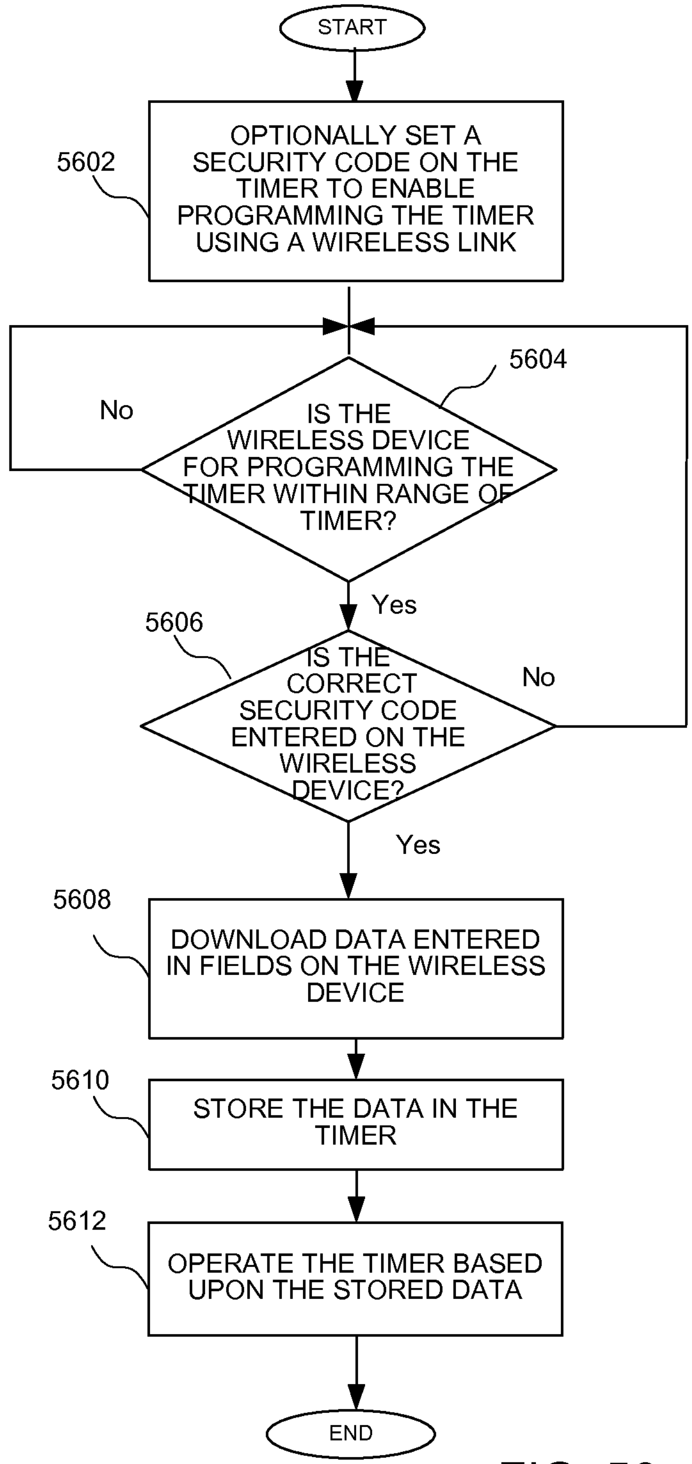

START
5602
OPTIONALLY SET A SECURITY CODE ON THE TIMER TO ENABLE PROGRAMMING THE TIMER USING A WIRELESS LINK
5604
IS THE WIRELESS DEVICE FOR PROGRAMMING THE TIMER WITHIN RANGE OF TIMER?
No
Yes
5606
IS THE CORRECT SECURITY CODE ENTERED ON THE WIRELESS DEVICE?
No
Yes
5608
DOWNLOAD DATA ENTERED IN FIELDS ON THE WIRELESS DEVICE
5610
STORE THE DATA IN THE TIMER
5612
OPERATE THE TIMER BASED UPON THE STORED DATA
END

FIG. 56

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	A PROGRAMMABLE LIGHT TIMER AND METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Filer:	John Joseph King
Attorney Docket Number:	CEIC 401D1

Filed as Small Entity

Filing Fees for **Utility under 35 USC 111(a)**

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**730**

Electronic Acknowledgement Receipt

EFS ID:	24116127
Application Number:	14944302
International Application Number:	
Confirmation Number:	6303
Title of Invention:	A PROGRAMMABLE LIGHT TIMER AND METHOD OF IMPLEMENTING A PROGRAMMABLE LIGHT TIMER
First Named Inventor/Applicant Name:	John Joseph King
Customer Number:	62081
Filer:	John Joseph King
Filer Authorized By:	
Attorney Docket Number:	CEIC 401D1
Receipt Date:	18-NOV-2015
Filing Date:	
Time Stamp:	10:46:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$730
RAM confirmation Number	8128
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	CEIC401D1applicationdatasheet.pdf	843168 832925441da7794f9c27bcc13c814913da59e205	no	6
Warnings:					
Information:					
2	Oath or Declaration filed	CEIC401D1declaration.pdf	13838 62ac50b07995e41cc8cdb1323771aa20999d973a	no	1
Warnings:					
Information:					
3		CEIC401D1app.pdf	152640 bc7a7ee985da8c9cef5d982b168a0636013e7749	yes	36

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	31
Claims	32	35
Abstract	36	36

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
Warnings:					
Information:					
4	Drawings-only black and white line drawings	CEIC401D1drawings.pdf	326652 9d051d2fa95f9784a90832f0e960ac5ba45bbe44	no	18
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	36946 55b0d8ab887348f0cf5313e4b2c1f43894d6723c	no	2
Warnings:					
Information:					

Total Files Size (in bytes):	1373244

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

SCORE Placeholder Sheet for IFW Content

Application Number: 14944302 Document Date: 11/18/2015

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions below.

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- Other USPTO employees can bookmark the current SCORE URL (http://Score.uspto.gov/ScoreAccessWeb/).
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Form Revision Date: September 30, 2013