AO 120 (Rev. 08/10)

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

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 TEXAS on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-131	2/6/2022	WESTERN DISTRICT OF TEXAS

PLAINTIFF	DEFENDANT
ROSEN TECHNOLOGIES LLC	RESIDEO TECHNOLOGIES, INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	6,581,846	6/24/2003	ROSEN TECHNOLOGIES LLC
2	6,619,555	9/16/2003	ROSEN TECHNOLOGIES LLC
3	6,789,739	9/14/2004	ROSEN TECHNOLOGIES LLC
4	7,156,318	1/7/2007	ROSEN TECHNOLOGIES LLC
5	7,185,825	3/6/2007	ROSEN TECHNOLOGIES LLC

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
10/27/2022 Doc #40 ORDER GRANTING [39] Motion to Dismiss.

CLERK	(BY) DEPUTY CLERK	DATE
PHILIP J. DEVLIN		10/27/2022

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**

AO 120 (Rev. 08/10)

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

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 TEXAS on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-131	2/6/2022	WESTERN DISTRICT OF TEXAS

PLAINTIFF	DEFENDANT
ROSEN TECHNOLOGIES LLC	RESIDEO TECHNOLOGIES, INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,232,075	6/19/2007	ROSEN TECHNOLOGIES LLC
2	RE40,437	7/15/2008	ROSEN TECHNOLOGIES LLC
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
10/27/2022 Doc #40 ORDER GRANTING [39] Motion to Dismiss.

CLERK	(BY) DEPUTY CLERK	DATE
PHILIP J. DEVLIN		10/27/2022

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

AO 120 (Rev. 08/10)

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

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 TEXAS on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-131	2/6/2022	WESTERN DISTRICT OF TEXAS

PLAINTIFF	DEFENDANT
ROSEN TECHNOLOGIES LLC	RESIDEO TECHNOLOGIES, INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	6,581,846	6/24/2003	ROSEN TECHNOLOGIES LLC
2	6,619,555	9/16/2003	ROSEN TECHNOLOGIES LLC
3	6,789,739	9/14/2004	ROSEN TECHNOLOGIES LLC
4	7,156,318	1/7/2007	ROSEN TECHNOLOGIES LLC
5	7,185,825	3/6/2007	ROSEN TECHNOLOGIES LLC

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

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**

AO 120 (Rev. 08/10)

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

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 TEXAS on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-131	2/6/2022	WESTERN DISTRICT OF TEXAS

PLAINTIFF	DEFENDANT
ROSEN TECHNOLOGIES LLC	RESIDEO TECHNOLOGIES, INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,232,075	6/19/2007	ROSEN TECHNOLOGIES LLC
2	RE40,437	7/15/2008	ROSEN TECHNOLOGIES LLC
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

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**

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT7129032

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
IAED TECHNOLOGIES INC	12/03/2021

RECEIVING PARTY DATA

Name:	ROSEN TECHNOLOGIES LLC
Street Address:	17330 PRESTON RD
Internal Address:	ST 200D
City:	DALLAS
State/Country:	TEXAS
Postal Code:	75252

PROPERTY NUMBERS Total: 18

Property Type	Number
Patent Number:	7232075
Patent Number:	7152806
Patent Number:	7156318
Patent Number:	7185825
Patent Number:	7145110
Patent Number:	7058477
Patent Number:	7028912
Patent Number:	7050026
Patent Number:	6902117
Patent Number:	6789739
Patent Number:	6786421
Patent Number:	6619555
Patent Number:	6578770
Patent Number:	6581846
Patent Number:	7841542
Patent Number:	7838803
Application Number:	13953135
Application Number:	14313507

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Email: JASON@IPVAL.COM

Correspondent Name: JASON BOURGEOIS

Address Line 1: 4940 BROADWAY STREET

Address Line 2: ST130

Address Line 4: SAN ANTONIO, TEXAS 78209

NAME OF SUBMITTER:	JASON BOURGEOIS
SIGNATURE:	/JASON BOURGEOIS/
DATE SIGNED:	01/19/2022
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 3

source=IAED and Rosen Tech Patent Assignment#page1.tif

source=IAED and Rosen Tech Patent Assignment#page2.tif

source=IAED and Rosen Tech Patent Assignment#page3.tif

PATENT ASSIGNMENT AGREEMENT

THIS PATENT ASSIGNMENT AGREEMENT (the "Agreement"), is made and entered into this 3rd day of December, 2021 (the "Effective Date"), is by and between IAED Technologies Inc., a Canadian Company with a principal place of business at 695 Chenin Avila Unit 7 Suite 259, Piedmont, Quebec, J0R1T0 Canada ("Assignor") and Rosen Technologies, LLC, a Texas company organized under the laws of Texas, ("Assignee"). Assignor and Assignee are also referred to in this Agreement each as a "Party" and collectively as the "Parties."

WHEREAS, Assignor is the sole owner of all rights, title and interest in and to the inventions (the "Inventions") as described and claimed in the United States and foreign patents and patent application as listed on Schedule A (United States patent properties) and Schedule B (foreign patent properties) hereto (collectively the "Patents");

NOW, THEREFORE, in consideration of the mutual covenants and agreements of the Parties and pursuant to the Purchase Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, it is hereby agreed as follows:

I. ASSIGNMENT

1. Assignor hereby sells, transfers, assigns and sets over to Assignee all rights, title and interest (for all countries) in and to the Inventions and the Patents, and all the rights and privileges under any letters patent that may be granted under any continuations, divisions, reissues, reexaminations, renewals and extensions therefor and thereon and all continuations, divisions, reissues, reexaminations, renewals and extensions thereof; and all applications for industrial property protection, including without limitation, all applications for patents, utility models, copyright, and designs which may hereafter be filed for said Inventions and Patents in any country or countries, together with the right to file such applications and the right to claim for the same the priority rights derived from the Inventions and the Patents under the patent laws of the United States, the International Convention for the Protection of Industrial Property, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable; and all applications for industrial property protection, including, without limitation, all applications for patents, utility models, copyrights and designs which may hereafter be filed for said Inventions or Patents in any country or countries, together with the right to file such applications; and all forms of industrial property protection, including, without limitation, patents, utility models, inventors' certificates, copyrights and designs which may be granted for said Invention and/or Patent in any country or countries and all extensions, renewals and reissues thereof.
2. The rights, title and interest transferred above are subject to Assignor having previously granted a non-exclusive, fully paid up, royalty-free license to the Patents to Verdant Environmental Technologies Inc. dated August 31, 2016 (Verdant License) presently held through acquisition by Emerson Electric Co. For the avoidance of doubt, Emerson Electric Co. (including its Subsidiaries) or any subsequent acquirer of this pre-existing license. Further, including the right to expand the license in the future to products branded under other trademarks owned by the holding licensee.

3. Assignor hereby authorizes and requests the Commissioner of Patents and Trademarks of the

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 7

United States and any official of any country or countries foreign to the United States, whose duty is to issue patents or other evidence or forms of industrial property on applications as aforesaid, to issue the same to Assignee, it successors, assigns and legal representatives, or to such nominees as it may designate.

4. Assignor agrees that, whenever reasonably requested by Assignee, Assignor will execute all papers, take all rightful oaths, and do all acts which may be reasonably necessary for securing and maintaining patents for the Inventions in any country and for vesting title thereto in Assignee, its successors, assigns and legal representatives or nominees.

5. Assignor authorizes and empowers Assignee, its successors, assigns and legal representatives or nominees, to invoke and claim for any application for patent or other form of protection for the Inventions, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable, and to invoke and claim such right of priority without further written or oral authorization from Assignor.

6. Assignor hereby consents that a copy of this Agreement shall be deemed a full legal and formal equivalent of any assignment, consent to file or like document that may be required in any country for any purpose and more particularly in proof of the right of Assignee or nominee to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it.

7. All of the rights, title and interest in and to the Inventions and the Patents sold, transferred, assigned and set over to Assignee hereunder include all income, royalties, damages and payments now or hereafter due or payable with respect thereto, and all causes of action (whether in law or equity) and the right to sue, counterclaim, and recover for the past, present and future infringement of the rights assigned or to be assigned hereunder.

Assignor

By: IAED Technologies, Inc.
Name: Howard Rosen
Title: Managing Member

Assignee

By: Rosen Technologies LLC
Name: Adam Baumli
Title: Managing Member

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 8

SCHEDULE A
UNITED STATES PATENTS AND PATENT APPLICATIONS

U.S. Patent Application Publications

Publication Number	Application Number	Publication Date	Application Date	Issue Date
US20150028114A1	13/953,135	1/29/2015	7/29/2013	Pending
US20150369508A1	14/313,507	12/24/2015	6/24/2014	Pending

U.S. Patent Publications

Patent Number	Application Number	Publication Date	Application Date	Issue Date
US7232075B1	11/039,180	6/19/2007	1/19/2005	6/19/2007
US7152806B1	10/654,230	12/26/2006	9/3/2003	12/26/2006
US7156318B1	10/654,235	1/2/2007	9/3/2003	1/2/2007
US7185825B1	10/875,579	3/6/2007	6/24/2004	3/6/2007
US7145110B1	11/254,078	12/5/2006	10/19/2005	12/5/2006
US7058477B1	10/995,574	6/6/2006	11/23/2004	6/6/2006
US7028912B1	10/878,825	4/18/2006	6/28/2004	4/18/2006
US7050026B1	10/440,474	5/23/2006	5/15/2003	5/23/2006
US6902117B1	10/420,660	6/7/2005	4/21/2003	6/7/2005
US6789739B2	10/287,677	9/14/2004	11/4/2002	9/14/2004
US6786421B2	10/654,236	9/7/2004	9/3/2003	9/7/2004
US6619555B2	10/075,866	9/16/2003	2/13/2002	9/16/2003
US6578770B1	10/119,180	6/17/2003	4/9/2002	6/17/2003
US6581846B1	10/091,767	6/24/2003	3/6/2002	6/24/2003
US7841541B1	11/557,492	11/30/2010	11/7/2006	11/30/2010
US7836803B1	11/852,036	11/23/2010	9/7/2007	11/23/2010

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 9

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/654,235	01/02/2007	7156318	0307.1AA4	4749

51413 7590 12/13/2006

MARC E. HANKIN, ESQ.
11414 THURSTON CIRCLE
LOS ANGELES, CA 90049

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 730 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 Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Howard Rosen, Hampstead, CANADA;

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 10

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

BIBDATASHEET

Bib Data Sheet

CONFIRMATION NO. 4749

SERIAL NUMBER	FILING OR 371(c) DATE / RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/654,235	09/03/2003	345	3744	0307.1AA4

APPLICANTS

Howard Rosen, Hampstead, CANADA;

**** CONTINUING DATA **********

This application is a CIP of 10/060,768 01/30/2002 PAT 6,824,069

**** FOREIGN APPLICATIONS **********

IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** SMALL ENTITY **
** 11/21/2003

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no	CANADA	8	20	3

35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance

Verified and Acknowledged _____ Examiner's Signature Initials

ADDRESS
51413

TITLE
PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS

FILING FEE RECEIVED		
375	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

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

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/654,235	09/03/2003	Howard Rosen	0307.1AA4

CONFIRMATION NO. 4749

51413
MARC E. HANKIN, ESQ.
11414 THURSTON CIRCLE
LOS ANGELES, CA 90049

OC000000021246733
OC000000021246733

Date Mailed: 11/16/2006

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/07/2006.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

for MARQUITA MOORE
PATDACAP (571) 272-4200

OFFICE COPY

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

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/654,235	09/03/2003	Howard Rosen	0307.1AA4

CONFIRMATION NO. 4749

OC000000021246717

OC000000021246717

David T. Bracken
The Law Office of David T. Bracken
4839 Bond Avenue
Orange, CA 92869

Date Mailed: 11/16/2006

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/07/2006.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

---

for MARQUITA MOORE
PATDACAP (571) 272-4200

OFFICE COPY

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)

7590 11/03/2006

David T. Bracken
The Law Office of David T. Bracken
4839 Bond Avenue
Orange, CA 92869

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~~ electronically transmitted to the USPTO (571) 273-2885, on the date indicated below.

Grace Pak	(Depositor's name)
	(Signature)
November 7, 2006	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/654,235	09/03/2003	Howard Rosen	0307.1AA4	4749

TITLE OF INVENTION: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$700	$0	$0	$700	02/05/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
NORMAN, MARC E	3744	345-773000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). previously filed on March 16, 2006
☒ 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 Marc E. Hankin
2 Hankin Patent Law
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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature Marc E. Hankin Date November 7, 2006

Typed or printed name Marc E. Hankin Registration No. 38,908

This collection of information 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.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 14

Electronic Patent Application Fee Transmittal

Application Number:	10654235
Filing Date:	03-Sep-2003
Title of Invention:	PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
First Named Inventor/Applicant Name:	Howard Rosen
Filer:	Marc E. Hankin/Grace Pak
Attorney Docket Number:	0307.1AA4

Filed as Small Entity

Utility Filing Fees

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	700	700
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**700**

Electronic Acknowledgement Receipt

EFS ID:	1299330
Application Number:	10654235
International Application Number:	
Confirmation Number:	4749
Title of Invention:	PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
First Named Inventor/Applicant Name:	Howard Rosen
Correspondence Address:	David T. Bracken The Law Office of David T. Bracken 4839 Bond Avenue - Orange CA 92869 US 7147444798 -
Filer:	Marc E. Hankin/Grace Pak
Filer Authorized By:	Marc E. Hankin
Attorney Docket Number:	0307.1AA4
Receipt Date:	07-NOV-2006
Filing Date:	03-SEP-2003
Time Stamp:	21:05:33
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$700
RAM confirmation Number	809

Deposit Account	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	HRosen-ButtonEdit-POAandCCA.pdf	102267	no	2
Warnings:					
Information:					
2	Issue Fee Payment Recorded	HRosen-ButtonEdit-IssueFee.pdf	88515	no	1
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	8247	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	199029		

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.

PTO/SB/82 (04-05)
Approved for use through 11/30/2005. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	10/654,235
Filing Date	9/3/2003
First Named Inventor	Howard Rosen
Art Unit	2173
Examiner Name	
Attorney Docket Number	0307.1aA4

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint the practitioners associated with the Customer Number: 51413

☒ Please change the correspondence address for the above-identified application to:

☒ The address associated with Customer Number: 51413

OR

☐ Firm *or* Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email	Marc@hankinpatentlaw.com		

I am the:

☒ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

SIGNATURE of Applicant or Assignee of Record

Signature			
Name	Howard Rosen		
Date	MARCH 16, 2006	Telephone	(314) 489-2021

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.36. 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 1.11 and 1.14. This collection is estimated to take 3 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, 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

American LegalNet, Inc.
www.USCourtForms.com

Auto-Reply Facsimile Transmission

TO: Fax Sender at 3102748643

Fax Information
Date Received: 3/16/2006 1:28:40 PM [Eastern Standard Time]
Total Pages: 18 (including cover page)

ADVISORY: This is an automatically generated return receipt confirmation of the facsimile transmission received by the Office. Please check to make sure that the number of pages listed as received in Total Pages above matches what was intended to be sent. Applicants are advised to retain this receipt in the unlikely event that proof of this facsimile transmission is necessary. Applicants are also advised to use the certificate of facsimile transmission procedures set forth in 37 CFR 1.8(a) and (b), 37 CFR 1.6(f). Trademark Applicants, also see the Trademark Manual of Examining Procedure (TMEP) section 306 et seq.

Received Cover Page =======>

03/16/2006 10:29 3102748643 PAGE 01

9034 Sunset Boulevard, Suite 200
West Hollywood, CA 90069
Tel: (310) 275-8946
Fax: (310) 274-8643
Marc@HankinPatentLaw.com

Hankin Patent Law, A Professional Corporation

Fax

To:	US Patent Office	**From:**	Grace Pak
Fax:	(571) 273-8300	**Pages:**	18 (including cover)
Phone:		**Date:**	March 16, 2006
Re:	Revocation of Power of Attorney with New Power of Attorney and Change of Correspondence Address, for 17 patent applications.	**CC:**	

☐ **Urgent** ☑ **For Review** ☐ **Please Comment** ☐ **Please Reply**

Please see the attached Revocation of Power of Attorney with New Power of Attorney and Change of Correspondence Address forms, for 17 patent applications. The first named inventor for all 17 patent applications is Howard Rosen, and the application numbers are as follows:

1) 10/075,866
2) 10/030,768
3) 10/634,235
4) 10/634,230
5) 10/634,236
6) 10/878,825
7) 10/875,579 ✓
8) 29/179,077
9) 10/995,574
10) 10/420,660
11) 10/440,474
12) 10/690,909 ✓
13) 10/091,757
14) 10/119,180
15) 11/254,078 ✓
16) 10/287,677
17) 11/254,079 ✓

Thank You,
Grace Pak
Legal Assistant
Hankin Patent Law

PAGE 1/18 * RCVD AT 3/16/2006 1:28:40 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-1/21 * DNIS:7730300 * CSID:3102748643 * DURATION (mm-ss):06-48

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

7590 11/03/2006

David T. Bracken
The Law Office of David T. Bracken
4839 Bond Avenue
Orange, CA 92869

EXAMINER	
NORMAN, MARC E	
ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 11/03/2006

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/654,235	09/03/2003	Howard Rosen	0307.1AA4	4749

TITLE OF INVENTION: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$700	$0	$0	$700	02/05/2007

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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.

PTOL-85 (Rev. 07/06) Approved for use through 04/30/2007.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 21

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)

7590 11/03/2006

David T. Bracken
The Law Office of David T. Bracken
4839 Bond Avenue
Orange, CA 92869

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.
10/654,235	09/03/2003	Howard Rosen	0307.1AA4	4749

TITLE OF INVENTION: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	$700	$0	$0	$700	02/05/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
NORMAN, MARC E	3744	345-773000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information 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.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 22

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/654,235	09/03/2003	Howard Rosen	0307.1AA4	4749

7590 11/03/2006

EXAMINER	
NORMAN, MARC E	
ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 11/03/2006

David T. Bracken
The Law Office of David T. Bracken
4839 Bond Avenue
Orange, CA 92869

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 730 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 730 day(s).

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 Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 07/06) Approved for use through 04/30/2007.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 23

Notice of Allowability	Application No.	Applicant(s)	
	10/654,235	ROSEN, HOWARD	
	Examiner	Art Unit	
	Marc E. Norman	3744	

-- 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 *application filed 9/3/03*.

2. ☒ The allowed claim(s) is/are *1-20*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   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.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ 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. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 9/3/03; 2/7/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 24

EXAMINER'S AMENDMENT

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:

In the specification section previously amended on 7 February 2005, the following changes have been made:

At line 3, "10/XXX,XXX" has been changed to -- 10/654,236, now United States Patent No. 6,786,421, --.

At line 7, "10/XXX,XXX" has been changed to -- 10/654,230 --.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

As per independent claims 1, 9, and 11, the prior art does not teach the programmable thermostat system combinations as recited, and in particular the stored program features recited in section D, subsection 3 of each of these claims.

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."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc E. Norman whose telephone number is 571-272-4812. The examiner can normally be reached on Mon.-Fri., 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. 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.

MN



MARC NORMAN
PRIMARY EXAMINER

PTO/SB/42 (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

Sheet_____of_____

37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT (Use several sheets if necessary)	Docket Number (Optional) 0307.1aA4	Patent Number
	Applicant Rosen	
	Issue Date	Group Art Unit

U.S PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	~~6366861~~		~~Naughton et al~~			
	5170935		Federspiel et al			
	4224625		Penz			
	6285912		Ellison et al			
	5818428		Eisenbrandt et al			

invalidated by different Ex

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER	DATE CONSIDERED
	10/23/01

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

OIPE JC18
FEB 07 2005
PATENT & TRADEMARK OFFICE

Please type a plus sign (+) inside this box → ☐

PTO/SB/08A (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Rosen
Group Art Unit	
Examiner Name	
Attorney Docket Number	0208.2cA4

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Document Number	Kind Code[2] (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
MW		4,224,615				
MW		5,086,385				
		~~5,170,935~~		previously cited		
		~~5,818,428~~		previously cited		
MW		6,059,195				
MW		6,192,282				
		~~6,285,912~~		previously cited		
MW		6,330,806				
MW		6,344,861				
MW		6,478,233				
MW		6,595,430				
MW		6,621,507				

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Office[3]	Number[4]	Kind Code[5] (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
MW			DE 3334117.6					
MW			EP 0985994					
MW			WO 97/11448					
MW			WO 97/39392					

Examiner Signature		Date Considered	10/20/04

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Unique citation designation number. [2] See attached Kinds of U.S. Patent Documents. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

OIPE JC10 FEB 07 2005 PATENT & TRADEMARK OFFICE

Please type a plus sign (+) inside this box →

PTO/SB/08B (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U. S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet | | of |

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	
Group Art Unit	
Examiner Name	
Attorney Docket Number	

OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
MN		1. ADI, "Leopard User Manual," 93 pages, 2001.	
MN		2. Business Wire, "MicroTouch Specialty Products Group to Capitalize on Growing Market for Low-Cost Digital Matrix Touchscreens," p1174 (2 pages), January 6, 1999.	
MN		3. DeKoven et al., "Designing Collaboration in Consumer Products," 2 pages, 2001. Freudenthal et al., "Communicating extensive smart home functionality to users of all ages: the design of a mixed-initiative multimodal thermostat-interface," pp. 34-39, March 12-13, 2001.	
MN		4. Honeywell News Release, "Honeywell's New Sysnet Facilities Integration System For Boiler Plant and Combustion Safety Processes," 4 pages, December 15, 1995.	
MN		5. Honeywell, "W7006A Home Controller Gateway User Guide," 31 pages, July 2001.	
MN		6. "High-tech options take hold in new homes - 200-08-28 - Dallas Business Journal," http ://bizjournals.com!dallas/stories/2000/08/28/focus4, 3 pages, dated August 28, 2000, printed August 19, 2004.	
MN		7. "Product Review - Philips Pronto Remote Control," http://hometheaterhifi.com/volume 6 2/philipsprontoremotecontrol.html, 5 pages, dated May 1999, printed August 20, 2004.	
MN		8. http://www.cc.gatech.edu/computing/classes/cs6751 94 fall/2roupc/climate-2/node 1 .html, "Contents," 53 pages, printed September 20, 2004.	
MN		9. "HAI Company Background," http://www.homeauto.com/AboutHAI/abouthai main.htm, 2 pages, printed August 19, 2004.	
MN		10. Cardio Manual, available at http ://www.secant.ca/En/Documentation/Cardio2é-Manual.pdf, Cardio Home Automation Inc., 55 pages, printed September 28, 2004.	
MN		11. "RC X10 Automation Forum: Control your Heating and Cooling System with Pronto(1/1)," http://www.remotecentral.comlcgi-binlmboardlrc-x 1 0/thread.c~i? 12, 2 pages, dated April 23, 1999, printed August 20, 2004.	

Examiner Signature	MN	Date Considered	10/23/01

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Unique citation designation number. [2] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

Notice of References Cited	Application/Control No. 10/654,235	Applicant(s)/Patent Under Reexamination ROSEN, HOWARD	
	Examiner Marc E. Norman	Art Unit 3744	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,114,554 B2	10-2006	Bergman et al.	165/238
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	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.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 30

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

Bib Data Sheet

CONFIRMATION NO. 4749

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/654,235	09/03/2003 RULE	345	3744	0307.1aA4

APPLICANTS
Howard Rosen, Hampstead, CANADA;

** CONTINUING DATA **********
~~This application is a CIP of 10/060,768 01/30/2002 PAT 6,824,069~~
** FOREIGN APPLICATIONS **********

IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** SMALL ENTITY **
** 11/21/2003

		STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed	☐ yes ☑ no	CANADA	8	20	3
35 USC 119 (a-d) conditions met	☐ yes ☑ no ☐ Met after Allowance				
Verified and Acknowledged	Examiner's Signature Initials				

ADDRESS
David T. Bracken
The Law Office of David T. Bracken
4839 Bond Avenue
Orange, CA92869

TITLE
Programmable thermostat incorporating a liquid crystal display selectively presenting adaptable system menus including changeable interactive virtual buttons

FILING FEE RECEIVED		
375	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 31

Issue Classification	Application/Control No.	Applicant(s)/Patent under Reexamination	
	10/654,235	ROSEN, HOWARD	
	Examiner	Art Unit	
	Marc E. Norman	3744	

ISSUE CLASSIFICATION

ORIGINAL CLASS	ORIGINAL SUBCLASS		CLASS	CROSS REFERENCE(S) SUBCLASS (ONE SUBCLASS PER BLOCK)						
236	94		62	129						
INTERNATIONAL CLASSIFICATION			165	11.1						
G05D	23/00		345	173						
G09G	5/00		700	276						
	/									
	/									
	/									

~~(Assistant Examiner)~~ (Date)	MARC NORMAN 10/23/04 PRIMARY EXAMINER (Primary Examiner) (Date)	Total Claims Allowed: 20	
(Legal Instruments Examiner) (Date)		O.G. Print Claim(s): 1	O.G. Print Fig.: 1A

☐ 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
1	1		31		61		91		121		151		181
2	2		32		62		92		122		152		182
3	3		33		63		93		123		153		183
4	4		34		64		94		124		154		184
5	5		35		65		95		125		155		185
7	6		36		66		96		126		156		186
9	7		37		67		97		127		157		187
11	8		38		68		98		128		158		188
16	9		39		69		99		129		159		189
17	10		40		70		100		130		160		190
19	11		41		71		101		131		161		191
14	12		42		72		102		132		162		192
15	13		43		73		103		133		163		193
13	14		44		74		104		134		164		194
6	15		45		75		105		135		165		195
8	16		46		76		106		136		166		196
10	17		47		77		107		137		167		197
12	18		48		78		108		138		168		198
18	19		49		79		109		139		169		199
20	20		50		80		110		140		170		200
	21		51		81		111		141		171		201
	22		52		82		112		142		172		202
	23		53		83		113		143		173		203
	24		54		84		114		144		174		204
	25		55		85		115		145		175		205
	26		56		86		116		146		176		206
	27		57		87		117		147		177		207
	28		58		88		118		148		178		208
	29		59		89		119		149		179		209
	30		60		90		120		150		180		210

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 32

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	10/654,235	ROSEN, HOWARD
	Examiner: Marc E. Norman	Art Unit: 3744

SEARCHED			
Class	Subclass	Date	Examiner
236	1C 94		
62	126 129	10/23/2006	MN
165	11.1		
345	173		
700	276		

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner
See attached EAST search		10/23/2006	MN

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
EAST search (see attached) Inventor name search	10/23/2006	MN

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 33

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
10/654,235	ROSEN, HOWARD
Examiner	**Art Unit**
Marc E. Norman	3744

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	10/23/06
	1	1
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	11
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	
	33	
	34	
	35	
	36	
	37	
	38	
	39	
	40	
	41	
	42	
	43	
	44	
	45	
	46	
	47	
	48	
	49	
	50	

Claim		Date
Final	Original	
	51	
	52	
	53	
	54	
	55	
	56	
	57	
	58	
	59	
	60	
	61	
	62	
	63	
	64	
	65	
	66	
	67	
	68	
	69	
	70	
	71	
	72	
	73	
	74	
	75	
	76	
	77	
	78	
	79	
	80	
	81	
	82	
	83	
	84	
	85	
	86	
	87	
	88	
	89	
	90	
	91	
	92	
	93	
	94	
	95	
	96	
	97	
	98	
	99	
	100	

Claim		Date
Final	Original	
	101	
	102	
	103	
	104	
	105	
	106	
	107	
	108	
	109	
	110	
	111	
	112	
	113	
	114	
	115	
	116	
	117	
	118	
	119	
	120	
	121	
	122	
	123	
	124	
	125	
	126	
	127	
	128	
	129	
	130	
	131	
	132	
	133	
	134	
	135	
	136	
	137	
	138	
	139	
	140	
	141	
	142	
	143	
	144	
	145	
	146	
	147	
	148	
	149	
	150	

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 34

10/654,235

	Type	Ref #	Hits	Search Text	DBs
1	IS&R	S3	3196	(345/173).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
2	IS&R	S4	708	(62/126).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
3	IS&R	S5	830	(62/129).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
4	IS&R	S2	721	(236/94).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
5	IS&R	S6	375	(700/276).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
6	IS&R	S7	1007	(165/11.1).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
7	IS&R	S1	900	(236/1c).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT
8	BRS	S8	7348	S1 or S2 or S3 or S4 or S5 or S6 or S7	US-PGPUB; USPAT; EPO; JPO; DERWENT
9	BRS	S13	1115	virtual adj button	US-PGPUB; USPAT; EPO; JPO; DERWENT
10	BRS	S12	124	S10 or S11	US-PGPUB; USPAT; EPO; JPO; DERWENT
11	BRS	S9	654	thermostat and (touch adj (screen or pad))	US-PGPUB; USPAT; EPO; JPO; DERWENT
12	BRS	S10	67	S8 and S9	US-PGPUB; USPAT; EPO; JPO; DERWENT
13	BRS	S14	5	S12 and S13	US-PGPUB; USPAT; EPO; JPO; DERWENT
14	BRS	S11	91	S9 and ("62"/$ or "236"/$ or "165"/$).ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT
15	BRS	S16	70	S8 and S15	US-PGPUB; USPAT; EPO; JPO; DERWENT

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 35

	Type	Ref #	Hits	Search Text	DBs
16	BRS	S17	99	S15 and ("62"/$ or "236"/$ or "165"/$).ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT
17	BRS	S19	135	S16 or S17	US-PGPUB; USPAT; EPO; JPO; DERWENT
18	BRS	S18	34	S16 and S17	US-PGPUB; USPAT; EPO; JPO; DERWENT
19	BRS	S20	5	S19 and S13	US-PGPUB; USPAT; EPO; JPO; DERWENT
20	BRS	S15	723	thermostat and ((touch adj (screen or pad)) or touchpad or touchscreen)	US-PGPUB; USPAT; EPO; JPO; DERWENT
21	BRS	S22	29	S15 and legend	US-PGPUB; USPAT; EPO; JPO; DERWENT
22	BRS	S21	8	S19 and legend	US-PGPUB; USPAT; EPO; JPO; DERWENT
23	BRS	S24	3	S23 and legend	US-PGPUB; USPAT; EPO; JPO; DERWENT
24	BRS	S23	56	thermostat.ab. and ((touch adj (screen or pad)) or touchpad or touchscreen)	US-PGPUB; USPAT; EPO; JPO; DERWENT
25	BRS	S25	4	S23 and S13	US-PGPUB; USPAT; EPO; JPO; DERWENT
26	BRS	S26	40	S23 and sens$3	US-PGPUB; USPAT; EPO; JPO; DERWENT
27	BRS	S27	166	S19 or S23	US-PGPUB; USPAT; EPO; JPO; DERWENT
28	BRS	S30	554720	S29 nor S28	US-PGPUB; USPAT; EPO; JPO; DERWENT
29	BRS	S29	19	S27 and ((multiple or plural$3 or several) adj2 (room or space or zone))	US-PGPUB; USPAT; EPO; JPO; DERWENT

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 36

	Type	Ref #	Hits	Search Text	DBs
30	BRS	S28	17	S27 and (first adj2 (room or space or zone))	US-PGPUB; USPAT; EPO; JPO; DERWENT
31	BRS	S31	11	S29 not S28	US-PGPUB; USPAT; EPO; JPO; DERWENT

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 37

RECEIVED
CENTRAL FAX CENTER
MAR 16 2006

PTO/SB/82 (04-05)
Approved for use through 11/30/2006. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	10/654,235
Filing Date	9/3/2003
First Named Inventor	Howard Rosen
Art Unit	2173
Examiner Name	
Attorney Docket Number	0307.1aA4

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint the practitioners associated with the Customer Number: 51413

☒ Please change the correspondence address for the above-identified application to:

☒ The address associated with Customer Number: 51413

OR

☐ Firm *or* Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email	Marc@hankinpatentlaw.com		

I am the:

☒ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

SIGNATURE of Applicant or Assignee of Record

Signature			
Name	Howard Rosen		
Date	MARCH 16, 2006	Telephone	(314)489-3021

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.36. 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 1.11 and 1.14. This collection is estimated to take 3 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, 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

American LegalNet, Inc.
www.USCourtForms.com

OIPE JC107
FEB 07 2005
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
Inventor(s): Howard Rosen
Serial No.: 10/654,235
Filing Date: 9/3/2003
Group No.
Examiner:
Attorney Docket No.: 0307.1A4

INFORMATION DISCLOSURE STATEMENT - REMARKS

COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure under 37 C.F.R. 1.56 and pursuant to 37 C.F.R. 1.97-1.98, Applicant hereby notifies the U.S. Patent and Trademark Office of the documents listed on the attached Form PTO- PTO/SB/08A. Except as noted, one copy of the cited document is submitted herewith.

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant reserves the right to dispute any of the listed documents as prior art during examination. Further, Applicant does not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application. Furthermore, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other material information may exist. Applicant respectfully submits that all pending claims are patentable over the foregoing references, alone or in combination.

Although further described below, the following is brought more particularly to the examiner's attention. The reference titled "Cardio manual" discloses the broad idea of incorporating a dot-matrix liquid crystal display with touchscreen having virtual buttons responsive to a user's touch. Most relevant are pages 7, 16, 23, and 45 through 47.

The following are US patents:
4,224,615 discloses a generalized form of a touch screen for user input.
5,086,385 discloses that a personal computer may receive inputs such as temperature in its operation as a home automation system having a touchscreen interface.
5,170,935 describes using touchscreen up or down arrows to change comfort settings on a thermostat.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 39

5,818,428 describes a touch screen for a PC or home appliance that can be changed in appearance after purchase by a user to make the interface more acceptable to the user.
6,059,195 discloses a home automation system suggesting use of a touchscreen for a portion of the user interface (copy not submitted).
6,192,282 discloses a home automation system including connections from a central control device to remote thermostats, where the central control device comprises a touchscreen as part of the user interface.
6,285,912 discloses a thermostat with what is described as a "touch panel" consisting of mechanical buttons.
6,330,806 discloses a thermostat suggesting that a touchscreen is one of several forms of user interfaces (copy is not submitted).
6,344,861, with an effective filing date of 1993, discloses that a handheld device such as a PDA may be used wirelessly to form an interface with a thermostat. (US Patent Nos. 5,866,697 and 6,020,881 are described in the '861 patent – copies not submitted).
6,478,233 discloses a thermostat implementing an algorithm for saving energy in the operation of HVAC equipment which in addition incorporates a touchscreen as part of a user interface.
6,595,430 discloses a graphical representation for scheduling control setpoints for a thermostat, optionally via a touchscreen.
6,621,507 discloses thermostat with a touchscreen interface for selection of language used for communication with the user.

The following are foreign patents or publications:
DE 3334117.6 published in 1985 discloses input of schedules of temperature control setpoints over a period of up to 72 hours by way of touching a light pen to a graphic pictorial on a display showing a graph of temperature versus time.
EP 0985994 discloses using transparent overlays on a touch sensitive layer to create different user interfaces with a touch pad. One of the user interfaces is used to input control setpoints for a thermostat.
WO 97/11448 discloses input of schedules of temperature control setpoints for an individual room over a period of up to 24 hours by way of touching a graphic pictorial on a display showing a graph of temperature versus time (US Patent No. 6,140,987 is described in the '448 publication – copy not submitted).
WO 97/39392 discloses a home automation system with a touchscreen interface .

The following are publications:
1. ADI, "Leopard User Manual," 93 pages, 2001. – discloses a home automation control center that allows a user to use a personal computer with proprietary software to develop a touchscreen pictorial for the touchscreen on the control center. The device is capable of displaying temperature without control of space conditioning equipment.
2. Business Wire, "MicroTouch Specialty Products Group to Capitalize on Growing Market for Low-Cost Digital Matrix Touchscreens," p1174 (2 pages), January 6, 1999. – discloses that a touchscreen panel can be used to control HVAC equipment.
3. DeKoven et al., "Designing Collaboration in Consumer Products," 2 pages,

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 40

2001. Freudenthal et al., "Communicating extensive smart home functionality to users of all ages: the design of a mixed-initiative multimodal thermostat-interface," pp. 34-39, March 12-13, 2001. – discloses research using a touchscreen and speech input to determine user response to programmable thermostats and their useful interfaces.

4. Honeywell News Release, "Honeywell's New Sysnet Facilities Integration System For Boiler Plant and Combustion Safety Processes," 4 pages, December 15, 1995. – describes using touchscreen controls for boiler operation.
5. Honeywell, "W7006A Home Controller Gateway User Guide," 31 pages, July 2001. – discloses a home automation device with a mouse-driven indicator.
6. "High-tech options take hold in new homes - 200-08-28 - Dallas Business Journal," http ://biziournals.com!dallas/stories/2000/08/28/focus4, 3 pages, dated August 28, 2000, printed August 19, 2004. – discloses a home management system using a touchscreen panel and icons.
7. "Product Review - Philips Pronto Remote Control," http://hometheaterhifi.com/volume 6 2/philipsprontoremotecontrol.html, 5 pages, dated May 1999, printed August 20, 2004. – discloses a handheld, "universal learning remote" device entirely based on a touchscreen for communicating control signals to entertainment devices.
8. http://www.cc.gatech.edu/computing/classes/cs6751 94 fall/2roupc/climate-2/node 1 .html, "Contents," 53 pages, printed September 20, 2004. – disloses student research into using a touchscreen as part of a user interface for a thermostat, among other devices.
9. "HAI Company Background," http://www.homeauto.com/AboutHAI/abouthai main.htm, 2 pages, printed August 19, 2004. – discloses that a touchscreen can be operated in a programmable thermostat.
10. Cardio Manual, available at http ://www.secant.ca/En/Documentation/Cardio2é-Manual.pdf, Cardio Home Automation Inc., 55 pages, printed September 28, 2004. – discloses a dot-matrix touchscreen thermostat with multiple screens for a user interface that can accomplish, among other things, scheduling multiple setpoints in a seven day period. Most important, page 7 of this reference discloses that pressing a virtual button on the touchscreen interface can cause the legends and functions to change only for virtual buttons other than the one pressed.
11. "RC X10 Automation Forum: Control your Heating and Cooling System with Pronto(1/1)," http://www.remotecentral.comlcgi-binlmboardlrc-x 1 0/thread.c~i? 12, 2 pages, dated April 23, 1999, printed August 20, 2004. – discloses that a Pronto controller can send X-10 signals on an AC powerline to thermostats adapted to receive such signals.

Respectfully submitted, Dated: February 4, 2005

D. Bracken

David T. Bracken
Registration No. 37,522

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 41

OIPE JC1/07
FEB 07 2005
PATENT & TRADEMARK OFFICE

Please type a plus sign (+) inside this box →

PTO/SB/08A (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Rosen
Group Art Unit	
Examiner Name	
Attorney Docket Number	0208.2cA4

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	U.S. Patent Document Number	Kind Code[2] (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		4,224,615				
		5,086,385				
		5,170,935				
		5,818,428				
		6,059,195				
		6,192,282				
		6,285,912				
		6,330,806				
		6,344,861				
		6,478,233				
		6,595,430				
		6,621,507				

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Office[3]	Number[4]	Kind Code[5] (if known)	Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
		DE	3334117.6					
		EP	0985994					
		WO	97/11448					
		WO	97/39392					

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Unique citation designation number. [2] See attached Kinds of U.S. Patent Documents. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

OIPE JC107 FEB 07 2005 PATENT & TRADEMARK OFFICE

Please type a plus sign (+) inside this box → ☐

PTO/SB/08B (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U. S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet | | of |

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	
Group Art Unit	
Examiner Name	
Attorney Docket Number	

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	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, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		1. ADI, "Leopard User Manual," 93 pages, 2001. 2. Business Wire, "MicroTouch Specialty Products Group to Capitalize on Growing Market for Low-Cost Digital Matrix Touchscreens," p1174 (2 pages), January 6, 1999. 3. DeKoven et al., "Designing Collaboration in Consumer Products," 2 pages, 2001. Freudenthal et al., "Communicating extensive smart home functionality to users of all ages: the design of a mixed-initiative multimodal thermostat-interface," pp. 34-39, March 12-13, 2001. 4. Honeywell News Release, "Honeywell's New Sysnet Facilities Integration System For Boiler Plant and Combustion Safety Processes," 4 pages, December 15, 1995. 5. Honeywell, "W7006A Home Controller Gateway User Guide," 31 pages, July 2001. 6. "High-tech options take hold in new homes - 200-08-28 - Dallas Business Journal," http ://biziournals.com!dallas/stories/2000/08/28/focus4, 3 pages, dated August 28, 2000, printed August 19, 2004. 7. "Product Review - Philips Pronto Remote Control," http://hometheaterhifi.com/volume 6 2/philipsprontoremotecontrol.html, 5 pages, dated May 1999, printed August 20, 2004. 8. http://www.cc.gatech.edu/computing/classes/cs6751 94 fall/2roupc/climate-2/node 1 .html, "Contents," 53 pages, printed September 20, 2004. 9. "HAI Company Background," http://www.homeauto.com/AboutHAI/abouthai main.htm, 2 pages, printed August 19, 2004. 10. Cardio Manual, available at http ://www.secant.ca/En/Documentation/Cardio2é-Manual.pdf, Cardio Home Automation Inc., 55 pages, printed September 28, 2004. 11. "RC X10 Automation Forum: Control your Heating and Cooling System with Pronto(1/1)," http://www.remotecentral.comlcgi-binlmboardlrc-x 1 0/thread.c~i? 12, 2 pages, dated April 23, 1999, printed August 20, 2004.	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Unique citation designation number. [2] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

OIPE JC107
FEB 07 2005
PATENT & TRADEMARK OFFICE

IFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
Inventor(s): Howard Rosen
Serial No.: 10/654,235
Filing Date: 9/3/2003
Group No.
Examiner:
Attorney Docket No.: 0307.1A4

TRANSMITTAL LETTER:
PRELIMINARY AMENDMENT

COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted hereunder for filing is the above patent application and/or related documents as listed below.

CERTIFICATE OF MAILING (37 CFR 1.08)
I, the person below signing this Certificate of Mailing, hereby certify that this document and the documents referred to as enclosed therewith are being deposited with sufficient postage for first class service with the United States Postal Service on this date in an envelope as addressed to: Commissioner for Patents, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450

D. Bracken
Signature: David T. Bracken
Date of Mailing: February 4, 2005

☒ Amendment / Remarks – 4 p.

☒ PTO SB/08A – 2 p.
☒ Information Disclosure Statement – Remarks – 3 p.

Address all correspondence to: David T. Bracken
The Law Office of David T. Bracken
4839 East Bond Avenue
Orange, CA 92869
Phone: 714-744-4798

D. Bracken
Attorney for Applicant(s)
David T. Bracken, Reg. No. 37522

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 44

OIPE JC107
FEB 07 2005
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
Inventor(s): Howard Rosen
Serial No.: 10/654,235
Filing Date: 9/3/2003
Group No.
Examiner:
Attorney Docket No.: 0307.1A4

PRELIMINARY AMENDMENT / REMARKS

COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant submits the following preliminary amendment to the specification.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 45

Specification: Please amend the specification as follows:

Page 1, lines 5-13:

~~This application is a continuation in part of pending United States Patent Application No. 10/060,768.~~ This application is related to: co-pending United States Application No. 10/XXX,XXX entitled "Programmable Thermostat Including a Feature for Providing a Running Total for the Cost of Energy Consumed During a Given Period for Heating and/or Cooling a Conditioned Space" by Howard B. Rosen, filed on even date herewith; and co-pending United States Application No. 10/XXX,XXX entitled "Programmable Thermostat Incorporating a Liquid Crystal Display and Having a Feature for Mounting Horizontally, Vertically and Any Intermediate Orientation" by Howard B. Rosen, filed on even date herewith.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 46

REMARKS

This application was filed originally claiming benefit pursuant to 35 USC § 120 of the earlier filing date of:

US Patent No. 6,824,069
Issued: November 30, 2004
Title: PROGRAMMABLE THERMOSTAT SYSTEM EMPLOYING A TOUCH SCREEN UNIT FOR INTUITIVE INTERACTIVE INTERFACE WITH A USER
Inventor(s): Howard Rosen
Serial No. 10/060768
Filing Date: 1/30/2002

Applicant hereby disclaims for the present application the benefit of the earlier filing date of Serial No. 10/060768 pursuant to 35 USC § 120 and accepts as the filing date of this application that date on which the application was actually filed with the USPTO, i.e., the filing date indicated above with this application's information.

All the claims of US Patent No. 6,824,069 are being disclaimed by the Applicant for the entire term of that patent. Applicant seeks to sever all connection between US Patent No. 6,824,069 and the present application.

Co-pending applications or issued patents that were originally filed as continuations in part of Serial No. 10/060768 are shown in the following list:

Serial No.	Filing Date	Status
10/654,235	9/3/2003	PENDING
10/654,930	9/3/2003	PENDING
10/654,236	9/3/2003	ISSUED
10/878,825	6/28/2004	PENDING
10/875,579	6/24/2004	PENDING
29/179,077	4/4/2003	ISSUED

All benefit of the earlier filing date of Serial No. 10/060768 as to the above are being disclaimed as well. Submitted with this preliminary amendment is a supplemental disclosure of additional references. Applicant has only recently become aware of these references in relation to pursuing a business transaction.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 47

Respectfully submitted, February 4, 2005

D Bracken

David T. Bracken
Reg. No. 37,522

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 48

(19) FEDERAL REPUBLIC OF GERMANY

[EMBLEM]

GERMAN PATENT OFFICE

(19) **PUBLISHED PATENT APPLICATION**

(11) **DE 3334 117 A 1**

(51) Int. Cl.[3]
G 06 F 3/033
G 05 B 1/03

(21) File reference: **P 33 34 117.6**
(22) Application Date: **09/21/83**
(43) Publication Date: **04/04/85**

(71) Applicant:

Siemans AG, 1000 Berlin and 8000 Munich, GER

(72) Inventor:

Johne, Werner, 8021 Baierbrunn, GER

[Stamped:]
Library Bur. Ind. Eigendom
May 10, 1985

(54) PROCEDURE FOR INPUT OF INFORMATIO FOR PROCESS CONTROL AND/OR ADJUSTMENT BY MEANS OF AN INPUT DISPLAY UNIT IN COORDINATION WITH A PEN

For the input of set values into a set-value memory for process control and/or adjustment by means of a display unit in coordination with a pen. Coordination points can be entered with a Pen; after entering merely the corner dots of a desired graph into a coordinate system displayed by the input display unit, consisting of coordinates between these corner dots, the coordinates of the set-value graph located between the dots are determined by a microprocessor and stored as set values in the set-value memory. The input display unit then displays a coordinate system determined on the basis of prior input information, to be imaged, based on their physical dimensions and their units

[DIAGRAM]

Patent Claims

1. Procedure for the input of information for process control and/or adjustment by means of an input display unit in coordination with an input pen. Coordinate points can be entered into the display unit with the input pen. This procedure is characterized by the fact that for the input of set values into a set-value memory for process control and/or adjustment, upon entering merely the corner dots (E) of a desired set value graph (K) into a coordinate system created from these coordinates between these corner dots (E), a microprocessor (R) determines the coordinates of the interdots (Z) located between the corner dots (E) of the desired set value graph (K), which then, together with the coordinates of the corner points entered with a light pen (G), are stored in the set-value memory (S).

2. Procedure claimed in claim 1, characterized by the fact that the input display unit (B) displays a coordinate system determined by prior information based on the physical dimensions and their units to be imaged.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 50

Procedure for Input of Information for Process Control and/or Adjustment by Means of an Input Display Unit Coordinated with an Input pen

Set-point adjusters are frequently used for the control and/or adjustment of technical processes. With their help a time-dependent command variable for process control and adjustment is set so that the control and/or adjustment function variable always indicates its set value, i.e., the value it must have at any point in time. Function variables and command variables may involve different physical variables, e.g., temperature (and/or march of temperature) as a function variable and an electrical signal imaging the march of temperature as a command variable. Such an electrical signal can be created by means of a set-point adjuster to store the path of the signal by optical or electrical means.

To achieve the desired course of the function variable, first a relevant signal path must be entered into the set-point adjuster. This can be achieved by an operator who keys the coordinate data of individual dots of the set-value graph in dot-by dot

In a different context, (cf. NTZ-Report15 [Journal of Communication Engineering], "Data Display Units", 1973, especially pp. 7, 9, 13, 44) there is a known procedure of entering graphs of function-curves into a graph memory by entering data of different graph dots into the input display unit in coordination with an input pen, e.g., a light pen, by entering coordinate dots with the input pen or by entering them dot-by-dot via a microprocessor. There are no connections provided to process elements, in particular for set-value output.

This method of entering a set-value path into a set-point adjuster dot-by-dot for process control and/or adjustment appears to be relatively time-consuming and particularly disturbing if set-value graphs have to be altered more or less frequently, as is the case in experimental runs.

However, (from DE-PS 25 10 632) the method of entering information via input display unit and pen, by entering coordinate dots by pen is currently known. Commands are entered by a light pen to the process by positioning the command on the corresponding symbolic process element .

This method of one display presupposing all commands possible for the process element concerned appears feasible for the input of relatively few commands, entered on an infrequent basis; otherwise the display of the commands as well as time consumed could turn problematic for the input of commands.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 52

This invention points out a method for a less time-consuming input of set values into a set-value memory for process control and/or adjustment by mans of an input display unit, together with an input pen, by entering into it coordinate points with the input pen. This invention involves a procedure for the input of set values into a memory for process control and adjustment by means of an input display unit, together with an input pen, by entering coordinate dots; according to the invention, this procedure is characterized by the fact that for the input of set values into a set value memory for process control and/or adjustment, following input of only the corner dots of a desired set value graph into a coordinate system displayed by the input display unit, the coordinates of the interdots located between the corner dots of the desired set value graph are determined by a microprocessor and subsequently stored as set values in a set-value memory, together sith the coordinates of the corner dots entered by the light pen.

The invention which abandons the more extensive set-value input by a light pen, has the advantage of avoiding the time-consuming attempt to achieve utmost accuracy of the set-value graph while still being able to succeed in storing a computer-exact corner dot to corner dot set-value graph.

In further developing the invention, the input display unit can display a certain coordinate system based on previous input information pursuant to physical variables and their units to be imaged, having the advantage of entering set values of vastly different variables and dimensions into the connected set-point adjuster by means of one and the same display unit.

The diagram describes the invention in more detail.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 53

The diagram represents a schematic view in a scope required for understanding the invention of an arrangement for input of set values into a set-value memory S, having an input display unit B coordinated with an input pen G. Although this is not shown in detail in the diagram, the input display unit B next to the actual display screen with associated deflecting control and brightness control can have central control and data memory which allows to input functional graphs with a light pen/input pen G dot-by – dot. The input display unit B is connected to a microprocessor R able to read the functional dots entered into the input display unit B from any location of the display screen and, conversely, can enter function dots in any location of the display screen. Microprocessor R is also connected to set-value memory S. In addition, the diagram shows that the display screen can be provided with virtual keys (located on the right-hand side in the diagram) ("24 H"m "48 h", 72 h"; "° C"), which can be "activated" by a light pen G as a so-called key-simulation.

For the input of process control and/or adjustment set values, e.g. temperature set values for climatic test cabinets, where set-value memory S functions, a schematic arrangement is depicted in the following diagram

An operator may have already entered information over a desired time period of 24 hours by a light pen G as a keyboard simulation, during which period set values are supposed to appear, so that horizontal scaling has been set on the display screen for set-value input; furthermore, again by way of keyboard simulation, information may have been entered about the set values to be determined for the physical variable, for example, the temperature in ° C, so that for set value input vertical scaling has been set on the display screen. Thereby, based on prior input information, the input display unit displays the coordinate system determined by the physical variables and their units to be imaged from the set-value graph, where according to displayed coordination variables, certain functional values, for example, temperature and time-determined process control

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 54

and/or adjustment set values can be displayed. By means of the light pen G, these functional values can be entered dot-by-dot.

For the input of set values into the set-value memory S for process and/or adjustment control, only the corner dots E of a desired set value graph K have to be entered by a light pen --schematically depicted in the diagram -- into the coordinate system as displayed by display unit B. The coordinates of these corner dots E are now received by the microprocessor R, which determines the interdots Z located between corner dots E, as shown in the diagram. Finally, the coordinates of these interdots Z, together with the coordinates of the entered corner dots E, entered by the light pen G, are stored as set values in set-value memory S.

From the beginning of the process to be controlled and/or adjusted, the set values can be released in proper sequence at the output point s of the set-value memory S, regardless of whether they were entered by a light pen G or whether they were determined by microprocessor R. This will not be discussed any further at this point.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 55

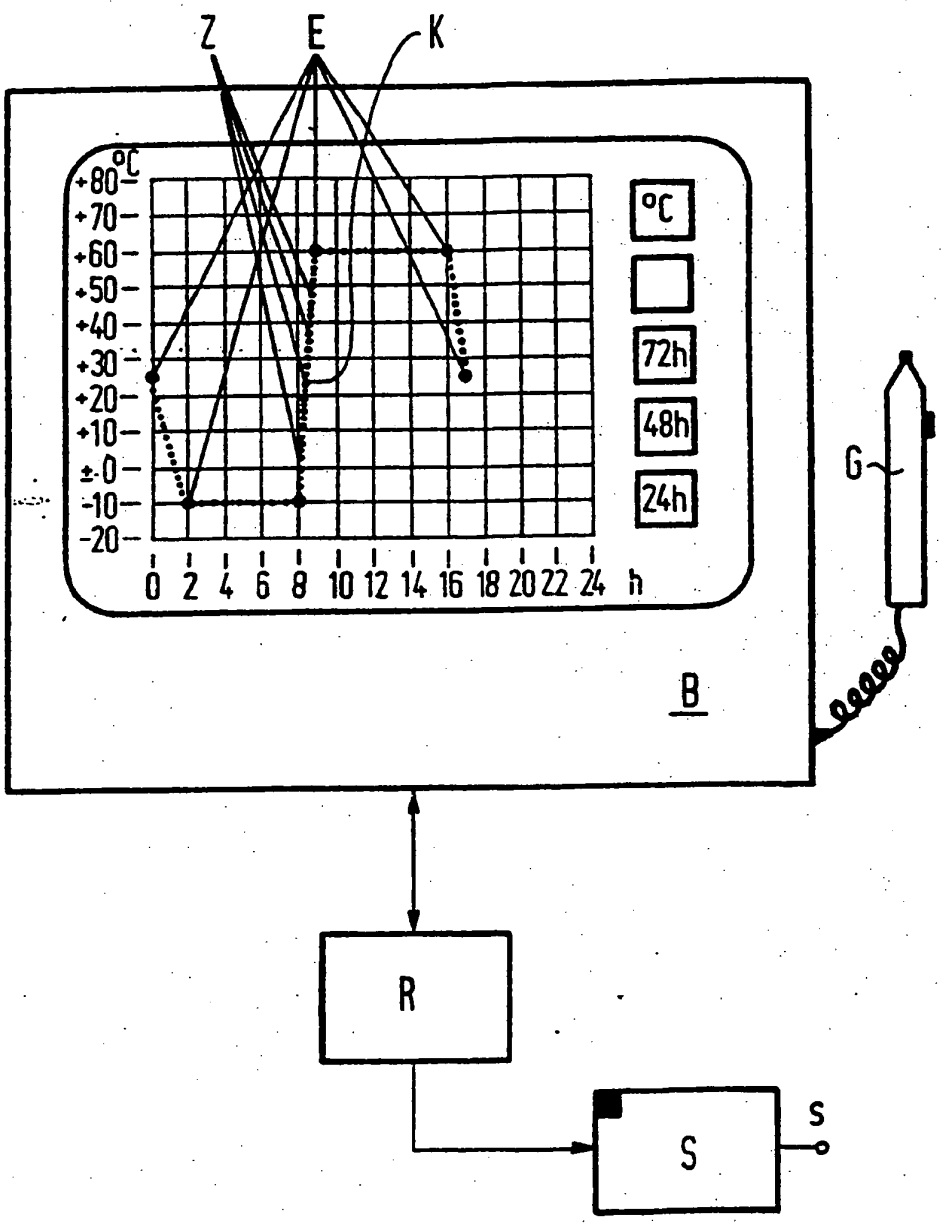
--Blank Page-

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 56

- 9 -
1/1

Nummer: 33 34 117
Int. Cl.³: G 06 F 3/033
Anmeldetag: 21. September 198
Offenlegungstag: 4. April 1985

83 P 1697 DE



BEST AVAILABLE COPY

ORIGINAL INSPECTED

THIS PAGE BLANK (USPTO)

[Barcode]

(19) [LOGO] European Patent Office

(11) **EP 0 985 994 A1**

(12) **European Patent Application**

(43) Publication date:
03/15/2000 Official Gazette 2000/11

(51) Int. Cl.[7]: **GO5D 23/19**, GO5B 19/10, GO6K 11/18, GO6F 3/033

(21) Application number: **98117217.4**

(22) Application date: **09/11/1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extended States:
AL LT LV MK RO SI

(72) Inventors:
-- **Copley, Jonathan Miles**
6330 Cham (Switzerland)
-- **Hauser, Thomas**
6330 Cham (Switzerland)

(71) Applicant:
Electrowatt Technology Innovation AG
6301 Zug (Switzerland)

(54) Procedure and Device for Input of Process Parameters

(57) This invention describes a procedure and a device for input of process parameters, specifically a heating/air conditioning system or components related thereto, whereby on an input device (1) of a control unit (2) of a heating/air conditioning system or, for example, a room-temperature control unit, different process states and/or the parameters (14,16) to be adjusted accordingly by means of variable indicator/control fields (7,...7f) and, if applicable, in conjunction with fixed indicator/control fields (10, 12), are displayed. By selecting different control levels (23a, ...23e) the respective process parameters (14, 16) can be entered for each selected control level, causing different indicator/control fields to appear. The design of these indicator/control levels (7,...7f) is variable, i.e., they function either as an indicator or control field for each control level, or assume no specific task, each time varying in their function, their significance, and their dimensions. Thus, the operator is guided, according to each control level (23a, ...23e), by indicator/control areas of different design, emerging in different positions of the input device (1) in different dimensions and with different functions; thereby, intuitive user guidance is guaranteed.

FIG. 1

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 59

Description

[0001] This invention pertains to a procedure for the input of process parameters, specifically of a heating and/or air conditioning system, as claimed in claim 1, an input device of a control unit for the input of process parameters and use of this procedure and the input device for programming a heating/air conditioning control unit, a thermostat, or an air conditioning control unit as claimed in any of claims 14 thru 16.

[0002] Such procedures and devices for different purposes and applications are already known. For example, **EP 0 831 276 A1** lists a known input device for the control of kitchen stoves, displaying a so-called "touch-screen" , which displays different indicator/control areas of different operating modes of a stove in connection with fixed indicator/control fields; these areas also serve as controls for individual burners on top of stove ranges.

[0003] In addition, computers placed in airports and banks are known to be equipped with such touch-sensitive input areas, for the purpose of facilitating the operator's data input by enabling him to avoid using a keyboard or mouse. Such touch-sensitive input-masks are known from **WO 93 11 518 A1** and consist of two transparent flexible plastic sheets/films equipped with almost invisible electrodes in-between, on touch creating an electric contact, thereby communicating the touch position, i.e., the operator's "request", to the control unit and control device, enabling it to compare the touch position with the respective underlying function, thereby performing the requested task.

[0004] By contrast, control systems in buildings are far more complex. Even in a simple private home, a heating system consists of a different number of components, e.g., a burner, a pump, different valves, thermostats for the different rooms, and, as a possible addition, an air conditioning system, all of which must be regulated and controlled and perform different functions, depending on the heating program. This requires, for example, for the heating system to provide different temperatures at different times of the day or for different days of the week or during vacation days.

[0005] Present-day "intelligent" building control systems include control of furnace, air conditioning, security systems, fire detection equipment and additional systems to maintain a building, adding more and more to an increased complexity in this sector as well. In order to reliably regulate and control such systems, the current owner, in most cases, needs to study very complicated and voluminous operating manuals.

[0006] In addition, the problem of adjusting the respective control parameters and process parameters within a building control system consists in that in many cases the user only rarely changes the adjustment of the respective process parameter – perhaps in summer or winter – so that, unlike the operation of computers or kitchen appliances, he no longer remembers the operating instructions about the control device.

[0007] Traditional control devices for the adjustment of, say, heating/air conditioning systems of a building are mostly of a very complex design, because the different multitude of process parameters must be entered for a multitude of different process conditions. For the most part, programming errors occurring in these traditional heat-control units are not immediately detected, and during the course of days, weeks or even months of this error-state prevailing in the system may cause lasting defects to or even ruin individual appliances, heating units, or system facilities. In addition, strict guidelines issued by the Technical Inspection Agency [TÜV] and relevant licensing bureaus for approval and initial operation of such heat control units, require their "fail safe" design. In this instance, too, there exists a fundamental difference between these extremely complicated heat control units and the very easy operation of kitchen appliances, fax machines, copiers, or bank-transfer computers.

[0008] The above-mentioned factors – significant complexity of heating units, complicated instructions to be absorbed by operators, lengthy intervals between operations of these devices and the inherent potential of severe or even ruinous consequences to a building, caused by a maloperation of these heating control units – for some time have led to a demand for an easily operated and intuitive user system for the input of process parameters relating to heat control units.

[0009] **EP 0332 957** informs us about a heat control unit with an, inter alia, multifunctional display provided with set as well as variable input fields. Applicable keyboards are strictly allocated to definite operating modes,

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 60

with this heat control unit showing one line of variable keyboards, which, according to the selected operating level, are suitable for controlling different process parameters. To these keys – arranged in a set location of the input field -- can be selectively allocated different functions in menu form. The disadvantage of this heat control unit lies in the complexity of inputting the appropriate process parameters as well, demanding of operators a high degree of knowledge about programming these heat control devices, as on one hand these keyboards are always positioned in a fixed location, on the other hand their dimensions are unchangeable, forcing operators to advance to different operating levels by frequent and repeated pressing down on different keys. However, these operating levels are of a very complicated design and, because of the keys being almost constantly occupied, understanding their application remains limited. The variable keys are also programmed with constantly recurrent references, their dimensions remaining unchanged.

[0010] Therefore, the underlying task of this invention is to improve input procedures and devices of heating/air conditioning systems of the type mentioned in the beginning, so as to avoid the disadvantages of conventional procedures and devices and, specifically, to make it possible for operators to intuitively program the control unit of a heating/air conditioning system or any of its components, without prior knowledge and without having to study lengthy and complicated operating instructions.

[0011] The task of this invention will be solved by means of independent claims 1 and 7. Further developments are claimed in each sub-claim: Several applications of the procedure according to the invention and the input device according to the invention are claimed in claims 14-16.

[0012] This invention describes a procedure for the input of process parameters, specifically a heating/air conditioning system or components connected thereto, where different process conditions and/or the corresponding process parameters to be adjusted are shown on an input device of a control unit of the heating/air conditioning system or, as an example, of a control unit regulating the room temperature of a certain room or air conditioning several rooms of a building, by means of variable display/operating areas and, if applicable, in connection with set display/operation areas. By selecting different control levels, each process parameter can be entered, causing various display/operation areas to appear. These display/operation areas are designed to be variable in such a way that they either function as a display or an operating area for each control level or perceive no specific task but time vary in their functions, their reference, and their dimension, where according to the operati0n level, the operator is guided by differently designed display/operation areas emerging at different positions of the input device in varying dimensions and with varying functions.

[0013] By means of simple, intuitively self-explanatory symbols the user moves "hand over hand" through the operational levels by pressing menu-reatede on the corresponding operating panels which by the display of different operational fields at different positions and with different dimensions guide the user step-by step through the programming process of the heat control unit.

[0014] Selection of different operation levels can proceed in different ways: One, it is possible to select the different operational levels by means of certain display/operation areas. As soon as a certain operational panel is activated, parts or the entire input area will change; new operation/display areas of different dimensions and functions will appear, thereby pointing out to the operator in a simple way which process parameters he about to adjus and which process condition an/or process parameter happens to apply at the moment.

[0015] Another possibility would be to equip the input field of the input device with different insert cards, so that according to the inserted card the respective operating areas of the input field would display different functions, meanings, and dimensions. The insert cards then define the different operating levels, the functions of the input device, and the image and selection of at least parts of the display/operation areas. The insert cards may be designed as magnetic, mechanical, electronic, or optical data carriers in the format of a credit or telephone card, having either a magnetic strip, an electronic chip or a perforated area in order to communicate to the input device which function is supposed to be set or which function the input device is to perform. The input device is capable of communicating with the corresponding insert card.

[0016] By means of these insert cards, which on the input device correspond partly or completely with the respective LED, LCD, or set indicators, visually replacing, supplementing, functionally adjusting, optimizing and/or parameterizing them, the service specialist or user of the system to be adjusted is able to quickly and cost-effectively program and adjust the input device. The system-specific parameter are transferred in situ by inserting the card and provided with a systems diagram and key allocation. Buy inserting the card,

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 61

the device is then parameterized, controlled, and optimized. This combination of insert card, variable display/operation fields, and their automatic allocation substantially reduces time spent by service personnel in situ, as well as maintenance, installation and reprogramming costs.

[0017] Another possibility consists in letting the input field connected – detachably --with the input device, slide across a surface, which clearly shows all procedural conditions and process parameters of the procedure to be controlled, in order to adjust the respective process parameter. The different positions of the input represent the different levels of operation which, in the case of insert cards or activation of different operation levels by individual operation areas represent individual levels of operation by means of display/operation areas.

[0018] In this process, the variable display/ operation areas will relect only the part of the process that is selected by the respective control level and is needed at the moment for the adjustment of the corresponding process parameter, thereby avoiding an inundation of operators with excessive and confusing information.

[0019] As an advantage, the process parameters relevant in each case are changed during the input of process parameters by corresponding indicator/operating fields, so as to allow the operator to maintain control over his current activity at all times. Thus, at input of the respective values, the dynamic change of the relevant process parameters facilitates "the programming of the control unit in a playful way". This offers a variety of graphic possibilities to facilitate the input of different process parameters for operator. Furthermore, this provides the possibility of programming different controllers by the same input device, i.e., the possibility of using a portable input device that will be attached to the respective controller that then can be programmed via the above-mentioned control levels. This will drastically reduce the cost of input devices for controllers of heating/air conditioning systems or their related components. Furthermore, adjustment of the many different components of the heating/air conditioning system will be made easier for the user by the fact that he always deals with the same menu management and the same symbols and images of process parameters, making it possible for him to use the same input device to perform a great variety of programming functions, regardless of room temperature adjustments, adjustment of the central heating kettle, or adjustment of air conditioning for different rooms.

[0020] The input area is a touch-sensitive and transparent field, realizing the vastly different operational fields in known ways by means of a transparent and/or semi-permeable touch-screen element. These transparent elements are familiar and available on the market in large quantities. Therefore attaching the detachable input field to the input device and to provide for appropriate means of communication so as to be detachable appears to be advantageous, in order to make communication between input field and input device possible. This communication may proceed either wire-bound, radio-controlled, or by optic means, thereby, for example, enabling operators to program different controllers inside a house by means of a portable input area.

[0021] For instance, placing certain surfaces, backed by symbols, on or adjacent to respective controllers, so that the input area merely has to be placed on top of the surface for appropriate programming, would be an option. The appropriate position of the input area on the surface would then be determined mechanically or electromagnetically or optically. Similar to the computer "mice", the input area can be moved across the surface, where, depending upon the position on the surface different functions, dimensions, or meanings are allocated to individual indicator-/operation areas. Another possibility would be to combine this input area with an LED-indicator that can be co-integrated into the input area and, furthermore, could be of transparent design as well, so that, according to the selected function, and/or according to the process parameters to be adjusted, the relevant process parameters is shown on the input area itself, next to the subjacent surface, changing dynamically upon input of the appropriate data.

[0022] Furthermore, the input device may itself have an opening to receive insert cards that define the different operation levels and are provided with a perforated grid, to enable the input device to identify the type of insert card used. As an option, the insert card may be provided with a magnetic strip, indicating to the input device which card is inserted at the moment, whereupon the input device communicates to the input area which indicator/operation areas are activated, their function and meaning, the dimensions to be shown and, if applicable, the LED-readings to be activated. These LED-readings can also be deposited with parts of the input area, so that the respective indicator/operation areas of the input area indicate no function at this point.

[0023] In this way, the greatly different dimensions of operation areas and/or display areas can be defined – either having a display or operation function or merely acting as non-functioning "glass" for the display of subjacent LED-readings, surface, symbols, or graphic images.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 62

The combination of display/operation areas is designed in a way that, according to the selected operation level, individual areas either serve for displays or operations or for display plus operation or, in addition, to cover up or display subjacent surfaces. Furthermore, colored plastic of paper cards can be inserted between LCD/LED-reading and/or the display/operation surface and the touch-sensitive element, i.e., touch-screen input area, to cover parts of the subjacent display area, for the purpose of realizing specific input/display options. This allows to emphasize particular elements, e.g., time periods of temperature decreases and time periods of heating intervals, highlighted in part by color-coded cards and in part by the subjacent reading "display" or by lighting up, to communicate to the user that this particular area is currently either activated or deactivated. This is illustrated by:

Fig. 1 Schematic view of a heating/air conditioning system with input device, according to the invention, and enlarged view of the input area;

Fig. 2 input device and sectional view of the input device;

Fig. 2a a different design of the input device, according to Fig. 2;

Fig. 2b an additional design of the input device according to Fig. 2;

Fig. 3 an additional design of the input device, according to Fig. 2 and sectional view of input device;

Fig. 4 view of a first operation level of the input device;

Fig. 5 view of two second operation levels;

Fig. 6a view of a third operation level;

Fig. 6b view of a fourth operation level;

Fig. 6c view of a fifth operation level;

Fig. 7 view of an additional fifth operation level;

Fig. 8 view of a variation of the operation level, according to Fig. 7;

Fig. 9 view of a dynamic 5th operation level with an appertaining 6th operation level; and

Fig. 10 schematic view of a very large number of two-dimensional operation levels, arranged side by side.

[0025] Fig. 1 shows a schematic view of a controller 2, for example of a heating/air conditioning system with flow 3b, return 3a, and pump 4. Likewise, controller 2 may involve the thermostat of a warm-water pipe 3a and 3b, connected with one or several heating units (not shown) via a stop valve 4 which is connected with room-temperature sensors (not shown) which reads the current room temperature and provides it to controller 2, thereby enabling it to control the warm-water pipe of the heating unit in accordance with adjusted temperatures during different hours of the day.

[0026] The heat controller 2 is connected to an input device1 which a data line 5 (in case it is placed at a distance from controller 2) or which may be attached directly to the controller 2. The input device shows an input area 6, enlarged for emphasis in Fig. 1 emphasis. This input device 6 is equipped with display/operation areas 7, shown schematically in Fig.1 as an arrangement of cells and columns.

[0027] Fig. 2 shows a view of the input device 1 with input area 6 which is fastened on top of the input device1. Input area 6 shows a number of display/operation areas 7, arranged besides fastened display/operation areas 10. The right half of input area 6 is used to indicate e.g., room temperatures varying between 5° C and 30° C, the actual current temperature being indicated by one or more light-emitting diodes 8. The section through input device 1 also shows the display/operation areas 7 arranged at the left side and the etiquettes and adhesive labels10 fastened for temperature readings, arranged next to each diode 8. This section of input area 6 can also be transparent, in order to make the markings underneath the display area 6 visible. By example, current temperatures can also be realized by means of digital readouts. Underneath the variable display/operation areas 7, a hollow space is provided for receiving insert cards 9, which are provided with appropriate means fore the input device 1 to recognize the type of card that has been inserted into opening 11.
According to the type of card 9 inserted into the opening, the display/operation areas 7 are assigned different functions, meanings, and/or dimensions, so that either individual display/operation areas 7 have individual functions or a group of display/operation areas 7 are combined to perform one function or display.

[0028] Fig. 2a shows a different design of input device 1 according to Fig. 2, having input area 6 attached atop input device 1. Again, cards 9 are used to be inserted into opening 11t; these insert cards 9 are smaller than those used in Fig. 2, so that the lower half of input area 6 is used as fixed display/operating area 7a. This display/operation area 7a can be provided either with different functions and/or references by the input device 1, by means of a subjacent active surface for the display of process parameters or be used

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 63

strictly for the display of process parameters which can be changed via variable display/operation areas 7 in the upper left part of input area 6. Here, too, the right half of input area 5 is used for temperature readouts, displayed by etiquettes or adhesive stickers 10, their active status being displayed by light-emitting diodes.

[0029] Fig. 2b shows a further design of input device 1, according to Fig. 2 or Fig. 2a, where, as an additional feature the right, previously static input area 6 has been replaced by two oblong variable display/operation areas 7f, which can be used e.g., for the display of relevant process parameters or for the input of additional functions. As an example, when inserting a card 9 into the upper left part of input area 6 one could conceivably provide the respective operation areas 7 with their respective functions, while a larger display area 7a at the left lower part of operation area 6 is activated to indicate the process status to be actually adjusted, whereas the small static display area at the right lower edge of the input area 6 can be intended as an warning area in a situation where the room temperature drops, say to 5° Celsius. If the temperature exceeds 5° C, both right oblong areas 7f of input area 6 can me used to read the current temperature and in addition be used to show date and hour.

[0030] Fig. 3 shows yet another design of input area 6 according to Fig. 2, Fig. 2a or Fig. 2b. In this version the right lower half of display area 6 is intended as fixed display/operation area 12, to be equipped either with switches, buttons, or keys, whereas the other parts of input field 6 are provided with variable display/operation areas 7.

[0031] By example, Fig. 4 shows a first operation level 23a of operation area 6, subdivided into two upper rows of six each variable display/operation areas 7b and to lower fixed display areas 7c. The upper left variable display/operation area 7b shows the current hour, where pressing down on the operation area changes the entire input area 6 and , e.g., a second operation level 23b according to Fig. 3 (at the left side) appears, containing only 4 areas. At the left side, display area 7a can be seen, showing the actual hour, in this case "09:45". By pressing down both upper right control keys (operation area) 7b, the time can be adjusted, while the lower-most right control key 13b is used to reset into the first operation level 23a, according to Fig. 4.

[0032] By pressing down on the upper central display/operation area 7b, according to Fig. 4, the second operation level 23b, depicted in Fig. 5, is reset, which, like the second operation level 23b can be used to adjust the time. The current day-temperature, in this example 23° C, is shown at the left side, while the current day-temperature (e.g., the room-temperature) can be adjusted by both upper right keys 13. By pressing down on the lower right operation area 7b, the return key 13b retrieves the screen, i.e., i.e. into the first operation level 23a, according to Fig. 4.

[0033] The same procedure applies to the upper right display/operation area 7b for adjustment of the respective night temperature. The adjustment of thermostats for the entire day is located below the upper threedisplay/operation areas 7b according to Fig.4. On the lower two rows of input area 6, one recognizes display areas 7c, which show the different hours as well as the date 21, i.e., always the current date. The rectangular curve shows the adjusted room temperatures at different times of day, and point 17 displays the current hour – also displayed in the upper left display area 7b.

[0034] Fig. 6a shows a third operation level 23c, accessible by clicking the return keys 13, according to Fig. 5, as long as this procedure is provided for. There, the days of the week are displayed by means of different large display/operation areas 7d. The display of current weekdays 14 is used for the adjustment of different heating graphs for each day of the week; a "copy" key activates the installed copy function. The "return" key 13b is used to "jump" back to the first operation level 23a. However, it is also possible to jump into operation level 23c, depicted in Fig. 6a by clicking the above-described keys of the first operation level 23a, so that clicking the respective days of the week results in jumping into the respective second operation level 23b, shown in Fig. 5, in order to input the desired temperatures for different times and different conditions of the day.

[0035] Fig. 6b shows a fourth operation level, characterized by the capability to intuitively adjust the rectangular curve shown in Fig. 4 by defining the different time periods t1 to t6. the upper two rows of display/operation areas 7e are used to adjust the time periods t1 to t6 as well as time as such, i.e., the adjusted current time for the respective time period – the time changing dynamically by clicking the arrow keys. In these areas, indication of the individual time periods t1 to t6 is static. Thereby the first two rows of display/control keys 7e meet the demands of display areas, of operation areas, and of set display/operation areas.

[0036] The lower two rows of display/operation areas 7e are used for dynamic display of the current, adjusted process parameters t1 to t6, as well as for a readout of the respective day- and night-temperatures, adjustable by the left lower four display/operation areas. Again, arrow keys13 are used to adjust the displayed temperature 14. When changed, i.e. the relevant arrow key 13 is clicked, the upper and/or potential of the heating graph 16a and 16b changes.

]0037] Fig. 6c shows another design of the fourth operation level 23b, defining different on- off stages for different times of different heating periods as well, using display/operation areas 7b, activated accordingly by touch, indicating to the operator by the light of an individual operation area 1, that now the time within the operation field can be changed by clicking

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 64

arrow-key 13. Clicking the return key 13b resets the third operation level 23c.

[0038] Fig. 7 shows another design of input area 6, having a large display field 7a, which is changed via operation fields 7b and its arrow-symbols 13. On the left lower display area 15 the symbol for the relevant day-period is located, in this diagram, for example, the daily activity. By clicking both upper left arrow-keys the relevant daytime temperature (here, 24° C) can be enlarged or reduced, while with both lower right arrow-keys 13 the on/of time for this daytime temperature can be altered. During this process, a ball 17 moves slowly along the rectangular graph , so that, depending on the position of the ball, either both upper left control keys 7b or both lower right control keys are activated, enabling the operator to adjust the correct time as well as the correct temperature.

[0039] Fig. 8 shows another design of the fourth operation level 23d of Fig. 7, which, instead of a rectangular curve as in Fig. 7, is provided with a coordinate system, whose horizontal axis indicates the current temperature and the vertical axis – the correct time. By using the relevant arrow-keys, the currently adjusted variable16 can be altered so as to adjust the respective temperature for the corresponding time period or time to achieve the selected process status 15. Even this instance clearly shows that only a few of the variable display/operation keys are intended for operation, whereas other display/operation keys 7 are used for display or are meaningless.

[0040] Fig. 9 displays another adjustment option of the fourth operation level 23b, also including a fifth operation level 23a. Clicking the left lower two arrow-keys 13 of the fourth operation level 23d, allows point 17 to move dynamically along rectangular graph 16, while an indicator simultaneously shows the position of point 17 on the curve. The upper large display area 7a operates only for dynamic display of the of the changing process parameter that can be changed by means of the two lower arrow-keys. By clicking the relevant return-key 13b the actual daytime and nighttime temperature for the selected time 14 in the sixth operation level 23e, with the operation area 7a of the sixth operation level 23e automatically indicating the relevant night or day-symbol, depending on the time 14 the return-key 13b has been clicked in the fifth operation level 23d. By clicking the return-key 13b of the sixth operation level 23e, a jump back into the fifth operation level is possible. Inside the fifth operation level 23d another area (not shown) can be provided, guaranteeing a return jump into the first Operation level 23a, shown in Fig. 4.

[0041] Fig.10 shows an alternative design of this invention, having an input device connected by a line with a transparent input area 6.

[0042] This input area 6 can be moved across the surface 30 backed by symbols. The surface is provided with means for detecting the position of input area 6. In addition, input area 6 can itself be equipped with such means, in order to communicate e current position to input device 1. This can be realized by moving input area 6 into a reset position by clicking a certain key on input area 6, to communicate to input device 1 that input area 6 is currently placed on reset.

[0043] All relative moves of input area 6 can be detected by optic or mechanic means (e.g. small balls on the underside of the frame of input area 6). Depending on the adjusted position of input area 6 on surface 30, the applicable display/operation areas 7 of input area 6 are defined by appropriate functions, references and/or dimensions, so as to enable input device1 to assign different tasks to relevant display/operation areas 7, depending upon the position. The surface 30 is provided with symbols 7, 14, 13 of different type and size and can also be provided with a surface 12 for operator's information; it performs no technical function. Here, too, input area 6 can be provided with combined display/operation areas, which can cover parts of the surface below or overwrite them with other displays, therebypotentially achieving utmost flexibility.

[0044] This arrangement is of particular advantage, as operators have a clear view on surface 30 of each function and all process parameters and process states. Depending on their planned use, "controllers" or "process parameters to be adjusted", different adjustments of applicable display/operation areas can be defined.

Patent claims

1. Procedure for input of process parameters, specifically a heating/air conditioning system or related components,

by displaying on an input device 1 of a controller 2 different process conditions and/or the relevant process parameters (14, 16) by means of display/operation areas (7, ...7f) and possibly in conjunction with fixed display/operation areas, and to select different operation levels (23a,...23e) for input of process parameters (14, 16) via different display/operation areas (7, ...7f, 13), **characterized by**

the input of process parameters (14, 16) via variable display/operation changing their function, reference and/or size according to the selected operation level (23a,...23e), where the variable display/operation areas (7, ...7f) are located, at least in part, in varying positions.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 65

2. Procedure as claimed in claim 1, **characterized by**

selection of the different operation levels (23a, ... 23e) by means of certain display/operation areas (20, 13b) and/or by means of insert cards (9), and/or by means of Input area 6 of input device 1 and underlying surfaces or parts of a surface (30).

3. Procedure as claimed in claim 1 or 2, **characterized by**

selection of process parameters (14, 16) via variable display/operation areas (7, ...7f) which reproduce only the part of the process selected by the applicable operation levels (23a.... 23e).

4. Procedure as claimed in one of the aforementioned claims, **characterized by**

providing the insert cards (9) with information for the selection of variable operation levels (23a, ...23e).

5. Procedure as claimed in one of the aforementioned claims, **characterized by**

the input of process parameters (14, 16) over variable display/Operation areas (7, ...f), which according to values entered, undergo a dynamic change and/or indicate a different operation level (23a... 23e)

6. Procedure as claimed in one of the aforementioned claims, **characterized by**

graphic representation of process parameters (14, 16) i.e., temperatures, weekdays, heating curves, heating periods or combination of process parameters (14, 16), this graphic representation undergoing at least partial changes during input of process parameters (14, 16)

7. Procedure as claimed in one of the aforementioned claims, **characterized by**

detecting variable operation levels (23a, ...23e) and allocating variable display/operation area (7, ...7f) to input area (6) or to parts of input area 6 of the input device (1), according to their function, reference and/or their size.

8. Input device (1) of a controller (2) for the input of process parameters, specifically a heating/air conditioning system or related components, with variable display/operation areas (7, ...7f) and, possibly, fixed display/operation areas (10, 12) indicating different process conditions and/or process parameters (14, 16) to be adjusted, and can be input into various operation levels (23a,...23e), via process parameters (14, 16), via varying display/operation areas (7, ...7f, 13),

characterized by
the input capability of process parameters (14, 16) via display/operation areas (7, ...7f) which, according to the selected operation level (23a, ...23e) alter their function, meaning and/or size, and the fact that the variable display/operation areas (7, ...7f) for varying operation levels (23a, ...23e) occupy varying position, at least in part.

9. Input Device (1) as claimed in claim 8, **characterized by**

input device (1) having a touch-sensitive and transparent input area (5) that has varying operation areas (7, ...7f), detect touch and relay it to the input device (1), as well as making visible any surfaces, data, or objects located below the input area (6).

10. Input device (1) claimed in claims 8 or 9, **characterized by**

the fact that the input area (6) is detachably connected to input device (1) and has means for data communication with input device (1

11. I nput Device (1) as claimed in one of claims 8 - 10 **characterized by**

input device (1) having an opening to receive insert cards (9), defining the different operation levels (23a...23e), as well as having means for the detection of the insert card (9) used in each case.

12. Input Device (1) as claimed in one of claims 8 – 11, **characterized by**
the defining by insert cards (9) of different operation levels a...23e), functions of the input device (1), and display & selection of at least

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 66

parts of display/operation area (7,...7f).

13. Input Device (1) as claimed in claim 11 or 12 **characterized by**

the insert cards (9) being magnetic, mechanical, electronic, or optical data carriers and the input device being capable of communicating with the appropriate insert card (9).

14. Input Device (1) as claimed in one of claims 8 – 13, **characterized by**

the input device (1) and/or the input area (6) having a muffle for the detection of the position of the input area (6) on a surface (30), with the varying positions of the input area (6) on the surface (30), defining the varying operation levels (23a,...2e)

15. Input device (1) as claimed in one of claims 8 – 14, **characterized by**

the activation or deactivation of individual operation areas (7, ...7f) of the input area (6), according to the selected or detected operation level (23a,... 23e).

16. Input Device (1) as claimed in one of claims 8 – 15, **characterized by**

the added usability of individual operation levels (7, ...7f) of input area (6) for the display of process parameters (14, 16) and/or process conditions.

17. Use of an input device (1) as claimed in one of claims 8 – 16, or a procedure as claimed in one of claims 1 – 7 for programming the heat controller of a heating system.

18. Use of an input device (1) as claimed in one of claims 8 – 16 or a procedure as claimed in one of claims 1 - 7 for programming a thermostat for the adjustment of the room-temperature of a room heated by a heating system and/or cooled by an air conditioning system.

19. Use of an input device (1) as claimed in one of claims 8 – 16 or a procedure as claimed in one of claims 1 – 7 for programming a heat controller for either individual or all rooms of a building.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 67

Fig. 1

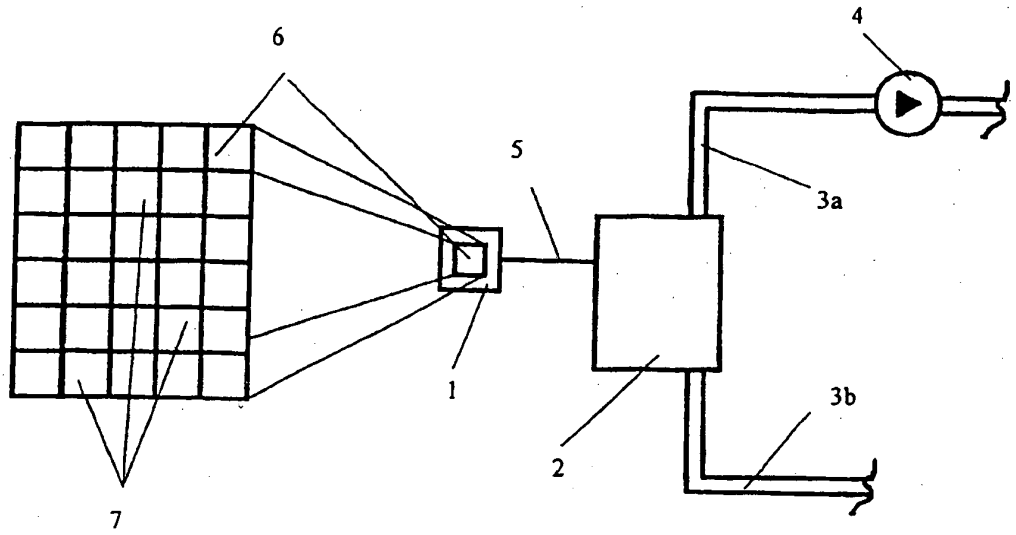


Fig. 2

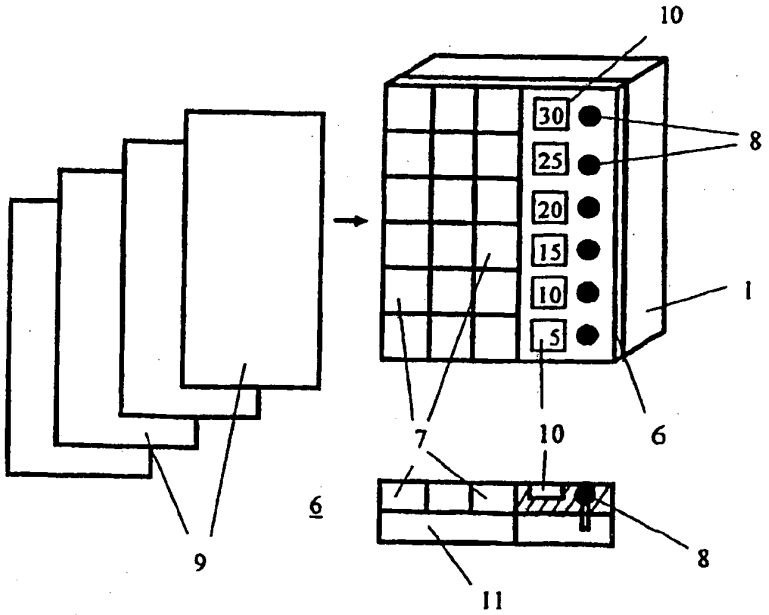


Fig. 2a

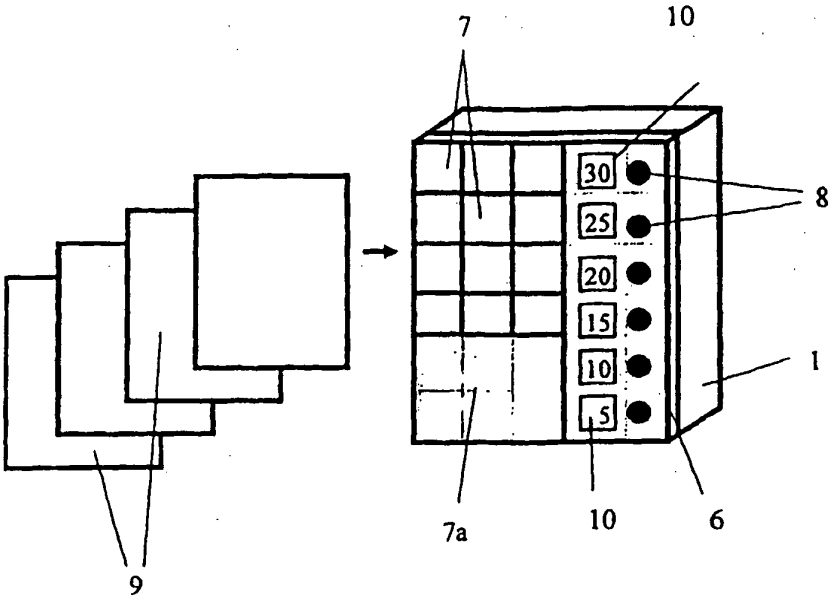


Fig. 2b

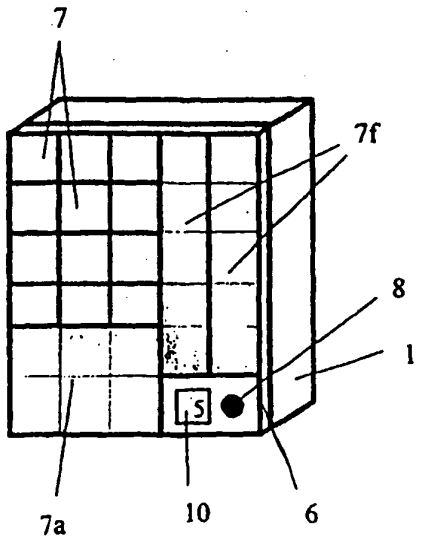


Fig. 3

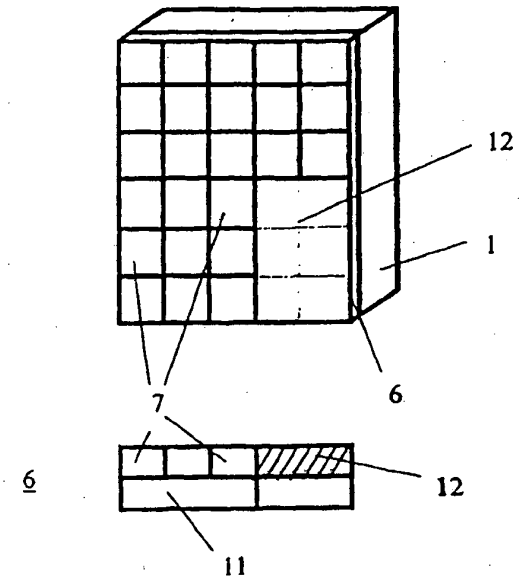
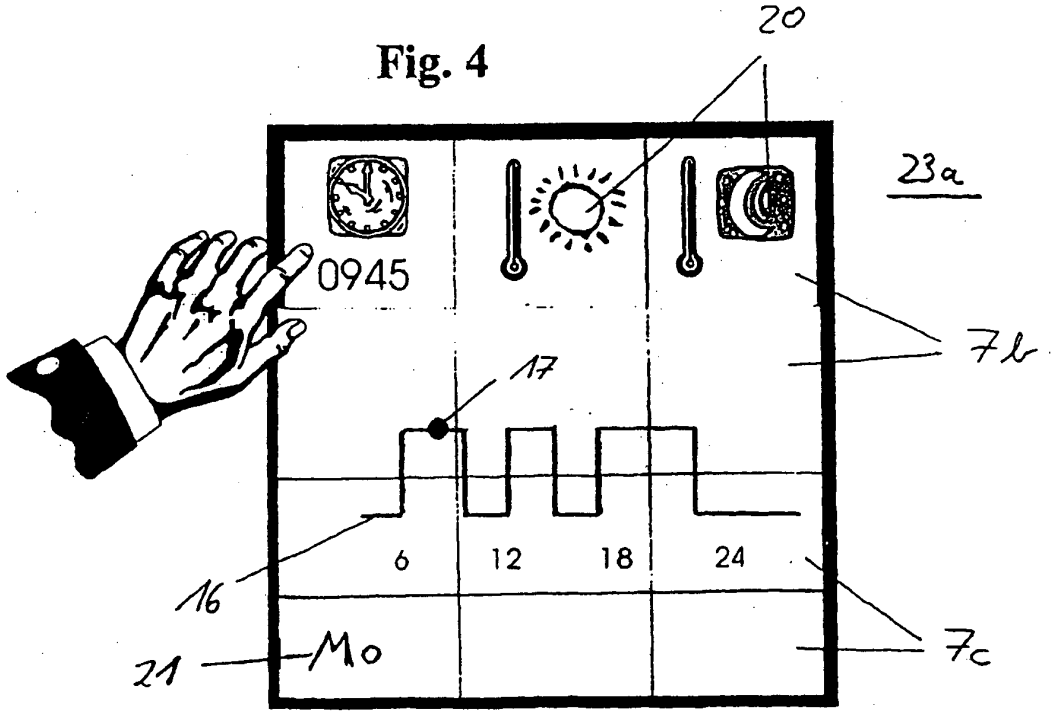


Fig. 4



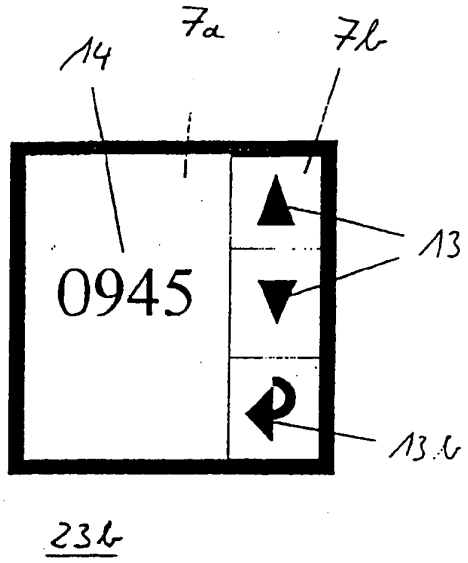

14
7a
7b
0945
13
13.b
23b

Fig. 5

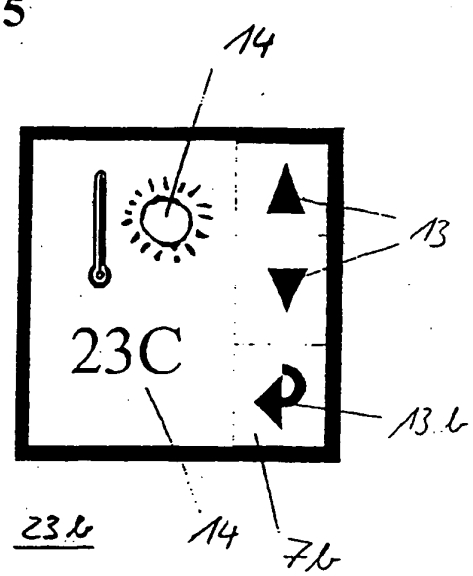

14
23C
13
13.b
23b
14
7b

Fig. 6a

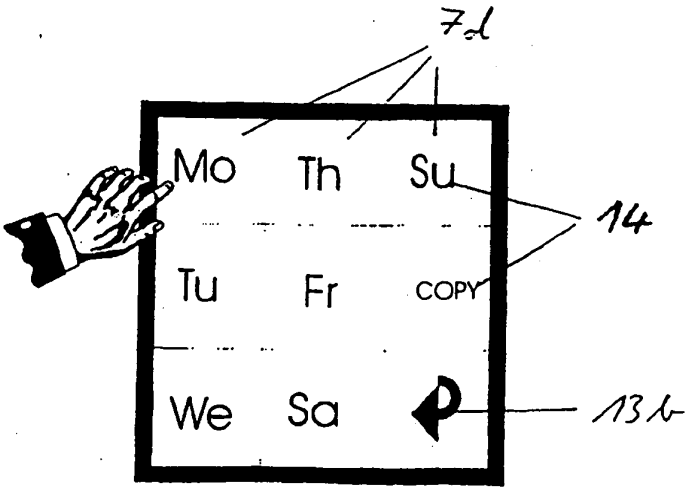

7d
Mo
Th
Su
Tu
Fr
COPY
We
Sa
14
13.b
23c

Fig. 6b

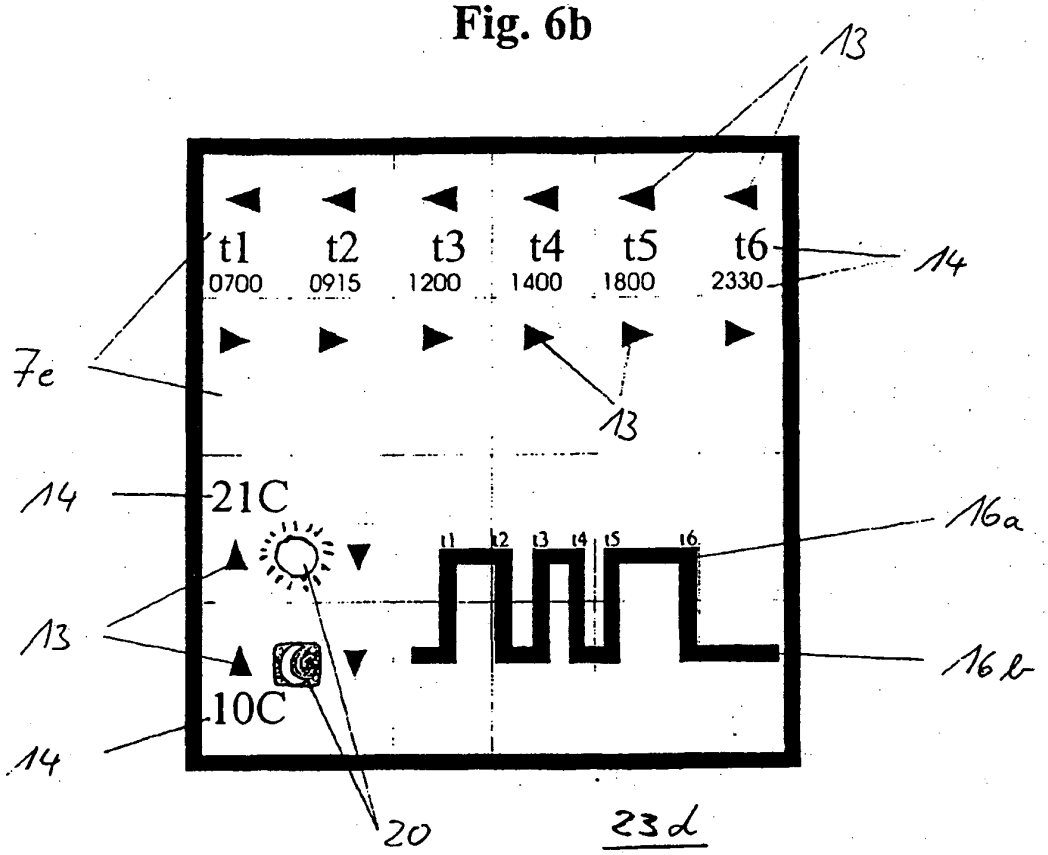

13
t1 0700
t2 0915
t3 1200
t4 1400
t5 1800
t6 2330
14
7e
13
14
21C
16a
13
16b
10C
14
20
23d

Fig. 6c

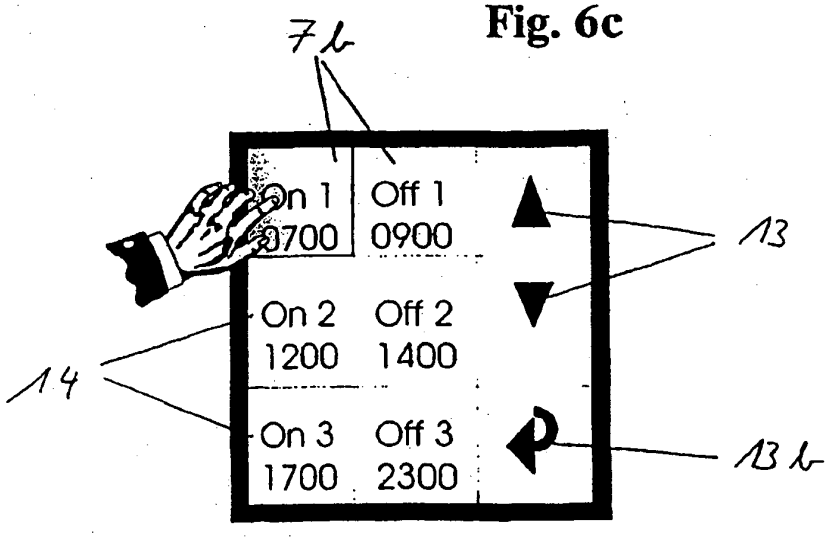

7b
On 1 0700
Off 1 0900
13
On 2 1200
Off 2 1400
14
On 3 1700
Off 3 2300
13b
23d

Fig. 7

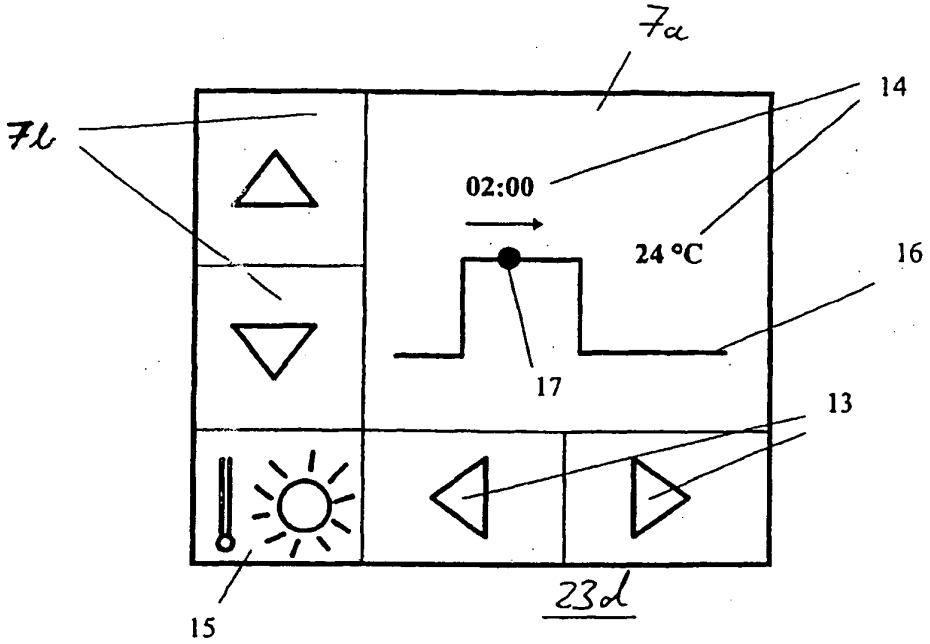


Fig. 8

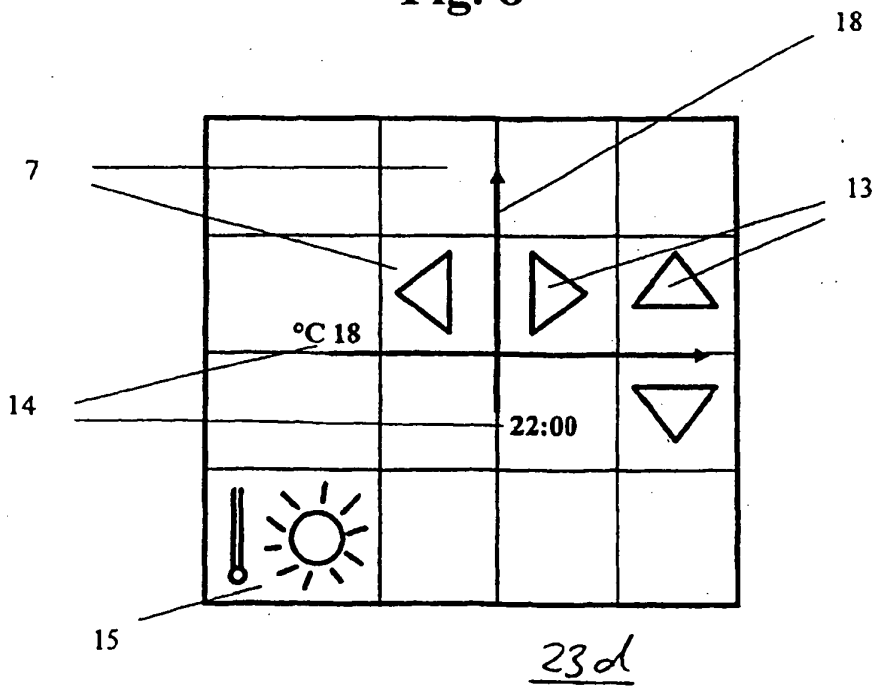


Fig. 9

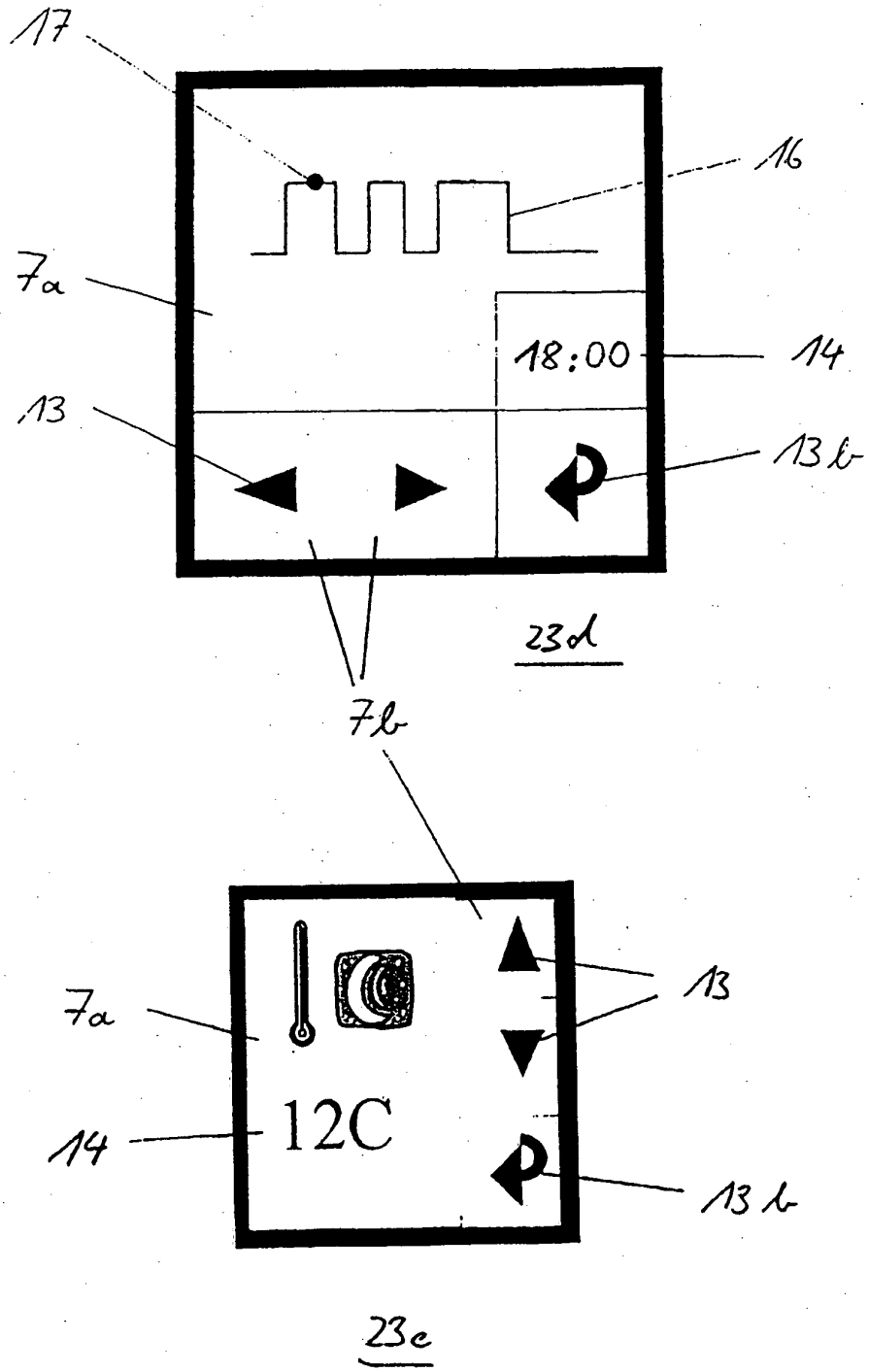
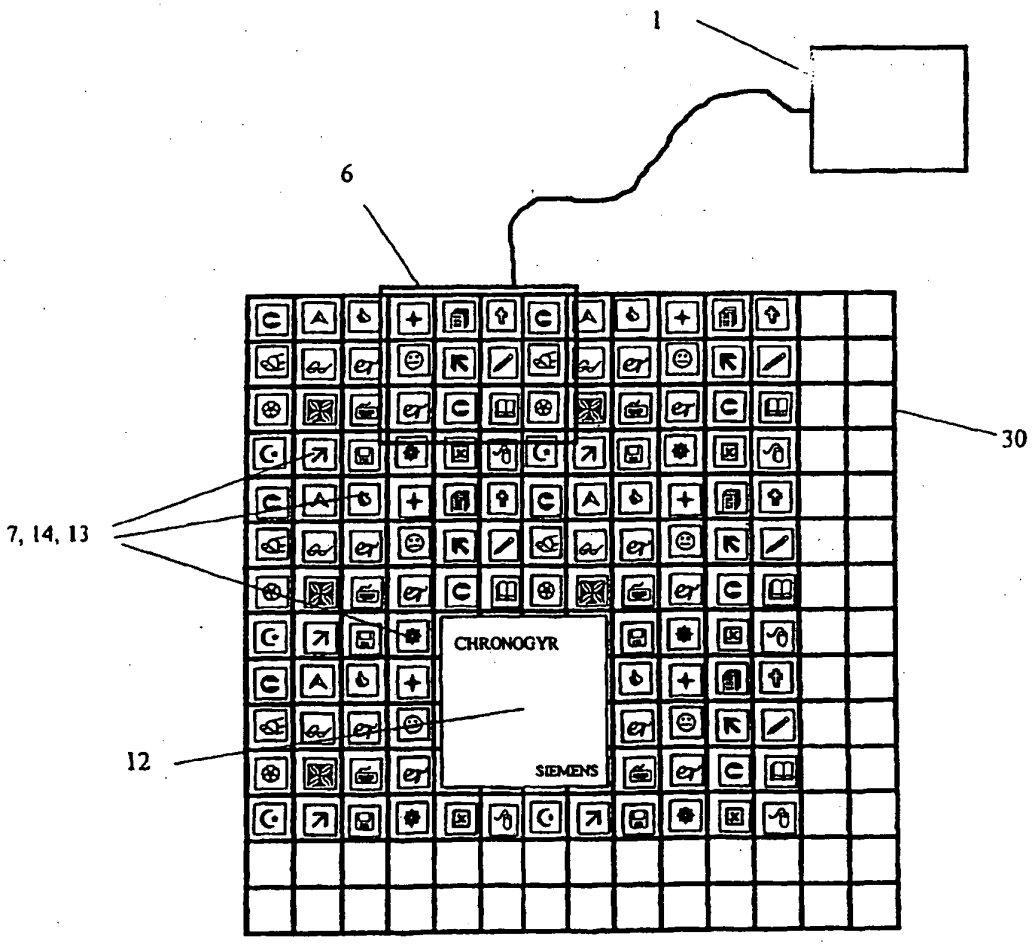


Fig. 10



THIS PAGE BLANK (USPTO)

PCT INTERNATIONAL BUREAU OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION [Emblem]
INTERNATIONAL APPLICATION, PUBLISHED PURSUANT TO THE INTERNATIONAL PATENT COOPERATION CKONVENTION

(51) International Patent Classification [6] GOSB 19/10 A1

(11) International Publication Number: WO 97/3939

(43) International Publication Date: October 23, 1997 (10.23.9)

(21) International FileN umber: PCT/AT97/00071

(22) International Application Date: April 16 1997 (04/16/97)

(30) Priority Dates:
A 692/96 April 17 1996 (04/17/96)

(71)(72) Applicant and Inventor: HANAZEDER, Erwin [AT/AT];

(74) Attorneys: HÜBSCHER; Gerhard etc.; Spittelwiese 7, A-4020 Linz (AT).

(81) Designated Countries: AL, AM, AT, AU AZ BA, BB, BO, BR, BY, CA,,CH, CN,CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LI, LR, LS, LT, LU, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO,RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO Patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM); European Patent)AT; BE; CH; DE; DK; ES; FI; FR; GB; GR; IE; IT; LU; MC; NL; PT, SE), OAPI Patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
with International Research Report.

(54) Title: DEVICE FOR REGULATING A HEATING SYSTEM, SPECIFICALLY IN A RESIDENTIAL BUILDING

(57) Abstract

This invention describes a device for regulating a heating system, specifically for a residential building, with a heating controller (15), with an input device (17) for set temperature values related to a measured variable, preferably time and/or outdoor temperature, and with a set value memory (16) connected to the input device (17) transmitting set values, depending on the measured valuable, to the heating controller (15). To simplify set value input, it is proposed that the input device (17) consist of a display (30) for analog screen input in at least one coordinate system with preset graduation and of an evaluation circuit (31) for set temperature values entered in analog form on the display (30) via the coordinate axis (34) for the measured variable, said evaluation circuit (31) being connected at the output side of the set value memory (16)

[DIAGRAM]

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 77

FOR YOUR INFORMATION

Codes for identification of PCT member countries listed on cover sheets of documents publishing international applications pursuant to PCT.

AL	ALBANIA	ES	SPAIN	LS	LESOTHO	SL	SLOVENIA
AM	ARMENIA	FI	FINLAND	LT	LITHUANIA	SK	SLOVAKIA
AT	AUSTRIA	FR	FRANCE	LU	LUXEMBOURG	SN	SENEGAL
AU	AUSTRALIA	GA	GABUN	V	LATVIA	SY	SWAZILAND
AZ	AZERBAIJAN	GB	UNITED KINGDOM	MC	MONACO	TD	TSHAD
BA	BOSNIA-HERZEGOVINA	GE	GEORGIA STATE	MD	REPUBLIC MOLDAVIA	TG	TOGO
BB	BARBADOS	GH	GHANA	MG	MADAGASCAR	TJ	TAJIKHISTAN
BE	BELGIUM	GN	GUINEA	MK	FORMER YUGOSL. REPUBLIC OF MACEDONIA	TM	TURKMENISTAN
BF	BARCLEA FASO	GR	GREECE	ML	MALI	TU	TURKEY
BG	BULGARIA	HU	HUNGARY	MN	MONGOLIA	TT	TRINIDAD & TOBAGO
BJ	BENIN	IE	IRELAND	MR	MAURITANIA	UA	UKRAINE
BR	BRAZIL	IL	ISRAEL	MW	MALAWI	UG	UGANDA
BY	BELARUS	IS	ISLAND	MX	MEXICO	US	U.S.A.
CA	CANADA IT	IT	ITALY	NE	NIGERIA	UZ	UZBEKISTAN
CF	CENTRAL AFRICAN REPUBLIC	JP	JAPAN	NL	THE NETHERLANDS	VN	VIETNAM
CG	CONGO	KE	KENIA	NO	NORWAY	YU	YUGOSLAVIA
CH	SWITZERLAND	KG	KIRGHIZ REP.	NZ	NEWZEALAND	ZW	ZIMBABWE
CI	IVORY COAST	KP	NORTH KOREA	PL	POLAND		
CM	CAMEROON	KR	SOUTH KOREA	PT	PORTUGAL		
CN	CHINA	KZ	KAZAKHSTAN	RO	RUMANIA		
CU	CUBA	LC	ST. LUCIA	RU	RUSSIAN FEDERATION		
CZ	CZECH REPUBLIC	DR	GERMANY	SD	SUDAN		
DK	DEBMARK	LK	SRI LANKA	SE	SWEDEN		

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 78

Device for Regulating a Heating System, Specifically in a Residential Building

This invention describes a device for regulating a heating system, specifically for a residential building, with a heating controller, with an input device for set temperature values related to a measurable variable – preferably time or external temperatures -- and with a set-value memory connected to an input device for transmitting set values, depending on the measured value, to the heating controller.

To control a heating system or individual heating circuits, according to a preset specified march of temperature, heating controllers are installed that compare the measured actual temperature values decisive for temperature control, e.g. outside temperature, inside temperature, flow temperature, etc., with preset values and intervene to offset any variance between preset and actual values. Specific temperatures in buildings, set for a day or a week, are usually programmed on a keyboard and set temperatures valid for selected daytimes must be entered and stored laboriously for each day of a week in prescribed sequence into a set-value memory allocated to the heating controller. This requires professional expertise. The graphic display of the stored set march of temperature via a time axis on the screen to facilitate the review of set values, has been known. However, the actual march of temperature as received by readings from temperature sensors in the heating system can be displayed on such a screen as well. After all, we are aware of the fact that to monitor a heating system, especially a solar heating system (EP 0676 682 A2), actual values perceived by temperature sensors and/or measured variables are stored in a time slot I case thresholds are exceeded prior to and after the are exceeded , in order to better assess any malfunction based on the stored temperature variables. However, while

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 79

these well-known procedures are structured on set values, they are unable to facilitate the required comparatively laborious input of set values.

Therefore, this invention is based on the task of designing a device of the kind described in the beginning that will simplify a set-value input, even for a layman.

The invention solves this task by means of an the input device which consists of a screen for analog input in at least one coordinate axis with preset graduation and an evaluation circuit connected to the output site of the set-value memory for analog input of set temperature values on display, via the coordinate axis.

This procedure creates the possibility for analog input of a set-value process into a coordinate axis on a display screen, provided with dimensional graduation.
By means the evaluation circuit, the set values required for regulation are determined from the set-value graph entered analog and entered and stored digitally into the set-value memory. The stored set values can be retrieved to be displayed again, to make any necessary corrections by analog overwrite of the displayed set-value graph. The changed set-value course is then stored in the set-value memory by means of the evaluation circuit.

The analog input on the screen could also be performed with a mouse connected to a computer. However, it would simplify matters if the screen were to be designed with liquid crystals covered by a touch-sensitive film, because the set-value graph could be entered by hand with a pen on this type screen, known as "touch-screen".

If additional input of certain program data related to a heating system is required for a program to proceed in an orderly manner, the screen can be provided with separate input areas for such preset program data to be transmitted to the heat controller. Screen input can be simplified via certain input areas, e.g., when set-value graphs are called up via these input areas for individual heating circuits or for certain weekdays.

If the set-value memory entered through the display screen is connected to a transmission unit at a distance between the input device and the heating controller, whose receiving unit is allocated to the heating controller, the preset-value transmission for heating control can proceed from a remote location over the transmission distance in an equally simple way via an analog screen input. To transmit data from the heating controller to the screen, it is recommended to equip both heating controller and input device with transmission and receiving units to traverse the transmission distance.

Of course, the display screen provided for analog input can be used for the display of selected measured variables of the heating system, opening up a multitude of possible applications, not only for the transmission of preset values but also for monitoring the heating system with the readout of actual values.

The diagram shows a completed example of the invented device. Depicted are:

Fig. 1, a heating system with a control device in a simplified block diagram.

Fig. 2, the device according to the invention for regulating a heating system, in a block diagram, and

Fig. 3, a schematic view of an optional design of the display screen for analog input of the control device on a larger scale.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 81

the heating system according to Fig. 1 is designed as a warm-water heating system, having several heatint circuits 1, of which only three are depicted. The joint flow 2 and joint return 3 of these heating circuits, supplied with warm water from their joint flow 2 thru a valve 4 each, are connected by a buffer 5, via flow 7, which can be loaded by heating boiler 6. The return 8 of the heating boiler 6 is provided with a charge pump 9. However, the buffer 5 can be loaded by a solar collector 10, whose flow 11 is connected to a heat exchanger 12 of the buffer 5. The cold junction of this heat exchanger 12 is connected to the return 14 of the solar collector 10 via a pump13.

The control of this heating system, which shows only one of the performance options and can be supplemented and modified in multiple ways, proceeds via a heat controller 15, equipped with set-value memory 15. The set values needed for heat control, especially the time-related preset temperature values for individual heating circuits 1, preferably heating individual rooms, are entered into and stored in the set-value memory 16 by means of an input device 17. The actual values linked to the set values are transmitted via sensor 18 for room temperatures determined by individual heating circuits 1, via a sensor for external temperatures 19, a temperature sensor 20 for the flow temperature of heating boiler 6, a sensor 21 for solar insolation, a sensor for the flow temperature of the solar collector 10, and possibly other sensors, and transmitted to the heat controller 15, which in cases of variances intervenes as usual to offset any variance. For this purpose, the valve controls 4 are mmonitored by a valve-switching circuit 23 to control the room temperature within the range of individual heating circuits, according to set values. In compliance with the control program, control of the heat circuit pump 24 and the mixing valve 25 by which the return 3 can be connected to the flow 2 of the heating system to control the flow temperature, proceeds by heat controller 15, which also selects the heating boiler 6 and the solar collector 10. The

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 82

control circuits 26 and 27 provided for this purpose need not be attached directly to heating controller 15 but may be positioned near heating boiler 6 and/or the solar collector 10, as pointed out in Fig. 1. In this case, a transmission path must be provided; a wireless transmission path 28 appears feasible. To avoid limiting the transmission of signals toward one direction, it is recommended that transceiver-receiver units 29 be allocated to the heating controller 15 as well as to control circuits 26 and 27, especially if control circuits 26 and 27 include secondary control circuits which control heating boiler 6 and/or solar collector 10, depending on actual values collected by sensors, directly connected to control circuits 26 and 27. As an example, according to Fig. 1, this applies to temperature sensor 20 of the flow temperature of heating boiler 6, to sensor 21 for solar insolation, and sensor 22 for the flow temperature of the solar collector 10. Measured variables obtained to control circuits 26 and 27 can be transmitted to heating controller 15, to be monitored and stored.

Input device 17 for set values transmittable to heating controller 15 in Fig. 2 consists of a screen 30 for analog input and of an evaluation circuit 31, connected to the set-value memory 16 at the output site, determining from the analog input the set values for digital storage, applying a method that appears feasible for the control program of heating controller 15. The display screen 30 is built preferably from liquid crystals with a touch-sensitive film, a so-called touch-screen, so that set values can be entered directly by pressing down on the display screen 30 with a pen 32 (Fig. 3) or a finger. Of course, the screen 30 may also be used to display stored set values and/or other measured variables in analog form or as numerical values. For this purpose a control circuit 33 is provided in Fig. 2, used to call up set values from set-value memory 16 and/or the heating controller 15, to be displayed on the screen 30. Thereby

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 83

it is possible, for instance, to display the set and actual values, limited for control circuits 26 and 27,on the screen 30 for review.

Fig. 3 displays the input of set values on the screen in more detail. This screen 30 shows a coordinate system whose coordinate axes 34 and 35 display a dimensional graduation, firstly, for the hourly daily sequence and secondly, for the desired room temperature. Using the aforementioned pen 32, the desired march of temperature 36 above the time axis, created by the coordinate axis 34, can be entered. This preset march of temperature can be entered for each day of the week and for each heating circuit 1. For this purpose, input areas 37 for each day of the week and input areas 38 for each heating circuit 1, allocated to each of rooms 1 to 8 are provided on the screen. Thereby, via input areas 37 and 38, the march of preset temperatures can be defined independently from each other for each of the rooms 1 to 8 and for each day of the week and be entered into the set-value memory 16 through the evaluation circuit. The selected input areas 37 and 38 can be read in a display field 39. Aside from the described input areas, an input area 40 is provided – enabling input of set values for heating control during vacation periods without having to overwrite the usual weekly control. In addition, the display screen 30 can be switched via a control panel to display stored set values and/or variable actual values.

Aside from preset temperatures, on- and - off times of the heating circuit pump 24 and/or additional pumps for the purpose of maintaining the march of present temperatures, can be displayed or preset, as shown in a pump-activity diagram 41 of Fig. 3. In addition, The display can be selected in each case via an input area 42 and be switched, for example, to display actual values.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 84

The input device 17, together with the set-value memory 16 and control switch 33, is able to form building unit 43 apart and physically separate from heating controller 15. This is shown, dotted, in Fig. 2. In this case, too, the relevant set values can be transmitted, analog, to heating controller 15 over a distance, by entering the set-value graphs on the screen 30. For this purpose, building unit 43, like heating controller 15, must be equipped with an appropriate transceiver-receiver unit 29, to transmit over a distance.

This invention is, of course, not limited to the presented example. Thus, the control device can be utilized not only for heating but also for the cooling of rooms. In this case, heat has to be removed from the rooms via heating circuits 1. For example, the necessary cooling of the heat transfer medium can proceed via a heat pump. Set values for room temperatures can be entered in analog form.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 85

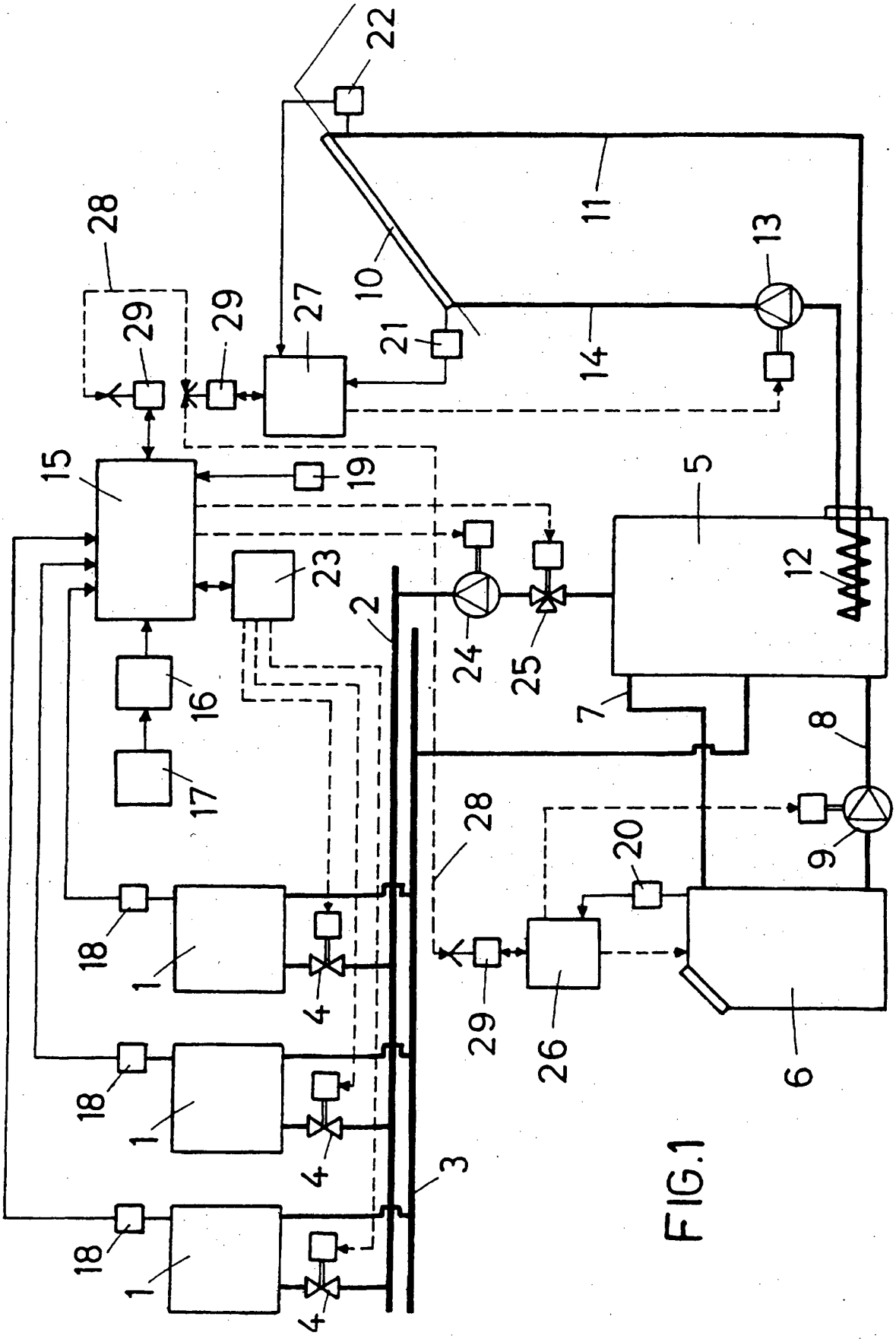


FIG.1

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 86

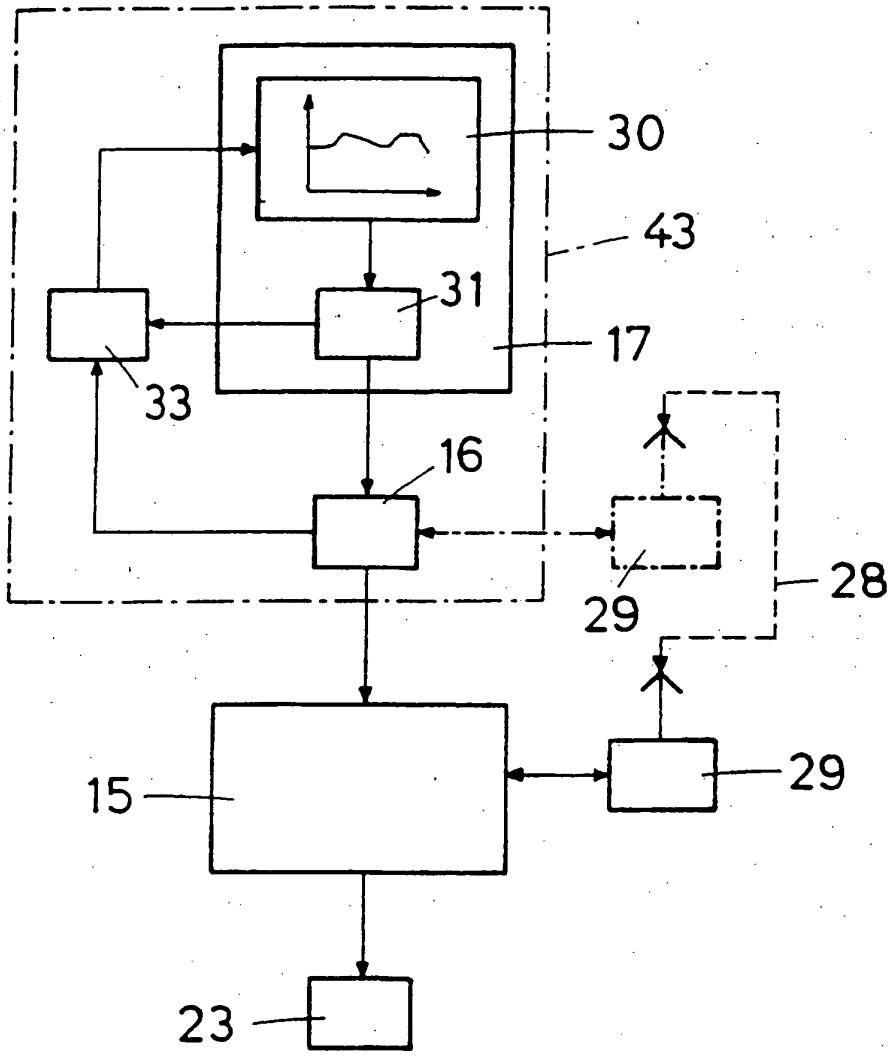


FIG.2

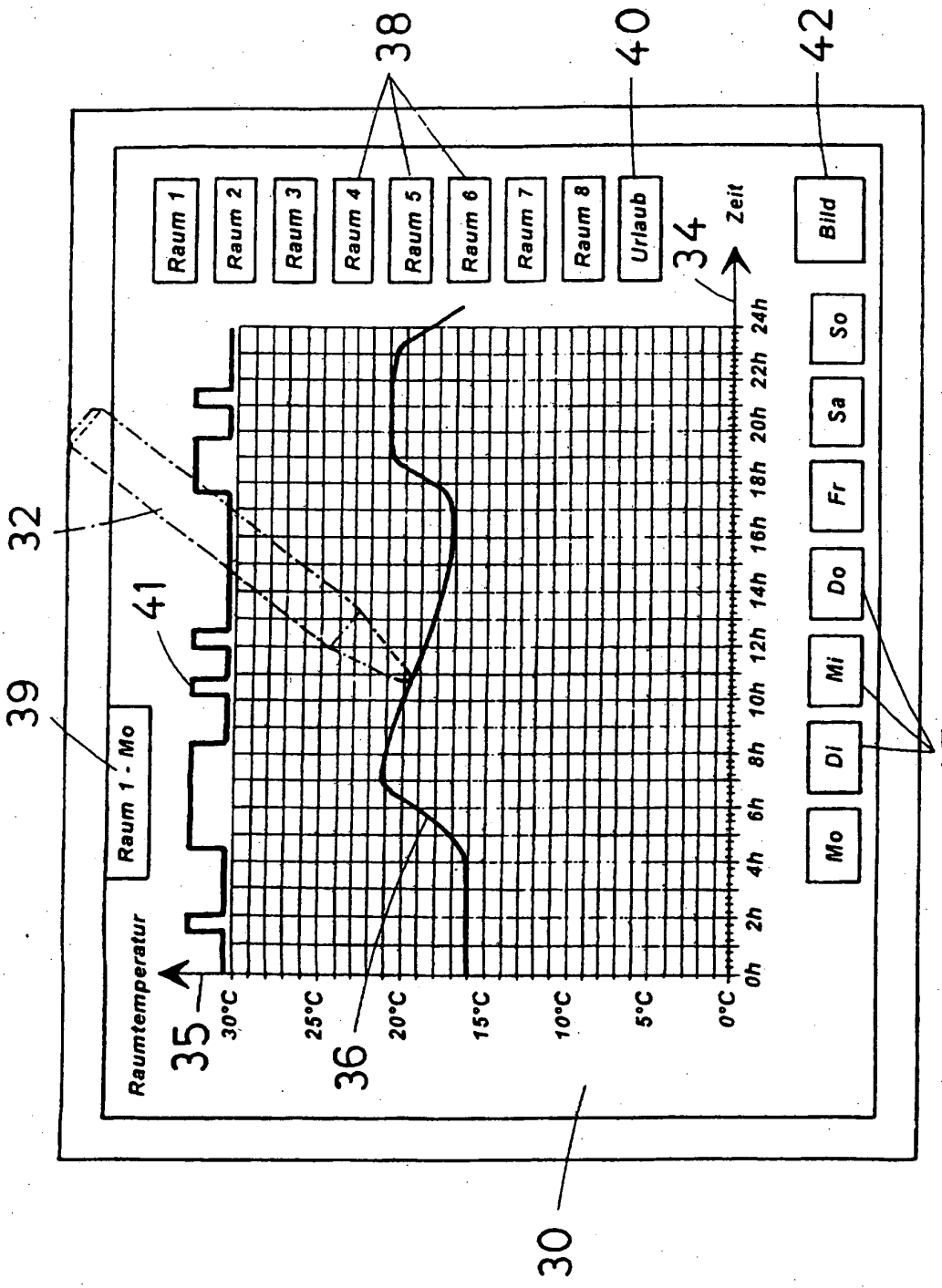


FIG.3

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 88

Fig.3

Legend: Item 35 – room temperature
Item 39 – Room 1 – Monday
Item 37 – Days of the week (Tuesday – Sunday)
Item 38 – Room 1 thru 8
Item 40 -- Vacation

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 89

Three pp. (fax pp. 034 thru 036) re PCT/AT/00071 contain a document titled, "International Search Report" previously translated from the German-language version contained in the subsequent three pages.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G09G 5/00 — A1

(11) International Publication Number: **WO 97/11448**

(43) International Publication Date: 27 March 1997 (27.03.97)

(21) International Application Number: PCT/US96/14520

(22) International Filing Date: 18 September 1996 (18.09.96)

(30) Priority Data:
60/003,883 18 September 1995 (18.09.95) US

(71) Applicant *(for all designated States except US)*: INTELLINET [US/US]; 2900 South Horseshoe Drive, Naples, FL 33942 (US).

(72) Inventors; and

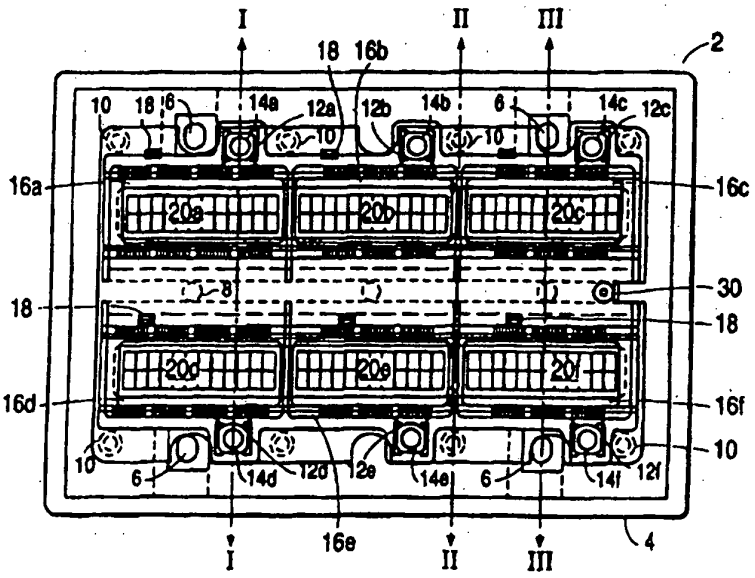
(75) Inventors/Applicants *(for US only)*: STEIN, Michael [US/US]; 10862 Longshore Way West, Naples, FL 34104 (US). KAUFMAN, Toby, Ray [US/US]; 13715 Eldridge Avenue, Sylmar, CA 91342 (US). RICHARZ, Yves, Alexander [CH/US]; 628 South Reese Place, Burbank, CA 91506 (US). TARLOW, Kenneth, Allen [US/US]; 94 Birch Avenue, Corte Madera, CA 94925 (US). NESBITT, Bryce, Craig [US/US]; 1712 Marin Avenue, Berkely, CA 94707 (US).

(74) Agent: KILPATRICK & CODY, L.L.P.; Suite 800, 700 13th Street, N.W., Washington, DC 20005 (US).

(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: USER INTERFACE FOR HOME AUTOMATION SYSTEM



(57) Abstract

Described is a user interface particularly suited for use in a home automation system. This interface combines advantages of a conventional touch screen (such as ease of use and accurate "key" placement) with the advantages of a conventional mechanical keypad (such as reduced cost and tactile feedback). The interface is well suited for use on any wallspace and may be easily reconfigured as necessary to support a host of system functions. The interface utilizes a backlit LCD separated into separate display sections (modules 15 and 17), each having a durable, scratch resistant lens (22). Cantilevered switches (14a to 14f) associated with each display are used to detect a user's selection of a displayed option.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 91

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgystan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic			SE	Sweden
CG	Congo	KR	Republic of Korea	SG	Singapore
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LR	Liberia	SZ	Swaziland
CS	Czechoslovakia	LT	Lithuania	TD	Chad
CZ	Czech Republic	LU	Luxembourg	TG	Togo
DE	Germany	LV	Latvia	TJ	Tajikistan
DK	Denmark	MC	Monaco	TT	Trinidad and Tobago
EE	Estonia	MD	Republic of Moldova	UA	Ukraine
ES	Spain	MG	Madagascar	UG	Uganda
FI	Finland	ML	Mali	US	United States of America
FR	France	MN	Mongolia	UZ	Uzbekistan
GA	Gabon	MR	Mauritania	VN	Viet Nam

USER INTERFACE FOR HOME AUTOMATION SYSTEM

FIELD OF THE INVENTION

This invention relates to an improved interface for interacting with a variety of electronically controlled systems and appliances. More particularly, the present invention relates to an improved touchscreen, particularly suited for use in residential or commercial automation systems, which provides a consistent, easy to use interface.

BACKGROUND OF THE INVENTION

In recent years, both the number and variety of electronic devices and appliances in use have increased dramatically. Lighting systems, personal computers (PCs), video tape recorders, compact disc (CD) players, stereo receivers, and televisions are but a few of the most common devices found in both residential and commercial settings. Even appliances which rely on non-electric power sources, such as gas burning furnaces, are usually controlled electronically.

Reflecting the variety of devices now available, many different systems and devices are used to provide more centralized or automated control of the appliances found in the home and the office. These can be as simple as a remote-control entertainment system comprising a CD player, stereo and television, or as complex as a building environmental control system for regulating HVAC and security functions.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 93

A central feature of any automation system is the interface by which the user interacts with the automation system. User interfaces permit one to program future operation or to control different devices from a centralized location. Reflecting the variety of appliances or devices that are to be controlled, user interfaces may range widely in complexity. In some settings, a more complicated interface is necessary to provide the broad range of functionality required. For example, a building control center may be sufficiently complicated to require training for the operator. On the other hand, in many environments, particular residential settings, it is essential that interfaces be easy to use and understand so that the entire range of functionality may be utilized.

Unfortunately, the standard approach now commonly used is for each device or system in a given environment to be controlled according to a particular methodology which might differ dramatically from other systems. For example, a home might include a security system, an entertainment system, an environmental control system, and so forth, each with its own unique interface. Thus, a user may be required to set a thermostat in a first manner, program a VTR in a different manner, and program the security system in yet a different manner. By requiring the user to learn several methods of operating each system or set of devices in the environment, it is more difficult for the user to become familiar with the various systems and to take full advantage of all their features.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 94

Another drawback associated with this standard approach is that the use of different interfaces may result in an increase in the amount of space taken up in the setting. For example, two or more different keypad controllers may be mounted on a wall to separately control individual systems. As a result, there may be a decrease in available wall space and a negative impact on the aesthetic quality of the setting.

Some automation systems attempt to address these limitations through the use of menu driven interfaces which are connected to a single, dedicated control processor. With such a system, a user may control various systems, such as lighting, HVAC, and security, from a single type of interface which uses a common methodology for interacting with the user. In general, such interfaces incorporate a display, typically a cathode ray tube (CRT) or liquid crystal display (LCD), which provides the user with several options for controlling one or more systems in the setting.

Different types of interfaces are used in menu driven systems. In some systems, a touch screen is utilized wherein the user presses a portion of the display screen to make a selection. The user's fingertouch is detected and the display indicates which area of the display has been selected. Alternatively, conventional mechanical switches may be provided in proximity to the display screen. A graphical image on the display device directs the user to the appropriate push-button flanking the display. This approach is

similar to that adopted in connection with many automated teller machines (ATMs).

Touchscreens are advantageous in that the area in which the user is prompted to make a selection is usually identical to the region which is actually acted upon by the user. For example, virtual buttons may be displayed which are selected on the same display area. On the other hand, touchscreens are relatively expensive and require a fair amount of support by processor and memory elements in order to function properly. Moreover, their use may not prove to be as convenient to the average user as more simple mechanical buttons which provide tactile feedback to the user, usually by a button which clicks when fully depressed.

The other above-mentioned approach of providing mechanical switches in proximity to a display screen overcomes these drawbacks, at least in part, in that the mechanical switches may provide tactile feedback. However, since the switches are offset from the display, this approach may require more care in use, particularly in comparison with a touchscreen. In particular, the offset between the switches and the display may make it difficult for a user to determine which button corresponds to a given option. As a result, the user may become disoriented and there may be a delay in the selection of a desired option as the user verifies which switch corresponds to the desired option. Such a delay is clearly unacceptable where the user is attempting to address certain high priority control systems, such as lighting systems or home security. Further, this problem

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 96

may be exacerbated where the display screen contains more than a few simple commands. Thus, the combination display/push-button interface is limited by its nature in the amount of information that may be displayed and the command options that may be offered.

Accordingly, there is a need for an economical, menu-driven interface that permits the user to rapidly and efficiently select a desired function and enter a desired command. There is a related need for the interface to provide tactile feedback to signal the user that a command has in fact been entered.

SUMMARY OF THE INVENTION

It is an object of the invention to meet these needs and to overcome the above-describe shortcomings of conventional user interfaces.

It is a further object of the invention to provide a user interface which comprises: a liquid crystal display divided into a plurality of regions;
a microcontroller operatively coupled to a host controller, the microcontroller driving the liquid crystal display according to signals received from the host controller so as to display text or images on each of the plurality of regions of the liquid crystal display; a transparent member covering each of the regions of the liquid crystal display; and a plurality of switch elements disposed proximal to the regions of the liquid crystal display, each of the switch elements being actuated by the transparent member covering it when the transparent member is depressed by a user; wherein the

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 97

microcontroller detects actuation of the switch elements and provides an indication to the host controller in response thereto.

According to one feature of the invention, the user interface further comprises a plurality of light emitting diodes, each disposed proximal to each region of the liquid crystal display, the light emitting diodes being operated by the microcontroller. Optionally, these light emitting diodes are multicolored so as to be indicative of several system states.

According to another feature of the invention, the liquid crystal display is backlit. A light sensor coupled to the microcontroller is used to regulate the intensity of the backlighting of the liquid crystal display depending on the intensity of ambient light detected with the light sensor.

According to another feature of the invention, wherein the transparent member covering the liquid crystal display is made of a scratch resistant, durable material, such as Lexan.

According to still another feature of the invention, the liquid crystal display and the microcontroller are mounted on a printed circuit board which, in turn, is mounted to a wall mounted electrical box. A faceplate is applied to the face of the transparent overlay so as to cover the fasteners which affix assembly to the electrical box.

According to yet another feature of the invention, the host controller provides instructions to the microcontroller whereby a menu of options are displayed

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 98

on the liquid crystal display to the user. The user indicates selection of a displayed option by depressing the transparent member over the corresponding region of the liquid crystal display.

Additional objects and features of the invention will be apparent from the detailed description of the preferred embodiments set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Fig. 1A is a front plan view of a printed circuit board and overlay for a user interface in accordance with an embodiment of the invention.

Figs. 1B-1D are respective cross-sectional views of the interface of Fig. 1A taken, respectively along lines I-I, II-II, and III-III.

Fig. 2A is a front plan view of a transparent overlay in accordance with an embodiment of the invention.

Figs. 2B-2D are respective cross-sectional views of the transparent of Fig. 2A taken along lines A-A, B-B, and C-C.

Fig. 3 is a back plan view of the printed circuit board of Figs. 1A-1D.

Fig. 4 is a front plan view of a faceplate in accordance with an embodiment of the invention.

Fig. 5 is a front plan view of the faceplate of Fig. 4 showing an adhesive layer applied thereto.

Fig. 6 is a cross-sectional view of the faceplate of Fig. 5 taken along line D-D.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 99

Fig. 7 is a block diagram illustrating the functional aspects of an interface in accordance with the invention.

Figs. 8 to 11 are illustrations of various virtual keypads displayed in a menu driven hierarchy.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Preferred embodiments of the invention are now described in reference to the accompanying drawings. Figs. 1 to 6 illustrate the physical construction of one embodiment of the interface according to the invention. The remaining drawings illustrate the functional aspects of this embodiment of the invention.

As described in detail below, the user interface 2 according to the preferred embodiment principally comprises the following components: a printed circuit board (PCB) 34; a transparent overlay 22; and a faceplate 38. The electronic components of the user interface are mounted to the PCB 34, either directly or by mounting on the reverse side of the PCB 34. The transparent overlay 22 is fastened to the PCB 34 and the combined unit 2 is then mounted in a standard electrical box, such as a three gang box. The faceplate 38 is then applied over the face of the interface to cover the screwheads and to provide a seamless appearance.

Fig. 1A is a front plan view of the PCB 34 with the transparent overlay 22 attached thereto. Figs. 1B to 1D are respective cross-sectional view taken respectively along lines I-I, II-II, and III-III in Fig. 1A.

Various electronic components are disposed on the front side of the PCB 34. These include two liquid crystal display (LCD) modules (an upper module 15 and a lower module 17) which are each segmented into three display areas so as to provide six display surfaces 20a-20f. In proximity to each of the six display surfaces 20a-20f are respective microswitches 14a-14f and indicator light emitting diodes (LEDs) 18. An optional photosensor 30 is disposed between two of the display portions 14c and 14f.

As explained below, the indicator LEDs 18 serve to provide visual feedback in response to user input and provide an indication of system status. Preferably, bicolored LEDs (red and green) are utilized which can be actuated to produce indications of various states. The indicator LEDs 18 can be turned on, off, or blink. In the on or blinking state, the LEDs 18 can emit a red light, a green light, and also an amber light by lighting the LED both green and red simultaneously. Thus the indicator LEDs 18 are capable of displaying up to seven states (off, solid red, solid green, solid amber, blinking red, blinking green, blinking amber).

In this example, each of the two LCD modules 15 and 17 have displays which are two characters high by forty characters wide. As described below, each display is segmented into through regions, resulting in the loss of six characters per LCD. As a result, each virtual button that is displayed at regions 20a-20f has a display area which is twelve characters wide by two characters high, thus providing a total of twenty-four possible characters

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 101

for display. This segmentation economically increases the number of apparent discrete displays, even though only two discrete modules are actually utilized.

In the preferred embodiment, the six display regions 20a-20f of the LCDs are individually backlit by a corresponding set of LEDs to provide enhanced visibility to the user. During times when the ambient background light is relatively high, it is necessary that the backlighting be relatively intense so that the display may be seen. When the ambient light is low, it is preferred that the backlighting be sufficient to illuminate the LCDs but relatively low enough so as not to be distracting. According to one variation of the invention, an optional photosensor 30 is provided on the face of the PCB to detect when the ambient light has fallen below a predetermined threshold, thereby indicating to the microcontroller that the backlighting should be decreased. According to a second variation, the microcontroller may simply be programmed to maintain the backlighting at a low level until the virtual keypad is activated by the user, and then return to a low level after a predetermined time has elapsed.

It is a further feature of the invention that the LEDs used to backlight the LCDs may be individually controlled at each of the display regions 20a-20f. It is thus possible to selectively turn on and off various "virtual buttons" displayed at regions 20a-20f by means of appropriate programming.

As best seen in Fig. 1A, the transparent overlay 22 is attached to the PCB 34 with eight fasteners 10 (screws

in this example). The fasteners 10 extend through respective hollow bevels 11 which extend from the surface of the PCB 34 and through vias in the PCB 34 (see Fig. 1A and 1C). The bevels 11 and four center supports 8 maintain the transparent overlay 22 at a fixed distance from the surface of the LCD display portions 20a-20f. As best seen in the cross-sectional views of Figs. 1C and 1D, the LCDs 15 are disposed between the center supports 8 and the bevels 11 so that the front surfaces 20a-20f of the LCDs are covered entirely by the transparent overlay 22.

The transparent overlay provides six separate touch areas 16a-16f which cover, respectively, the display surfaces 20a-20f. Each of these touch areas 16a-16f are connected via a rectangular portion 12a-12f to a post 24 which extends to just above a corresponding microswitch 14a-14f associated with one of the display surfaces 20a-20f. When the pressure is applied to any of the touch areas 16a-16f, a post 24 is consequently pushed down onto a corresponding one of the microswitches 14a-14f. Thus, the touch areas 16a-16f of the transparent overlay 22 act as cantilevers which activate a corresponding switch 14a-14f associated with one of the display surfaces 20a-20f. The microswitches 14a-14f provide tactile feedback to the user through the posts 24 that are coupled to the touch areas 16a-16f.

Once the transparent overlay 22 is fastened to the PCB 34 (and its associated controller board described below), the resulting assembly is mounted within a standard three gang box (not shown). The assembly is

mounted through four oval shaped openings 6 provided on the transparent overlay 10 (as best seen in Figs. 1A and 1D). These openings 6 are disposed in recesses in the front surface of the overlay 10 so as to be disposed over four of the six screw mounts of the three gang box (not shown). Unlike conventional components that are normally mounted in three gang boxes, oval openings 6 are utilized to permit adjustment of the interface 2 to compensate for any misalignment of the three gang box. The recesses for the oval-shaped openings 6 prevent bulging when the surface of the overlay is covered with the faceplate as described below.

While not shown, the assembled interface 2 according to the preferred embodiment is coupled to a network, such as a home automation system through communication lines and a power line provided to the three gang box. Preferably, conventional twenty gauge wire 14 is utilized to permit standard RS45 communication between the interface and the host processor of the home automation network.

Fig. 2A is a front plan view of the transparent overlay 22. Figs. 2B to 2D are respective cross-sectional views of the transparent overlay 22 taken, respectively, along lines A-A, B-B, and C-C.

In this example, the transparent overlay 22 preferably comprises a resilient, scratch-resistant material, such as polycarbonate GE (generally known as "LEXAN"). While in the preferred embodiment the transparent overlay 22 comprises a single piece, it is designed to provide six touch areas 16a-16f, which in

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 104

effect serve as respective clear plastic lenses over the display regions 20a-20f. Each touch area 16a-16f is associated with a post 24 by which the above-mentioned microswitches are activated when any of the touch areas 16a-16f are depressed.

Fig. 3 is a plan view of the rear surface of the PCB 34. As shown, the integrated circuits provided on the rear surface of the PCB include respective driver chips 36a-36f which are connected to the LCDs 15 and 17 and the backlight LEDs. Also mounted on the rear surface of the PCB 34 is a buzzer 28. The buzzer 28 provide audio feedback for a variety of situations. For example, it can be actuate to provide a clicking sound each time one of the microswitches 14a-14f are actuated to provide audio feedback confirming that a touch has resulting in selection of an option. It also may be used to signal an alarm, for example, to indicate that a security system be disarmed in order to avoid sounding an alarm.

The PCB 34 is also provided with two sockets 32 adapted to receive a processor card. While not shown in Fig. 3, this card preferably matches the footprint of the PCB 34 and is disposed parallel to thereto. A relatively inexpensive, standard eight bit microcontroller is disposed on the processor card. As explained below, the functions of the microcontroller include: communicating with the network host controller; controlling the indicator LEDs 18; receiving ambient light level signals from the optional photosensor 30; controlling the backlight LEDs associated with each virtual button; controlling the display drivers which in turn control the

LCDs; detecting actuation of the microswitches 26; and actuating the buzzer 28.

Associated with the microcontroller is flash read only memory (ROM) in which the firmware for basic level functions executed by the microcontroller is written. As known in the art, the use of flash ROM permits in circuit reprogramming of the microcontroller without the necessity of physically removing components from the circuit board.

Fig. 4 is a front plan view of a faceplate 38 which covers the front surface of the assembled interface 2 once it has been mounted to a wall surface. In the preferred embodiment of the invention, the faceplate comprises a silk screen or painted surface having six openings 40a-40f adapted to fit over the touch areas 16a-16f. In this way, the faceplate 38 covers the screwheads which affix the interface to the three gang box so as to provide an aesthetically pleasing, seamless appearance. In a more functional respect, the faceplate clearly defines the touch areas 16a-16f by covering the unused portions of the LCDs 15 and 17 as described above. It thus creates the impression of what is referred to herein as "virtual buttons" each having text or other images displayed thereon.

The faceplate further includes six transparent or translucent openings 42a-42f. These openings are disposed in alignment with the indicator LEDs 18 referred to above. For aesthetic purposes, it is preferable that the openings be translucent to such a degree that the LEDs 18 are visible when lit, and not visible when unlit.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 106

As illustrated in Fig. 5, it is preferred that the faceplate be applied to the surface of the transparent overlay 22 with an adhesive 44. In this way, no fasteners are visible which would interfere with the aesthetic features of the interface.

Fig. 6 is a cross-sectional view of the faceplate 38 taken along a line D-D in Fig. 5. This view illustrates the openings 42b and 42e which are provided in the faceplate 38.

From the foregoing description, it should be apparent that the interface according to the preferred embodiment provides several advantages through its unique design. For example, the cantilevered switches associated with the "virtual buttons" formed below the touch regions of the interface provides sensory feedback, both aural feedback with the buzzer and tactile feedback with the microswitches. The LCDs provide a means for displaying an unlimited number of alphanumeric messages in an economical manner. The use of associated indicator LEDs provide yet another simple, but effective means of conveying information to a user, such as system status.

It will be appreciated that the interface according to the invention can be applied in a large number of environments. By way of illustration, application of the interface in a home automation system is now described in reference to Figs. 7 to 11.

Fig. 7 is a block diagram of the functional interaction between the microcontroller 99 and the above identified components of the interface according to the preferred embodiment. As shown, the microcontroller 99

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 107

receives signals from the mechanical switches 98, light sensor 95, and optional infrared sensor 94. In turn, the microcontroller 99 provides appropriate signals to control the LCDs 97, the backlighting panel for the LCDs 96, the LED indicators 93, and the buzzer 91.

The microcontroller 99 communicates with a host computer 91 through a communications port. As noted above, the preferred embodiment utilizes an RS45 communication system. Of course, other means of communication are possible.

Based on signals received from the host processor, the microcontroller 99 displays information to the user through the LED indicators 93 and the LCD panel 97. User input, detected with the cantilevered switch arrangement noted above, is then provided to the host computer.

Based on this user input, the host computer controls various systems 92 connected to the network. As noted above, these controlled systems may include an energy management system, a security system, an entertainment system, or various other systems.

It will be appreciated that the programming for control of user interface and the systems attached to the system principally lies with the host computer. In fact, it is preferred that the user interface utilize a relatively simple microcontroller having sufficient memory and firmware to control basic functions, such as turning on and off the LED indicators and pixels of the LCDs as instructed by the host computer. While it is possible to utilize a more expensive microcontroller, it

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 108

is preferred to maintain most processing at the host level so as to reduce cost.

Maintaining most processing at the host level further simplifies any necessary programming revisions since changes can be performed centrally, rather than with each interface. As indicated above, should the need arise to alter the firmware resident at the interface level, flash ROM is utilized so that changes may be made without physically removing ICs from the PCB.

Fig. 8 illustrates an example of the a menu driven virtual keypad display as it appears in the preferred embodiment of the present invention. Preferably, the virtual keypad is designed so that six touch actuated transparent "keys" are superimposed over the LCD display 40 to form a display "page". Information is displayed in each of the six LCD display fields corresponding to a function that is controlled by the host computer. Certain controlled functions may be grouped to form a "menu" according to their level of priority or relatedness. Further, indicator LEDs 101, located proximal to each key, signal the user that a status change in a controlled function has occurred.

In the example illustrated in Fig. 8, the displayed information collectively forms a preconfigured "default menu," wherein information relevant to five high priority home control functions 102-105 are displayed concurrently with a "press for more options" key 107. A hierarchy of menus describing the various systems and subsystems controlled by the host computer may be accessed by actuating the "press for more options" key 107.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 109

In this example, depressing the area over the "Master Lights" virtual key 102 actuates a corresponding mechanical switch through the cantilever action described above. This is detected by the microcontroller, which sends a corresponding signal to the host computer. In response, the host computer may energize/de-energize a preestablished configuration of room lighting.

Actuating the "More Light Scenes" 105 key displays a preconfigured sub-system menu (not shown) wherein alternative lighting patterns may be controlled (e.g., pool lighting; front outside lighting; back outside lighting, etc.). The "Now Playing KTWV 94.7" key 103 displays the current channel setting on a radio receiver. Actuating this key displays a sub-menu illustrated in Fig. 9, wherein alternate preestablished radio station settings may be accessed or alternate menus configured to control different entertainment systems may be displayed (e.g., compact audio disc player, tape player, laser disc, television, video cassette player, etc.).

The "Alarm is NOT Armed" key 106 displays the current status of the home alarm system. Depressing this key accesses an alarm system sub-menu illustrated in Figure 12 for controlling various alarm system functions. The "Great Room Volume 25%" key 104 displays the current audio volume setting for speakers located in the great room. Depressing this key accesses the great room audio volume control sub-menu illustrated in Figure 11 by which various audio functions may be controlled (e.g., volume up, volume down, mute, audio power off, etc.).

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 110

Depressing the "Press for More Options" key 42 accesses alternative preconfigured sub-menus (not shown).

Fig. 9 illustrates an example of an alarm system sub-menu as it may appear on the keypad display after depressing the "Alarm is NOT Armed" key 106 in Fig. 8. Referring to Fig. 10, the alarm system sub-menu displays on the keypad display five functions 122-126 and a "Press to Exit/Return" function 127 The "Press to Exit/Return" key 127 returns the user to the default menu from the sub-system menu as illustrated in Fig. 10.

The functions displayed on the default menu illustrated in Fig. 8 and the various sub-menus illustrated in Figs. 9-11 may be optimized for an individual user's application to provide instant access to the most frequently used functions, including high priority home control functions such as security or lighting. According to the preferred embodiment of the invention, the upper left key of the default menu displays the main lighting scene, and the lower right key displays a "Press For More Options" to access subsequent menus. The invention is also designed so that the default menu will be displayed after a preset time-out period.

The default menu also provides access to all functions and subsystems that do not appear on the default menu. In the preferred embodiment of the present invention, if more than five subsystems are being controlled, four subsystems will be displayed on the main menu and additional subsystems can be accessed by pressing the "Press for More Options" key.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 111

It will be apparent that the number of systems that can be accessed by the invention is not limited by its design. According to the preferred embodiment of the invention, subsystem menus may provide up to five functions on one display page, or four functions with a "Press for More Options" key to access additional subsystem functions. Thus, a very large number of subsystems may be accessed using the present invention.

The invention has been now been described in fulfillment of the above noted objects. Specifically, a user interface has been described which is particularly suited for use in a home automation system. This interface combines advantages of a conventional touch screen (such as ease of use and accurate "key" placement) with the advantages of a conventional mechanical keypad (such as reduced cost and tactile feedback).

While the invention has been specifically described with reference to particular aspects, features, and embodiments thereof in relation to its preferred embodiment as a keypad interface for a home control system, other variations, modifications, and alternate embodiments will be apparent to those skilled in the art. It is intended that such variations, modifications and alternate embodiments are to be regarded as being within scope of the invention.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 112

WHAT IS CLAIMED IS:

1. A user interface comprising:

a liquid crystal display divided into a plurality of regions;

a microcontroller operatively coupled to a host controller, the microcontroller driving the liquid crystal display according to signals received from the host controller so as to display text or images on each of the plurality of regions of the liquid crystal display;

a transparent member covering each of the regions of the liquid crystal display; and

a plurality of switch elements disposed proximal to the regions of the liquid crystal display, each of the switch elements being actuated by the transparent member covering it when the transparent member is depressed by a user;

wherein the microcontroller detects actuation of the switch elements and provides an indication to the host controller in response thereto.

2. A user interface according to claim 1 further comprising a plurality of light emitting diodes, each disposed proximal to each region of the liquid crystal display, the light emitting diodes being operated by the microcontroller.

3. A user interface according to claim 2 wherein said light emitting diodes are multicolored.

4. A user interface according to claim 2 wherein the microcontroller operates the light emitting diodes on the basis of signals received from the host computer.

5. A user interface according to claim 1 wherein the liquid crystal display is backlit.

6. A user interface according to claim 5 further comprising a light sensor coupled to the microcontroller, the microcontroller regulating the intensity of the backlighting of the liquid crystal display depending on the intensity of ambient light detected with the light sensor.

7. A user interface according to claim 1 wherein the transparent member is made of Lexan.

8. A user interface according to claim 1 wherein the liquid crystal display and the microcontroller are mounted on a printed circuit board.

9. A user interface according to claim 1 wherein the printed circuit board is mounted to a wall mounted electrical box.

10. A user interface according to claim 1 further comprising a faceplate which covers fasteners which mount the printed circuit board to the electrical box.

11. A user interface according to claim 10 wherein the faceplate is applied to the printed circuit board with an adhesive.

12. A user interface according to claim 1 wherein the host controller provides instructions to the microcontroller whereby a menu of options are displayed on the liquid crystal display to the user.

13. A user interface according to claim 12 wherein the user indicates selection of a displayed option by depressing the transparent member over the corresponding region of the liquid crystal display.

14. A user interface according to claim 5 wherein predetermined regions of the liquid crystal display are backlit by separately controlled light emitting diodes, whereby selected portions of the liquid crystal display are operated independent of other portions.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 115

FIG. 1A

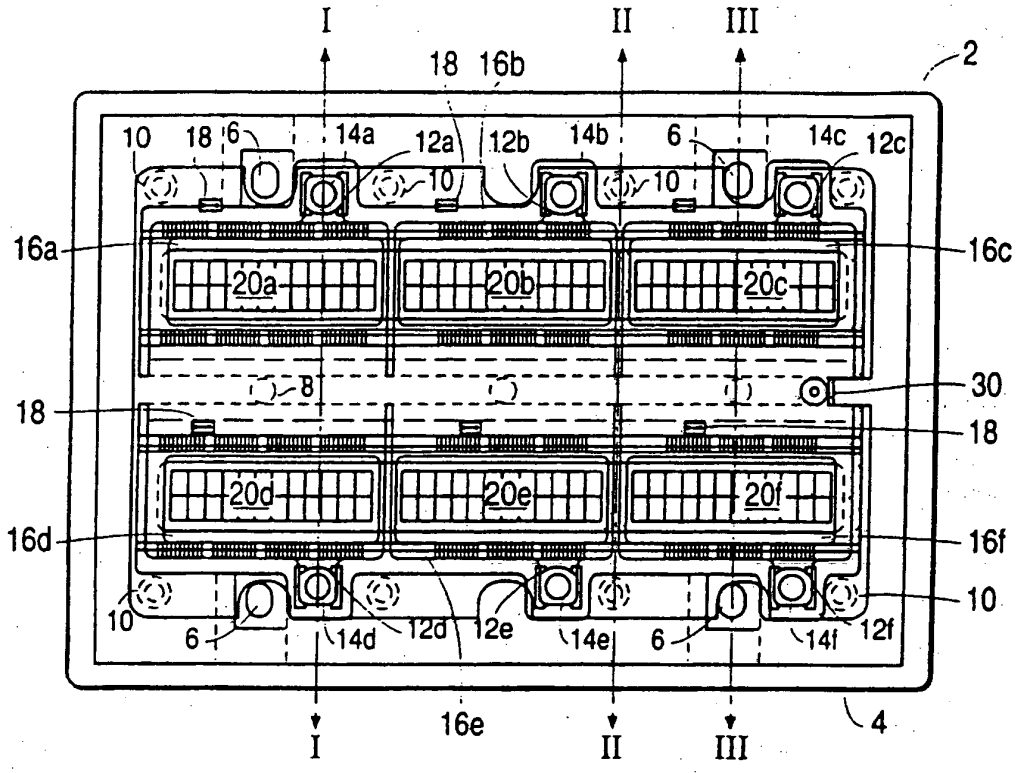


FIG. 1B

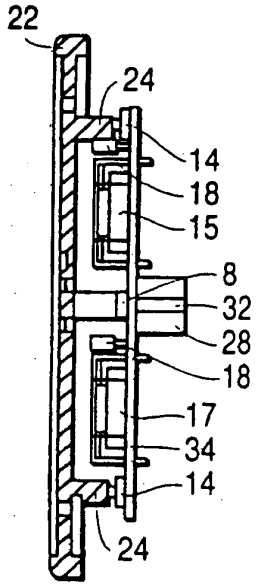


FIG. 1C

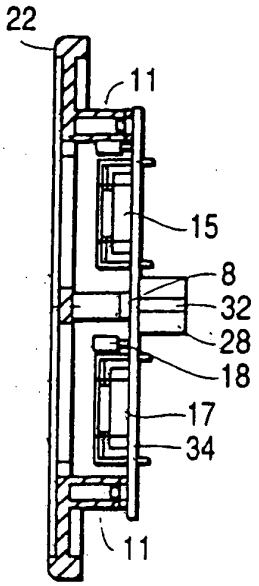
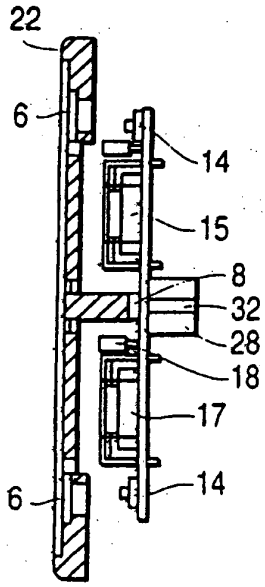


FIG. 1D



LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 116

FIG. 2A

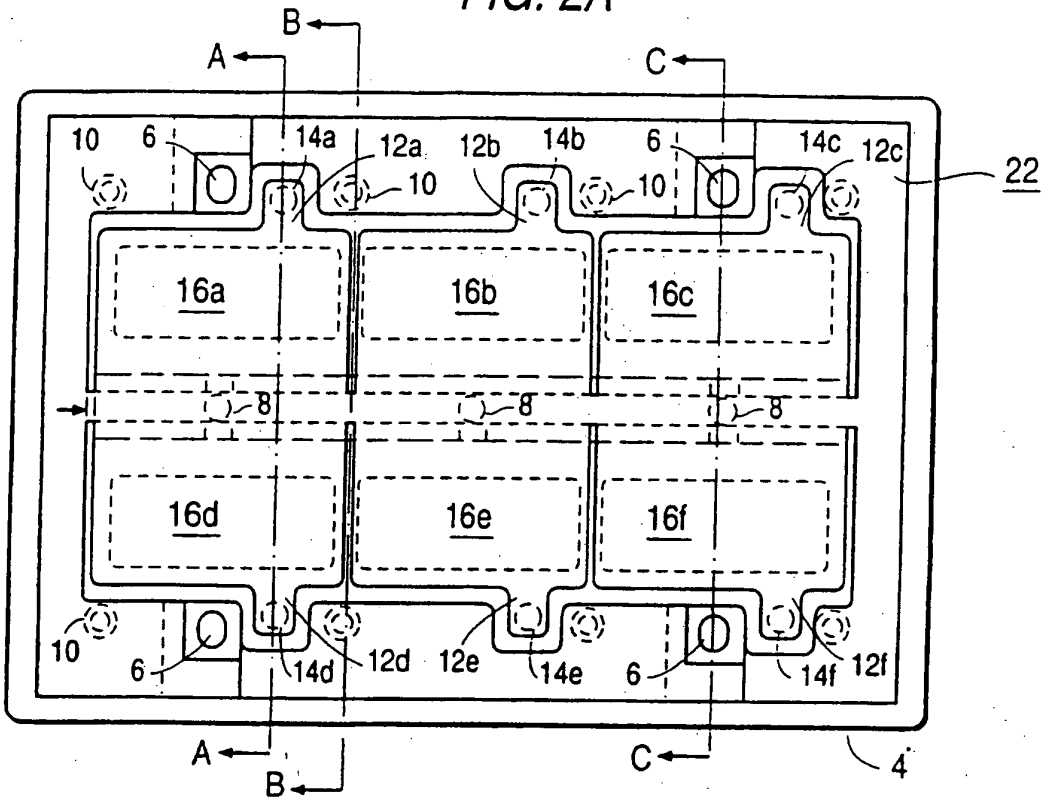


FIG. 2B

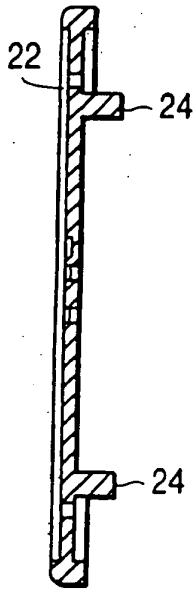


FIG. 2C

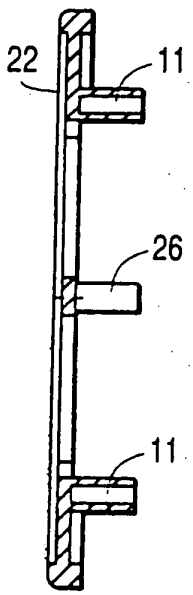
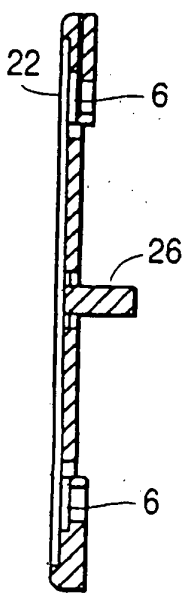
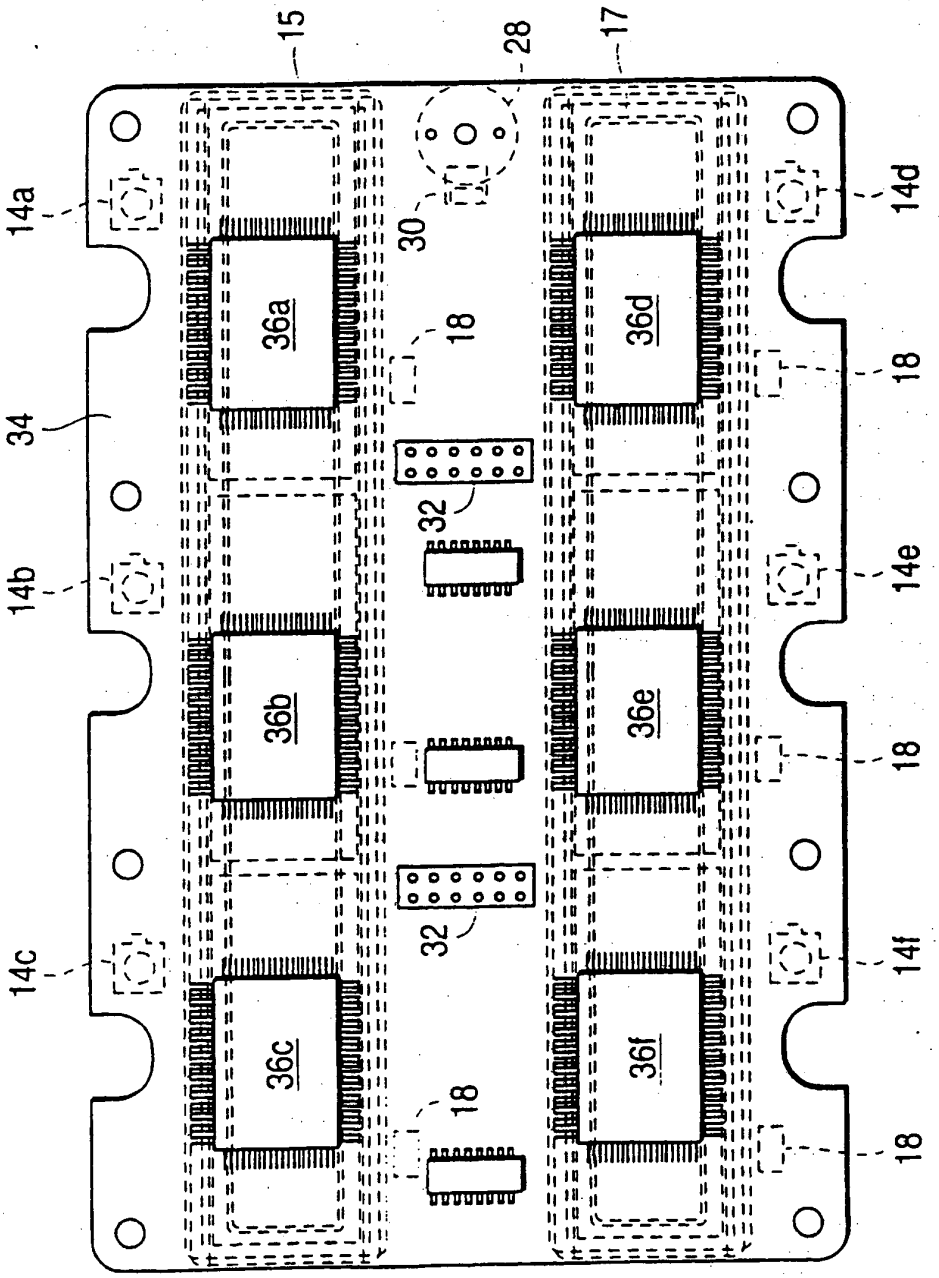


FIG. 2D



LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 117

FIG. 3



LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 118

FIG. 4

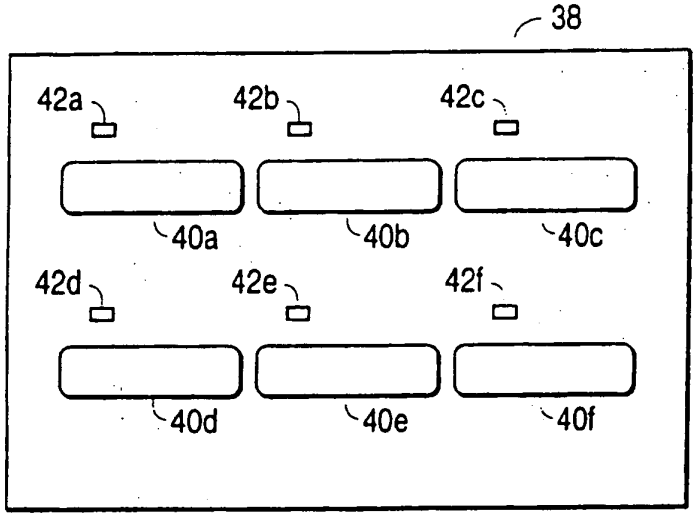


FIG. 6

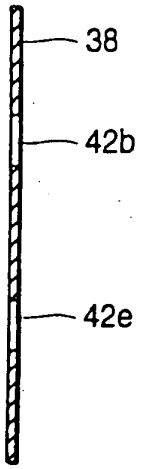
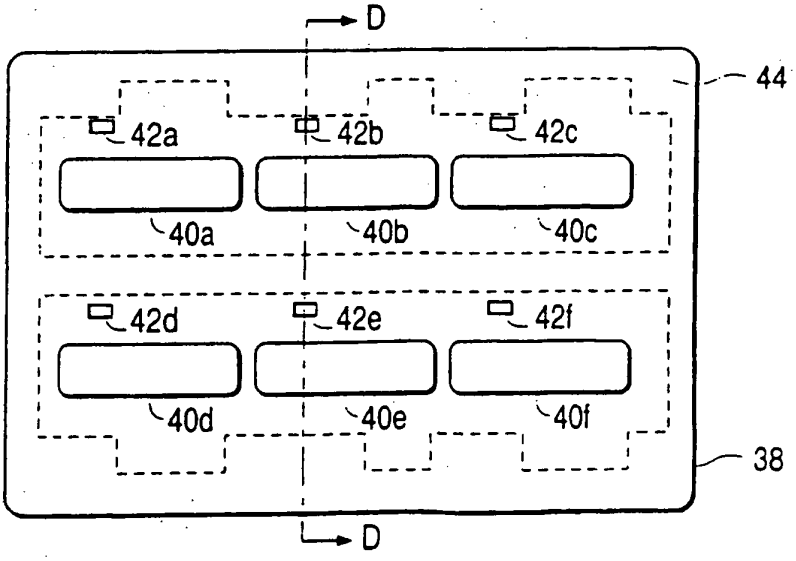
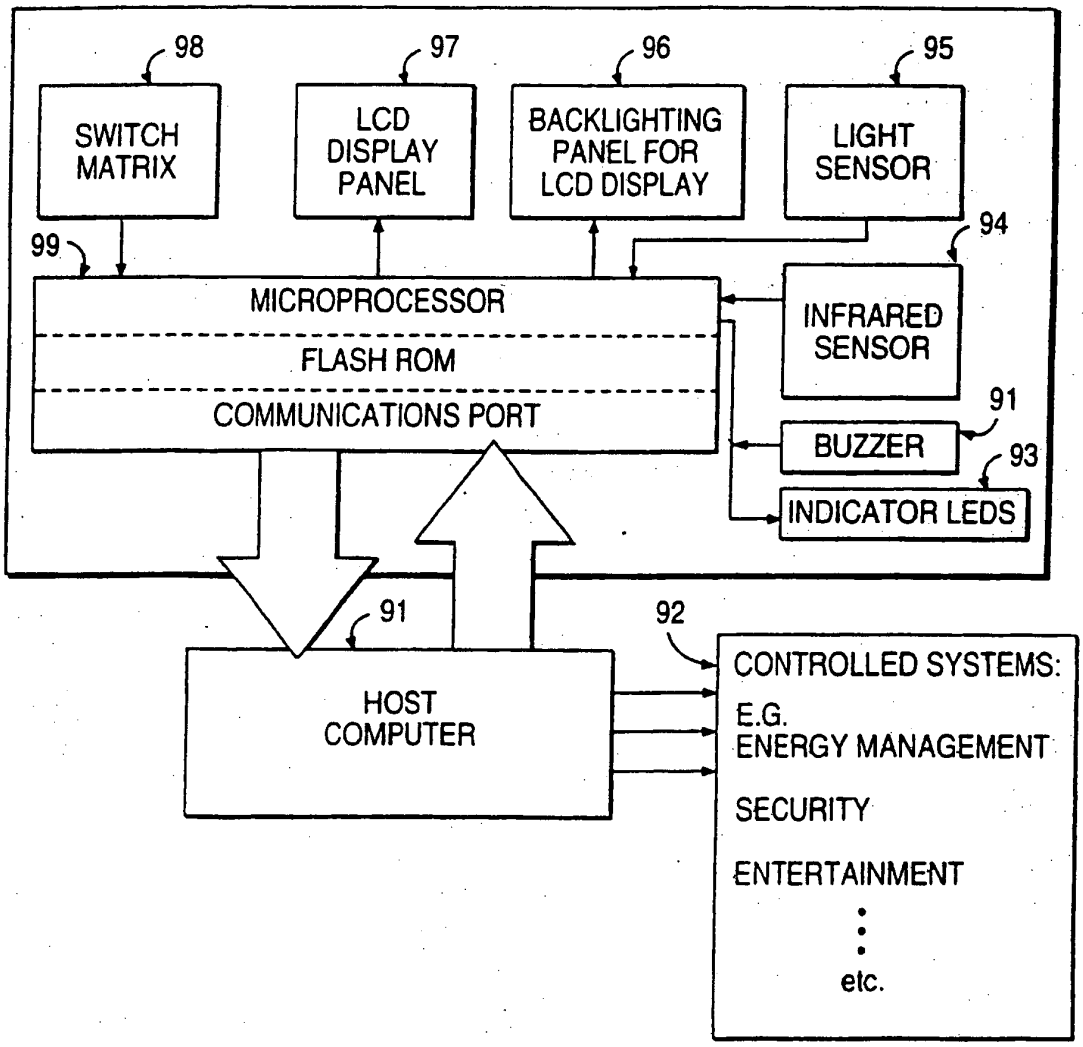


FIG. 5



LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 119

FIG. 7



LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 120

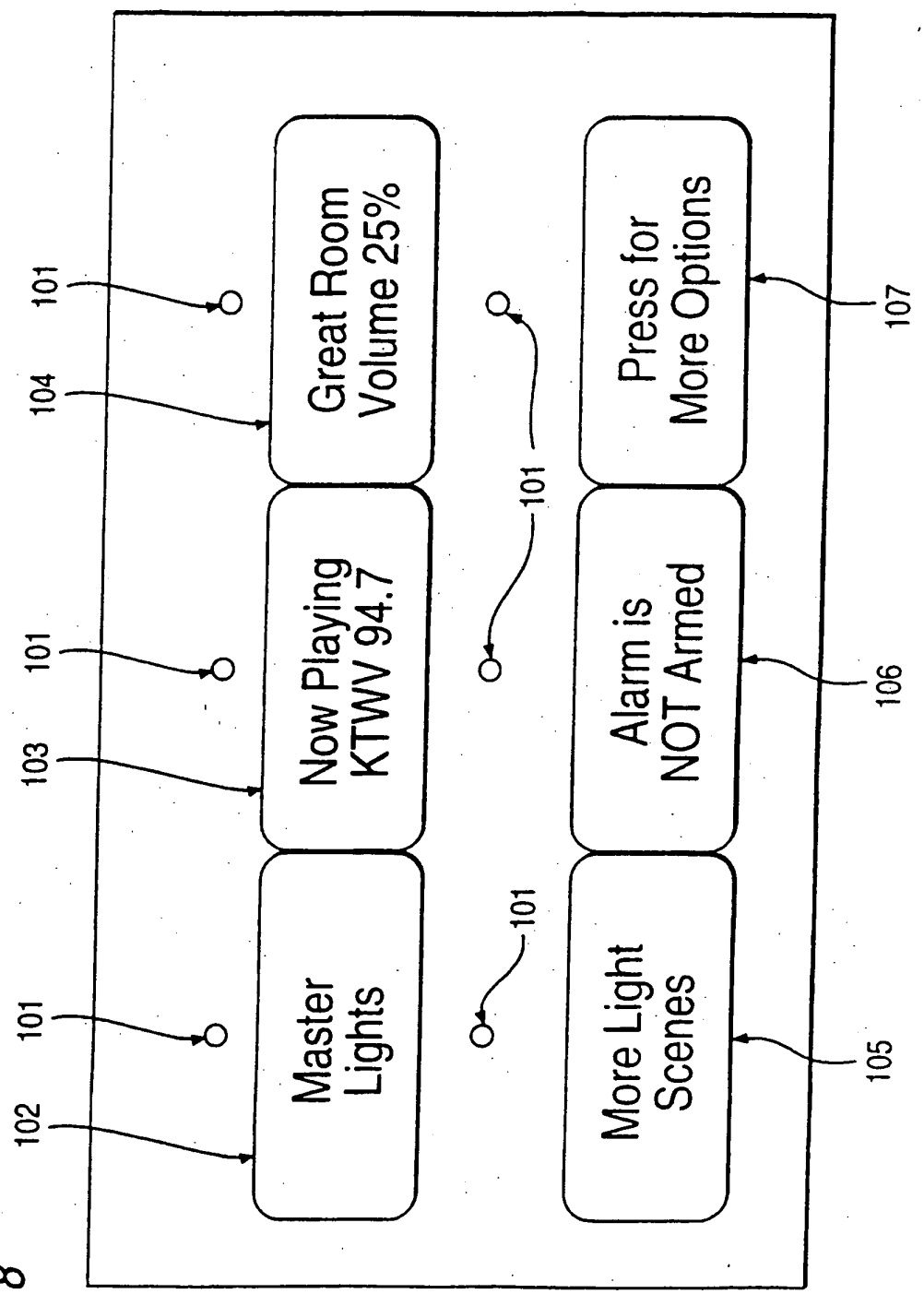


FIG. 8

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 121

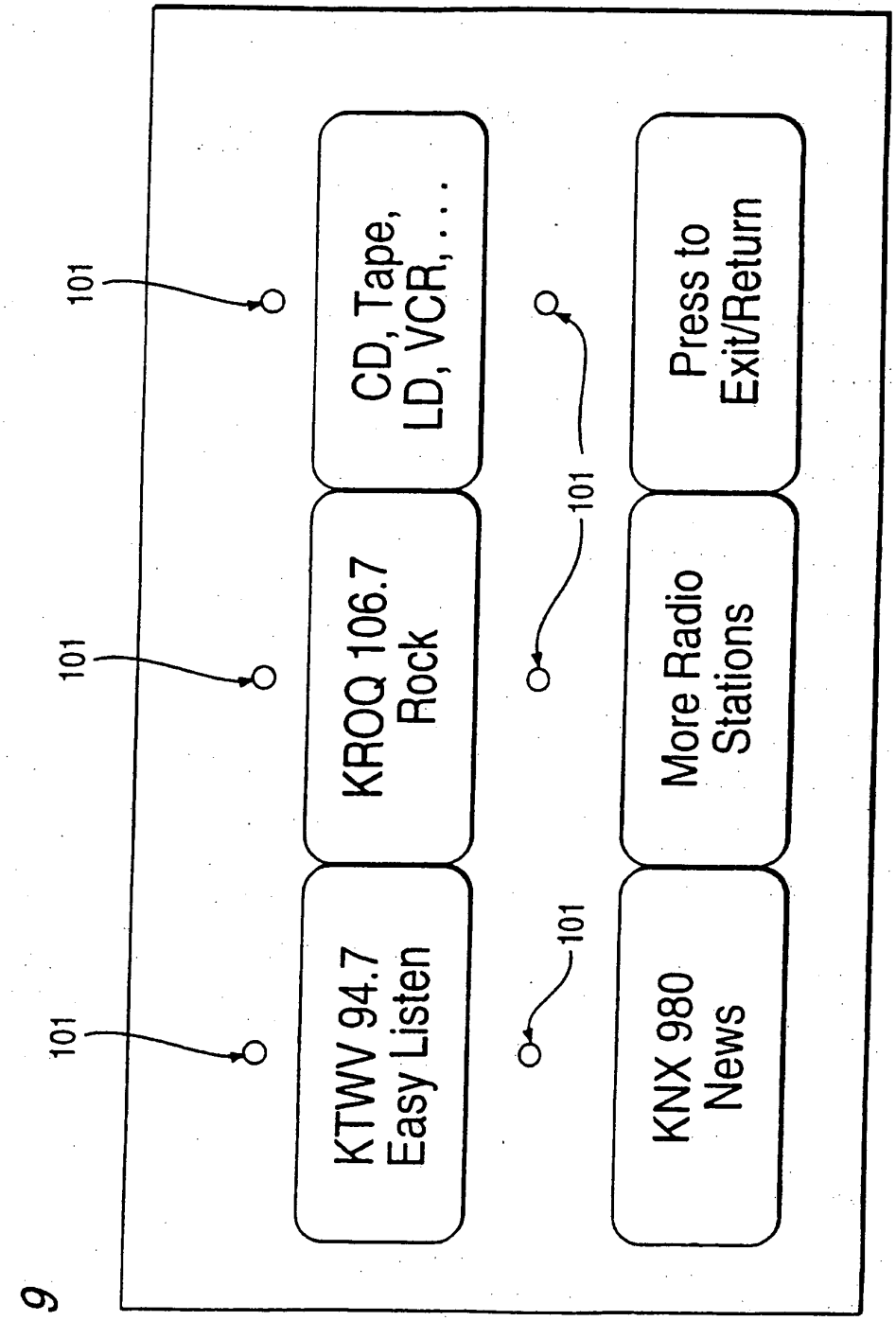


FIG. 9

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 122

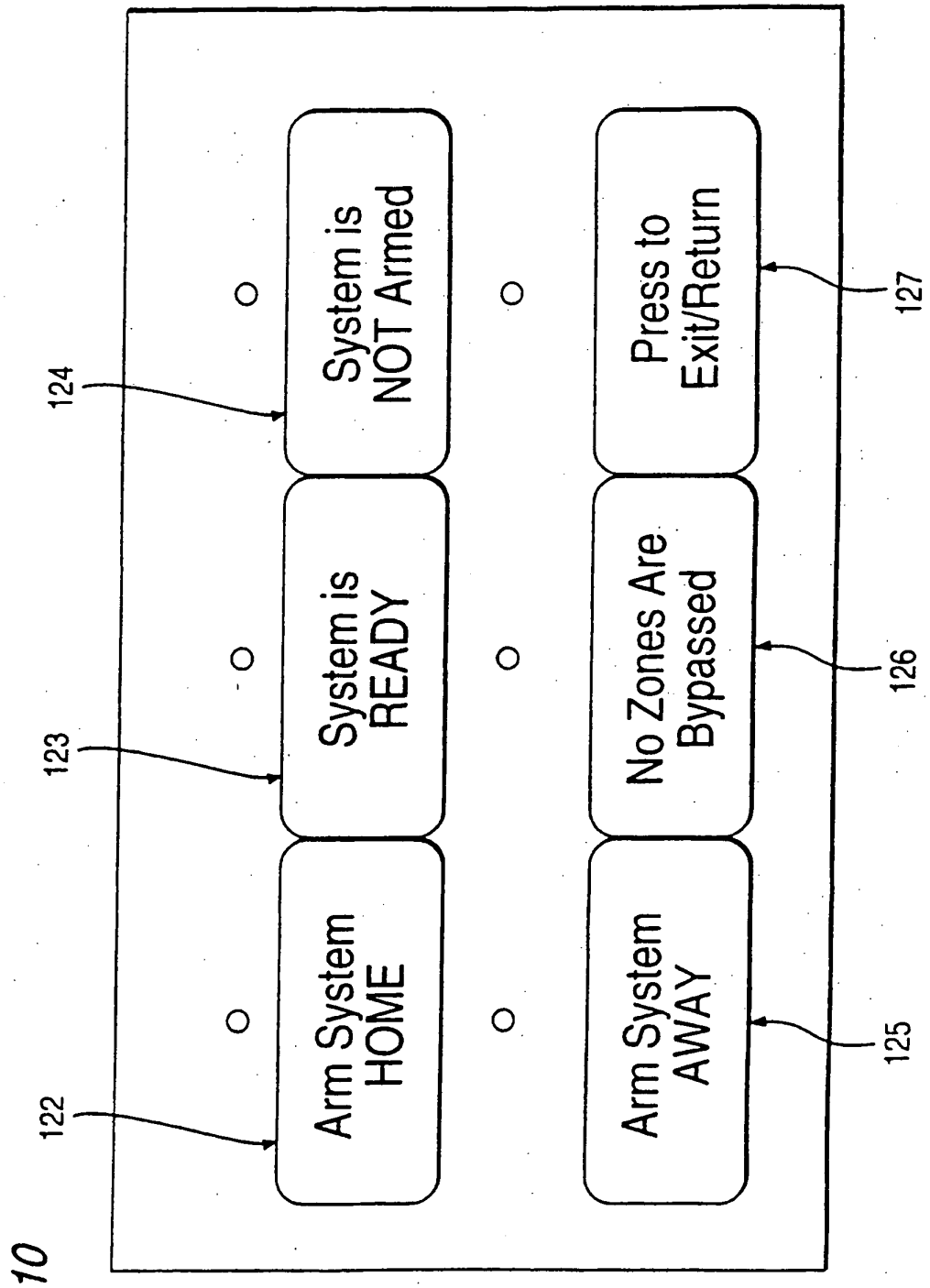


FIG. 10

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 123

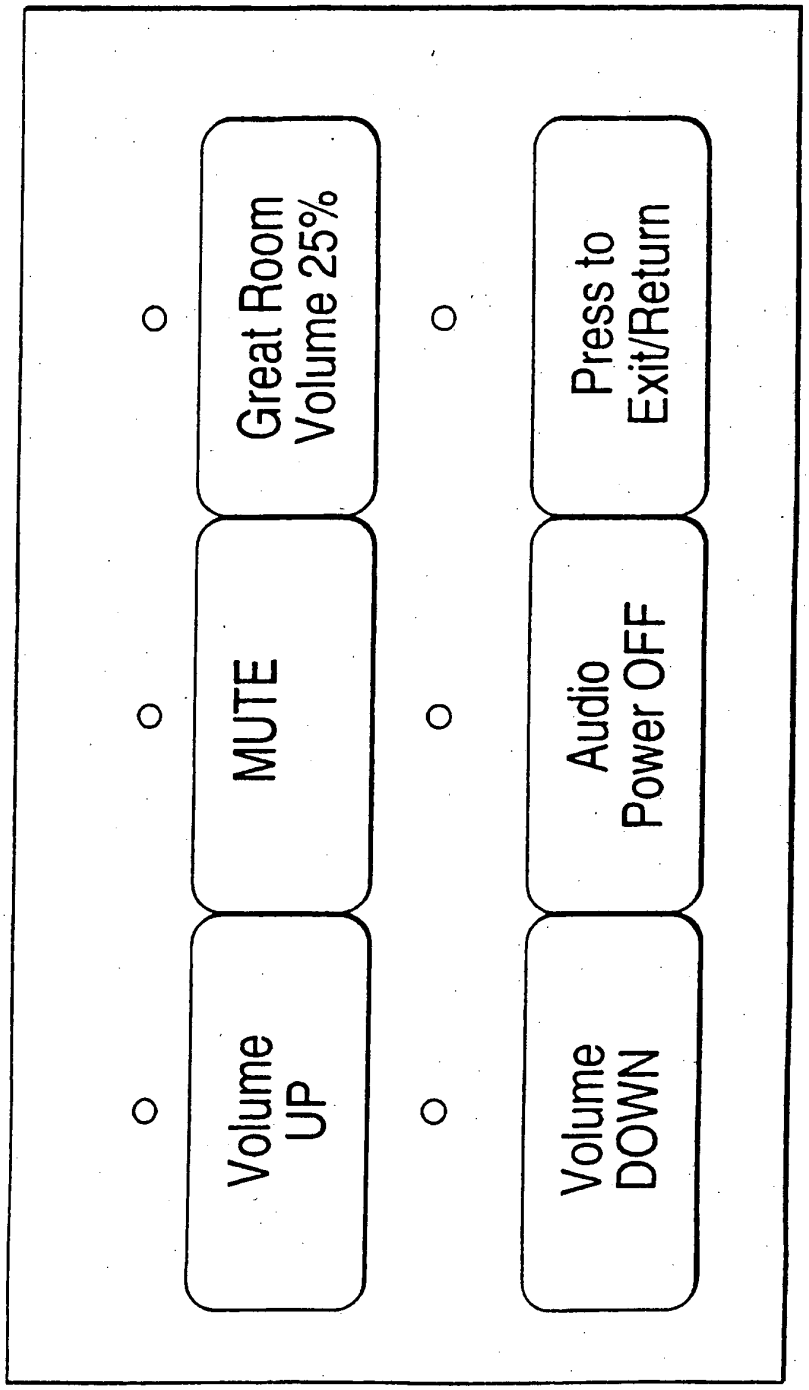


FIG. 11

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 124

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/14520

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G09G 5/00
US CL : 345/156

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 345/156, 170, 171, 171, 172, 173, 83, 146

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, MAGAZINE DATABASE, IAC(SM)COMPUTER DATABASE
search terms: touch screen or panel, smart home or house, microcontrollers or processors, LCD, LED, light sensor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,821,029 (LOGAN ET AL) 11 April 1989, figure 1, and column 3, line 45 to column 4 line 15.	1
Y	US, A, 5,396,226 (WAKE ET AL) 07 March 1995, figures 1, 2 and 3, and abstract.	1-14
Y	US, A, 5,034,602 (GARCIA, JR. ET AL) 23 July 1991, figure 2.	1-14
Y	US, A, 3,187,321 (KAMENY) 01 June 1965, figure 2.	1-14
Y	US, A, 4,810,937 (HAVEL) 07 March 1989, abstract.	3
Y	US, A, 5,097,396 (MYERS) 17 March 1992, abstract.	5,6,14

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 DECEMBER 1996	31 JAN 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer JOSEPH ACOSTA Telephone No. (703) 305-4700

Form PCT/ISA/210 (second sheet)(July 1992)*

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 125

INTERNATIONAL SEARCH REPORT

Inte. ional application No.
PCT/US96/14520

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,384,577 (MCLAUGHLIN ET AL) 24 January 1995, abstact and column 2, lines 26 to 28.	6
Y	US, A, 5,440,208 (USKALI ET AL) 08 August 1995, figure 3.	8, 14
Y	US, A, 4,066,850 (HEYS, JR) 03 January 1978, fugures 1, 2, 3, and 4.	9,10,11
Y	US, A, 4,360,716 (FIORELLA) 23 November 1982, abstract.	11
Y	US, A, 4,827,410 (CORREN) 02 May 1989, column 6, lines 54 to 55.	7
Y	US, A, 5,307,086 (GRIFFIN ET AL) 26 April 1994, figures 1 to 4.	12, 13

Form PCT/ISA/210 (continuation of second sheet)(July 1992)*

09/03/03
17668 U.S. PTO

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

22141 U.S. PTO
10/654235
09/03/03

Title: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
Inventor(s): Howard Rosen
Serial No.:
Filing Date:
Group No.:
Examiner:
Attorney Docket No.: 0307.1aA4

TRANSMITTAL LETTER:
REGULAR PATENT APPLICATION

CERTIFICATE OF MAILING (37 CFR 1.10)
I, the person below signing this Certificate of Mailing, hereby certify that this document and the documents referred to as enclosed therewith are being deposited with sufficient postage with the United States Postal Service on this date in an envelope as "Express Mail Post Office to Addressee" addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450
Mailing Label No.: ER 312816845 US

David T. Bracken
Signature: David T. Bracken
Date of Mailing: Sept. 3, 2003

COMMISSIONER FOR PATENTS

Sir:

Transmitted hereunder for filing is the above patent application and/or related documents as listed below.

Papers Which Are Required for Filing Date:

i) Pages of Specification: 19
ii) Pages of Claims: 7
iii) Pages of Drawings: 8
iv) Pages of Abstract: 1

Additional Papers Enclosed:

☒ Declaration/Power of Attorney
☒ Credit Card Authorization for $375
☒ Information Disclosure Statement / Remarks
☒ Copies of Cited Prior Art

Inventor(s)	
#1 Howard Rosen	Address #1: Lyncroft Road, Hampstead, Quebec, H3X 3E3 Canada

Address all correspondence to: David T. Bracken, The Law Office of David T. Bracken, 4839 Bond Avenue, Orange, CA 92869
Phone: 714-744-4798

☒ Applicant(s) claim small entity status for this application as per 37 CFR 1.9 and 27.
☒ Pursuant to 37 CFR 1.211, Applicant hereby requests nonpublication with this application. The application is not to be published under 35 U.S.C. 122(b). Applicant certifies that the invention disclosed in the application has not been 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.

David T. Bracken
Attorney for Applicant(s)
David T. Bracken, Reg. No. 37522

PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS

Cross-Reference to Related Applications

This application is a continuation in part of pending United States Patent Application No. 10/060,768 filed 01/30/2002. This application is related to: co-pending United States Application No. 10/XXX,XXX entitled "Programmable Thermostat Including a Feature for Providing a Running Total for the Cost of Energy Consumed During a Given Period for Heating and/or Cooling a Conditioned Space" by Howard B. Rosen, filed on even date herewith; and co-pending United States Application No. 10/XXX,XXX entitled "Programmable Thermostat Incorporating a Liquid Crystal Display and Having a Feature for Mounting Horizontally, Vertically and Any Intermediate Orientation" by Howard B. Rosen, filed on even date herewith.

Field of the Invention

The present invention relates to a programmable thermostat incorporating an interactive liquid crystal display (LCD), and, more particularly, to such a thermostat in which the LCD selectively presents adaptable menus, including variable representations of virtual buttons, in order to simplify user programming in accordance with a given environmental control system's configuration.

Background of the Invention

Thermostats have been used for many years as temperature sensitive switches which control heating and/or cooling equipment for conditioning a space in which the thermostat, or a temperature sensor connected to the thermostat, is placed. In the well known manner, a simple thermostat can be adjusted to establish a temperature set point such that, when the temperature in the conditioned space reaches the set point, the thermostat interacts with the heating and/or/cooling equipment to take suitable action to heat or cool the conditioned space as may be appropriate for the season as established by a user.

Modern thermostat systems, which take advantage of the ongoing rapid advances in electronic technology and circuit integration, have many features which provide more precise supervision of the heating and/or cooling equipment to achieve

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 128

more economical and more comfortable management of the temperature of a conditioned space. Many modern thermostat systems include a real time clock, a memory and a data processor to run a process control program stored in the memory; Such thermostats accurately measure the temperature of a temperature sensor disposed in the conditioned space and make decisions to send control signals to the heating and/or cooling equipment in order to closely control the temperature of the conditioned space. The use of programmed thermostat systems permits anticipating and minimizing hysterisis or overshoot of the temperature in the conditioned space. In addition, the program can specify different set points at different times of the day and week and may also include a "vacation" mode which employs different set points when the conditioned space is not occupied for an extended period.

Many modern thermostat systems are programmable by a user. Typically, prior art programmable thermostat systems employ a set of fixed position, button-actuated switches to be depressed in a precise sequence to program set points (which may vary with the day of the week) for programmable time periods which may include a vacation mode. The programming sequence may be followed on a separate display, typically an LCD with segmented text characters. In some modern thermostats, "virtual" buttons are presented on the LCD itself which is juxtaposed with a touch pad to effect an interactive touch screen.

There is a fundamental problem with the prior art programmable thermostat systems: they are difficult to program to the extent that some users are unable to successfully program them. This is because the user interfaces which have been employed in prior art programmable interfaces are not highly intuitive. Programmable thermostat systems have incorporated fixed position real or virtual buttons, at least some of which have multi-functions depending upon the point which a user has reached in the programming process. The user must usually refer to and attempt to decipher a programming manual (which is often difficult for the average user to readily understand) as the programming proceeds. But, the programming process is so complex to follow while trying to remember the instructions that many users give up, and the full capabilities of the thermostat system cannot be utilized.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 129

Outside of the art of programmable thermostat systems and programmable thermostats, dot matrix LCDs, which have pixel display elements arranged in rows and columns, are widely used. Dot matrix LCDs are not common as user-visible displays on programmable thermostats for viewing alphanumeric and iconic graphic information although such a thermostat is disclosed in, and particular features claimed in, co-pending United States Patent Application No. 10/440,474, filed May 15, 2003, and entitled: "Reverse Images in a Dot Matrix LCD for an Environmental Control Device" by Howard B. Rosen, incorporated by reference herein.

This limited use of dot matrix LCDs in programmable thermostats is because of basic engineering and practical considerations. Displayed information for a programmable thermostat generally includes such things as environmental conditions, heating and/or cooling equipment operation or non-operation, operational modes of the thermostat and the like. The most important information in thermostat displays is capable of being formed from segmented alphanumeric characters on less expensive LCDs without dot matrix capability and with reduced requirements for memory and programming.

Thus, dot matrix LCDs have not been widely used in prior art user programmable thermostats through a failure to understand an extended functionality capability of those devices when dot matrix LCDs are employed with a touch pad to effect an interactive display. This extended functionality is exploited to advantage in the present invention both to greatly simplify user programming and to relieve the manufacturer of the necessity to fabricate variants of the thermostat to suit the control and display aspects of various heating and/or cooling environments.

While the present invention may be practiced using segmented LCDs, it is preferably embodied using dot matrix LCDs.

Objects of the Invention

It is therefore a broad object of this invention to provide a field programmable thermostat which is very easy for a user to program.

It is another broad object of this invention to provide a field programmable thermostat which may be user-configured to limit functionality only as necessary for the specific conditioned space for which the program is being established.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 130

It is a more specific object of this invention to provide a programmable thermostat in which the menus displayed on a touch screen during user programming and temperature adjustment are simplified according to the specific heating and/or cooling system employed in the specific conditioned space for which the program is being established.

Summary of the Invention

Briefly, these and other objects of the invention are provided by a programmable thermostat system for controlling space conditioning equipment and which includes: a transparent touch pad juxtaposed with an LCD (preferably dot matrix) to constitute a touch screen for interactive interface with a user; one or more environmental condition sensors for providing an electrical signal indicative of the one or more sensed environmental conditions of a conditioned space; and a processor including: a central processing unit, a real time clock, a memory coupled to the central processing unit for storing program and data information and an input/output unit coupled between the processor and the touch screen for carrying out information transfer therebetween.

A program stored in the memory directs the central processing unit to communicate through the input/output unit to selectively: establish on the LCD a representation of at least one virtual button at a predetermined XY position; read the same XY position on the touch pad to determine if the virtual button has been touched; and if the virtual button has been touched, perform a predetermined action such as moving to a different menu and/or changing operating criteria. An alphanumeric message explaining the function of the virtual button is also displayed, and icon indicators may be employed to unmistakably associate a message with a virtual button. Different menus can place the virtual buttons and messages in various positions on the touch screen to facilitate intuitive programming.

In accordance with one aspect of the invention, environmental control selection virtual buttons are added to or eliminated from at least some menus of the operational display during preliminary programming depending on the type(s) of environmental control equipment a user actually has connected with a programmable thermostat. This feature makes ongoing user programming and system management easier and more

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 131

intuitive and also obviates the need for the manufacturer to fabricate and market multiple models of thermostats with different virtual buttons.

Thus, an image representative of a first virtual button may be shown on the touch screen display with graphics (alphanumeric characters and/or icons) on or closely associated with the first virtual button. The characters/graphics associated with the first virtual button indicate, for example, a current operating state or condition of the programmable thermostat. A user touching the first virtual button causes the device program to change the operating state or condition, and the graphics on the touch screen display also change to indicate the changed operating state or condition.

As an example, a first virtual button may be associated with the word "COOL" to indicate to a user that the programmable thermostat will only operate in an air conditioning mode. In the prior art, touching the first virtual button will shift the programmable thermostat from the air conditioning mode to, for example, a heating mode such that the associated text would change to "HEAT". However, in accordance with the invention, if the user has no heating equipment connected with the programmable thermostat, that fact will have earlier been entered into memory with a menu selection at a different touch screen display during preliminary programming. After that earlier entry indicating that no heater is connected with the programmable thermostat has been made, any user selecting an operating state or condition will not be shown any virtual button indicating that a heating mode is available.

Thus, after a simple, one-time, designation of the environmental control equipment installed in a given system using easy to understand menus, any subsequent user will only have to interact with first virtual buttons representing the actual environmental control equipment under control. It may be noted that this feature of the invention also allows a user to eliminate virtual buttons (and the associated environmental control functions) available at first interaction screens for the programmable thermostat *even if* the "eliminated" control equipment is actually installed and connected with the programmable thermostat, thereby adding a level of security against use of thermostats one user wants to preclude from use by others.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 132

Description of the Drawing

The subject matter of the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, may best be understood by reference to the following description taken in conjunction with the subjoined claims and the accompanying drawing of which:

FIG. 1A is a block diagram of a space conditioning system incorporating a programmable thermostat according to the present invention;

FIG. 1 is a partially cut away schematic and top view of a thermostat with a backlit dot matrix LCD employed as a display;

FIGs. 2 and 3 particularly illustrate a magnified section of the thermostat showing two forms of displaying contrast in a dot matrix LCD;

FIGs. 4 and 5 are perspective and front views, respectively, of an exemplary touch screen programmable thermostat of the present invention;

FIG. 6 is an exemplary pictorial of a first level interactive interface displayed on the touch screen;

FIG. 7 is an exemplary pictorial of a second level interactive interface displayed on the touch screen showing exemplary alternate contrast for a touch screen virtual button;

FIG. 8 is an exemplary pictorial of a second level interactive interface displayed on the touch screen with an exemplary sequence of virtual buttons available to a user upon touching a single virtual button;

FIG. 9 is an exemplary pictorial of the second level interactive interface displayed on the touch screen in FIG. 8 with a temporary "confirmation" virtual button for accepting the change of the single virtual button;

FIG. 10 is an exemplary pictorial of a second level interactive interface displayed on the touch screen in FIG. 8 with the function changed from "AUTOMATIC" to "COOL";

FIG. 11 is an exemplary pictorial of a menu displayed on the touch screen to provide a first set of menu selections including an "ADVANCED SETTINGS" virtual button;

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 133

FIG. 12 is an exemplary pictorial of another interactive interface displayed on the touch screen showing "ADVANCED SETTINGS" menu selections after the "ADVANCED SETTINGS" virtual button of FIG. 11 has been touched;

FIG. 13 is an exemplary pictorial of yet another interactive interface, reached by touching an "ENEGY WATCH" virtual button displayed on the touch screen, for entering settings for an "energy watch" mode;

FIG. 14 is an exemplary pictorial of a third menu interactive interface displayed on the touch screen for the "energy watch" mode;

FIG. 15 is exemplary pictorial of an interactive interface displayed on the touch screen of FIG. 8 as viewed in the device of FIG. 5 disposed in a horizontal mounting position;

FIG. 16 is exemplary pictorial of the text and graphics of the interactive interface displayed on the touch screen of FIG. 8 rotated for the device of FIG. 5 disposed in a vertical mounting position;

FIG. 17 is exemplary pictorial of an interactive interface displayed on the touch screen of FIG. 12 as viewed in the device of FIG. 5 disposed in a horizontal mounting position;

FIG. 18 is exemplary pictorial of the text and graphics of the interactive interface displayed on the touch screen of FIG. 12 rotated for the device of FIG. 5 disposed in a vertical position; and

FIGs. 19 and 20 illustrate the manner in which different first level interface screens may be reviewed and selected.

Detailed Description of the Preferred Embodiment(s)

Referring first to FIG. 1A, a user programmable thermostat system includes a processor 1, a touch screen 2 and a temperature sensor 5 which is disposed in a conditioned space 4. It will be understood that the processor 1 and the touch screen 2 are typically situated in a common housing (shown in an exemplary form in FIG. 5). The sensor 5 may also be situated in the common housing or remotely as shown, all as very well known in the art. The common housing is usually, but not necessarily, placed in the conditioned space 4. Thus, those skilled in the art will understand that the block diagram of FIG. 1A is very general in order to best explain the invention.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 134

The processor 1 includes a central processing unit (CPU) 9 in communication with a memory 8 for storing data and program information and also, via an input/output unit (I/O unit) 10, a touch pad 11 and an LCD 12 which together constitute the touch screen 2. The memory 8 may include a read-only part which is factory-programmed to include the process control program and a random-access part which stores data subject to change during operation. A settable real time clock 13 is used to keep time in the thermostat system to facilitate diverse operations, such as establishing different temperature set points (desired temperatures), during different periods of the day cycle. An analog-to-digital converter 27 (which may not be required in all systems) serves to convert any analog information received by the I/O unit 10 to digital information which is suitable for use by the CPU 9. The thermostat system may be suitably powered by a battery (not shown) and/or from equipment to which is connected.

Temperature information from the sensor 5 and output signals to a space conditioning (heating and/or cooling) unit 3 pass through the I/O unit 10 under control of the CPU 9 executing the process control program stored in the memory 8. Those skilled in the art will understand that if the correspondents external to the processor 1 communicating with the CPU 9 are all digital in nature (e.g., if the temperature sensor 5 incorporates its own analog-to-digital converter and sends a digital representation of temperature to the processor 1), then the I/O unit 10 may only constitute simple switching circuits. The LCD may optionally be backlit by any suitable means (not shown in FIG. 1A).

The heating/cooling equipment unit 3 may include one or more components such as a heater, a compressor-type air conditioner, a heat pump, etc.

Thus, in the usual manner during normal operation, the temperature sensor 5 sends an electrical signal (e.g., if the sensor 5 is a simple thermistor, a resistance value; several types of temperature sensors are widely used) representative of the temperature within the conditioned space 4 which the processor can compare against a previously entered set point to determine if control signals need to be sent to the space conditioning equipment 3. For example, if the temperature in the conditioned space 4 is found to be too low when operation is in the heating mode, the processor 1 signals the space conditioning equipment 3 to circulate, through ducts 6, 7, air from/to the

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 135

conditioned space 4 which is heated by the space conditioning equipment before return to the conditioned space. This heating phase continues until the sensor 5 indicates that the space is now too hot (or approaching too hot) with reference to the set point such that the processor 1 sends signal(s) to the space conditioning equipment 3 to cease the heating function, all as very well known in the art. In a cooling mode, a counterpart procedure is followed. Those skilled in the art will understand that the control process typically includes such refinements as anticipation, hysterisis accommodation, fan control, etc. which are acknowledged, but are not directly relevant to the invention.

It may be noted that integrated circuit chips including all the processor components with all the necessary interface conditioning circuits are available off-the-shelf and are under constant refinement for increased power. The subject invention only requires the capabilities of a processor such as the processor 1, and off-the-shelf integrated circuit processor chips may be used to advantage in the subject thermostat system.

Thermostat systems may be user programmable or non-user programmable. The present invention relates to programmable thermostat systems in which, in the prior art, programming steps have been entered using a "tactile" touch pad while observing a display which may be an LCD or some other display type. The drawbacks of the prior art interactive thermostats have been discussed above. The present invention employs a different type of thermostat user interface; viz., the touch screen 2, in which the touch pad 11 and LCD 12 are integrated and coordinated as will be discussed below and which, in conjunction with the processor 1, provides a programmable thermostat system which is very much easier to program than in the prior art.

FIG. 1 shows a thermostat 100 having a processor 101 for controlling space conditioning equipment in a manner equivalent to the discussion above. The processor 101 is electrically coupled with multiple connections 102 to a dot matrix LCD 104 whose individual pixels 105 are driven by suitable signals to their respective vertical columns and horizontal rows from the processor 101. Backlight panel 103 is shown for illustration as separated from a backside of LCD 104 although it is known and preferred that these two components be in close contact. Backlight panel 103 is connected to power and to processor 101 so that it can be turned on or off as needed or desired.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 136

The processor 101 also optionally includes a light sensor (not shown) for sensing the illumination level in the space in which the LCD 104 is located, which illumination may be compared with a previously entered minimum illumination value to determine whether or not the room is darkened or dimly lit. If so, the display image can be reversed to improve readability. Alternatively, as the processor 101 includes a real time clock, an image reversal can be instituted at predetermined times of the 24-hour day.

Thus, FIG. 2 shows section 106 operated as it would typically appear during a daytime or lighted room condition. The display elements of surrounding section 107 are essentially clear and, optionally, backlight panel 103 shines through them to improve readability. The display elements of image section 108 are partially or completely opaque during daytime or in a lighted space. The combination of image section 108 and surrounding section 107 therefore displays system information readily comprehensible and legible to a user in a lighted room.

FIG. 3 shows section 106 operated as it would during nighttime or in a dimly lit room. The image has been reversed such that the display elements of the surrounding section 107 are now partially or completely opaque, and light provided by backlight panel 103 is partially or substantially completely blocked. But, the display elements of image section 108 are now essentially clear, and the light from backlight panel 103 shines through them. The current system information is thereby comprehensible and legible to a viewer in the darkened space. The result of this mode of operation is a dimmer display which is suitable for low lighting conditions.

In another, similar, mode of operation, the reversible image can be repeatedly reversed to "flash" all or selected items of the display upon the occurrence of certain conditions as will be described below.

FIGs. 4 and 5 show an exemplary touch screen thermostat 110 with a housing 111 and touch screen 112 and incorporating the subject invention. Thermostat 110 has no physical buttons at all; rather, all the functions and displayed information of the programmable thermostat are available to a user by observation and interaction with the touch screen 112. In the example, the touch screen 112 is generally rectangular, thus having a long dimension and a short dimension.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 137

FIG. 6 shows a first pictorial 113 presented on the touch screen 112 and including: a column 114 of interactive virtual buttons 115, 116, 117; a "current temperature" display 139; a "date" display 119; a "current time" display 120; a "heating mode active" display 118; and a "cooling mode active" display 121. Pictorial 113 displays the word "AUTO" on virtual button 116 because the thermostat 110 is currently operating in an "automatic" mode to control both a heater and an air conditioner to respective setpoints shown in displays 118 and 121.

Pictorial 113 is a first level touch screen; i.e., a default first screen that is normally viewed by a user when first approaching the thermostat 110. The information conveyed to a user, during normal system operation of the exemplary current configuration shown in FIG. 6, are: current ambient temperature, current date and time, that a heater will turn on with reference to a set point of 21.5° C, that the air conditioning system will turn with reference to a set point of 24.0° C, that the thermostat 110 is operating in the "AUTO" mode where both heating and air conditioning system components are active and that the fan is responding to only the heating and air conditioning modes (i,.e., not always running).

When a user touches any active part of the touch screen in pictorial 113, the overall display changes to pictorial 122, a second level touch screen shown in FIG. 7. Virtual buttons 115, 116, and 117 still perform the functions described above. Newly-presented virtual buttons 127 and 129 can be selectively touched at temperature displays 128, and 130, respectively, to adjust the minimum and maximum set points. FIG. 7 also illustrates that virtual button 116 may be touched and responsively changed in step 123 by the control program to reverse contrast to be shown (in the same position previously occupied by virtual button 116) as reversed contrast virtual button 124. In order to attract the user's attention to this button position, reversals can be made in short intervals so that the virtual button 116 appears to be flashing. This "flashing" emphasizes the fact that the thermostat 110 is currently operating in a particular state or condition and that a user may want to change the operating state or condition of the thermostat 110. Touching virtual button 183 directs the control system to another mode of operation which will be discussed further below.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 138

FIGs. 8 to 10 show pictorial 122 in various interactive conditions. FIG. 8 illustrates that virtual button 116 can undergo step 131 in response to a user touch which also causes a change in the operating state of thermostat 110 and a change of the legend associated with virtual button 116 to one of the virtual buttons in column 132. In the example, successive steps 133 to 137 indicate that a user has touched virtual button 116 one or more times to cause the operating state of thermostat 110 and the legend of virtual button 116 to change with respect to those steps as follows:

A) at step 137, from "automatic" mode to "off" mode (none of the environmental control equipment connected with thermostat 110 will operate, and virtual button 116 shows "OFF");

B) at step 133, from "off" mode to "heat" mode (a heater or a heat pump in heat mode operates to heat the conditioned space, and virtual button 116 shows "HEAT");

C) at step 134, from "heat" mode to "cool" mode (an air conditioner or heat pump operating in the cooling mode operates to cool the conditioned space, and virtual button 116 shows "COOL");

D) at step 135, from "cool" mode to "emergency heat" mode (a backup electric heater operates to keep the conditioned space temperature above a lowest set point, and virtual button 116 shows "EMER HEAT"); and

E) at step 136, from "emergency heat" mode to "automatic" mode (the air conditioner and heater (or heat pump) operates in both the "heat" and "cool" mode, and virtual button 116 shows "AUTO").

FIGs. 9 and 10 illustrate an exemplary operation of changing, confirming and showing the change made by touching virtual button 116 twice. FIG. 9 shows that, under control of the process control program, virtual button 116 has already responded to step 133 to briefly change from the "auto" mode to the "heat" mode on the first touch and, on the second touch, has changed from the "heat" mode to the "cool" mode; and that a temporary active virtual button 138 is now displayed for a user to confirm that the user wishes to select the currently displayed function; i.e., "cool". Touching virtual button 138 under these conditions causes the changes seen in FIG. 10. It will be particularly noted in FIG. 10 that, as a feature of the system, display 118 has disappeared since the "auto" mode is no longer operational because no heating

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 139

function is active. Display 121 is still present in FIG. 10 because the "cool" mode is operational. Should the "heat" mode be selected and 'HEAT" shown with virtual button 116, display 121 will disappear and display 118 will reappear. In the "off" mode, both displays 118 and 121 will disappear.

It will be appreciated that the virtual buttons of virtual buttons column 132 may alternatively be reduced in size and distributed on the surface of pictorial 113 instead of being a set of virtual buttons activated and serially viewable by invoking steps 133-137. If the virtual buttons of virtual buttons column 132 are distributed as separately and simultaneously viewable virtual buttons, it is desirable that the virtual button for the function currently activated for thermostat 110 will "flash" in contrast as described above so that the user will know which of the operating states or conditions are currently controlled by thermostat 110.

However, it is an important feature of the thermostat 110 that, although a user may touch virtual button 116, fewer or more than all the virtual buttons of column 132, in the example, and their associated changes in the normal operation control effected by thermostat 110 may be available to a user. The user has the ability to "edit" and/or simplify the virtual buttons column 132 to reflect the user's environmental control equipment actually connected for control by thermostat 110.

If fewer than or more than the virtual buttons of virtual buttons column 132 are available to the user, appropriate fewer or more touching steps will be required to cycle through the functions of thermostat 110 and the corresponding legends which may appear with virtual button 116. The particular sequence of thermostat functions available at steps 133 to 137 is only exemplary of how normal user changes between operating states or conditions are made for thermostat 110; the virtual buttons of column 132 may, of course, have a different sequence and also reflect various space conditioning equipment components which may be installed in diverse applications.

Thus, as more fully described below, a user is able, typically during a system setup, to eliminate or add to the virtual buttons shown in column 132 (and their associated functions) by using the touch screen in a manner that allows the user to specify what environmental control equipment components are actually controlled by thermostat 110 and, accordingly, included in column 132.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 140

In practice, the thermostat manufacturer provides, in the control program, control sequences for as many different types of space conditioning components as might be used in widely diverse applications, alone or in combination. During setup, the user of a given installation eliminates those components, and graphics displays related thereto, which are irrelevant to the given installation, thus simplifying later ongoing programming and use of the thermostat. This system setup procedure is instituted by touching the "MENU" button 183 shown in FIG. 7 which the control program responds to by displaying second-level pictorial 140 on the touch screen.

FIG. 11 shows that pictorial 140 displays virtual buttons 141 to 149. Touching each of buttons 141 to 149 results in a new, usually third level, pictorial screen to show information and/or new buttons as follows:

A) for "home" icon button 141, a return to the first level, normal operation, pictorial 113 shown in FIG. 6;

B) for "DATE/TIME SETTINGS" button 142, for entering current date and time information;

C) for "SET SCREEN" button 145, for changing screen settings for the touch screen;

D) for "CLEAN SCREEN" button 146 to wipe the screen, e.g., with a lightly dampened cloth, without accidentally changing any of the settings; this function times out after a few seconds;

E) for button "FILTER MONITOR" button 147, entering, for display at pictorial 113 or similar touch screen, a reminder to change or clean filters on a specified schedule;

F) for "VACATION SETTINGS" button 148, for entering appropriate vacation system settings;

G) for "PROGRAM SETTINGS" button 143, for entering automatic temperature set point adjustments, typically for each of four selectable times for each day of the week;

H) for "ENERGY WATCH" button 144, for display of ongoing energy consumption and costs as discussed further below; and

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 141

l) for "ADVANCED SETTINGS" button 149, for entering the environmental control equipment connected with thermostat 110, entering energy consumption data and costs and other functions as described.

Touching virtual button 149 results in display of pictorial 150 of FIG. 12. In a manner similar to button 116 of FIG. 8, buttons 154 and 158 of FIG. 12 each represents a sequence of buttons that change after being touched by a user. Button 154 represents the presence or absence of air conditioning equipment connected with thermostat 110. Button 158 represents the presence or absence of heating equipment connected with thermostat 110.

More particularly, the virtual buttons in column 163 are those that become successively visible when a user successively touches button 154, also indicating a change in the designation of which cooling equipment is present in a given system. Similarly, in the example, buttons in column 164 are those that become successively visible when a user successively touches button 158, also indicating a change in the designation of which heating equipment is present in the given system.

In the example, invoking steps 160, 161 and 162 respectively cause a change in the function and legend appearing at button 154 from "heat pump" mode to "air conditioner" mode, from "air conditioner" mode to "no compressor" mode (no air conditioning equipment), and from "no compressor" mode to "heat pump" mode. The memory program contains programming adapted to cause effective operation of a heat pump or compressor type air conditioner depending on the one selected at button 154. If the "no compressor" mode is selected at button 154, the buttons column 132 of FIG. 8 will lack the "cool" and "auto" buttons and functions.

Cycling through steps 165, 166, 167, 168 and 169 respectively cause a change in the function and legend at button 158 from "electric furnace" mode (presence in the given system of an electric powered furnace) to "emer. elect. furnace" mode (additional presence of an emergency electric furnace), from "emer. elect. furnace" mode to "gas furnace" mode (presence of a gas furnace), from "gas furnace" mode to "oil furnace" mode (presence of an oil furnace), from "oil furnace" mode to "furnace off" mode (lack of heating equipment) and from "furnace off" mode to "electric furnace" mode. If the "furnace off" mode is selected at button 158, the buttons column 132 of FIG. 8 will lack

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 142

the "heat" and "emer heat" mode buttons and functions as well as the "auto" mode button and function. The control program stored in memory contains routines adapted to cause effective operation of any combination of the designated equipment.

Pictorial 155 of FIG. 12 also shows virtual button 151 for changing the temperature designation in the touch screen from Centigrade to Fahrenheit, buttons 153 and 157 for entering certain set point related parameters, button 155 for entering an installer message and button 146 for entering security settings.

FIG. 13 shows pictorial 171 which is activated by a user's touching button 152 of FIG. 12. Pictorial 171 is a menu permitting entry of energy requirement and cost information using cost determination information entry virtual buttons 172, 173, 174 and 175. Touching button 172 changes the numerical legend in increments to indicate kilowatts per hour required of a compressor if air conditioning equipment is present. Thus, the user is able to enter into the energy required for operation of a cooling component in the system. In a similar manner for buttons 173 and 174, a user can enter the energy requirements for a heating furnace or heat pump if in the system and that of a system fan. Button 175 allows the user to enter the per kilowatt hour cost of energy in the user's locality. The equipment energy requirements and energy cost are stored in the memory and used by the control program to calculate and display cumulative energy used and cumulative cost of that energy for a monitored period. The memory stores in a cumulative amount the periods in which the air conditioner, furnace, heat pump, fan and/or other environmental control equipment operates, and calculates and displays, as shown in pictorial 176 of FIG. 14 the running energy cost information. In the example, display 177 shows the number of days for which the energy information has been accumulated. Displays 178, 179, 179, and 180 show energy used by respectively and cumulatively the air conditioning compressor, the furnace and the fan, with the total energy being used by that equipment in display 181 and the total cost of that energy shown in display 182.

It will be understood that the user, with a few button manipulations, can easily determine what the running cost is for the use of the environmental control equipment in the user's system. In the example, the user can successively touch: an active part of the touch screen of pictorial 113 of FIG. 6, the "MENU" button 183 of pictorial 122 of

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 143

FIG. 8 and the "ENERGY WATCH" button 144 of pictorial 140 of FIG. 11 to arrive at the display of FIG. 14. Alternatively, the "ENERGY WATCH" button 144 can instead or also be provided on the touch screen of pictorial 113 of FIG. 6 so that a single button touch at the first level interface will bring the touch screen directly to the display of FIG. 14.

Attention is now directed to FIG. 15 which shows that pictorial 113 has alphanumeric text on the buttons and displays disposed horizontally for easy reading, as does the same alphanumeric text on the same buttons and displays in pictorial 113A of FIG. 16. However, the housing 111 of FIG. 15 has been rotated 90 degrees to obtain the vertical orientation of the housing 111 of FIG. 16. The control program of thermostat 110 can reorient the display from that shown in pictorial 113 to that shown in pictorial 113A by suitably remapping the column and row drive signals to the individual pixels of the LCD. This feature can be invoked, in one embodiment, by touching the "SCREEN SET" button 145 of pictorial 140 shown in FIG. 11 for a predetermined period of time (say five seconds), which action is sensed by the control program to cause a change of pictorial 113 to pictorial 113A or vice versa. All the pictorials for the touch screen for the thermostat 110 would be similarly reoriented, and FIGs. 17 and 18 show a similar translation of pictorial 155 to pictorial 155A.

This feature is not limited to a translation of only 90 degrees of the alphanumeric text, graphics and buttons of thermostat 110 as described above. The memory program, combined with the capability of a dot matrix type LCD, with its individually addressable pixels disposed in rows and columns, can cause a rotation of all those aspects of the touch screen to be rotated incrementally through 360 degrees so that a user can mount the housing 111 in whatever angled orientation is desired.

Attention is now directed to FIG. 19 in which pictorial 184 is obtained by touching the "SET SCREEN" button 145 of pictorial 140 shown in FIG. 11 for a predetermined period of time (say five seconds). This touching action is sensed by the control program which causes a display change from pictorial 140 shown in FIG. 11 to the pictorial 184 shown in FIG. 19. Pictorial 184 contains a sub-pictorial 185 that is a framed and generalized inactive version of first level interactive pictorial 113 shown in FIG. 6. The user sees in sub-pictorial 185 a general layout of virtual buttons, text and graphics that can be

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 144

selected to view as the pictorial of the first level interactive interface. This user selection can be made if the "SET SCREEN" button 145 of pictorial 184 shown in FIG. 19 is not touched for a predetermined period of time (say five seconds). However, the user can select other general layouts of virtual buttons, text and graphics that will thereafter be seen at the first level interactive interface.

Thus, referring now to FIG. 20. pictorial 186 contains a sub-pictorial 187 that is an alternate general layout of virtual buttons, text and graphics for the first level interactive interface that can be selected by a user. Sub-pictorial 187 appears if virtual button 145 is touched for a predetermined period of time (say five seconds). In sub-pictorial 187, a row of virtual buttons 191 are aligned along a top part of sub-pictorial 187 which will become the first level interactive interface shown in FIG. 8 when normal operation is resumed. When a return is made to the alternative first level interactive interface, touching any one of the virtual buttons 191 causes the control program of the thermostat to change operating states to one associated with that one virtual button. In one embodiment, a touched virtual button 191 is visually distinguished from the other virtual buttons 191 so the user knows which operating state currently controls the thermostat. One form of effecting that visual distinction is shown for virtual button 188. Virtual button 188 after being touched causes the control program to change the operating state of the thermostat to an "automatic" mode (the air conditioner and heater together, or a heat pump, operates in both the "heat" and "cool" modes, and virtual button 188 shows "AUTO"). Thereafter, the visible representation of virtual button 188 changes according to step 190 to the contrasting virtual button 189 and back to the form shown for virtual button 188 at short intervals to simulate a "flashing" virtual button. Virtual buttons 191 represent the same operating states represented by the similarly named virtual buttons of virtual buttons in column 132 shown in FIG. 8.

FIGs. 19 and 20 represent only two of many possible arrangements of virtual buttons, text and graphics that can be made available for selection by a user for the first level interactive interface. In the above exemplary method of making that selection, the user touches or refrains from touching the "SET SCREEN" button 145. This feature extends the ability of the user to select from one of several arrangements of virtual buttons, text and graphics at any of the levels of interactive or passive (information or

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 145

graphics only) interface of the thermostat. This feature may be implemented by steps other than touching or refraining from touching the "SET SCREEN" button 145.

While the principles of the invention have now been made clear in an illustrative embodiment, there will be immediately obvious to those skilled in the art many modifications of structure, arrangements, proportions, the elements, materials, and components, used in the practice of the invention which are particularly adapted for specific environments and operating requirements without departing from those principles.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 146

WHAT IS CLAIMED IS:

1. A programmable thermostat system for controlling space conditioning equipment comprising:

A) at least one environmental condition sensor providing an electrical signal indicative of the ambient temperature of a conditioned space in which said environmental condition sensor is situated;

B) a transparent touch pad juxtaposed with a liquid crystal display to constitute a touch screen for interactive interface with a user;

C) a processor, said processor including:

1) a central processing unit;

2) a real time clock;

3) a memory coupled to said central processing unit for storing program and data information; and

4) an input/output unit coupled between said processor and said touch screen for carrying out information transfer therebetween, said input/output unit further including:

a) a sensor input coupled to each said environmental condition sensors for receiving said electrical signal therefrom; and

b) a control output coupled to the space conditioning equipment for issuing control signals thereto; and

D) a control program stored in said memory for causing said central processing unit to communicate through said input/output unit to selectively:

1) establish on said liquid crystal display:

a) a representation of a first virtual button at a first predetermined position on the liquid crystal display; and

b) a first legend indicative of a first control function of said thermostat, which first control function is for controlling a first space conditioning equipment component, which first control function is active when the first legend is viewable;

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 147

2) read the position on the touch pad juxtaposed with said first predetermined position on said liquid crystal display to determine if the representation of said first virtual button has been touched;

3) if the first virtual button has been touched:

a) determining that the thermostat has been directed to control a second space conditioning equipment component;

b) activating a second control function for controlling the second space conditioning equipment component; and

c) displaying on said liquid crystal display a second legend indicative of said second control function of said thermostat, which second control function is for controlling the second space conditioning equipment component, which second control function is active when the second legend is viewable.

2. The programmable thermostat system of Claim 1 in which said touch screen comprises means for input by a user through the touch screen to establish in said memory which space conditioning equipment components are controllable by said thermostat.

3. The programmable thermostat system of Claim 1 in which the space conditioning equipment components include at least one of: a heater, a compressor type air conditioner and a heat pump.

4. The programmable thermostat system of Claim 3 in which if the first virtual button is been touched again after step D)3), determining that the thermostat controls a third space conditioning equipment component, activating a third control function for controlling the third space conditioning equipment component, and changing the second legend to a third legend indicative of the third control function of the thermostat.

5. The programmable thermostat system of Claim 4 in which one of the space conditioning equipment components is a heater and the graphic includes the word "heat" associated with said virtual button when the heater is controlled.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 148

6. The programmable thermostat system of Claim 4 in which one of the space conditioning equipment components is an air conditioning system and the graphic includes the word "cool" associated with said virtual button when the air conditioning system is controlled.

7. The programmable thermostat system of Claim 4 in which one of the space conditioning equipment components is a heat pump and the graphic includes the word "heat" associated with said virtual button when the heat pump is controlled while operating in its heating mode.

8. The programmable thermostat system of Claim 4 in which one of the space conditioning equipment components is a heat pump and the graphic includes the word "cool" associated with said virtual button when the heat pump is controlled while operating in its cooling mode.

9. A programmable thermostat system for controlling space conditioning equipment comprising:

A) at least one environmental condition sensor providing an electrical signal indicative of the ambient temperature of a conditioned space in which said environmental condition sensor is situated;

B) a transparent touch pad juxtaposed with a liquid crystal display to constitute a touch screen for interactive interface with a user;

C) a processor, said processor including:

1) a central processing unit;

2) a real time clock;

3) a memory coupled to said central processing unit for storing program and data information; and

4) an input/output unit coupled between said processor and said touch screen for carrying out information transfer therebetween, said input/output unit further including:

a) a sensor input coupled to each said environmental condition sensors for receiving said electrical signal therefrom; and

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 149

b) a control output coupled to the space conditioning equipment for issuing control signals thereto; and

D) a program stored in said memory for causing said central processing unit to communicate through said input/output unit to selectively:

1) establish on said liquid crystal display:

a) a representation of a first virtual button at a first predetermined position on the liquid crystal display; and

b) a first legend indicative of a first control function of said thermostat, which first control function is for controlling a first space conditioning equipment component, which first control function is active when the first legend is viewable;

2) read the position on the touch pad juxtaposed with said first predetermined position on said liquid crystal display to determine if the representation of said first virtual button has been touched;

3) if the first virtual button has been touched a predetermined number of times:

a) determining that the thermostat has been directed to control a plurality of space conditioning equipment components;

b) activating a second control function for controlling the plurality of space conditioning equipment components; and

c) displaying on said liquid crystal display a second legend indicative of said second control function of said thermostat, which second control function is for controlling in coordination the plurality of space conditioning equipment component, which second control function is active when the second legend is viewable.

10. The programmable thermostat system of Claim 9 in which the plurality of space conditioning equipment components comprise a heating component and a cooling component.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 150

11. A programmable thermostat system for controlling space conditioning equipment comprising:

A) at least one environmental condition sensor providing an electrical signal indicative of the ambient temperature of a conditioned space in which said environmental condition sensor is situated;

B) a transparent touch pad juxtaposed with a liquid crystal display to constitute a touch screen for interactive interface with a user;

C) a processor, said processor including:

1) a central processing unit;

2) a real time clock;

3) a memory coupled to said central processing unit for storing program and data information; and

4) an input/output unit coupled between said processor and said touch screen for carrying out information transfer therebetween, said input/output unit further including:

a) a sensor input coupled to each said environmental condition sensors for receiving said electrical signal therefrom; and

b) a control output coupled to the space conditioning equipment for issuing control signals thereto; and

D) a program stored in said memory for causing said central processing unit to communicate through said input/output unit to selectively:

1) establish on said liquid crystal display:

a) a representation of a first virtual button at a first predetermined position on the liquid crystal display; and

b) a first legend indicative of a first control function of said thermostat, which first control function is for controlling a first space conditioning equipment component, which first control function is active when the first legend is viewable;

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 151

2) read the position on the touch pad juxtaposed with said first predetermined position on said liquid crystal display to determine if the representation of said first virtual button has been touched;

3) if the first virtual button has been touched a predetermined number of times:

a) determining that the thermostat has been directed to refrain from controlling any space conditioning equipment components;

b) activating a second control function which prevents controlling any space conditioning equipment components; and

c) displaying on said liquid crystal display a second legend indicative of said second control function of said thermostat, which second control function is active when the second legend is viewable.

12. The programmable thermostat system of Claim 1 in which said liquid crystal display is a dot matrix type.

13. The programmable thermostat system of Claim 2 in which said liquid crystal display is a dot matrix type.

14. The programmable thermostat system of Claim 4 in which said liquid crystal display is a dot matrix type.

15. The programmable thermostat system of Claim 5 in which said liquid crystal display is a dot matrix type.

16. The programmable thermostat system of Claim 6 in which said liquid crystal display is a dot matrix type.

17. The programmable thermostat system of Claim 7 in which said liquid crystal display is a dot matrix type.

18. The programmable thermostat system of Claim 8 in which said liquid crystal display is a dot matrix type.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 152

19. The programmable thermostat system of Claim 9 in which said liquid crystal display is a dot matrix type.

20. The programmable thermostat system of Claim 11 in which said liquid crystal display is a dot matrix type.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 153

Abstract of the Disclosure

A programmable thermostat, with a touch screen liquid crystal display having the capability to add to or remove virtual buttons to the display depending on the items of space conditioning equipment connected with and controlled by the thermostat.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 154

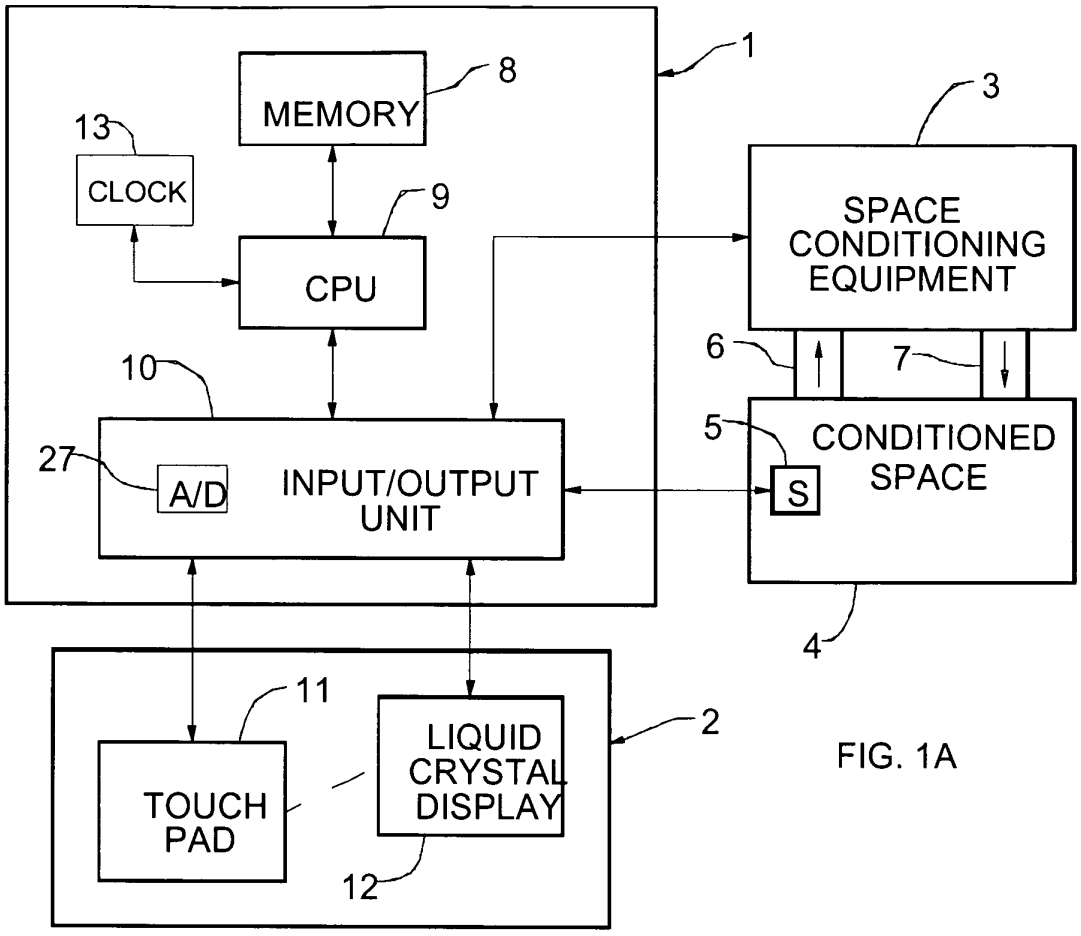

1
MEMORY
8
13
CLOCK
9
CPU
3
SPACE CONDITIONING EQUIPMENT
6
7
10
5
CONDITIONED SPACE
27
A/D
INPUT/OUTPUT UNIT
S
4
11
2
LIQUID CRYSTAL DISPLAY
TOUCH PAD
12

FIG. 1A

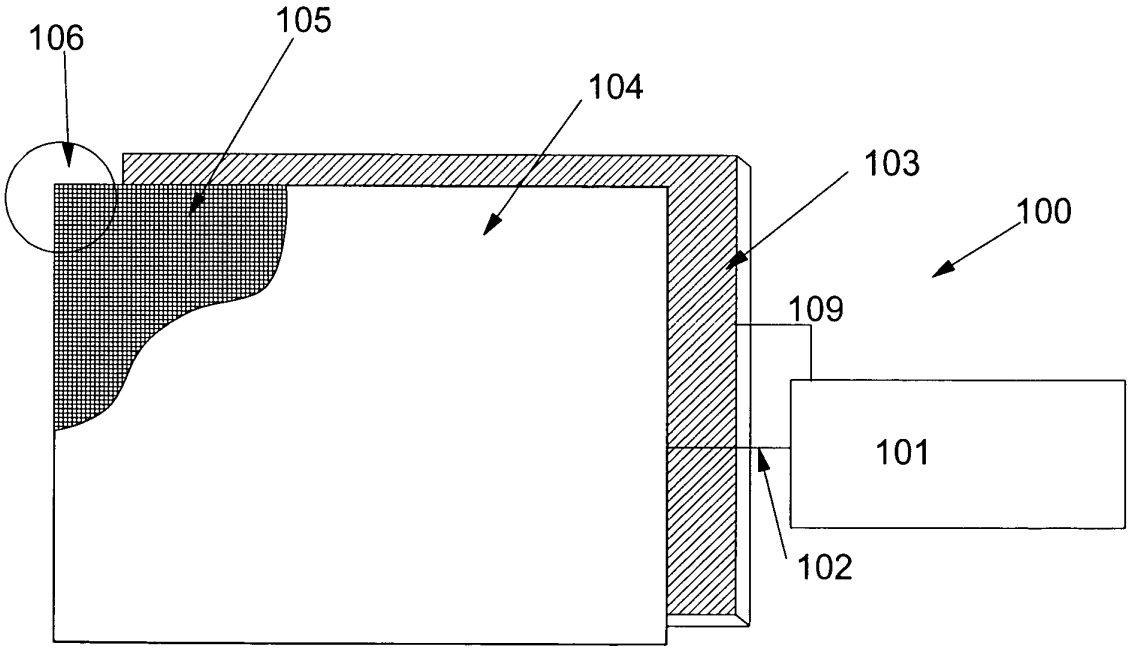

106
105
104
103
100
109
101
102

FIG. 1

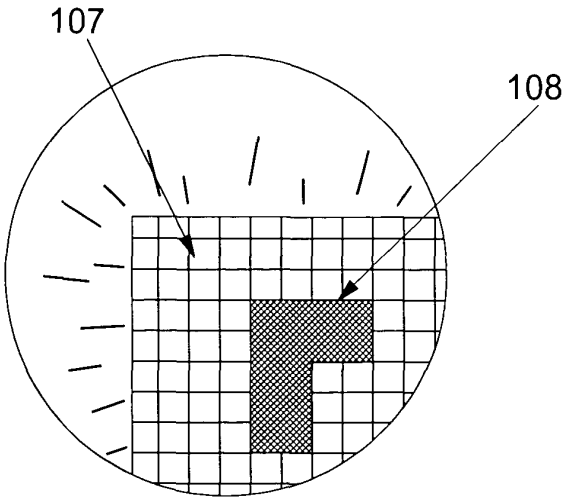


FIG. 2

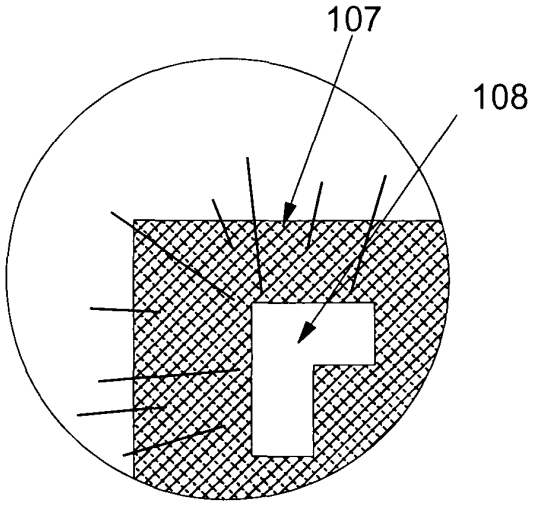


FIG. 3

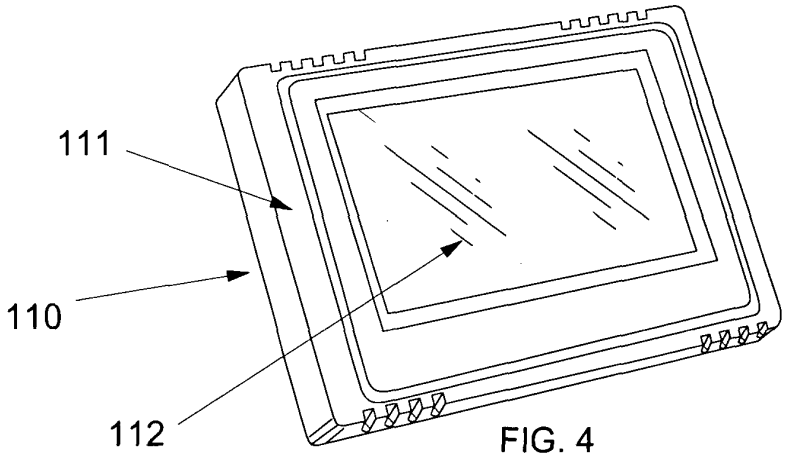


FIG. 4

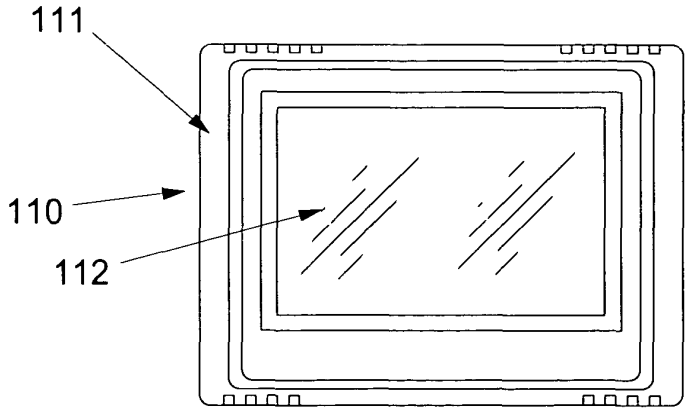


FIG. 5

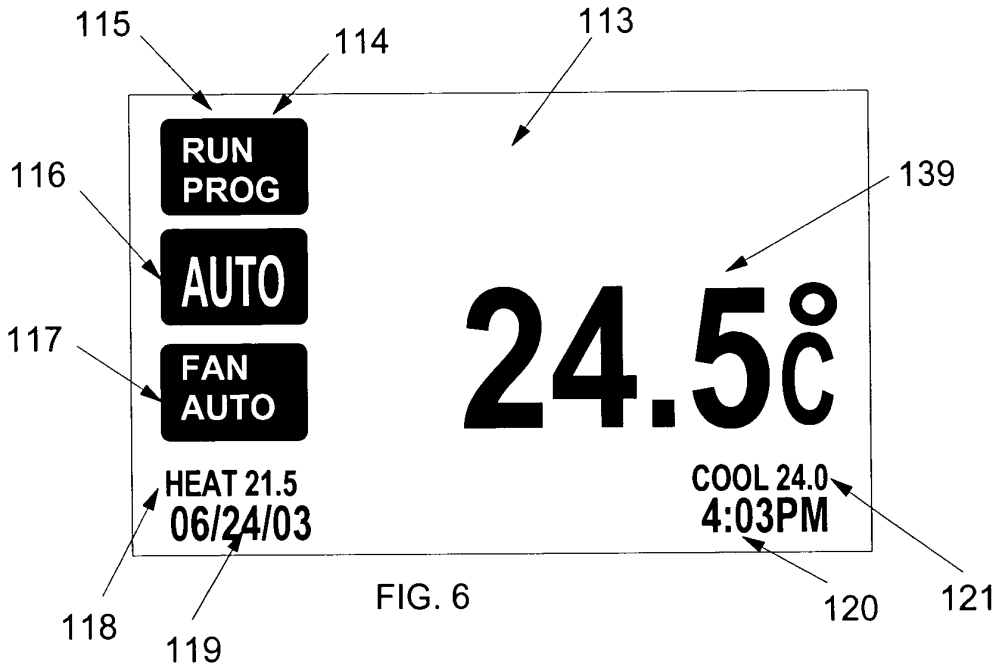
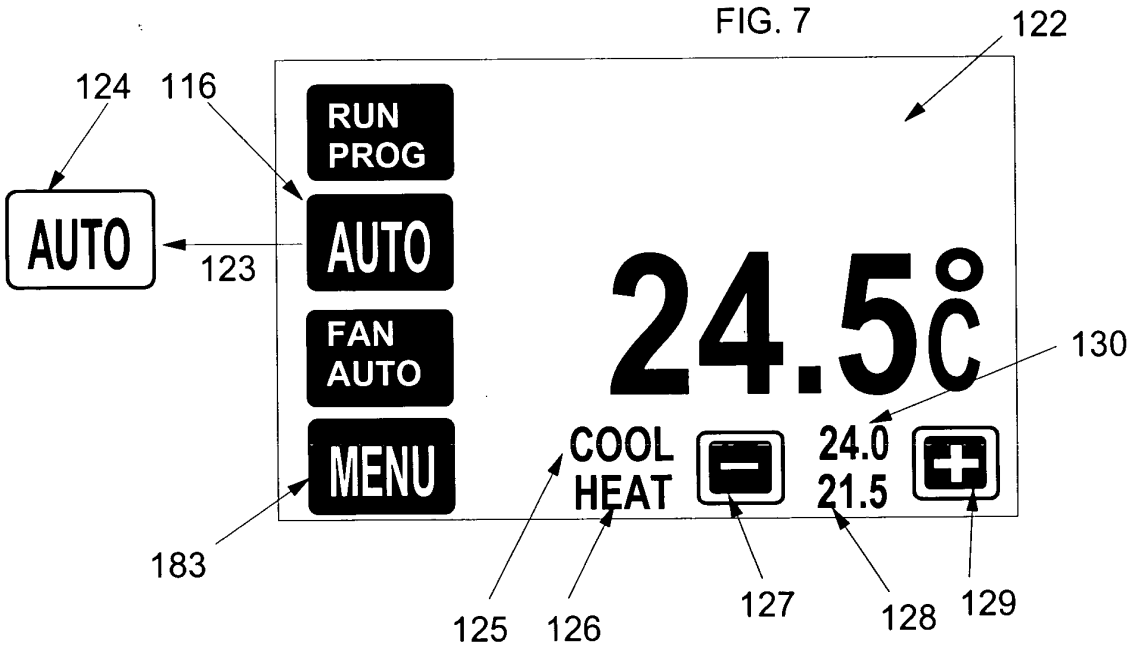

115
114
113
RUN
PROG
116
AUTO
139
117
FAN
AUTO
24.5°C
HEAT 21.5
06/24/03
COOL 24.0
4:03PM
118
119
120
121

FIG. 6

FIG. 7


122
124
116
RUN
PROG
AUTO
AUTO
123
FAN
AUTO
24.5°C
130
MENU
COOL
HEAT
24.0
21.5
183
125
126
127
128
129

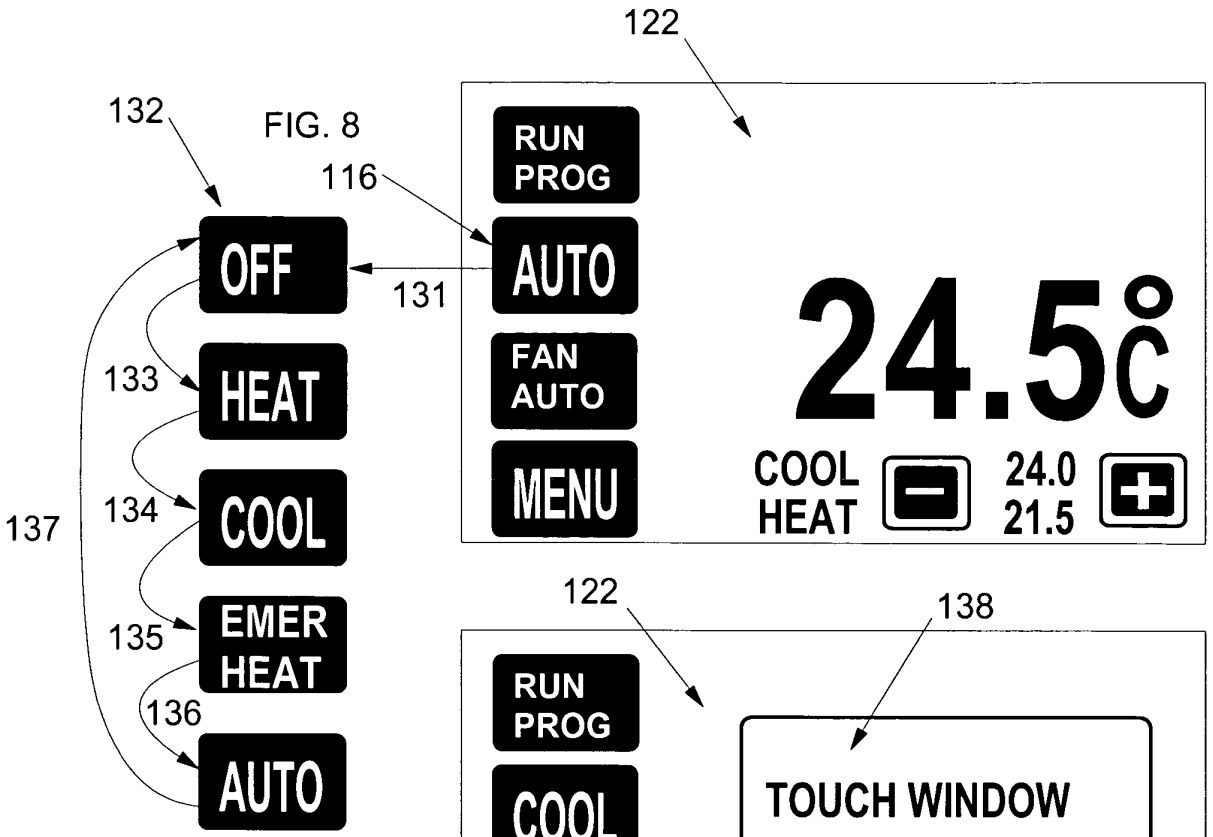


FIG. 8

FIG. 9

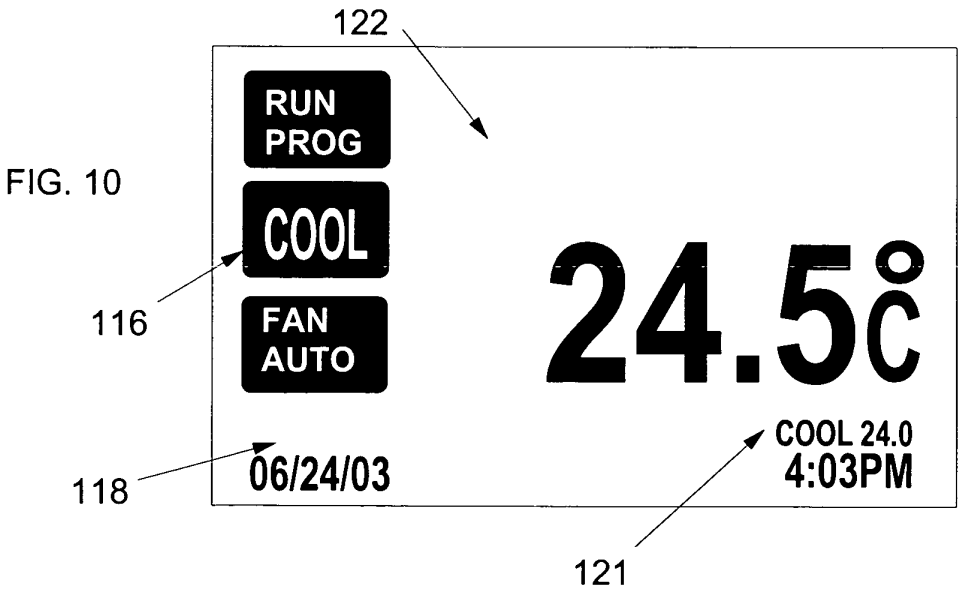
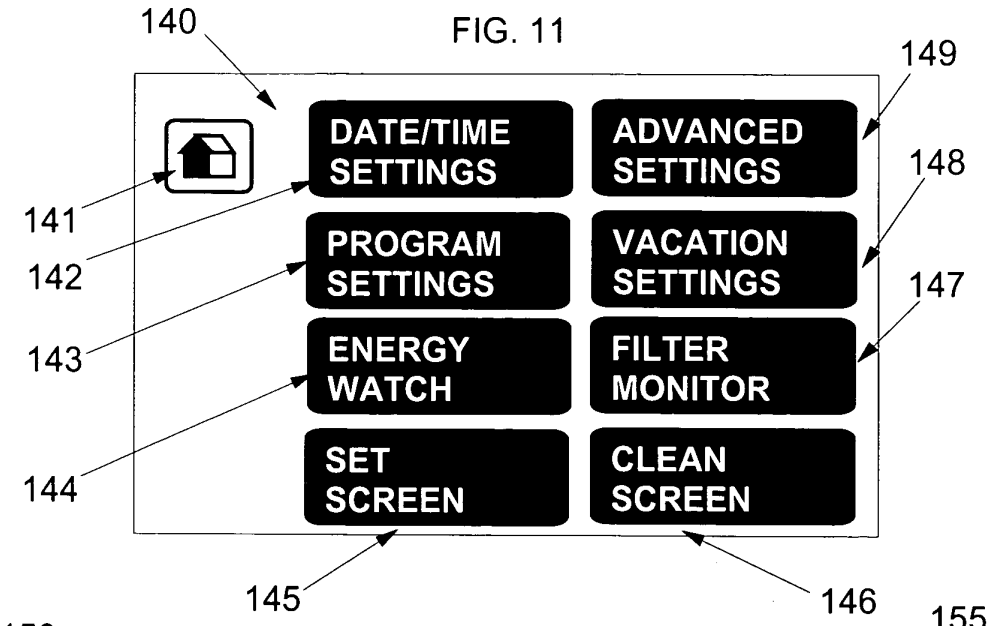


FIG. 10

FIG. 11


140
149
DATE/TIME SETTINGS
ADVANCED SETTINGS
148
141
142
PROGRAM SETTINGS
VACATION SETTINGS
147
143
ENERGY WATCH
FILTER MONITOR
144
SET SCREEN
CLEAN SCREEN
145
146

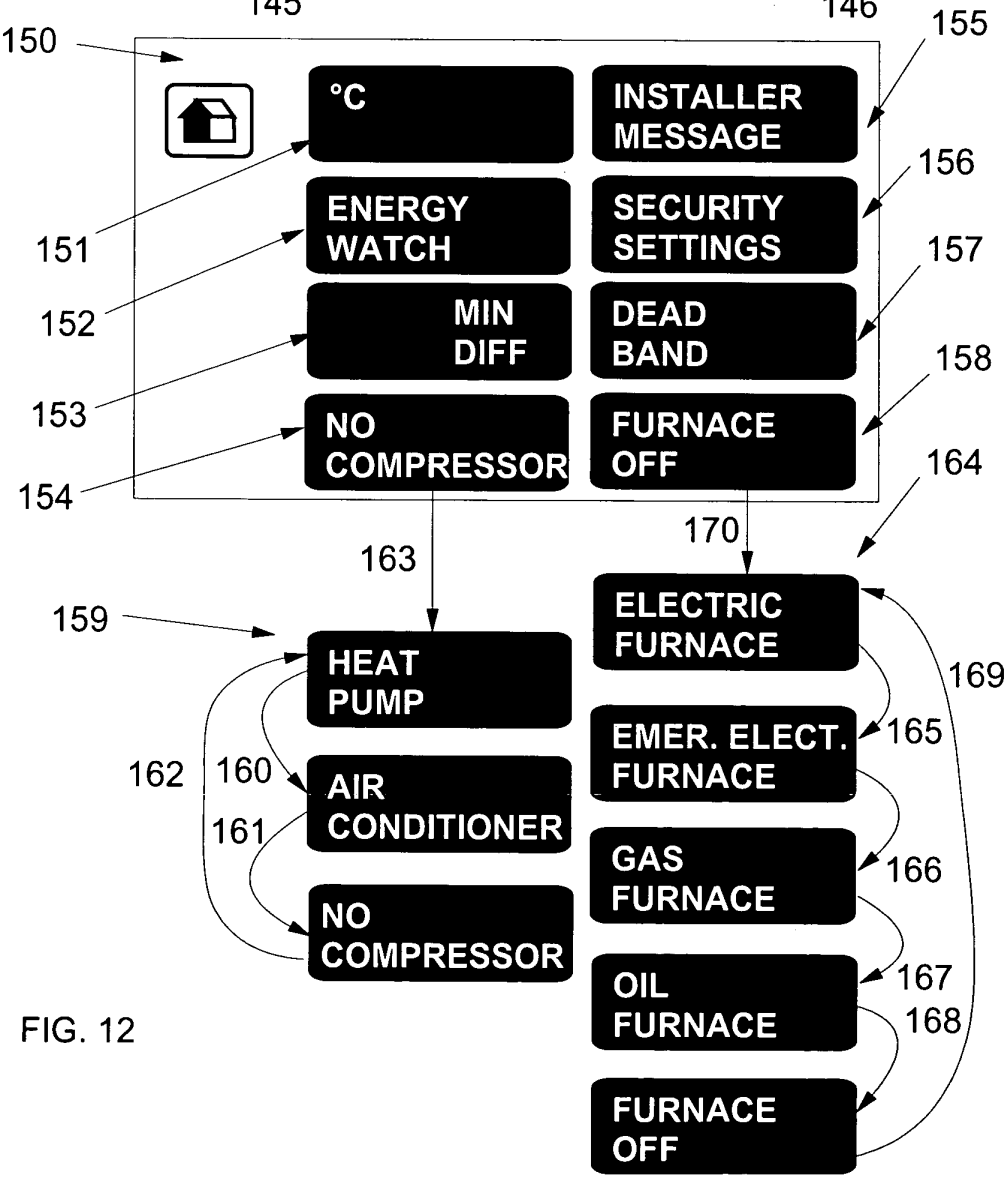

150
155
°C
INSTALLER MESSAGE
156
151
ENERGY WATCH
SECURITY SETTINGS
157
152
MIN DIFF
DEAD BAND
158
153
NO COMPRESSOR
FURNACE OFF
154
164
170
163
ELECTRIC FURNACE
159
169
HEAT PUMP
EMER. ELECT. FURNACE
165
162
160
AIR CONDITIONER
161
GAS FURNACE
166
NO COMPRESSOR
OIL FURNACE
167
168
FURNACE OFF

FIG. 12

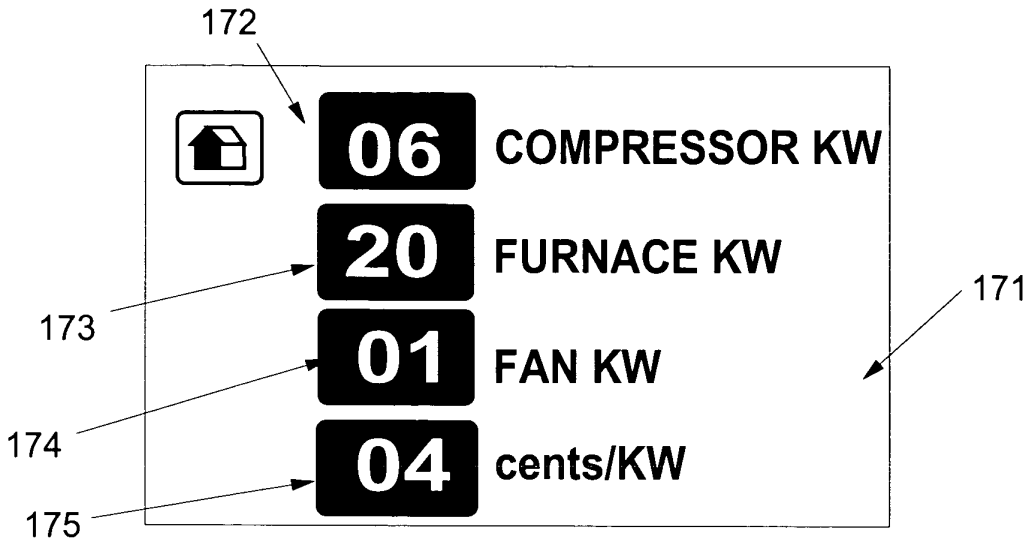

172
06
COMPRESSOR KW
20
FURNACE KW
171
173
01
FAN KW
174
04
cents/KW
175

FIG. 13

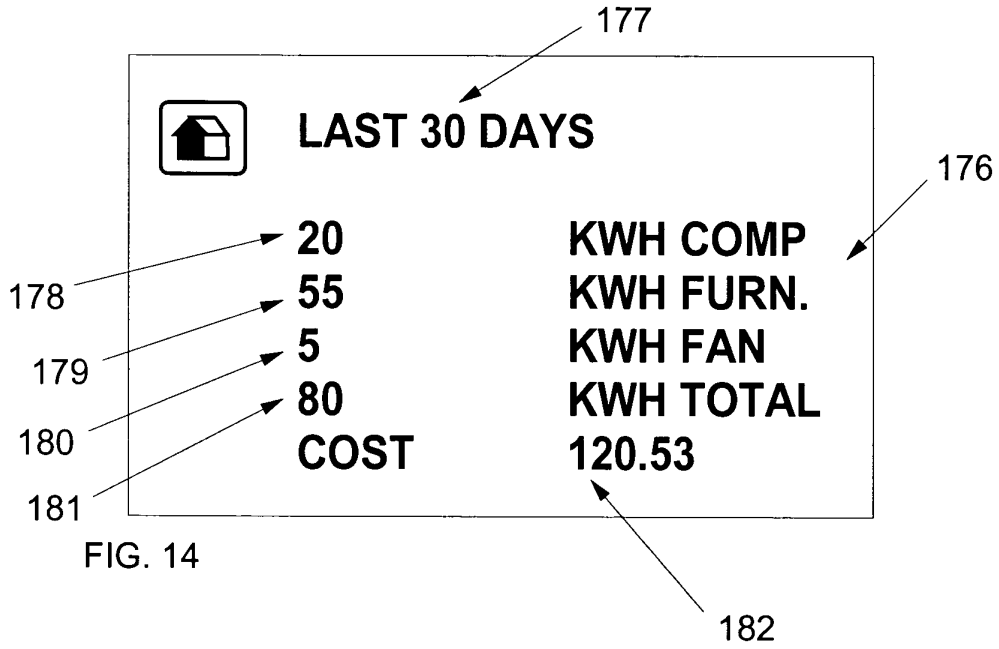

177
LAST 30 DAYS
176
20
KWH COMP
178
55
KWH FURN.
179
5
KWH FAN
180
80
KWH TOTAL
181
COST
120.53
182

FIG. 14

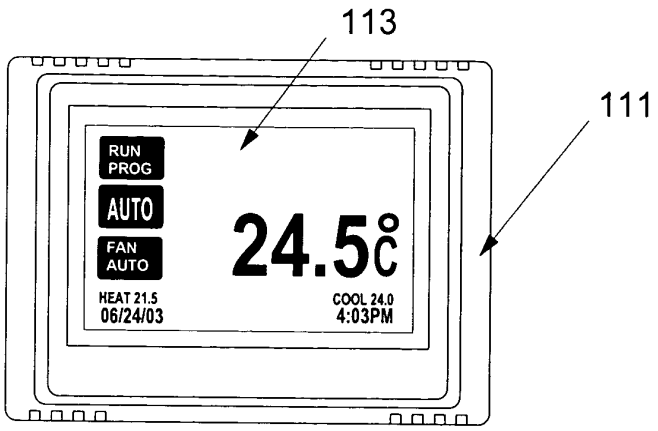


FIG. 15

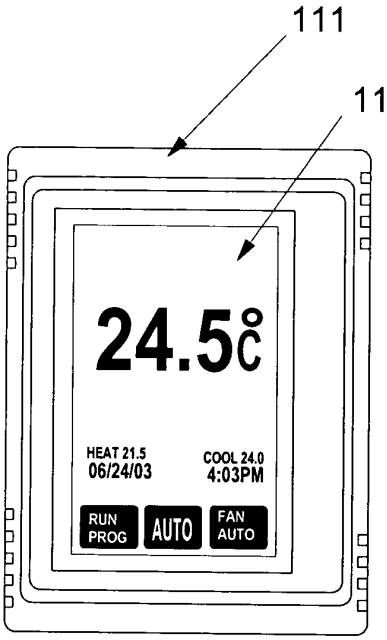


FIG. 16

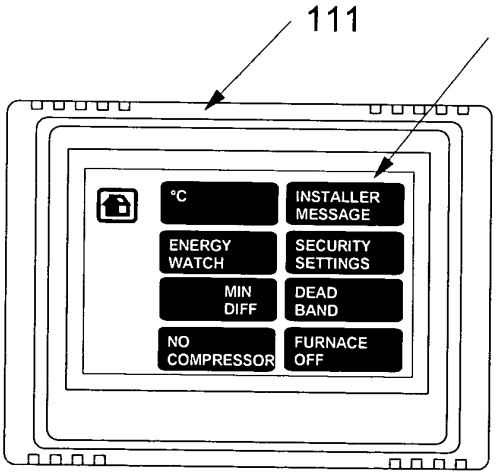


FIG. 17

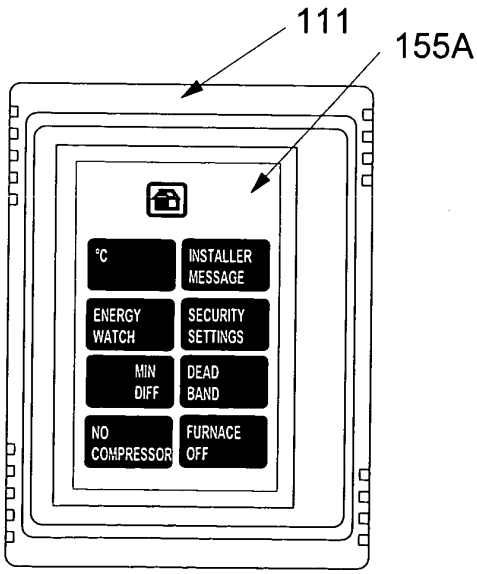


FIG. 18

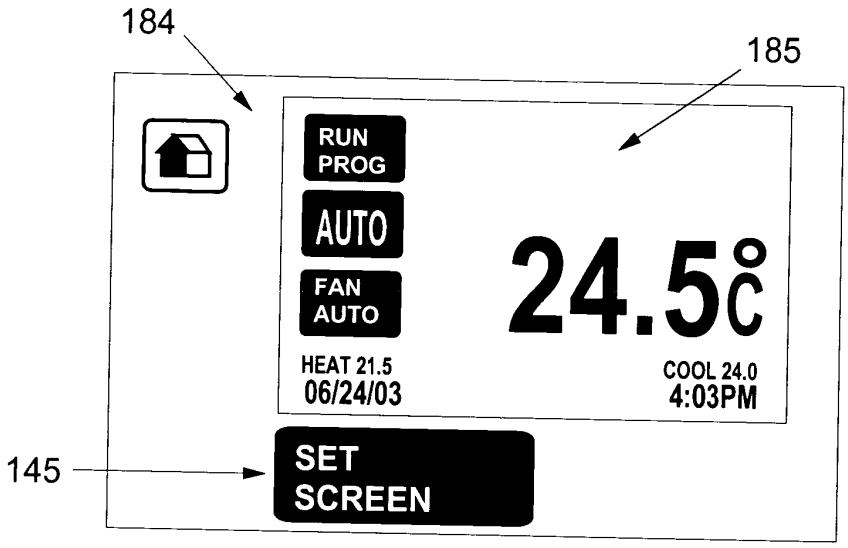

184
185
RUN
PROG
AUTO
FAN
AUTO
24.5°C
HEAT 21.5
06/24/03
COOL 24.0
4:03PM
145
SET
SCREEN

FIG. 19

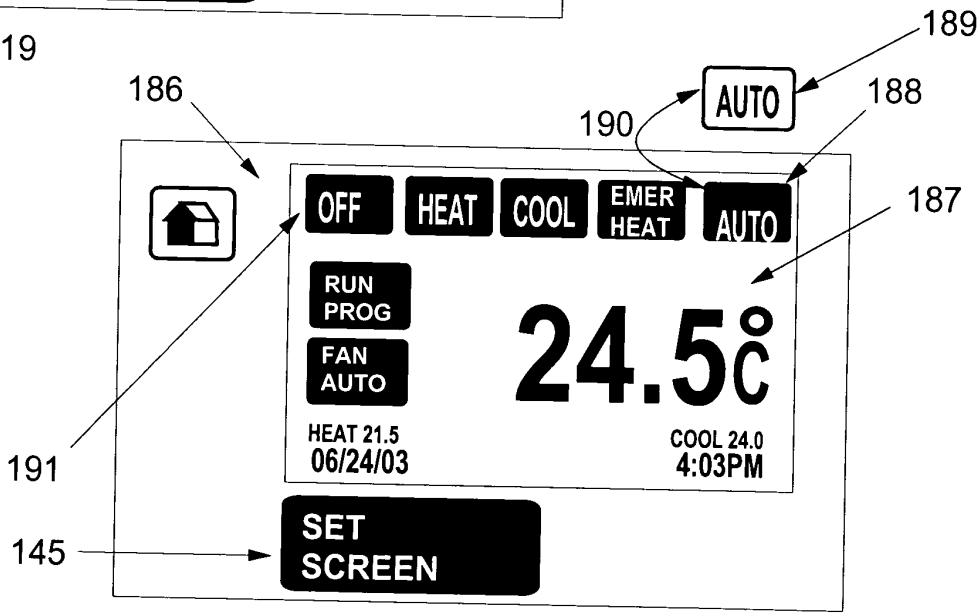

189
186
190
AUTO
188
OFF
HEAT
COOL
EMER
HEAT
AUTO
187
RUN
PROG
FAN
AUTO
24.5°C
HEAT 21.5
06/24/03
COOL 24.0
4:03PM
191
145
SET
SCREEN

FIG. 20

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS
Inventor(s): Howard Rosen
Assignee:
Serial No.:
Filing Date:
Group No.:
Examiner:
Attorney Docket No.: 0307.1aA4

DECLARATION / POWER OF ATTORNEY

As above-named inventor(s), I (we) hereby declare that:

1. My residence and citizenship are as stated by my name.

Full Name of Inventor:		Citizenship:
#1 Howard Rosen	Address #1: Lyncroft Road, Hampstead, Quebec, H3X 3E3 Canada	Canada

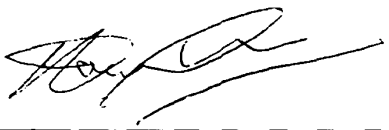
I (we) further declare that:

2. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention identified above and is attached hereto.

3. I have reviewed and understand the contents of the above identified specification, claims, drawings and abstract and acknowledge my duty to disclose information which is material to the examination of this application in accordance with Title 37 Code of Federal Regulations §1.56.

4. The inventor(s) named below does (do) hereby appoint as attorney of record with full power of substitution and revocation, to prosecute the above application and transact all business in the Patent and Trademark Office connected therewith.: 1. David T. Bracken, Registration No. 37,522; Send correspondence to: David T. Bracken, The Law Office of David T. Bracken, 4839 East Bond Avenue, Orange, California 92869

5. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. All the above statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 the United States Code, and such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full Name of Inventor:	Signature of Inventor:	Date:
#1 Howard Rosen		09/03/2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT INCORPORATING A LIQUID CRYSTAL DISPLAY SELECTIVELY PRESENTING ADAPTABLE SYSTEM MENUS INCLUDING CHANGEABLE INTERACTIVE VIRTUAL BUTTONS Inventor(s): Howard Rosen Assignee: Serial No.: Filing Date: Group No.: Examiner: Attorney Docket No.: 0307.1aA4	INFORMATION DISCLOSURE STATEMENT - REMARKS

COMMISSIONER FOR PATENTS

Sir:

In accordance with the duty of disclosure under 37 C.F.R. 1.56 and pursuant to 37 C.F.R. 1.97-1.98, Applicant hereby notifies the U.S. Patent and Trademark Office of the documents listed on the attached Form PTO-SB-08A. One copy of the cited document is submitted herewith.

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant reserves the right to dispute any of the listed documents as prior art during examination. Further, Applicant does not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application. Furthermore, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other material information may exist.Applicant respectfully submits that all pending claims are patentable over the foregoing references, alone or in combination.

US Patent 5170935 is directed to a system for a human to thermostat interface where a thermostat learns to compare presently input thermal sensations with calculated anticipatory parameters stored in the thermostat. Input means are described for touch screens.

US Patent 4224615 discloses a generalized form of a touch screen for user input.

US Patent 5818428 describes a touch screen for a PC or home appliance that can be changed in appearance after purchase by a user to make the interface more acceptable to the user.

US Patent 6344861 discloses that a handheld device such as a PDA may be used wirelessly to form an interface with a thermostat.

US Patent 6285912 discloses a multifunction control unit connected to sensors whose output to the multifunction control unit is stored and acted upon to control any of several applicances and pieces of equipment. Some the controlled equipment may include HVAC equipment.

The references do not disclose a method for using different touch screen displays which represent subsequent menu or sub listed functions accessible through a touch screen display in a thermostat.

Respectfully submitted,

David T. Bracken

David T. Bracken
Registration No. 37,522

Dated: Sept. 3, 2003

PTO/SB/42 (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

Sheet_____of_____

37 CFR 1.501 INFORMATION DISCLOSURE CITATION IN A PATENT (Use several sheets if necessary)	Docket Number (Optional) 0307.1aA4	Patent Number
	Applicant Rosen	
	Issue Date	Group Art Unit

U.S PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	6355861		Naughton et al			
	5170935		Federspiel et al			
	4224625		Penz			
	6285912		Ellison et al			
	5818423		Eisenbrandt et al			

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER	DATE CONSIDERED

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

03/05/2003 SDIRETA1 00000062 10654235

01 FC:2001 375.00 OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/69033

PATENT APPLICATION FEE DETERMINATION RECORD
Effective January 1, 2003

Application or Docket Number: 10,654,235

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	20	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	20 minus 20=	*
INDEPENDENT CLAIMS	3 minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	375.00	OR	BASIC FEE	750.00
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL	375	OR	TOTAL	

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

1, 5 11

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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 number found in the appropriate box in column 1.

LENNOX EXHIBIT 1003
Lennox Industries Inc. v. Rosen Technologies LLC, IPR2023-00717, Page 168