



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.
11/788,453	09/09/2008	7421847		5925

7590 08/20/2008
Harold A. Burdick
6676 Gunpark Drive, Suite E
Boulder, CO 80301

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the 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):

Brent W. Murray, Longmont, CO;
Patrick M. Bertsch, Thornton, CO;
Robert A. Maizner, Broomfield, CO;

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

05/01/2008

Harold A. Burdick
 6676 Gunpark Drive, Suite E
 Boulder, CO 80301

08/05/2008 HVUONG2 00000044 11788453

01 FC:1504
 02 FC:2501

300.00 OP
 720.00 OP



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.
-----------------	-------------	----------------------	---------------------	------------------

11788,453

04/20/2007

Brent W. Murray

5925

TITLE OF INVENTION: REFRIGERATION UNIT CONDENSATION PREVENTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$720	\$300	\$0	\$1020	08/01/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
TAPOLCAI, WILLIAM E	3744	062-150000

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 Harold A. Burdick

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)

Bradley W. Geuke

Ault, Colorado

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

7-30-2008

Typed or printed name

Harold A. Burdick

Registration No.

32,725

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.



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/788,453
Filing Date : April 20, 2007
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744
Examiner : Tapolcai, William E.

ISSUE AND PUBLICATION FEES TRANSMITTAL

Certificate of Mailing

The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I hereby certify that this correspondence is being
deposited with the United States Postal Service as first class
mail in an envelope addressed to: Mail Stop Issue Fee,
Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia
22313-1450, on July 30, 2008.

Harold A. Burdick

Name of Applicant, Assignee
or Registered Representative

Signature

7-30-08

Date



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/788,453
Filing Date : April 20, 2007
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744
Examiner : Tapolcai, William E.

ISSUE AND PUBLICATION FEES TRANSMITTAL

Enclosed is Form PTOL-85 (Fees Transmittal) together with our check number 1353 in the amount of \$1,020.00 to cover the issue and publication fees with respect to the above-identified U.S. Patent Application.

Respectfully Submitted,

Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355



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 05/01/2008

Harold A. Burdick
6676 Gunpark Drive, Suite E
Boulder, CO 80301

EXAMINER

TAPOLCAI, WILLIAM E

ART UNIT

PAPER NUMBER

3744

DATE MAILED: 05/01/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/788,453	04/20/2007	Brent W. Murray		5925

TITLE OF INVENTION: REFRIGERATION UNIT CONDENSATION PREVENTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$720	\$300	\$0	\$1020	08/01/2008

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.

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 05/01/2008

Harold A. Burdick
6676 Gunpark Drive, Suite E
Boulder, CO 80301

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.
11/788,453	04/20/2007	Brent W. Murray		5925

TITLE OF INVENTION: REFRIGERATION UNIT CONDENSATION PREVENTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$720	\$300	\$0	\$1020	08/01/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
TAPOLCAI, WILLIAM E	3744	062-150000

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, 1 _____ (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. 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.



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.
11/788,453	04/20/2007	Brent W. Murray		5925

EXAMINER	
TAPOLCAI, WILLIAM E	

ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 05/01/2008

7590 05/01/2008
Harold A. Burdick
6676 Gunpark Drive, Suite E
Boulder, CO 80301

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 0 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 0 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.

Notice of Allowability	Application No.	Applicant(s)	
	11/788,453	MURRAY ET AL.	
	Examiner	Art Unit	
	William E. Tapolcai	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 _____.
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)

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. ☐ Notice of References Cited (PTO-892) 2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>20070420</u> 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 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 _____. |
|--|--|

William E. Tapolcai
Primary Examiner
Art Unit: 3744

1. The following is an examiner's statement of reasons for allowance: the claims are allowable because the prior art of record fails to disclose or teach the claimed method steps of processing the data at the display case to anticipate formation of condensation at the display case and activating the heater in response thereto.

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."

2. The drawings filed on April 20, 2007 are acceptable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William E. Tapolcai whose telephone number is (571) 272-4814. The examiner can normally be reached on Mon. - Thurs., 6:30 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl J. 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.

Art Unit: 3744

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.

/William E. Tapolcai/
Primary Examiner, Art Unit 3744

William E. Tapolcai
Primary Examiner
Art Unit 3744

wet
April 28, 2008



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/788,453
Filing Date : April 20, 2007
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744 (Preliminary)

INFORMATION DISCLOSURE STATEMENT

Certificate of Mailing

The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I hereby certify that this correspondence is being
deposited with the United States Postal Service as first class
mail in an envelope addressed to Mail Stop Amendment,
Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia
22313-1450, on July 19, 2007.

Harold A. Burdick

Name of Applicant, Assignee
or Registered Representative


Signature

7-19-07
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Murray et al.
Serial Number	:	11/788,453
Filing Date	:	April 20, 2007
For	:	REFRIGERATION UNIT CONDENSATION PREVENTION
Group Art Unit	:	3744 (Preliminary)

INFORMATION DISCLOSURE STATEMENT

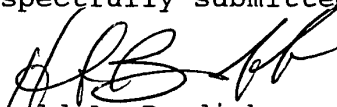
Claims 1 through 20 are in this Application which is a Division of U.S. Patent Application Serial No. 11/609,378 (now U.S. Patent No. 7,207,181) filed March 1, 2005 and having the same title.

Pursuant to 37 CFR 1.56, 1.97 and 1.98, Applicant wishes to bring the U.S. Patents and patent publication listed on the attached Form PTO-1449 to the Examiner's attention, which Patents and publication are requested to be made formally of record.

All of the listed Patents and publication were previously cited by or submitted to the Office in the above-identified prior applications which is relied upon for an earlier filing date in this application, and thus copies of the Patents and publication herein cited are not required to be provided (37 CFR 1.98(d)). Form PTO-1449 (incorporated hereinto by this reference) is enclosed herewith.

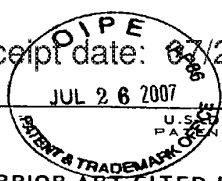
An early action on the merits of the instant application
is respectfully solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'HAB', with a stylized flourish extending to the right.

Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355

		Sheet <u>1</u> of <u>1</u>					
FORM PTO-1449 (REV. 7-80)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE					
LIST OF PRIOR ART CITED BY APPLICANT <i>(Use several sheets if necessary)</i>		ATTY. DOCKET NO. SERIAL NO. 11788,453					
APPLICANT Murray et al.		FILING DATE April 20, 2007					
GROUP 3744 (Preliminary)							
U.S. PATENT DOCUMENTS							
*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
/W.T./	AA	US04 0050072 A1	3/18/04	Palfy et al.			
/W.T./	AB	6 4 7 0 6 9 6	10/02	Palfy et al.			
/W.T./	AC	5 7 7 8 6 8 9	7/98	Beatenbough			
/W.T./	AD	5 7 7 8 1 4 7	7/98	Kim			
/W.T./	AE	4 1 2 7 7 6 5	11/78	Heaney			
/W.T./	AF	6 5 5 0 2 6 1	4/03	Shima et al.			
/W.T./	AG	5 8 9 9 0 7 8	5/99	Mager			
/W.T./	AH	3 9 3 9 6 6 6	2/76	Bashark			
/W.T./	AI	4 8 6 2 7 0 1	9/89	Small et al.			
/W.T./	AJ	4 2 6 1 1 7 9	4/81	Dageford			
/W.T./	AK	6 3 0 1 9 1 3	10/01	Schulak et al.			
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
	AL						
	AM						
	AN						
	AO						
	AP						
OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
	AR						
	AS						
	AT						
EXAMINER /William Tapolcai/				DATE CONSIDERED 04/28/2008			
*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.							

<i>Index of Claims</i> 	Application/Control No. 11788453	Applicant(s)/Patent Under Reexamination MURRAY ET AL.
	Examiner William E Tapolcai	Art Unit 3744

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant
☐ CPA
☐ T.D.
☐ R.1.47

CLAIM		DATE									
Final	Original	04/28/2008									
1	1	=									
2	2	=									
3	3	=									
4	4	=									
5	5	=									
6	6	=									
7	7	=									
8	8	=									
9	9	=									
10	10	=									
11	11	=									
12	12	=									
13	13	=									
14	14	=									
15	15	=									
16	16	=									
17	17	=									
18	18	=									
19	19	=									
20	20	=									

Search Notes 	Application/Control No. 11788453	Applicant(s)/Patent Under Reexamination MURRAY ET AL.
	Examiner William E Tapolcai	Art Unit 3744

SEARCHED			
Class	Subclass	Date	Examiner
62	80, 150, 176.2, 176.6, 248, 275	4/28/2008	wet

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search updated	4/28/2008	wet
EAST inventor name search	4/28/2008	wet

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
62	as above	4/28/2008	wet



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. 5925

SERIAL NUMBER 11/788,453	FILING or 371(c) DATE 04/20/2007 RULE	CLASS 062	GROUP ART UNIT 3744	ATTORNEY DOCKET NO.		
APPLICANTS Brent W. Murray, Longmont, CO; Patrick M. Bertsch, Thornton, CO; Robert A. Maizner, Broomfield, CO; ** CONTINUING DATA ***** This application is a DIV of 11/069,378 03/01/2005 PAT 7,207,181 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 05/15/2007						
Foreign Priority claimed ☒ Yes ☐ No 35 USC 119(a-d) conditions met ☒ Yes ☐ No Verified and /WILLIAM E Acknowledged TAPOLCAI/ Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY CO	SHEETS DRAWINGS 29	TOTAL CLAIMS 20	INDEPENDENT CLAIMS 3
ADDRESS Harold A. Burdick 6676 Gunpark Drive, Suite E Boulder, CO 80301 UNITED STATES						
TITLE Refrigeration unit condensation prevention						
FILING FEE RECEIVED 500	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		

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L11	176	62/248.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:50
L12	399	62/275.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:50
L13	318	62/150.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:50
L14	29	62/176.2.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:50
L15	385	62/176.6.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:51
L16	1	l3 and l5	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:51
L17	12	l11 and l13	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:52
L18	0	l11 and l14	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:52
L19	1	l11 and l15	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:52
L20	25	l12 and l13	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:53
L21	1	l12 and l14	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:53
L22	2	l12 and l15	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:53
L23	30	(electric adj heater) with (dew adj point)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:54

L24	6	(display adj case) with (electric adj heater)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:55
L25	8	(temperature adj sensor) with (door adj frame)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:55
L26	16	(temperature adj sensor) same (door adj frame)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2008/04/28 16:56
L27	27	((BRENT) near2 (MURRAY)).INV.	USPAT	OR	OFF	2008/04/28 16:56
L28	38	((BRENT) near2 (MURRAY)).INV.	US-PGPUB; USPAT	OR	OFF	2008/04/28 16:57
L29	9	((PATRICK) near2 (BERTSCH)).INV.	USPAT	OR	OFF	2008/04/28 16:58
L30	14	((PATRICK) near2 (BERTSCH)).INV.	US-PGPUB; USPAT	OR	OFF	2008/04/28 16:59
L31	0	((ROBERT) near2 (MAIZNER)).INV.	USPAT	OR	OFF	2008/04/28 16:59
L32	2	((ROBERT) near2 (MAIZNER)).INV.	US-PGPUB; USPAT	OR	OFF	2008/04/28 16:59
L33	2	((door adj frame) with heater and (dew adj point)). clm.	US-PGPUB	OR	OFF	2008/04/28 17:00

4/28/08 5:01:52 PM



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
11/788,453	04/20/2007	Brent W. Murray	

CONFIRMATION NO. 5925

Harold A. Burdick
6676 Gunpark Drive, Suite E
Boulder, CO80301

Title: Refrigeration unit condensation prevention

Publication No. US-2007-0193294-A1

Publication Date: 08/23/2007

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Pre-Grant Publication Division, 703-605-4283

IPW
PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/788,453
Filing Date : April 20, 2007
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744 (Preliminary)

INFORMATION DISCLOSURE STATEMENT

Certificate of Mailing

The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I hereby certify that this correspondence is being
deposited with the United States Postal Service as first class
mail in an envelope addressed to Mail Stop Amendment,
Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia
22313-1450, on July 19, 2007.

Harold A. Burdick

Name of Applicant, Assignee
or Registered Representative


Signature

7-19-07
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Murray et al.
Serial Number	:	11/788,453
Filing Date	:	April 20, 2007
For	:	REFRIGERATION UNIT CONDENSATION PREVENTION
Group Art Unit	:	3744 (Preliminary)

INFORMATION DISCLOSURE STATEMENT

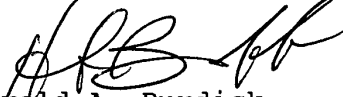
Claims 1 through 20 are in this Application which is a Division of U.S. Patent Application Serial No. 11/609,378 (now U.S. Patent No. 7,207,181) filed March 1, 2005 and having the same title.

Pursuant to 37 CFR 1.56, 1.97 and 1.98, Applicant wishes to bring the U.S. Patents and patent publication listed on the attached Form PTO-1449 to the Examiner's attention, which Patents and publication are requested to be made formally of record.

All of the listed Patents and publication were previously cited by or submitted to the Office in the above-identified prior applications which is relied upon for an earlier filing date in this application, and thus copies of the Patents and publication herein cited are not required to be provided (37 CFR 1.98(d)). Form PTO-1449 (incorporated hereinto by this reference) is enclosed herewith.

An early action on the merits of the instant application
is respectfully solicited.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'HAB', with a stylized flourish extending to the right.

Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355

Sheet 1 of 1FORM PTO-1449
(REV. 7-80)U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

SERIAL NO.

11/788,453

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Murray et al.

FILING DATE

April 20, 2007

GROUP

3744 (Preliminary)

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA	US04 0050072 A1	3/18/04	Palfy et al.			
	AB	6 4 7 0 6 9 6	10/02	Palfy et al.			
	AC	5 7 7 8 6 8 9	7/98	Beatenbough			
	AD	5 7 7 8 1 4 7	7/98	Kim			
	AE	4 1 2 7 7 6 5	11/78	Heaney			
	AF	6 5 5 0 2 6 1	4/03	Shima et al.			
	AG	5 8 9 9 0 7 8	5/99	Mager			
	AH	3 9 3 9 6 6 6	2/76	Bashark			
	AI	4 8 6 2 7 0 1	9/89	Small et al.			
	AJ	4 2 6 1 1 7 9	4/81	Dageford			
	AK	6 3 0 1 9 1 3	10/01	Schulak et al.			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

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

	AR							
	AS							
	AT							

EXAMINER

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.

USCOMM-DC 80-3985



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	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
11/788,453	04/20/2007	3744	500		20	3

CONFIRMATION NO. 5925

Harold A. Burdick
6676 Gunpark Drive, Suite E
Boulder, CO80301

FILING RECEIPT

Date Mailed: 05/16/2007

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

Brent W. Murray, Longmont, CO;
Patrick M. Bertsch, Thornton, CO;
Robert A. Maizner, Broomfield, CO;

Assignment For Published Patent Application

Bradley W. Geuke

Power of Attorney:

Robert Harris--19493
Harold Burdick--32725

Domestic Priority data as claimed by applicant

This application is a DIV of 11/069,378 03/01/2005 PAT 7,207,181

Foreign Applications

If Required, Foreign Filing License Granted: 05/15/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is
US11/788,453

Projected Publication Date: 08/23/2007

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Refrigeration unit condensation prevention

Preliminary Class

062

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER**Title 35, United States Code, Section 184****Title 37, Code of Federal Regulations, 5.11 & 5.15****GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under

37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

042007

22713 U.S. PTO

U.S. PTO
11/788453
04/20/2007

PTO/SB/05 (02-07)

Approved for use through 02/28/2007. OMB 0651-0032
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.

UTILITY PATENT APPLICATION TRANSMITTAL <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	
	First Inventor	Murray
	Title	REFRIGERATION UNIT COND- ENSATION PREVENTION
	Express Mail Label No.	ED 714240861 US

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria VA 22313-1450
1. ☐ Fee Transmittal Form (e.g., PTO/SB/17) <i>(Submit an original and a duplicate for fee processing)</i> 2. ☒ Applicant claims small entity status. <i>See 37 CFR 1.27.</i> 3. ☒ Specification [Total Pages <u>28</u>] <i>Both the claims and abstract must start on a new page (For information on the preferred arrangement, see MPEP 608.01(a))</i> 4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>29</u>] 5. Oath or Declaration [Total Sheets <u>3</u>] a. ☐ Newly executed (original or copy) b. ☒ A copy from a prior application (37 CFR 1.63(d)) <i>(for continuation/divisional with Box 18 completed)</i> i. ☐ DELETION OF INVENTOR(S) <i>Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).</i> 6. ☐ Application Data Sheet. See 37 CFR 1.76 7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix) ☐ Landscape Table on CD 8. Nucleotide and/or Amino Acid Sequence Submission <i>(if applicable, items a. - c. are required)</i> a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies	ACCOMPANYING APPLICATION PARTS 9. ☒ Assignment Papers (cover sheet & document(s)) Copy including Recording Data Name of Assignee _____ Bradley W. Geuke 10. ☐ 37 CFR 3.73(b) Statement ☐ Power of <i>(when there is an assignee)</i> Attorney 11. ☐ English Translation Document (if applicable) 12. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of foreign patent documents, publications, & other information 13. ☐ Preliminary Amendment 14. ☒ Return Receipt Postcard (MPEP 503) <i>(Should be specifically itemized)</i> 15. ☐ Certified Copy of Priority Document(s) <i>(if foreign priority is claimed)</i> 16. ☐ Nonpublication Request under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 17. ☒ Other: Express Mail Certificate Cover Letter
18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76: ☐ Continuation ☒ Divisional ☐ Continuation-in-part (CIP) of prior application No. <u>11/069,378</u> Prior application information: Examiner <u>Tapolcai</u> Art Unit: <u>3744</u>	
19. CORRESPONDENCE ADDRESS ☐ The address associated with Customer Number: _____ OR ☒ Correspondence address below	
Name <u>Harold A. Burdick</u> Address <u>6676 Gunpark Drive, Suite E</u> City <u>Boulder</u> State <u>Colorado</u> Zip Code <u>80301</u> Country <u>US</u> Telephone <u>(303) 530-1355</u> Email _____	
Signature <u>[Signature]</u> Date <u>4-20-07</u> Name (Print/Type) <u>Harold A. Burdick</u> Registration No. (Attorney/Agent) <u>32,725</u>	

This collection of information is required by 37 CFR 1.53(b). 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 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, 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.

22713 U.S. PTO
042007

The Law Firm of
HARRIS & BURDICK

6676 Gunpark Drive, Suite E
Boulder, Colorado 80301

Telephone (303)530-1355

ROBERT E. HARRIS

HAROLD A. BURDICK

INTELLECTUAL PROPERTY
Patent, Trademark and
Related Matters
FAX(303)530-1357

April 20, 2007

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

Divisional Patent Application Entitled: REFRIGERATION
UNIT CONDENSATION PREVENTION
By: Murray et al.

Sir:

Enclosed herewith is a divisional patent application (a division of U.S. Patent Application Serial No. 11/069,378, now pending) with drawings (29 sheets) for the invention described hereinabove, which application is presented for filing.

Also enclosed is a Transmittal Form, a copy of the recorded Assignment (including cover sheet and recording data from the assignment recording division) to Bradley W. Geuke, a copy of the executed Declaration and Power of Attorney filed in the prior (parent) application to this Divisional Application provided in accord with 37 CFR 1.63(d) (no deletion of inventors names is required), an Express Mailing Certificate and a check (number 1114) for the filing fee of \$500.00 to cover:

-Basic:	\$ 150.00
-Total number of Independent Claims (3) less 3, times \$100.00:	-0-
-Total number of Claims (20), less 20, times \$25.00:	-0-
-Search Fee:	250.00
-Examination Fee:	<u>100.00</u>

TOTAL FILING FEE \$ 500.00

The Applicant and Assignee (if any) qualify for small

entity treatment for fee purposes under U.S. law, and such status is requested.

Respectfully submitted,


Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor : Murray et al.
Title : REFRIGERATION UNIT
CONDENSATION PREVENTION

PATENT APPLICATION TRANSMITTAL
(SPECIFICATION, CLAIMS, DRAWINGS, FORMAL PAPERS AND FEES)
BY EXPRESS MAIL POST OFFICE TO ADDRESSEE

Certificate of Mailing

"Express Mail" mailing label number ED 714240861 US

Date of Deposit April 20, 2007

I hereby certify that this paper is being deposited
with the United States Postal Service "Express Mail Post
Office to Addressee" service under 37 CFR 1.10 on the date
indicated above and is addressed to Commissioner for
Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Harold A. Burdick
Name of Applicant, Assignee
or Registered Representative


Signature

REFRIGERATION UNIT CONDENSATION PREVENTION

By: Brent W. Murray

Patrick M. Bertsch

Robert A. Majzner

REFRIGERATION UNIT CONDENSATION PREVENTION

Related Application

This application is a divisional application of U.S. Patent Application Serial No. 11/069,378 Filed on March 1, 2005 by Murray et al. and entitled "Refrigeration Unit Condensation Prevention" which will issue as U.S. Patent No. 7,207,181 on April 24, 2007.

Field of the Invention

This invention relates to frame and/or door heating to remediate condensation build-up in refrigerated display cases, and, more particularly, relates to sensing and operating devices and methods for activation and deactivation of such heating.

Background of the Invention

Condensation build up on commercial refrigeration display case doors can cause door damage and presents a safety hazard if runoff from the door(s) and/or case frames accumulates on adjacent floors. Currently, in most commercial installations, in order to prevent excessive condensation build-up at display case doors and frames, the doors and frames are heated utilizing internal frame heaters operating at 100% duty cycle time (and incurring correspondingly high energy costs).

Devices have been heretofore suggested and/or utilized to control condensation without running heaters at 100% duty

cycle times. One approach has utilized a detector to directly sense the presence of condensation on the freezer door or frame and, responsive thereto, activate the internal frame/door heaters when condensation is sensed. The heaters then are run for a fixed duration or until moisture has evaporated. These devices have, however, not always proven successful. For example, detector failure due to environmental contamination or poor manufacturing tolerances of moisture sensors in general is common. Such detector failure can result in either frame/door heaters remaining off (thus failing to inhibit dangerous condensation build-up and runoff) or the heaters remaining on (thereby achieving no energy savings). Moreover, such devices are merely reactive, activating heaters only after potentially damaging and dangerous condensation has formed. (see the DOOR MISER XP by Door Miser, LLC and U.S. Patent No. 5,899,078, for examples).

Other devices have suggested condensation control utilizing dew point calculation. Monitoring air temperature, relative humidity and surface temperatures to initiate condensation control events has been utilized in a variety of applications including refrigeration (see, for example, U.S. Patent Publication No. US 2004/0050072 A1 and U.S. Patent Numbers 6,470,696, 5,778,689, 5,778,147, and 4,127,765). Some such devices or systems have utilized temperature sensing of both cold surfaces and the surrounding ambient air in condensation control response

calculations. As is known, when a cold surface temperature is equal to or lower than the dew point of the ambient air, condensation forms on the cold surface.

Such devices and systems have not proven altogether successful, however, due to inaccuracy of temperature readings, particularly where both cold and warm environments are adjacent one another such as is found at commercial freezer/refrigeration display cases. Failure to configure such systems to enhance accuracy of readings has resulted in erratic condensation control, on some occasions wasting energy unduly heating frames/doors, on other occasions responding late or otherwise inadequately to condensation formation, and/or on still other occasions failing to control appropriate heater cycling (i.e., shut-off) with consequent loss of efficiencies. Some such systems, utilized in fields not related to the problem of condensation at freezer doors, have addressed the problem of erratic temperature readings by artificially cooling the temperature sensors while heaters are powered on to counter the affect. This approach, however, is not feasible in large commercial freezer display installations where size and space are limited and where the cost for such counter measures are not easily absorbed (and not likely to be tolerated). Finally, most heretofore known systems employing dew point sensors for condensation control remain reactive, not proactively based on anticipation of condensation events. Further improvement could thus still be utilized

Summary of the Invention

The purpose of the apparatus, systems and methods of this invention is to efficiently eliminate door and frame condensation at widely utilized commercial freezer/refrigeration display cases. The invention is proactive in preventing condensation from forming by activating frame/door heaters before the dew point temperature at frame and door surfaces is reached. Power is then cycled off at a set point above dew point to save energy. This is accomplished by configuring apparatus of this invention to provide highly accurate sensing of frame temperature and dew point by thermally isolating temperature sensors and constantly updating data to reliably provide the ability to accurately anticipate condensation at case surfaces. The invention eliminates door damage and runoff safety hazards due to condensation build-up, efficiently cycles duty time of frame/door heaters thus lowering the installation's energy costs, and requires no expensive countermeasures to maintain accuracy and efficacious performance.

The condensation control apparatus of this invention includes a frame temperature sensing unit adapted for monitoring temperature of either the door or case of a display case. The frame temperature sensing has temperature sensor mounted on a carrier. A dew point sensing unit is adapted for monitoring ambient air temperature and relative

humidity outside of the display case and includes a carrier having at least one dew point sensing component thereat.

A control unit is connected with the sensing units and includes a processor connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity. The processor also deactivates the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above the dew point value. Housing for locating the sensing units includes structure establishing thermal isolation of the sensing units by minimizing heat transfer contacts with the housing. The temperature sensor and the dew point sensing component are located amid insulating air pockets formed by the structure of the housing. The housing and control unit are mountable at the display case.

The system of this invention further includes the sensing and control apparatus located at each display case in an array of display cases. An internal case temperature sensing unit is positionable inside the display case and connected with the control unit processor. The processor stores data related to readings at the sensing units and operation of the frame/door heater, and a communication control unit associated with the processor enables coordination of programming and data download access to the processor.

The method of this invention is for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater. The steps of the method include placing a temperature sensing unit in contact with the display case frame to monitor case frame temperature and mounting a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case. The monitored case frame temperature, ambient air temperature and relative humidity are utilized to anticipate formation of condensation at the display case and activate and deactivate the frame/door heater responsive thereto.

It is therefore an object of this invention to provide apparatus, systems and methods for efficient elimination of door and frame condensation at widely utilized commercial freezer/refrigeration display cases.

It is another object of this invention to provide apparatus, systems and methods for elimination of door and frame condensation at freezer/refrigeration display cases that proactively prevents condensation from forming by activating frame/door heaters before dew point temperature at frame and door surfaces is reached.

It is still another object of this invention to provide apparatus for efficient elimination of door and frame condensation at freezer/refrigeration display cases that are configured to accurately sense frame temperature and dew point by thermally isolating temperature sensors and that

are constantly data updated to reliably provide the ability to accurately anticipate condensation at case surfaces.

It is yet another object of this invention to provide apparatus, systems and methods utilized with freezer/refrigeration display cases that eliminate door damage and runoff safety hazards due to condensation build-up, efficiently cycle duty time of frame/door heaters thus lowering the installation's energy costs, and require no expensive countermeasures to maintain accuracy and performance of the apparatus and systems.

It is another object of this invention to provide condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, the apparatus including a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat, a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat, a control unit connected with the sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, and housing means for locating the sensing units including

structure establishing thermal isolation of the sensing units by minimizing heat transfer contacts between the sensing units and the housing means and locating the temperature sensor and the at least one dew point sensing component amid insulating air pockets formed by the structure of the housing means.

It is still another object of this invention to provide a system for condensation control at an array of refrigerated display cases, the cases each having at least one door, a frame and at least one frame/door heater, the system including sensing and control apparatus configured for location at each display case in the array of display cases, the apparatus including a frame temperature sensing unit adapted for mounting at the display case for monitoring temperature of one of the display case door or display case frame, a dew point sensing unit adapted for mounting at the display case for monitoring ambient air temperature and relative humidity outside of the display case, an internal case temperature sensing unit positionable inside the display case, and processing means mountable at the display case and connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, for deactivating the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above the dew

point value, and for storing data related to readings at the sensing units and operation of the frame/door heater, and a communication control unit associated with the processing means for coordinating programming and data download access to the processing means of the apparatus.

It is yet another object of this invention to provide a method for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, the method including the steps of placing a temperature sensing unit in contact with the display case frame to monitor case frame temperature, mounting a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case, and utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto.

With these and other objects in view, which will become apparent to one skilled in the art as the description proceeds, this invention resides in the novel construction, combination, and arrangement of parts and method substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that changes in the precise embodiment of the herein disclosed invention are meant to be included as come within the scope of the claims.

Brief Description of the Drawings

The accompanying drawings illustrate a complete embodiment of the invention according to the best mode so far devised for the practical application of the principles thereof, and in which:

FIGURE 1 is a diagrammatic illustration of one embodiment of the condensation prevention apparatus and system of this invention;

FIGURE 2 is an exploded view of the local controller unit of the apparatus of this invention;

FIGURE 3 is a perspective view of the case temperature sensor and housing of the apparatus of this invention;

FIGURE 4 is an exploded view of the sensor/housing of FIGURE 3;

FIGURE 5 is a sectional view of the sensor/housing of FIGURE 3;

FIGURE 6 is an illustration showing positioning of the sensor/housing of FIGURE 3;

FIGURE 7 is an exploded view of the dew point sensor and housing of the apparatus of this invention;

FIGURE 8 is a reverse exploded view of the sensor/housing of FIGURE 7;

FIGURE 9 is an illustration showing positioning of the sensor/housing of FIGURE 7;

FIGURE 10 is an exploded view of an alternative locational, housing and mounting configuration for the sensors/housings illustrated in FIGURES 3 and 7;

FIGURE 11 is a sectional illustration of the sensors/housing of FIGURE 10 in a first mounting;

FIGURE 12 is an illustration showing positioning of the sensors/housing of FIGURE 10 in an alternative mounting;

FIGURE 13 is an electronics block diagram of the apparatus of this invention;

FIGURES 14a through 14j are flow diagrams illustrating program control of local controller components and communications modules of the apparatus of this invention; and

FIGURES 15a through 15q are flow diagrams illustrating program control at centralized processing (an on- or off-site personal computer for example).

Description of the Invention

The system of this invention is illustrated in FIGURE 1 in association with a common commercial freezer/cooler display unit 21 including a display container 23 having a frame (not shown in this FIGURE) and doors 25 in frame 27 (hereinafter, refrigeration case(s)). Up to fifteen such cases 21 can be served by the system as currently configured (though greater or fewer cases could be accommodated). Each case 21 is provided with a local controller unit 31 connected with an array of case sensors including internal case temperature sensor 33, external case frame temperature sensor 35 and dew point sensor 37. The array of sensors may be hard wired (as shown herein) to unit 31 at each case

21 through frame members, or may be configured to function wirelessly utilizing known technologies. While separate frame temperature and dew point sensors 35 and 37 are shown in this FIGURE, an alternate configuration that combines both sensors into one housing is shown hereinafter. Sensor mounting positions may be selected as desired, though the configuration illustrated in FIGURE 1 is preferred where the sensors are separately housed.

Controller unit 31 is illustrated in FIGURE 2. AC power connector 41, switching relay 43, transformer 45, internal case temperature sensor connection (an RJ-22 connector for example) 47, frame temperature sensor and dew point sensor connectors (RJ-11 type connectors, for example) 49 are located on circuit board 51. Microprocessor 53 is located on board 51, as are in-coming and out-going connectors 55 (RJ-45 type connectors, for example) utilized so that a number of serially connected control units 31 are connectable with a single communication board/transmitter/receiver 57 in communication with receiver/transmitter/centralized processing 59 (FIGURE 1). LED's 65 and 67 (preferably green and red, respectively) on board 51 flash to indicate a status update from central processing 59 to microprocessor 53 (LED 65) and to indicate that relay 43 has switched power on to frame/door heaters (LED 67). Reset/programming interface 71 is mounted between LED's 65/67 at board 51.

Board 51 is maintained in housing 75 including first and second housing portion 77 and 79, respectively, with all connectors, LED's and user interfaces provided with access openings therethrough. Housing 75 is configured to be mounted between freezer door frame mullions where case lighting is typically located (thus providing AC power routing access). The housing is designed to be less than the height and width of a typical heretofore known and utilized mullion lighting lens cover adapted for such cases 21.

Controller unit microprocessor 53 can be calibrated to initiate operations anywhere above or below calculated dew point. Adjustments can be made from central processing 59 with wireless communication via the communications board/transmitter/receiver 57 connected to controller unit 31. Central processing 59 (a PC for example) receives data from units 31 via communications board/transmitter/receiver 57, including data enabling tracking, storing and making available reports of the history of ambient air temperature and humidity from dew point sensor 37, case frame and internal case temperatures from sensors 35 and 33, respectively, and power consumption of door heaters (all as shown herein in FIGURES 15). This information can be used to improve energy efficiency by recalibrating operating ranges of the apparatus and system of this invention, as well as for improved operational cost accounting.

The internal case temperature must remain below FDA approved levels or food will spoil, such being both a health

concern as well as an expense to the installation for potential loss of goods. It has heretofore been difficult to determine if temperature are within guidelines 24 hours a day. Utilization of the apparatus and system of this invention, however, and particularly utilization of internal case temperature monitoring by sensor 33 through controller unit 31, allows such detailed tracking and reporting. Moreover, the apparatus and system are configured to automatically send an alarm (one or both locally and by autodialer to a responsible technician) if maximum allowable internal case temperature as programmed is exceeded. If central processing 59 receives an alarm message from any of the local control units 31 in the system, an alarm or auto dial via a modem is initiated and a message is sent with regard thereto, including the exact case in the system wherein temperature has deviated (see FIGURES 14 and 15).

Temperature sensors 33 and 35 are similar and are housed as illustrated in FIGURES 3 through 6 (for purposes of description herein, only the housing of sensor 35 will be described since sensor 33 is much simpler to implement and maintain). Temperature sensor 35 housing 83 includes cover 85, sensor locating base 87 and circuit board/carrier 89 locating temperature sensor 35 including temperature sensing chip 91 at one surface thereof. This assembly is mounted to case frame unit or door frame unit 93 of display case 21 utilizing screws or adhesive, with base 87 adjacent frame

unit 93 as shown in FIGURE 5. Cabling from controller unit 31 is routed through cable protector 95 at base 87.

Temperature sensing chip 91 is located on board/carrier 89 so that when received in housing 83 it is located through sensor opening 99 at base 87. With proper materials sizing, chip 91 will be in direct contact with the surface of unit 93 being monitored when base 87 is mounted on frame unit 93. Housing 83 should be located at the coldest spot on the exterior of the freezer. That spot is usually in the center of the case between the bottom of a door 25 and door or case frame unit 93 (see FIGURE 6). Door and frame heaters 103 are located inside doors and/or frames of cases 21.

Housing 83 is configured at cover 85 and base 87 to thermally isolate sensing chip 91 from the warming effects of ambient air temperature in the vicinity of the chip and transfer thereof by the housing to the chip. Air space pockets 105 and 107 above and around chip 91, respectively, and limited housing contact (see FIGURE 5 wherein only a single locating post 109 maintains board/carrier 89 at its position in housing 83) isolate chip 91 from the housing. By thus configuring board/carrier 89 (made typically of FIBERGLASS material) and housing 83 (preferably made of plastic such as acrylonitrile butadiene styrene polycarbonate) little transfer of heat to sensor chip 91 occurs, assuring accurate measurement of surface temperature of unit 93 unaffected by inaccuracies introduced as artifact into the measurement by ambient air temperature conditions

in the vicinity of housing 83 (accuracy of frame temperature measurements has been documented by testing to be within 1 or 2 degrees Centigrade).

Air space pocket 105 is created by the depth of cover 85 adjacent board/carrier 89, the cover also insulating the sensor chip from the ambient. Air space pocket 107 is created by opening 99 having an opening area greater than surface area of chip 91. These improvements allow accurate tracking and monitoring of case frame temperature, used not only for precisely timed heater activation, but also for better timing of heater deactivation given the fast rise in frame temperature after frame/door heaters 103 are activated to prevent condensation.

Turning now to FIGURES 7 through 9, dew point sensor 37 is housed in housing 115 including cover 117 and mounting base 119. Circuit board/carrier 121 maintains sensor 37 circuitry including dew point sensing chip 123. Dew point sensing chip 123 is located, when assembled, in opening 129 in the face of cover 117, opening 129 including protective shield 131 having gaps 133 along the sides thereof to allow airflow over sensing chip 123 for measuring humidity and ambient air temperature. A membrane 141 covers opening 143 at sensing chip 123 to protect internal humidity and temperature sensing components from foreign matter such as cleansers and the like. The design of cover 117 protects membrane 141 without preventing airflow to sensing chip 123.

Housing base 119 includes cabling routing protector 145 for introducing and stabilizing cabling to sensor 37. Spacer ribs 147 at base 119 assure an insulating air gap between housing 115 and its adjacent mounting surface. Housing 115 is preferably mounted to door or case frame unit 151 located at the top of case 21, as shown in FIGURE 9, and between the frame unit and door 25 so that the cold air exiting the case when a door is opened will not affect the sensor readings.

Housing 115 is configured to thermally isolate dew point sensor 37 so that accuracy of the dew point sensor is maintained within to 1 to 3 degrees Centigrade. First, by assuring that sensor 37 is held away from the unnaturally heated frame (either cooled by the freezer or heated by frame heaters) with spacer ribs 147, the frame temperature will not influence the relevant dew point readings (primarily ambient air temperature). The air pocket (155 in FIGURE 9) behind board/carrier 121 and extending all the way to the mounting surface at unit 151 prevents thermal transfer through housing 115 from the mounting surface of frame unit 151. The cover includes openings 157 at opposite ends thereof to provide room temperature airflow at air pocket 155 of room temperature air. Housing mounting surface 159 is perpendicular to the dew point sensor board/carrier 121, and may be mounted by screws or (preferably) adhesive.

By thus configuring board/carrier 121 (made typically of FIBERGLASS material) and housing 115 (preferably made of plastic such as acrylonitrile butadiene styrene

polycarbonate) little transfer of heat to sensor chip 123 occurs, assuring accurate measurement of ambient air temperature and humidity unaffected by inaccuracies introduced as artifact into the measurement by freezer case 21 frame temperature conditions in the vicinity of housing 115. Housing 115 is configured utilizing board support protrusions 163 defining retainer pockets 165 having minimal contact surface along the outer edges of board/carrier 121 to maintain board positioning, thus further reducing thermal transfer. Depth of housing 115 behind pockets 165 establishes air pocket 155.

When door and frame heaters are activated it is important that they do not affect the reading from sensor 37 of actual room air temperature. This design sufficiently isolates sensor 37 from door and frame temperature swings, thereby preserving accuracy of readings of ambient air temperature and thus accuracy of dew point calculation. Absent such thermal isolation, it is possible for shut-off of heaters to be delayed indefinitely. For example, under the influence of heaters, if temperature readings were to rise at an insufficiently isolated dew point sensor then calculated dew point would increase. In such case, the doors would have to be heated further as the dew point is chased. Heating the doors further would raise the dew point still more in this scenario, thereby beginning an upwardly spiraling cycle until the heaters reach their maximum temperature and finally power off.

Turning now to FIGURES 10 through 12, an alternative embodiment for sensors 35 and 37 housing is illustrated wherein housing 115 is utilized to house both sensors. Thus all elements of the housing as heretofore described are the same unless otherwise specified hereinbelow. Sensor 35 is maintained at cabling routing protector 145 at retainer pockets 175 (one on each side, though only one side is shown in the drawings) defining ledges having minimal contact surface with board/carrier 89 to maintain the board, thus reducing thermal transfer through the housing to the board. A single locating post 177 may be utilized to further stabilize the board if necessary. As shown in FIGURE 11, sensor 91 and board/carrier 89 are completely surrounded by an insulating dead air pocket established by the depth of protector 145. This housing may be mounted either above (FIGURE 11) or below (FIGURE 12) door 25 of a case 21, and retains all the thermal isolation advantages discussed for the individually housed units as discussed above.

FIGURE 13 illustrates the electronics utilized by the apparatus of this invention. Incoming AC power is provided to relay 43 and is transformed at input/transformer 41/45 (12 volt DC output) for use by controller unit 31 and sensors 33, 35 and 37. Sensors 33 and 35 inputs are A/D converted and input to the central processing unit microprocessor 53 embodying the various comparitors and look up tables utilized (Sensor 37 is A/D converted at the sensor). LED's 65/67 are controlled in response to

microprocessor functions, and microprocessor programming can be conducted on-site through connector/interface 71.

Communications flow between microprocessor 53 and central processing 59 is monitored and controlled by communications board 57 in cooperation with microprocessor 53 and central processing 59. Relay activity is monitored and controlled by microprocessor 53 in response to set point achievement as specified in software and as sensed by the sensor array.

Thermal isolation of sensors 35 and 37 thus insure the accuracy of the sensors and thus the efficacy of the apparatus both in terms of its ability to anticipate condensation formation as well as its ability to save on energy expenses due to overheating of doors and frames or improper cycling of heaters. Overall functioning of the apparatus and system of this invention are as illustrated in FIGURES 14a through 14j and 15a through 15q. Heaters are activated just above dew point and thus just before moisture appears on freezer surfaces. Controller unit 31 may utilize any known sensor(s) 37 for monitoring ambient air temperature (for example, thermistors may be utilized for the temperature sensors herein, including by sensors 33 and 35) and relative humidity (capacitive polymer or thin film type sensor, for example, may be utilized wherein capacitance is proportional to the relative humidity of surrounding air). Combination sensors providing relatively accurate dew point sensing are known and commercially available. Microprocessor 53 looks up the dew point value

from a stored table. Input from monitored dew point sensor 37 and frame temperature sensor 35 are utilized in conjunction therewith to determine when to relay on the frame/door heaters as the frame temperature approaches the dew point (once the monitored frame temperature drops below a preselected set point above the dew point). Once the monitored frame temperature rises to a preselected set point above the dew point, the heaters are relayed off. On-board software builds a table of over 600 values into the dew point lookup table, set points, as well as other values, being updatable in real time from central processing. The look up table can be reprogrammed through interface 71.

The entire system preferably includes wireless communication for receiving data from multiple control units 31 at different cases 21. Controller unit 31 and communications board/transmitter/receiver 59 transfer data to central processing 59 for data viewing, tracking and report preparation. Central processing 59 is capable of printing efficiency reports, remote recalibration of heater operations and dial up warning programs should any freezer have a failure. Each controller unit 31 tracks internal case temperatures and will warn of unsafe temperatures or freezer failure. Unit/system calibration or recalibration is typically only required when sensors might be influenced by freezer temperatures. Freezer temperatures primarily influence sensor readings dependent on where sensors are mounted at installation. The case frame is not as cold at

the top of the freezer as the bottom, so the operating range of the sensors and unit 31 in the combined sensor housing configuration of FIGURE 10 are calibrated for the alternative locations.

WHAT IS CLAIMED IS:

1. A method for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, said method comprising the steps of:

monitoring case frame temperature and providing first output data related thereto;

monitoring ambient air temperature and relative humidity outside the display case and providing second output data related thereto;

processing said first and second output data at said display case to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto; and

communicating said first and second output data related to monitored case frame temperature, ambient air temperature and relative humidity and a record of display case frame/door heater activation and deactivation to a remote centralized processing location.

2. The method of claim 1 wherein said communicating step includes wirelessly receiving said first and second output data and said record from a selected one of a plurality of refrigerated display cases and wirelessly communicating with said processing location.

3. The method of claim 1 wherein said monitoring steps include reducing data inaccuracy by thermally isolating units utilized for monitoring.

4. The method of claim 1 further comprising accumulating said data and said record at said processing location to provide at least one of selective data/record viewing and data/record reporting.

5. The method of claim 1 further comprising accumulating a history of said record of display case frame/door heater activation and deactivation and selectively compiling efficiency reports related thereto at said processing location.

6. The method of claim 1 further comprising remotely recalibrating frame/door heater activation or deactivation based on data acquisition.

7. The method of claim 1 further comprising establishing constantly updatable on-site automated control parameters for the step of processing said first and second output data to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater.

8. A method for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, said method comprising the steps of:

placing a temperature sensing unit in contact with the display case frame to monitor case frame temperature;

mounting a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case; and

utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto.

9. The method of claim 8 further comprising thermally isolating said dew point sensing unit from variations in temperature of the display case frame or display case door.

10. The method of claim 8 further comprising thermally isolating said temperature sensing unit from variations in temperature of ambient air.

11. The method of claim 8 further comprising mounting an internal case temperature sensing unit inside the display case and monitoring internal case temperature.

12. The method of claim 11 further comprising storing data related to readings at said sensing units and operation of the frame/door heater.

13. The method of claim 12 further comprising wirelessly accessing said stored data.

14. A method for condensation control at any of a plurality of refrigerated display cases, each of the display cases having at least one door, a frame and at least one frame/door heater, said method comprising the steps of:

monitoring selected parameters related to each of the display cases in the plurality of display cases and providing output data related thereto;

collecting said output data;

anticipating from said collected output data condensation formation status at any of the display cases and establishing an output indicative thereof;

establishing measures to address said condensation formation status at any of the display cases responsive to said output indicative of condensation formation status; and

compiling a record of said data and said measures.

15. The method of claim 14 wherein said monitoring step includes monitoring temperature of display case doors or display case frames of each of the display cases and monitoring dew point at each of the display cases by monitoring ambient air temperature and relative humidity outside of each of the display cases, and wherein said step of establishing measures to address said condensation formation status includes the step of activating a selected display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity.

16. The method of claim 14 wherein said monitoring step includes monitoring temperature of display case doors or display case frames of each of the display cases and monitoring dew point at each of the display cases by monitoring ambient air temperature and relative humidity outside of each of the display cases, and wherein said step of establishing measures to address said condensation formation status includes the step of deactivating a selected display case frame/door heater when monitored display case door or frame temperature rises above a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity.

17. The method of claim 14 further comprising the steps of monitoring internal case temperatures of said plurality of display cases and compiling a record thereof.

18. The method of claim 14 further comprising the step of communicating said record to a remote processing location.

19. The method of claim 14 further comprising the step of reducing output data inaccuracy by thermally isolating units utilized for monitoring.

20. The method of claim 14 further comprising the step of establishing constantly updatable automated control parameters for the steps of anticipating condensation formation status and establishing measures to address said condensation formation status at any of the display cases.

REFRIGERATION UNIT CONDENSATION PREVENTION

Abstract of the Disclosure

Apparatus, systems and methods are disclosed for efficient elimination of door and frame condensation at widely utilized commercial freezer/refrigeration display cases. The apparatus includes a local controller unit connected with an array of case sensors including an internal case temperature sensor, an external case frame temperature sensor and a dew point sensor. The case frame temperature sensor and dew point sensor are housed to thermally isolate sensing elements thereof from effects of frame temperature changes and ambient air temperature in the vicinity of a sensing element, and to limit heat transfer by the housing to the sensing elements thereby improving sensing accuracy and apparatus performance.

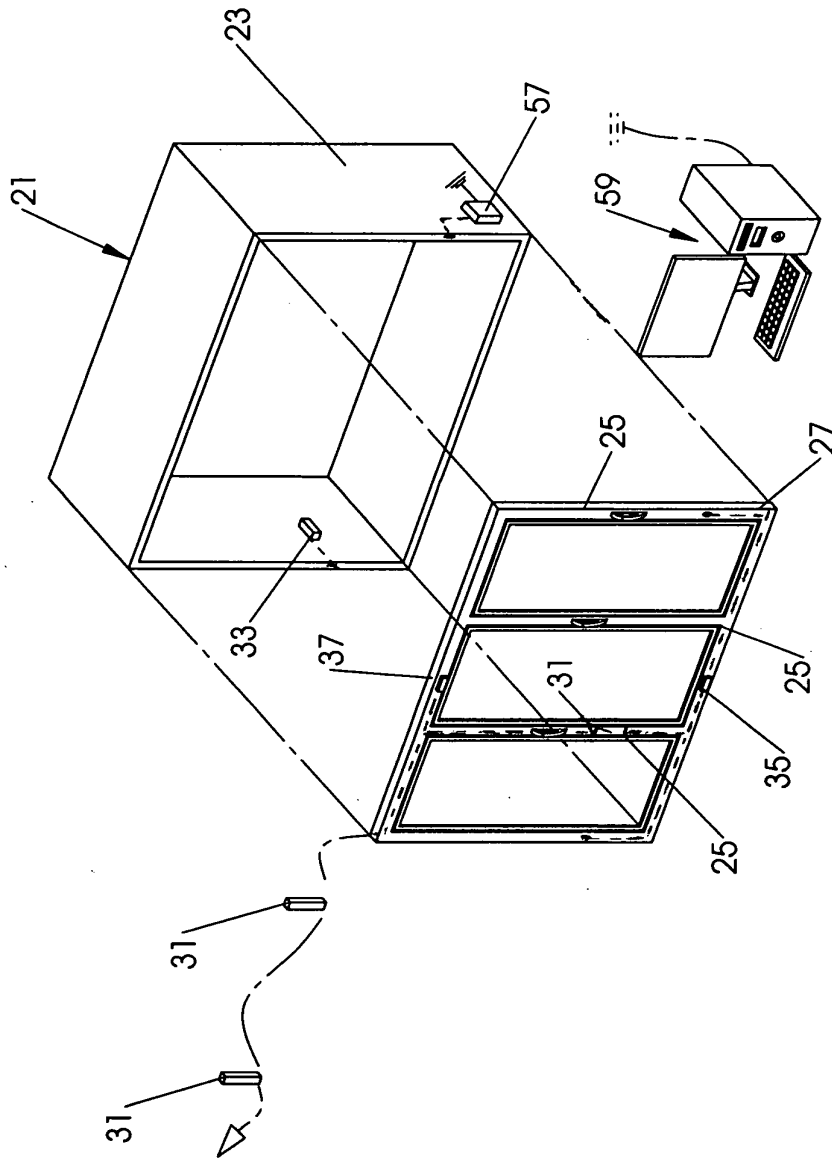


FIGURE 1

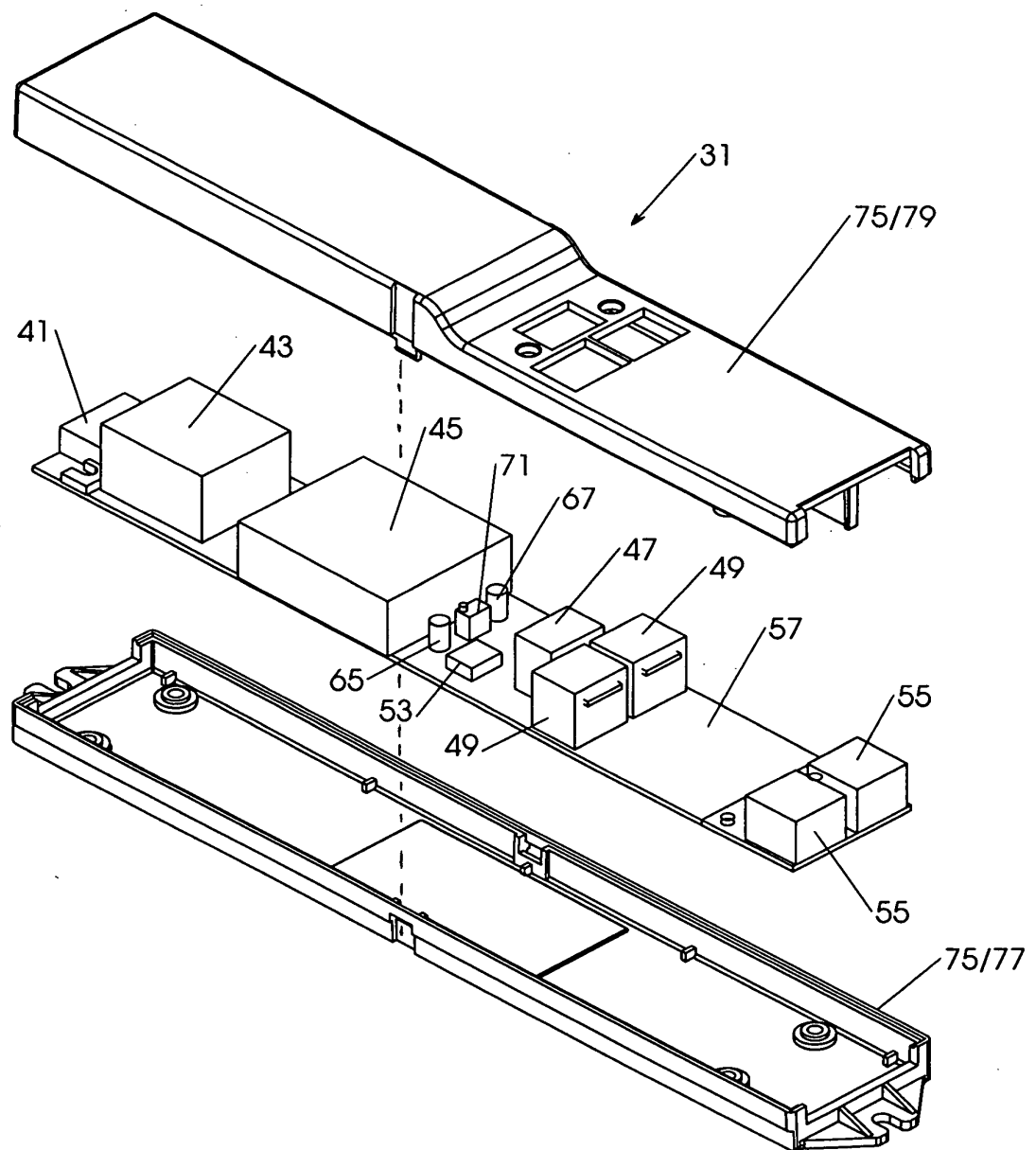
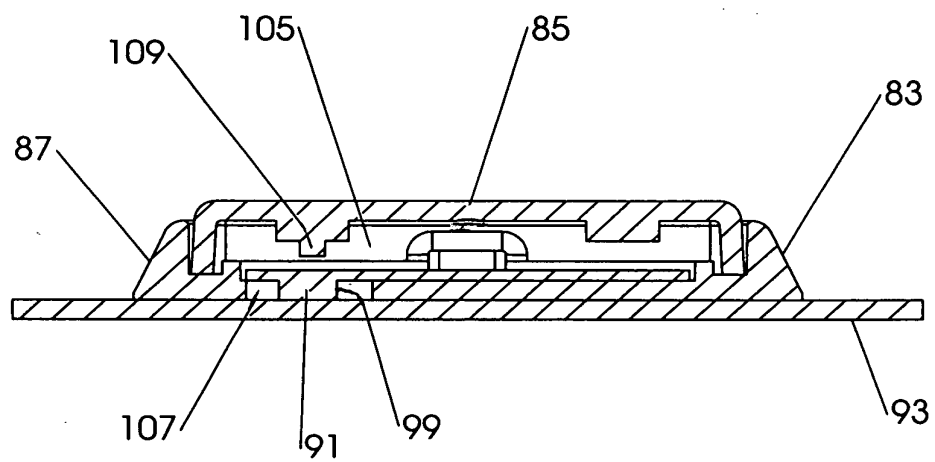
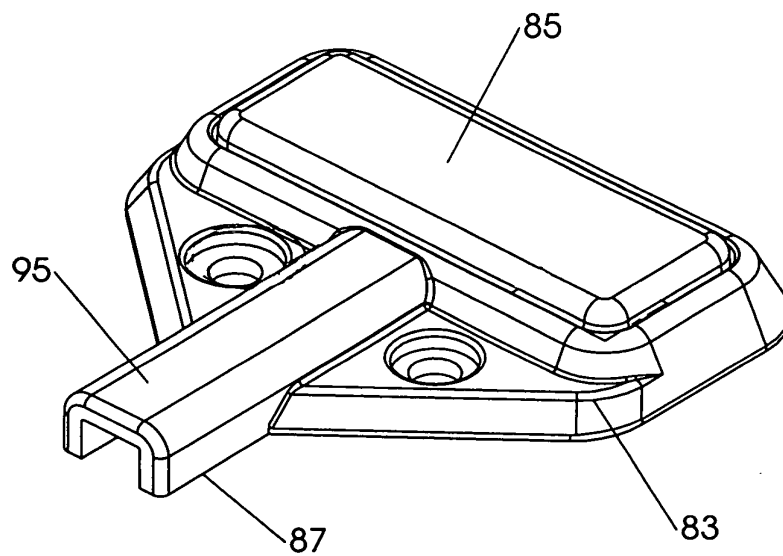


FIGURE 2

2/29



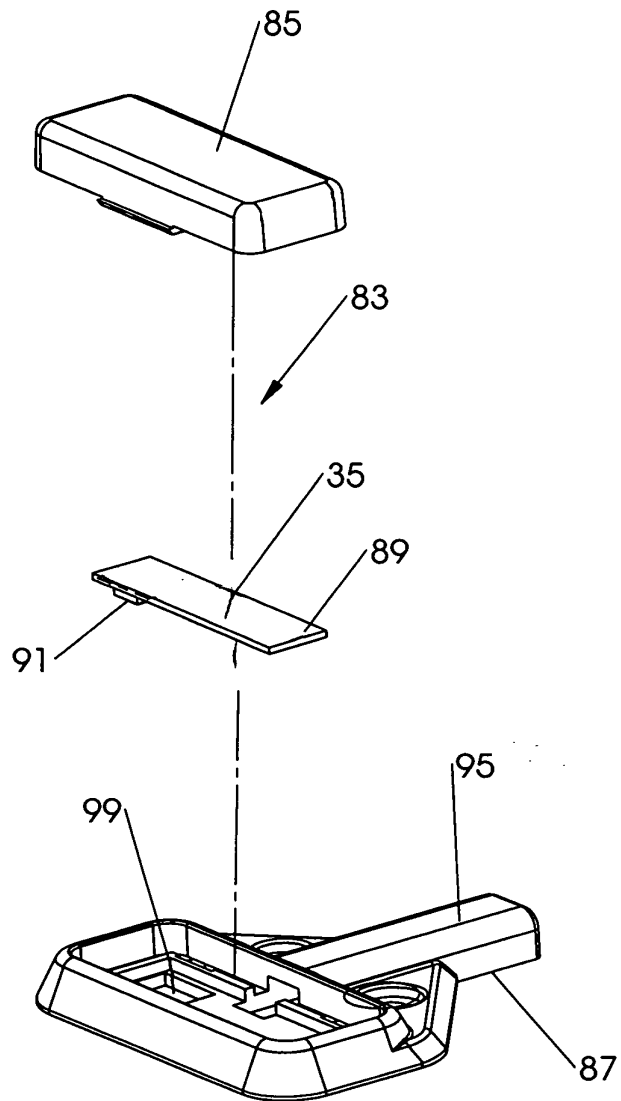


FIGURE 4

4/29

5/29

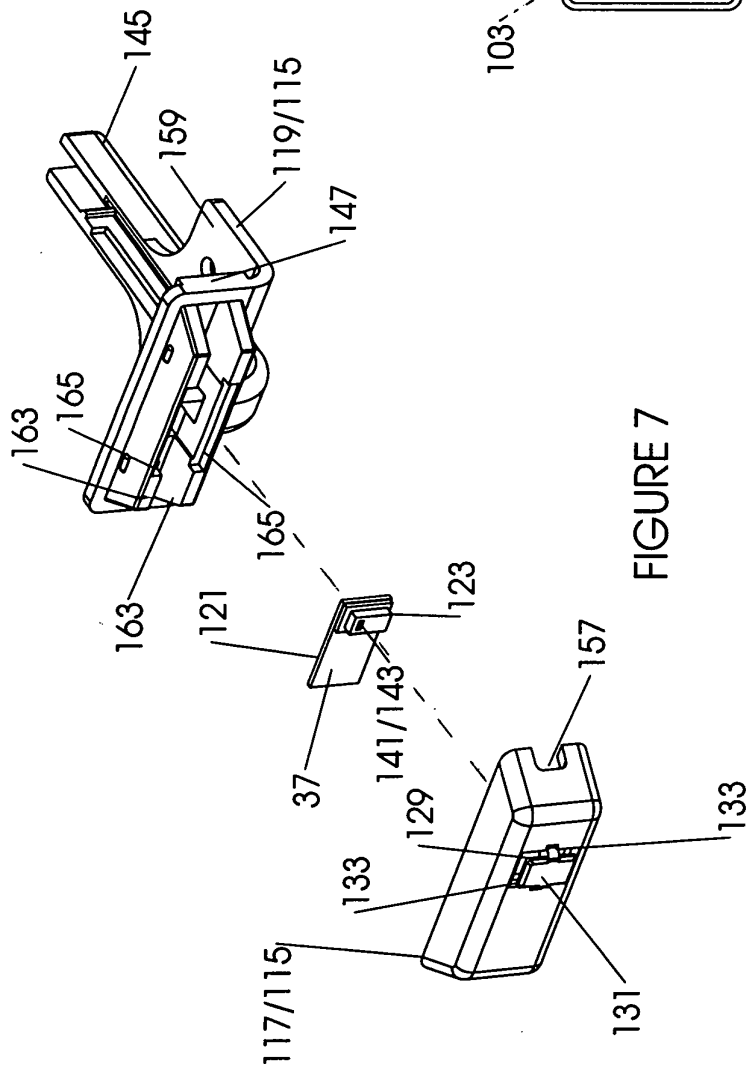


FIGURE 7

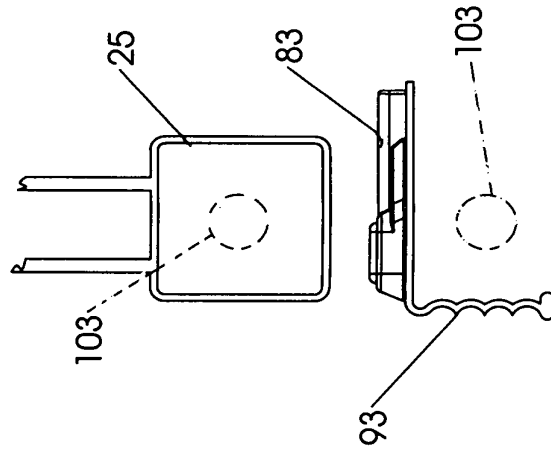


FIGURE 6

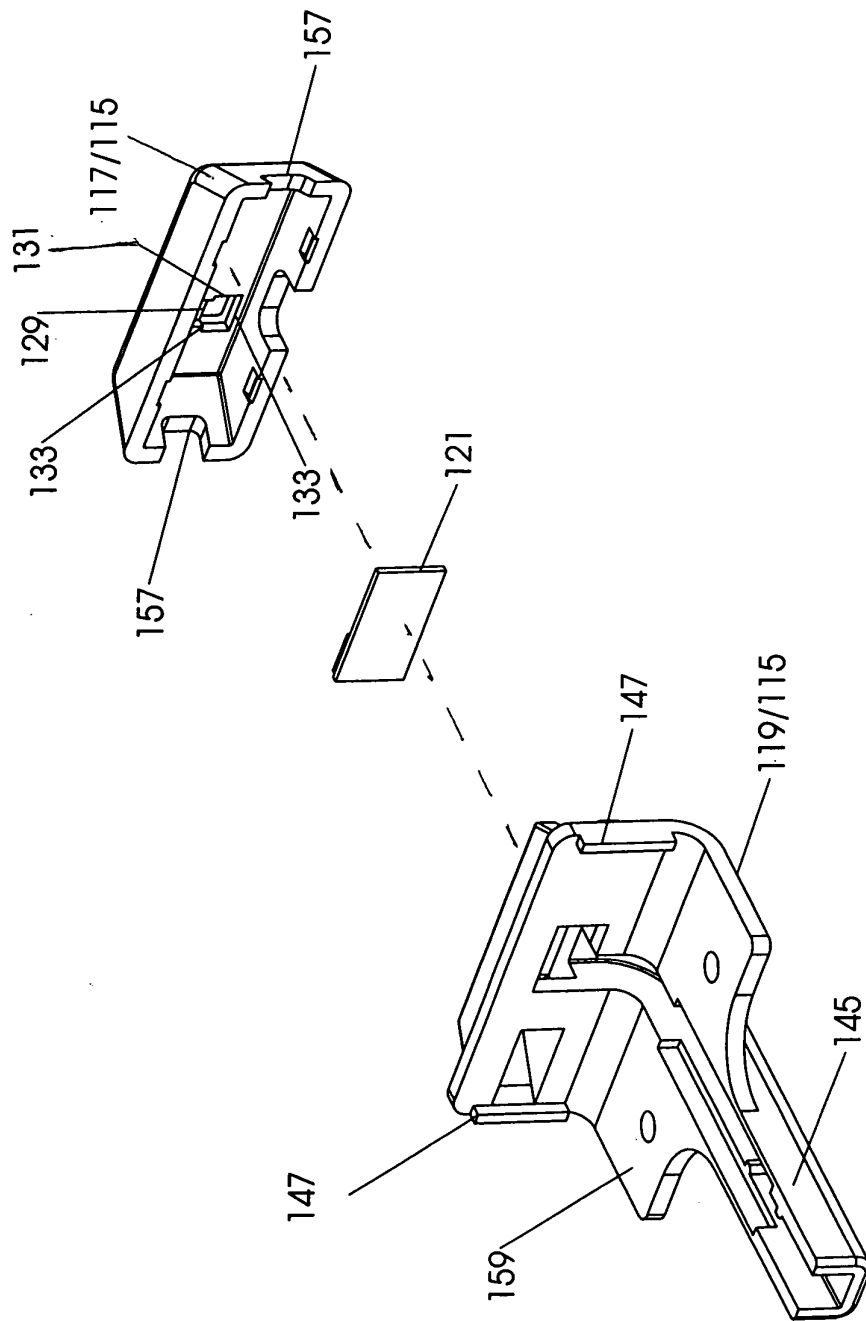


FIGURE 8

6/29

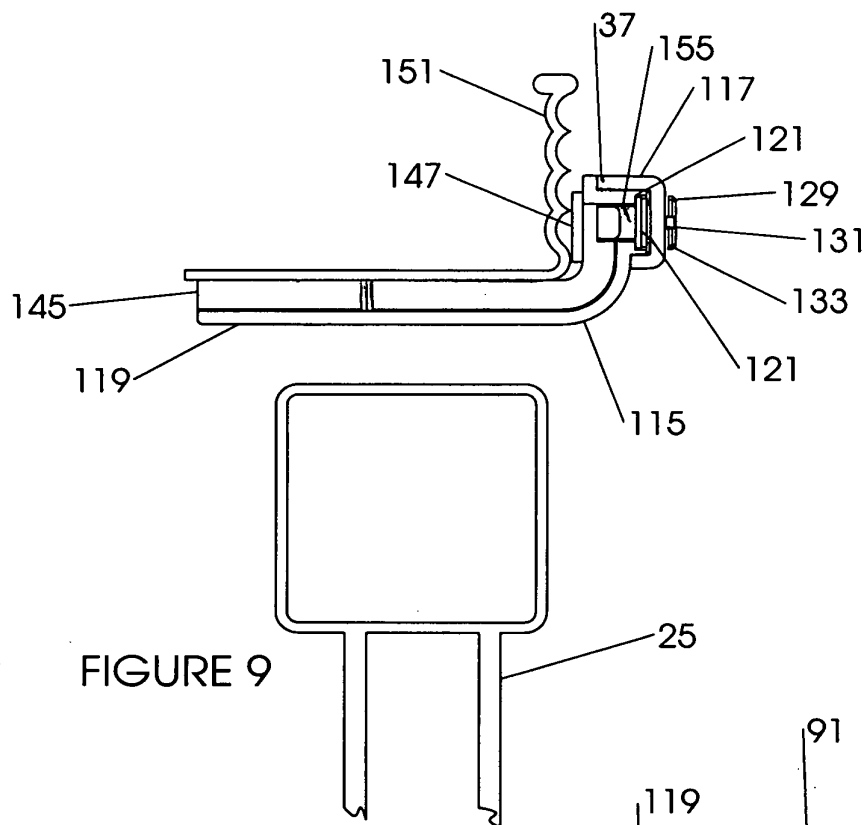


FIGURE 9

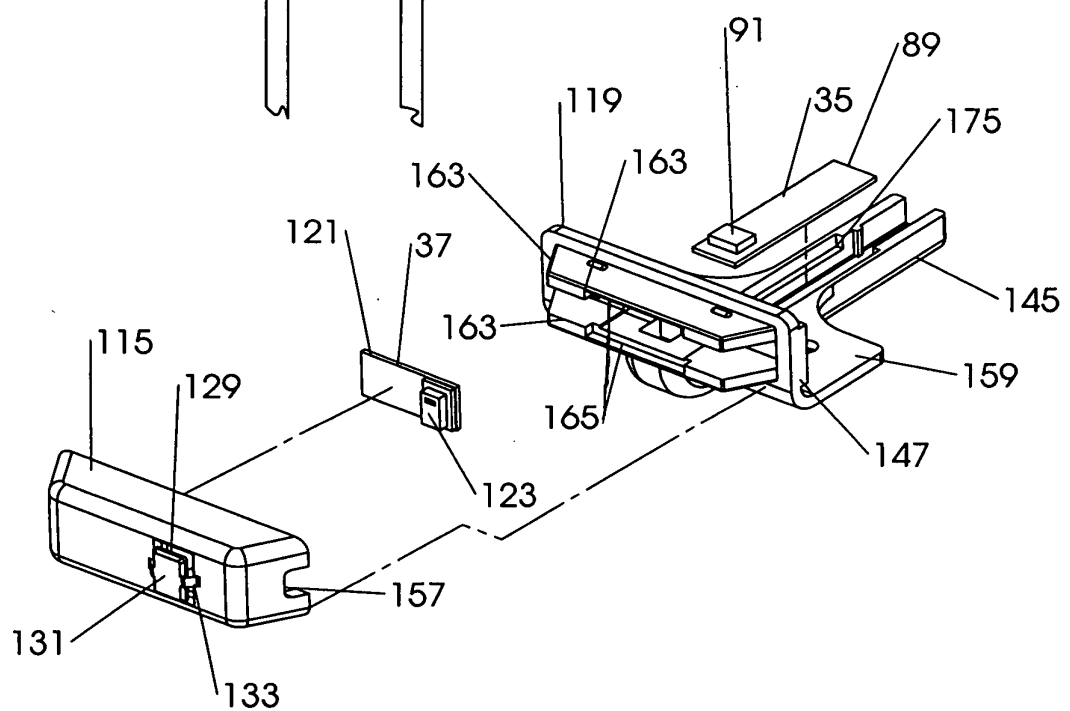


FIGURE 10
7/29

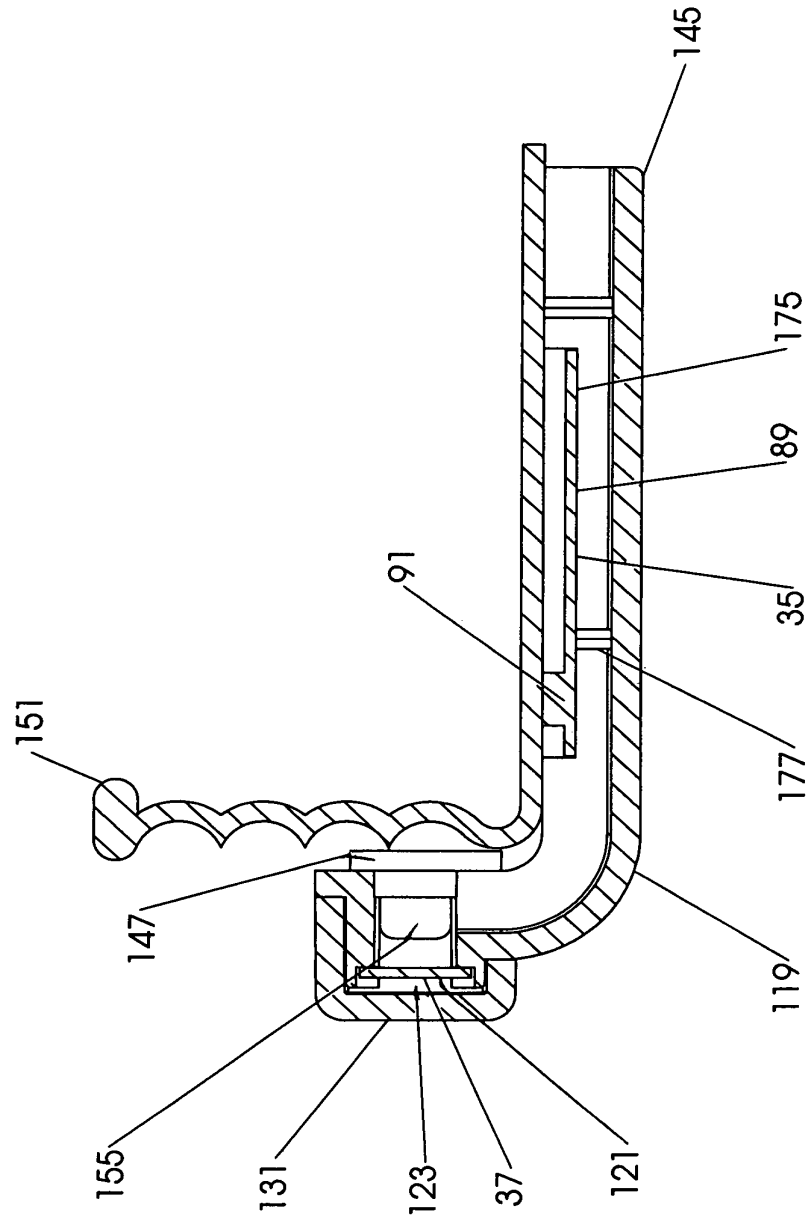


FIGURE 11

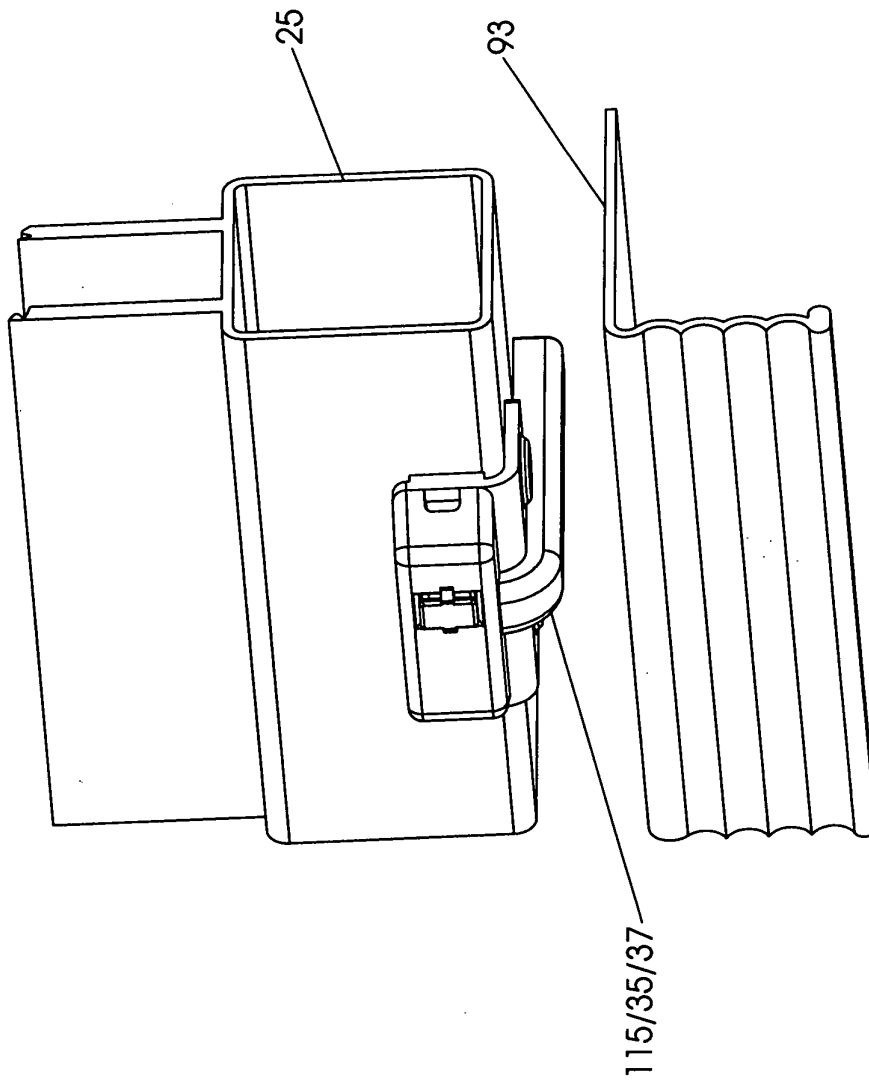


FIGURE 12

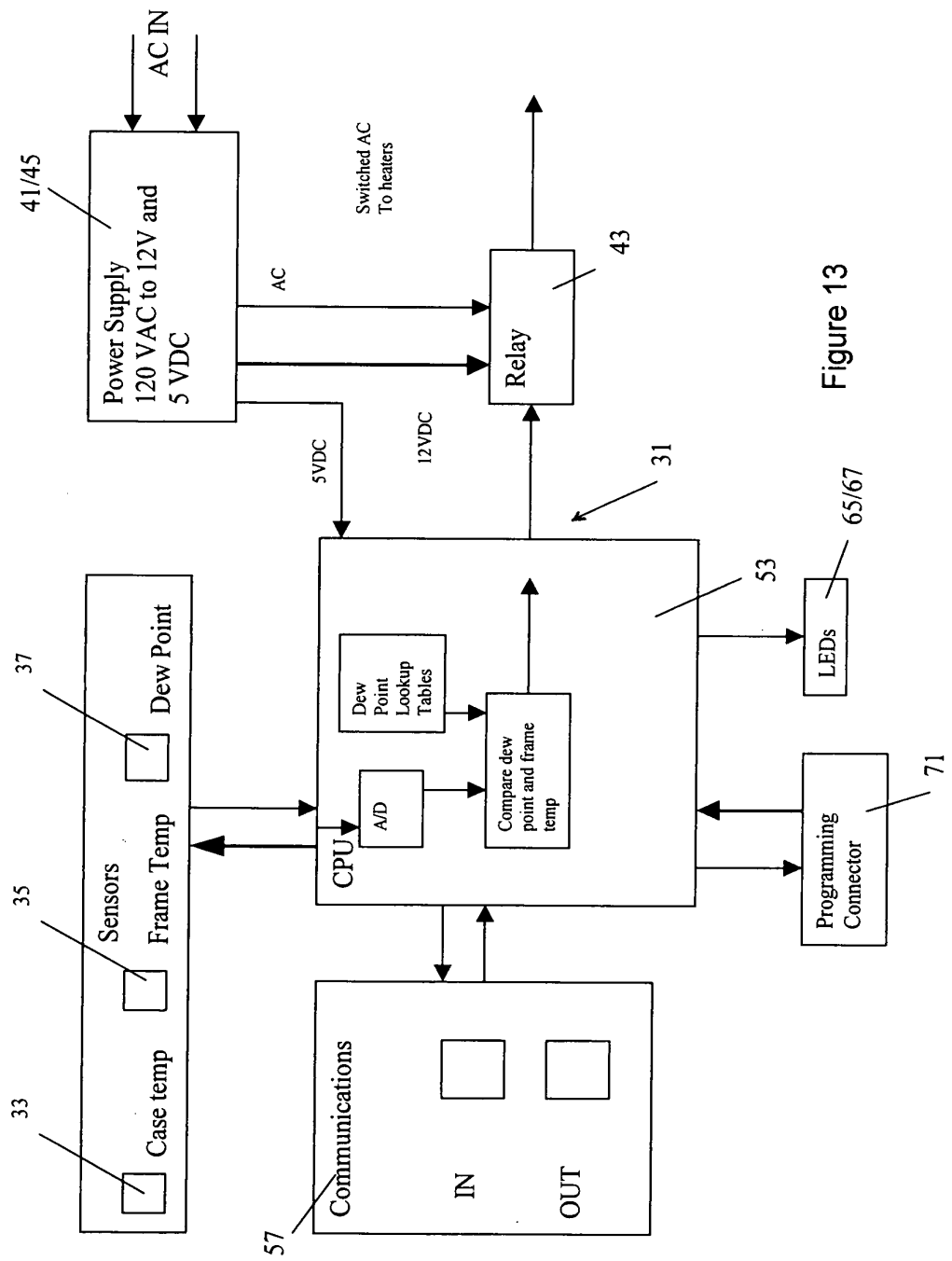


Figure 13

Figure 14a

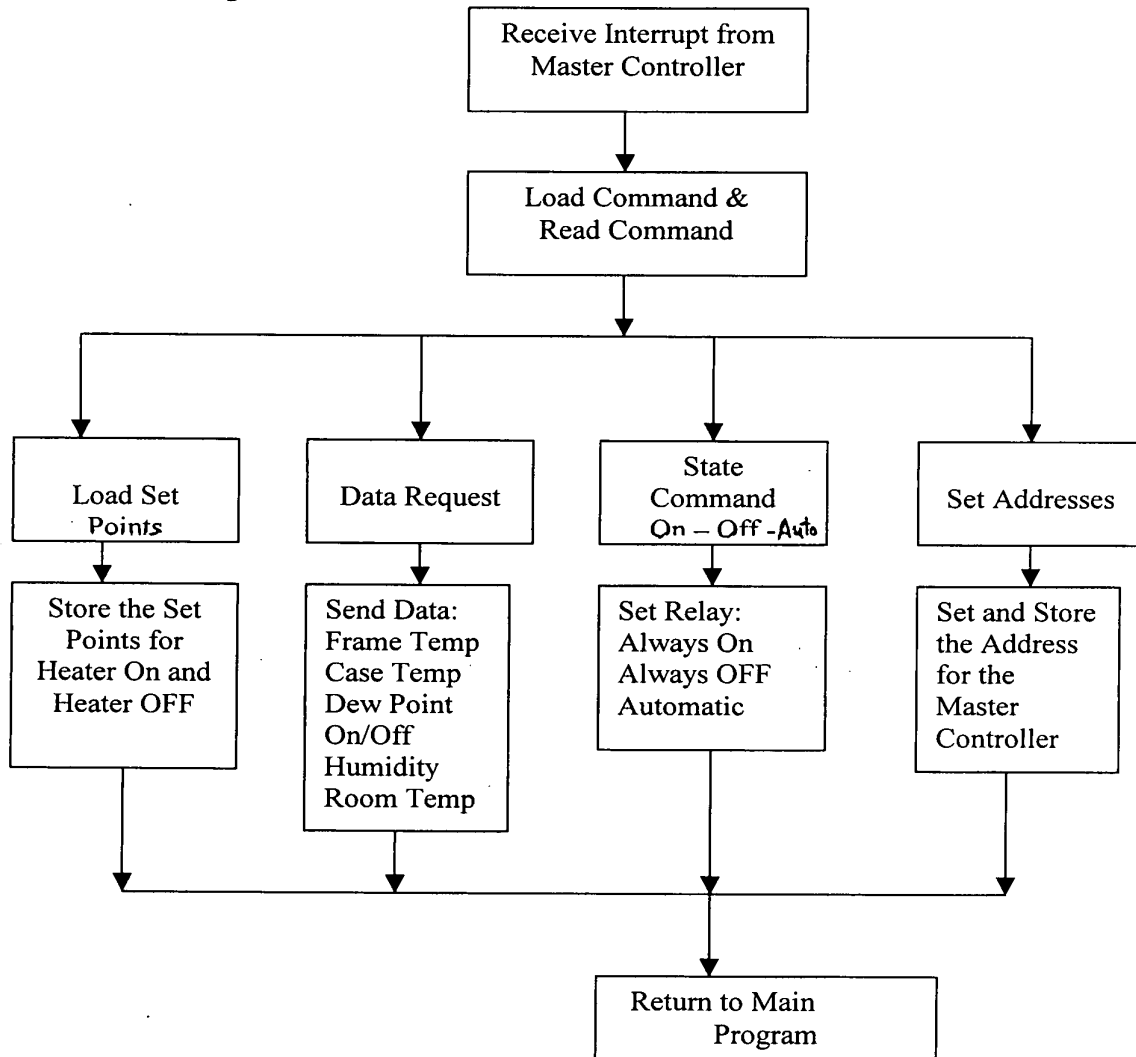
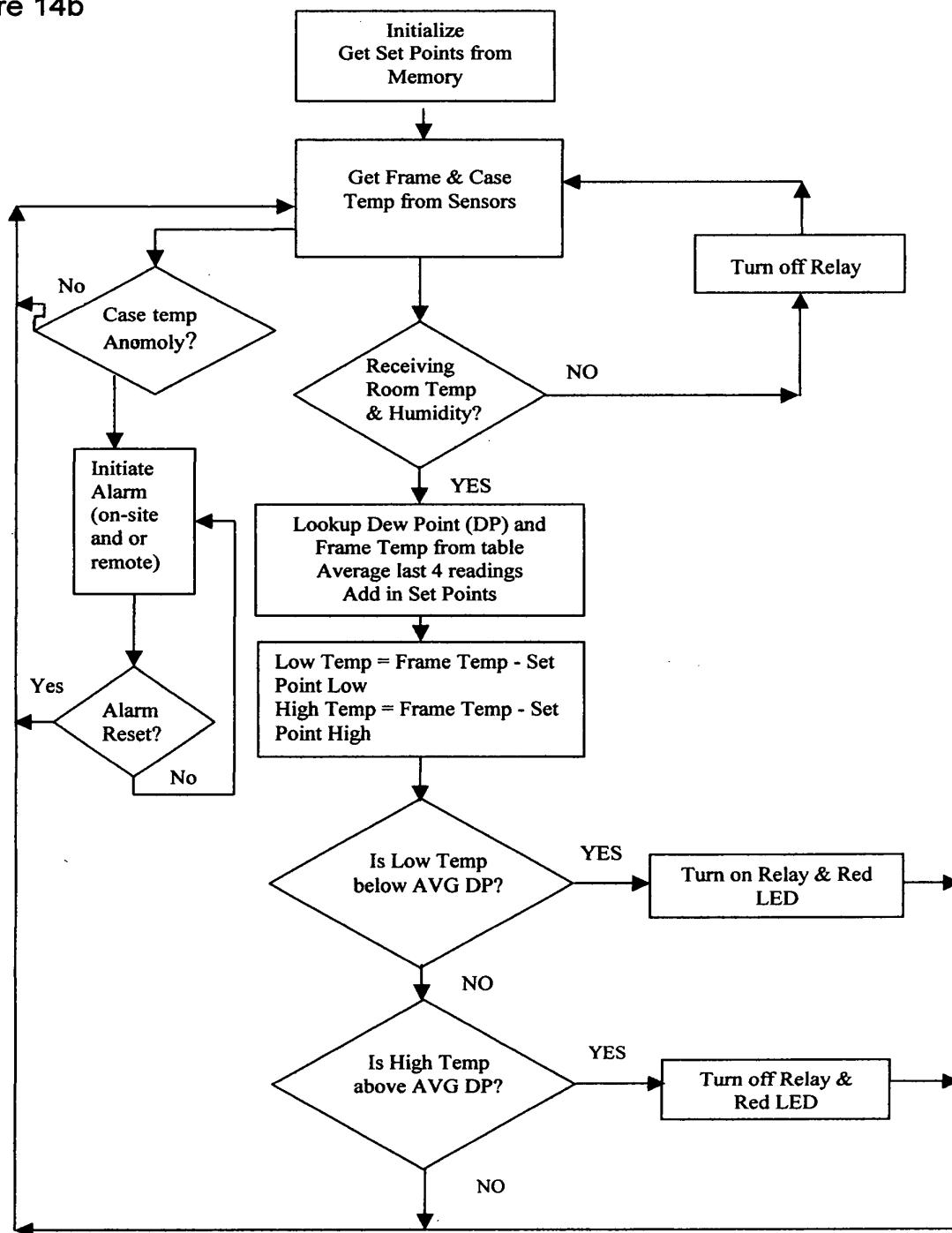


Figure 14b



12/29

13/29

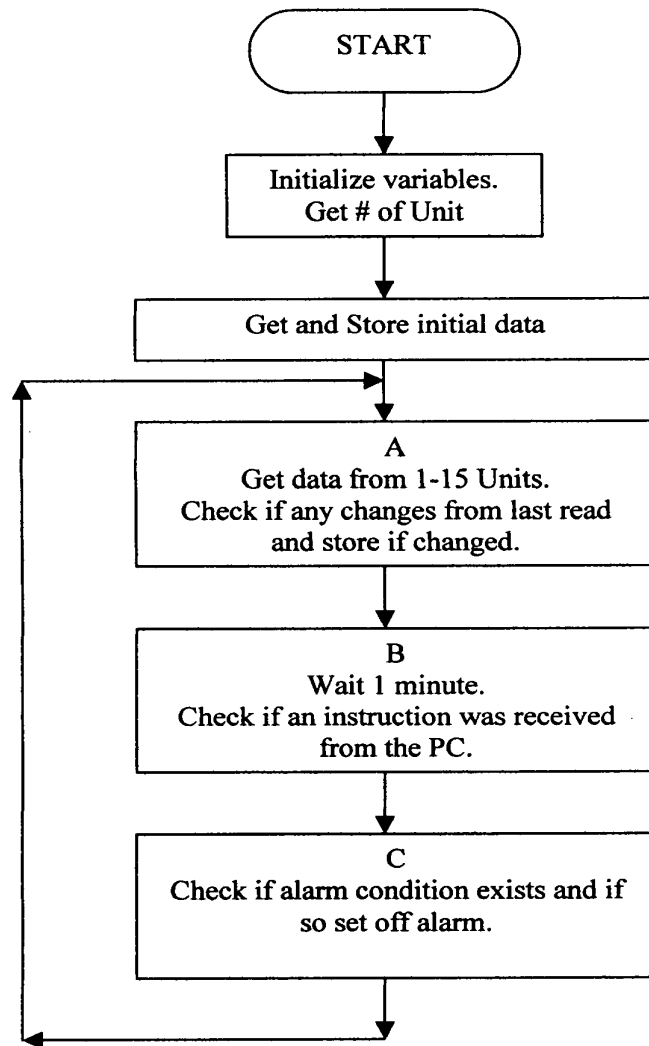


Figure 14c

Figure 14d

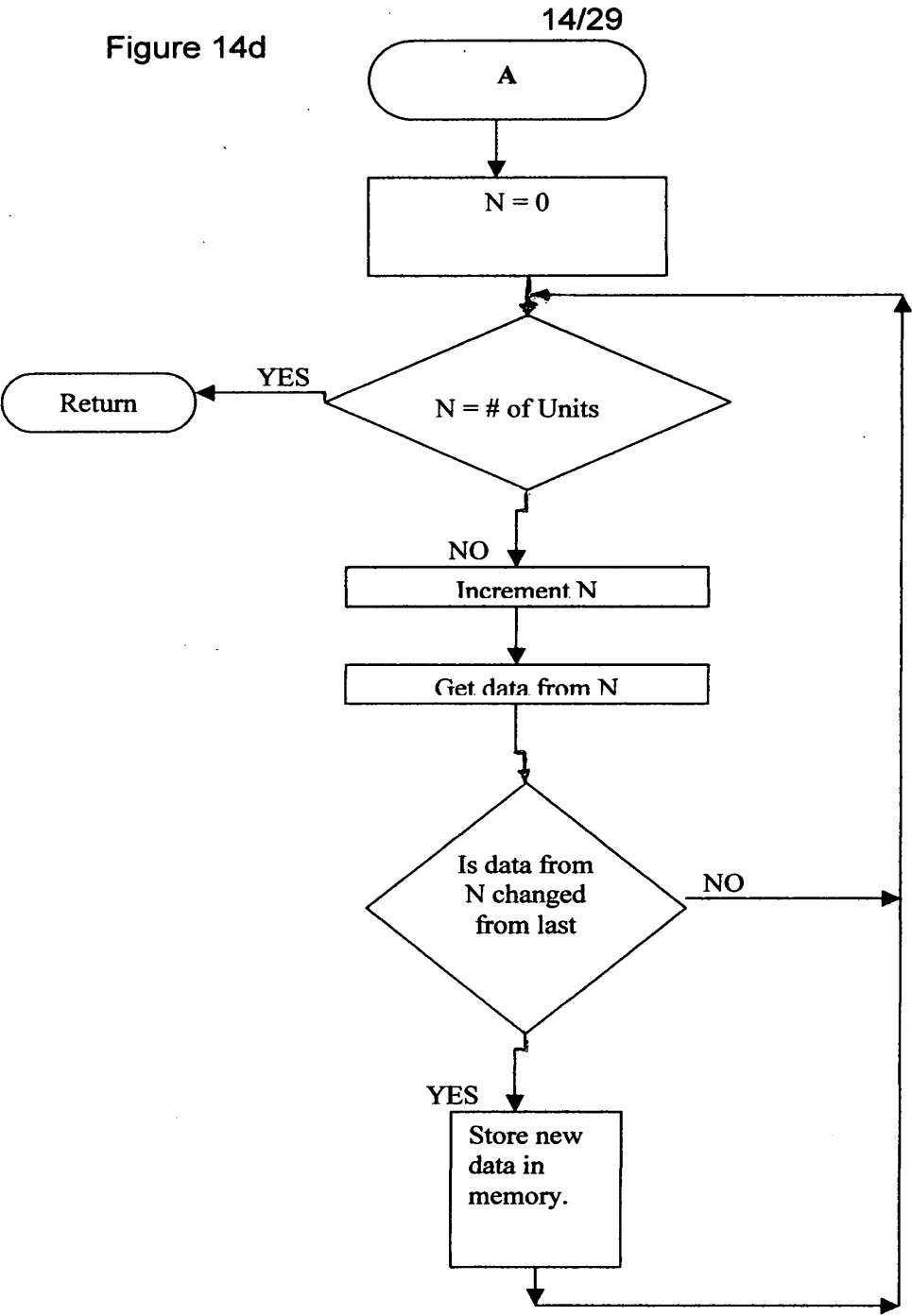
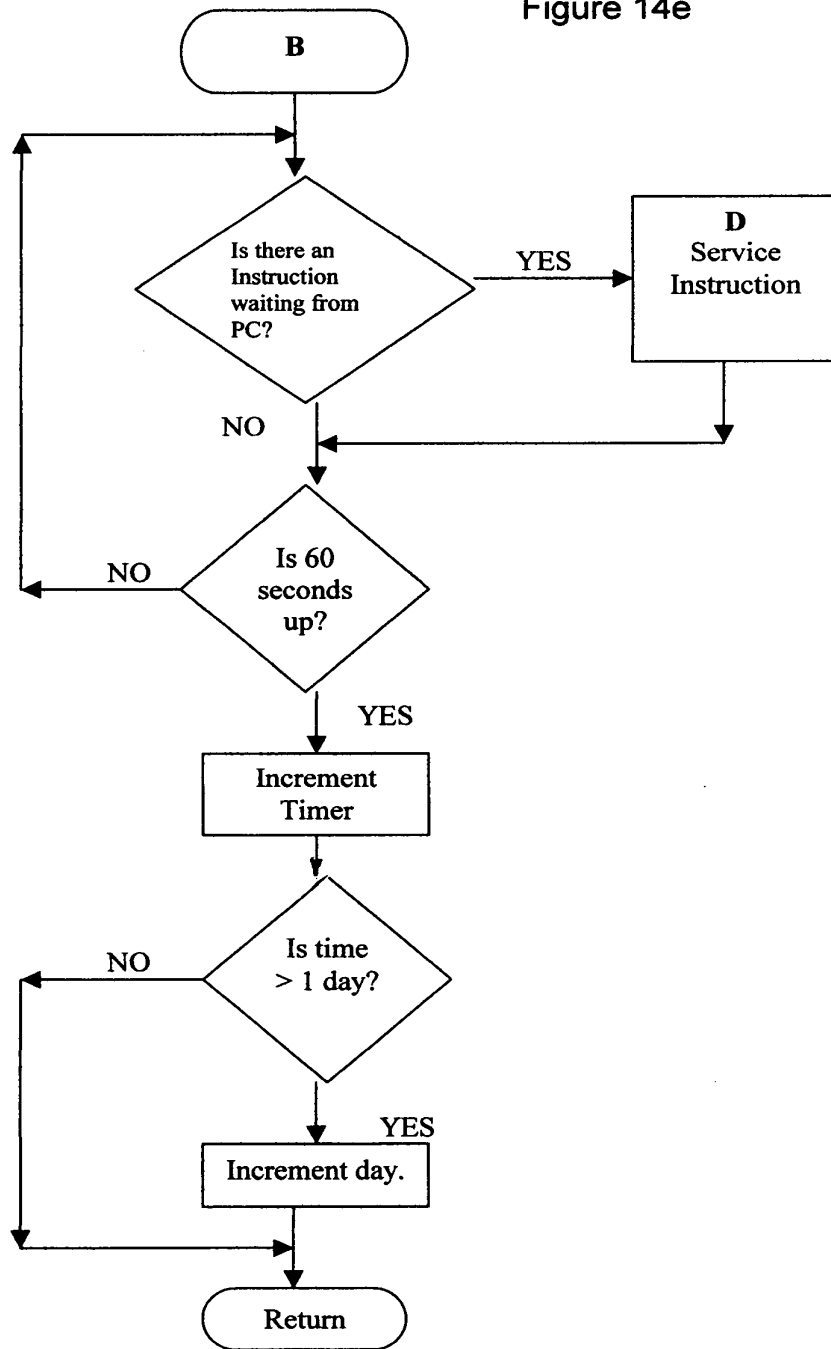


Figure 14e



15/29

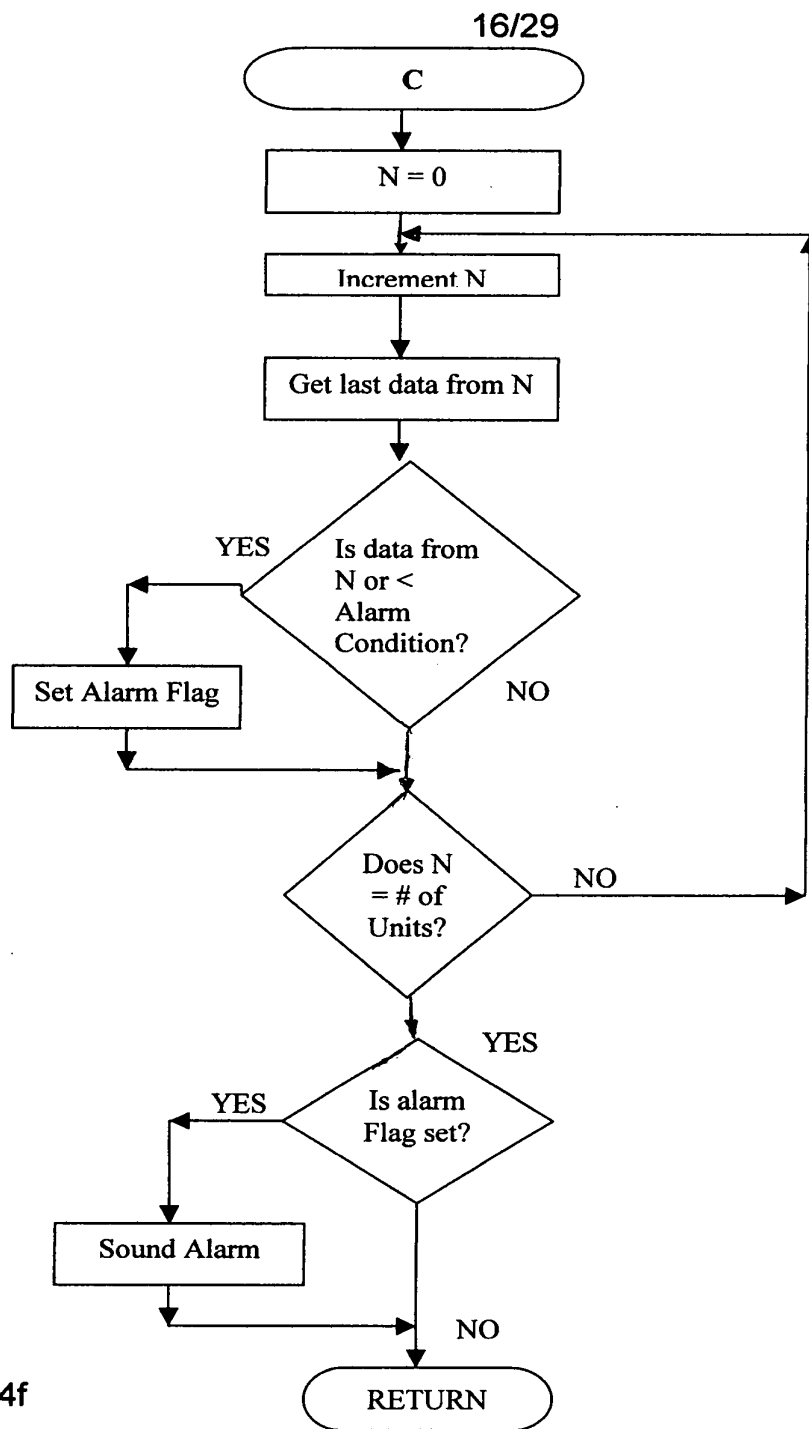


Figure 14f

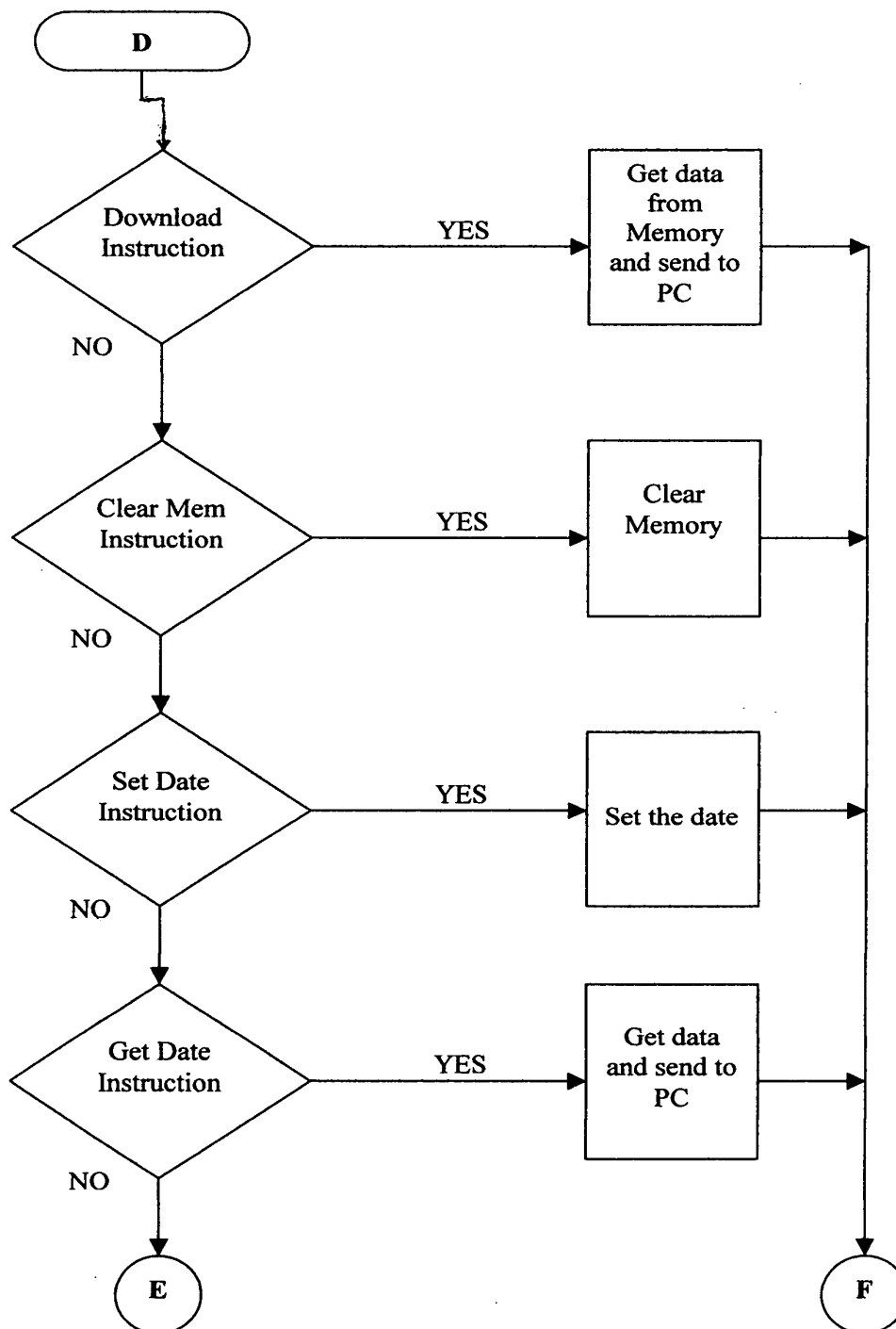


FIGURE 14h

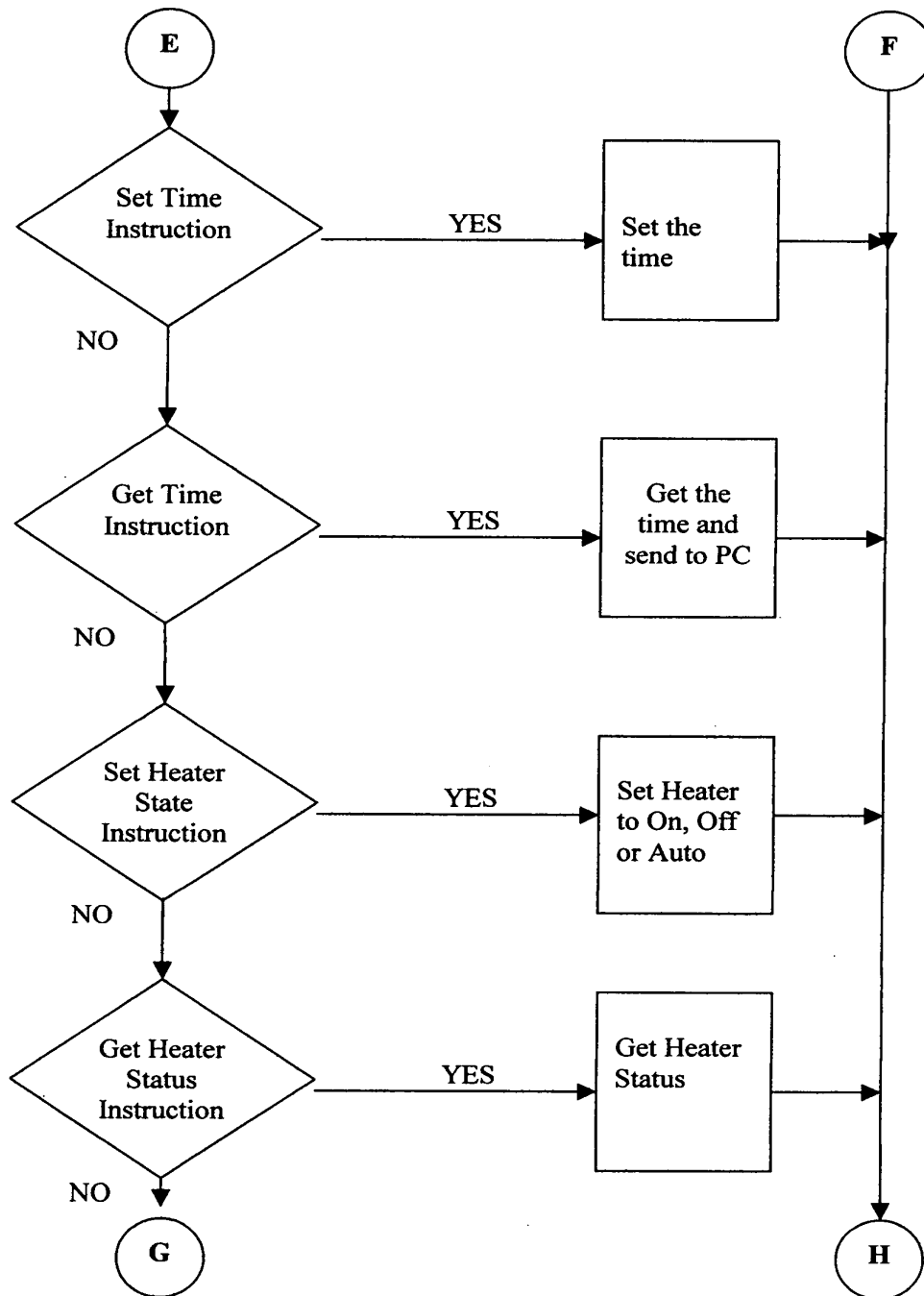


FIGURE 14i

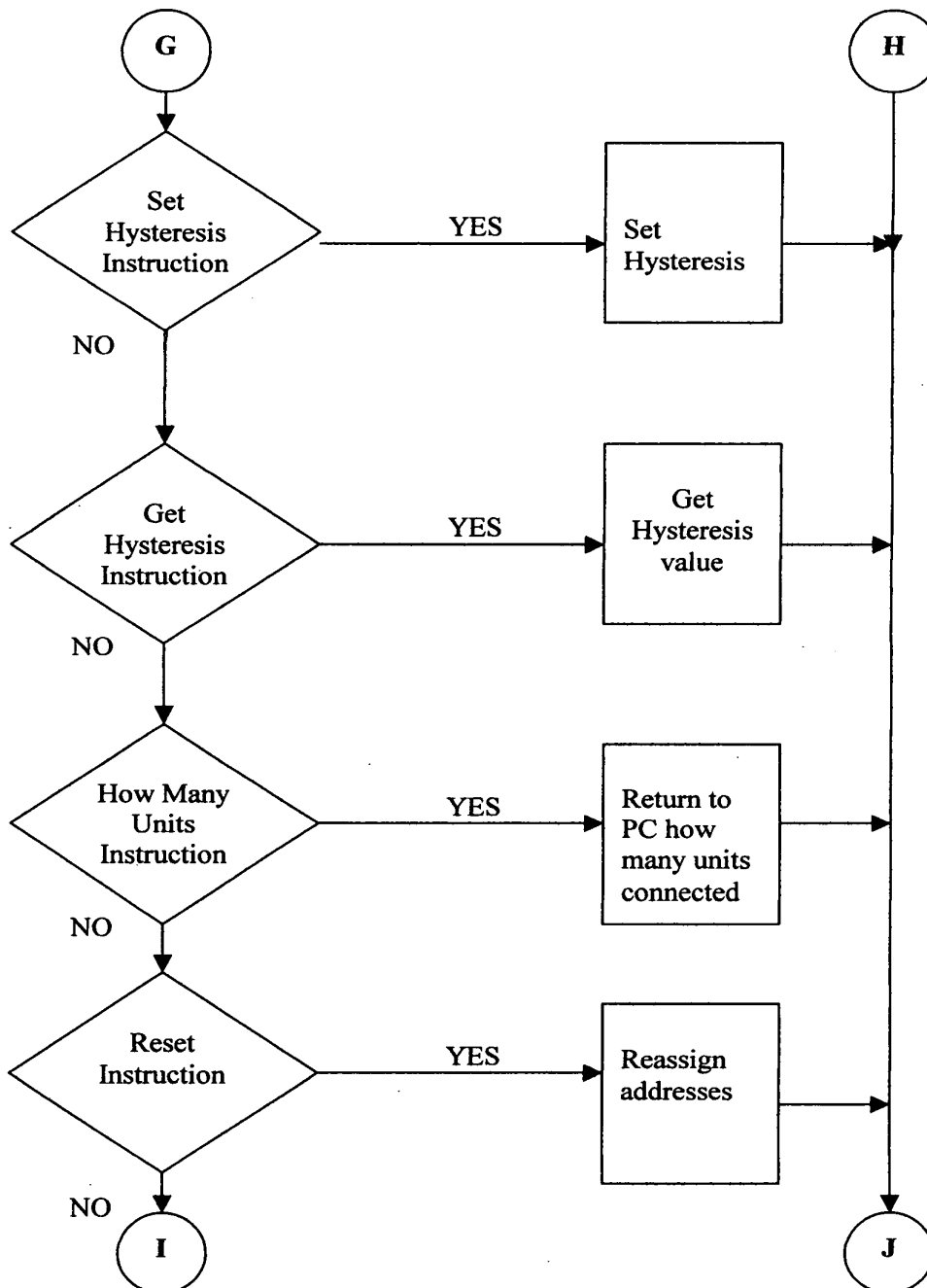


FIGURE 14j

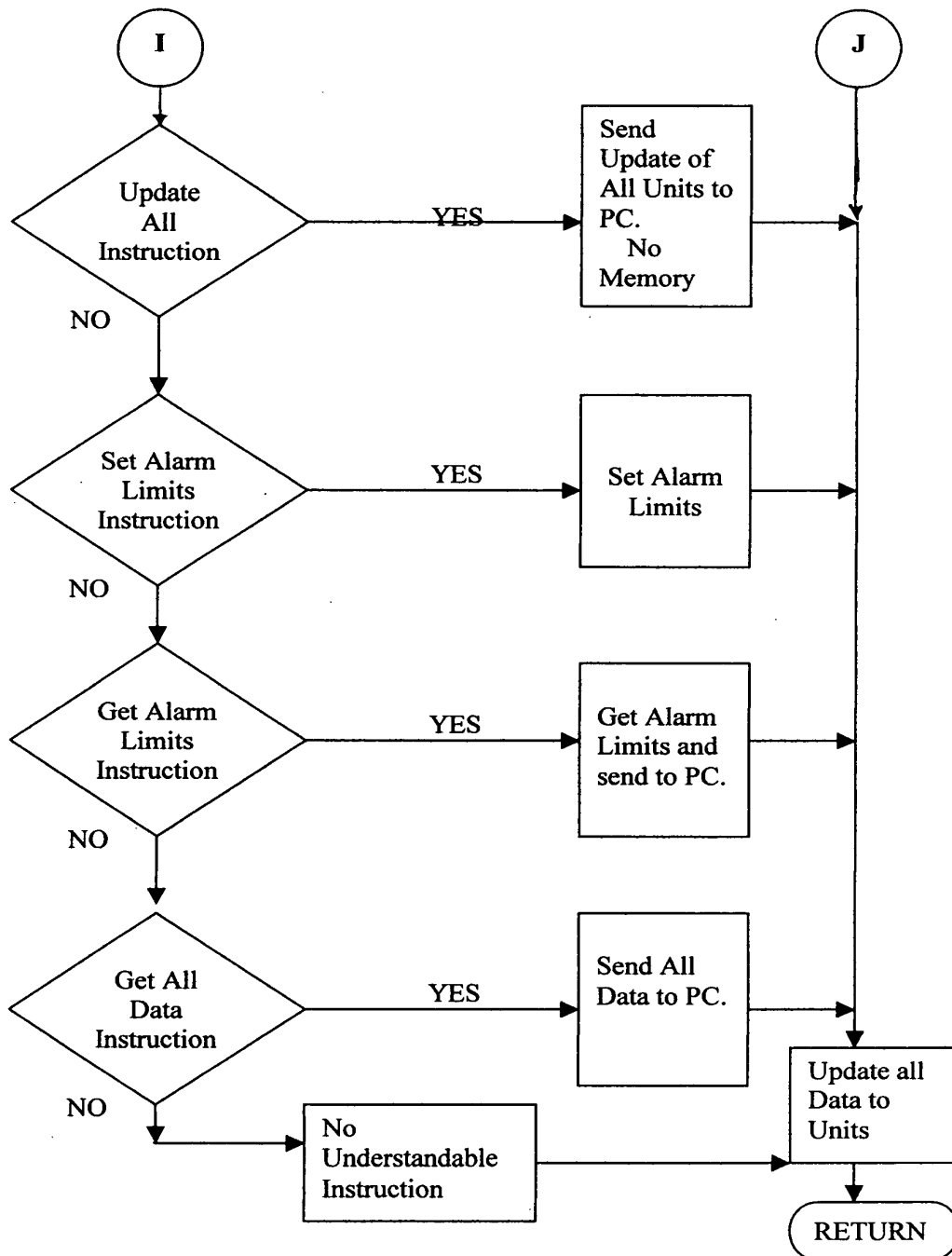


Figure 15a

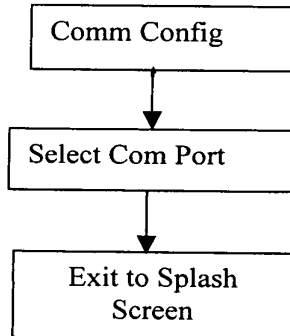


Figure 15c

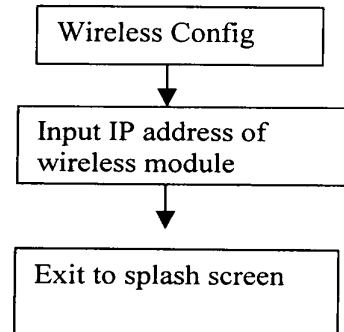


Figure 15b

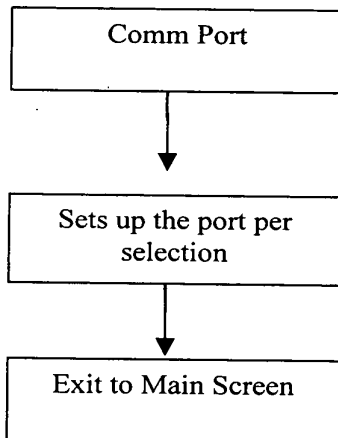


Figure 15d

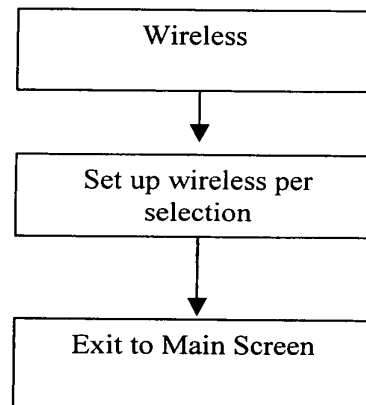


Figure 15e

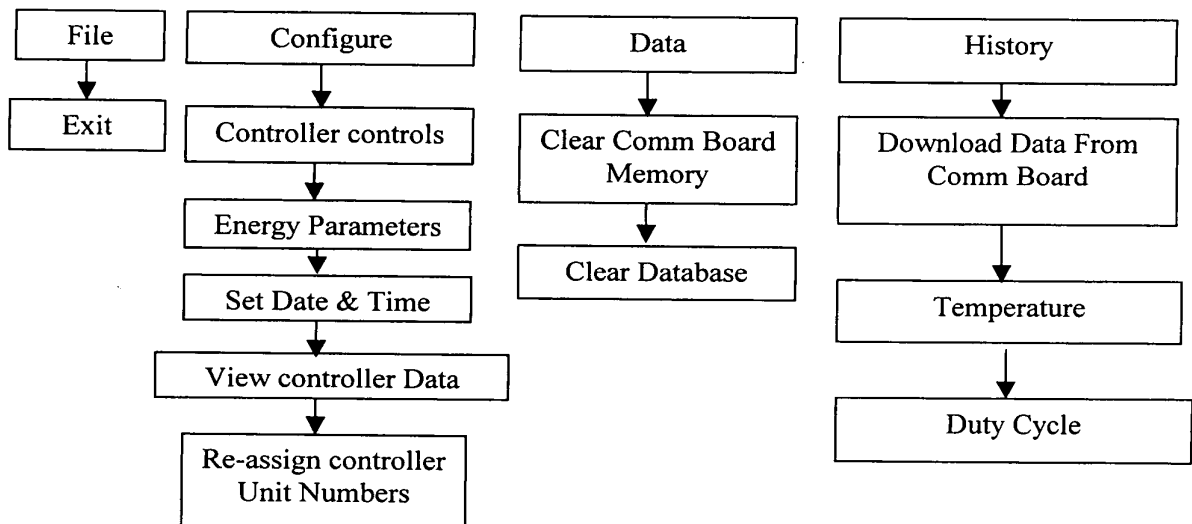
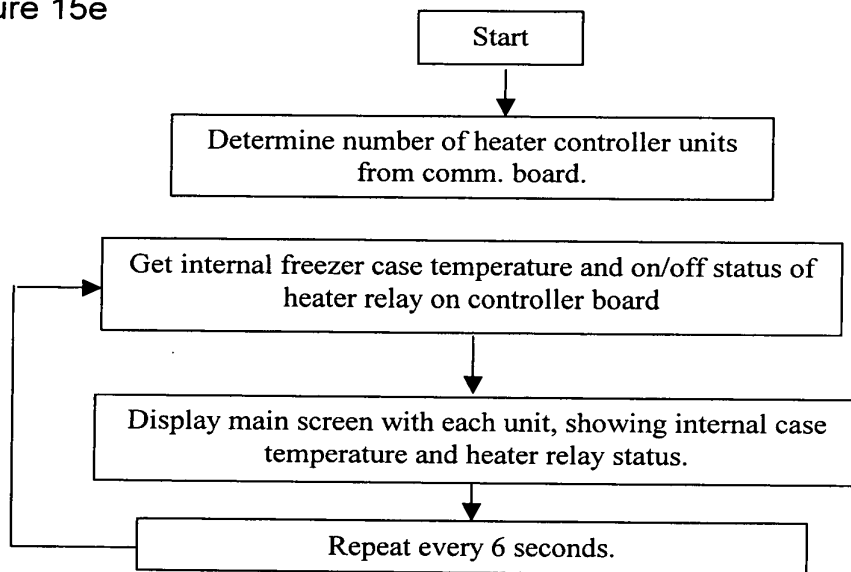


Figure 15f

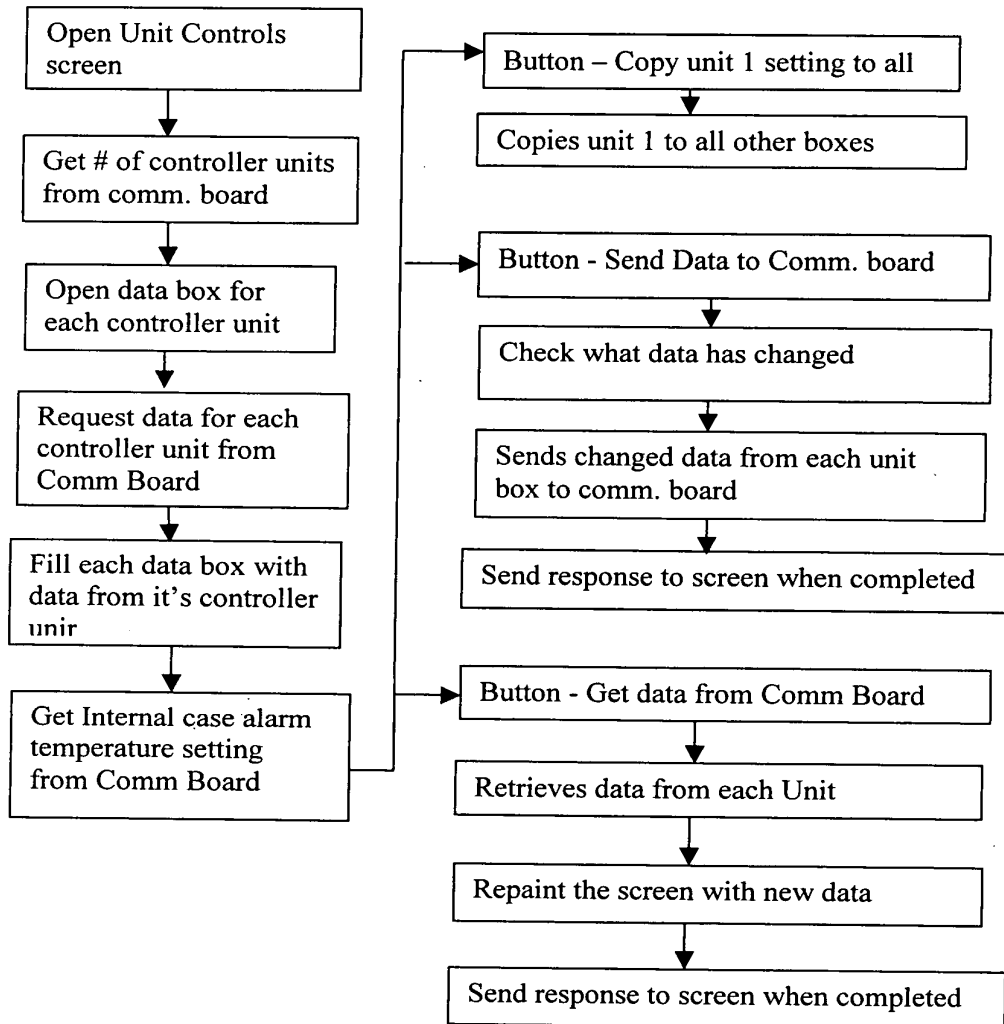


Figure 15g

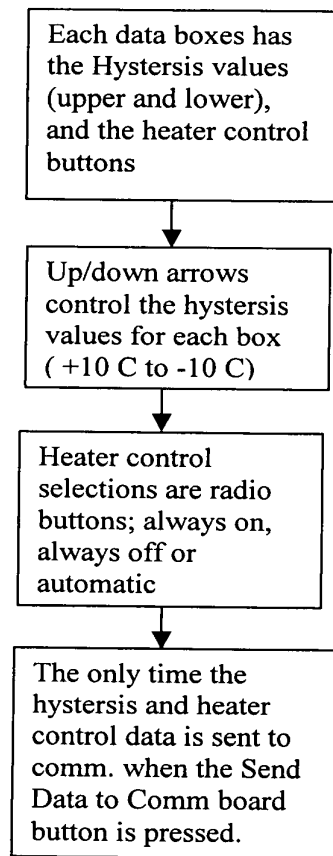


Figure 15h

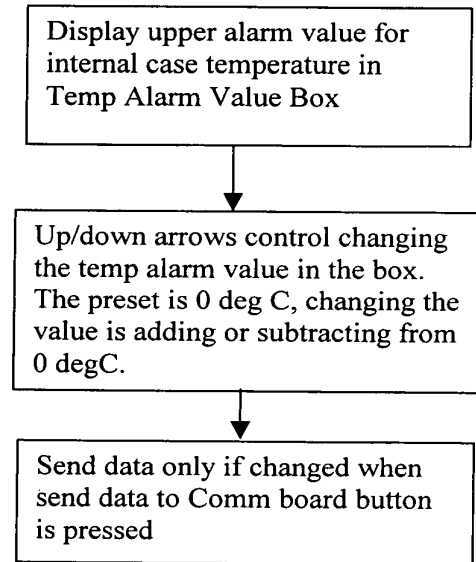
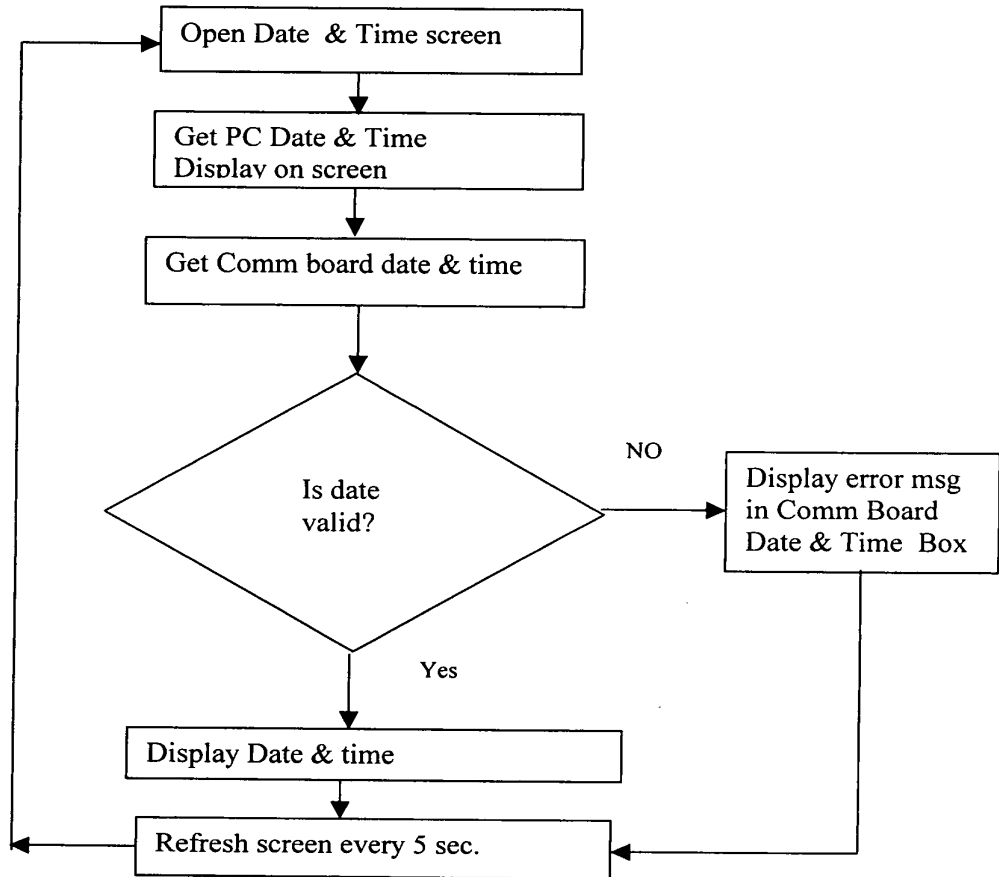


Figure 15i

Figure 15j

25/29



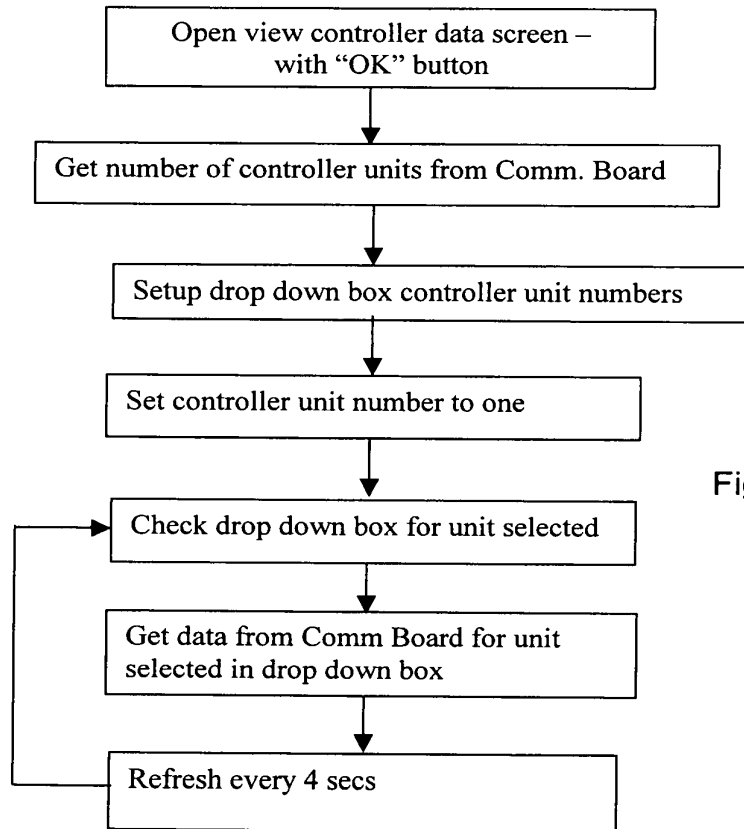


Figure 15k

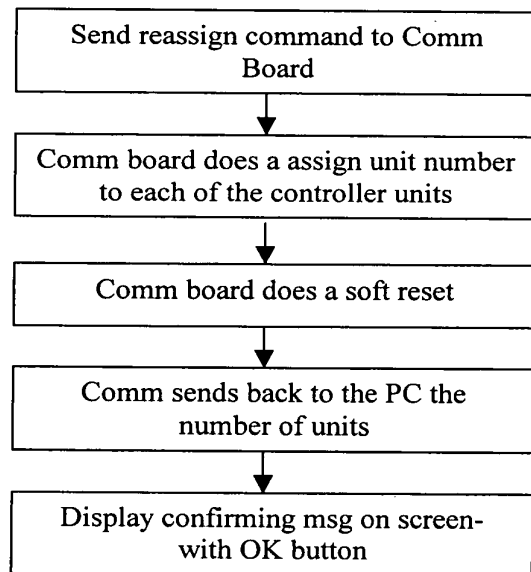


Figure 15l

27/29

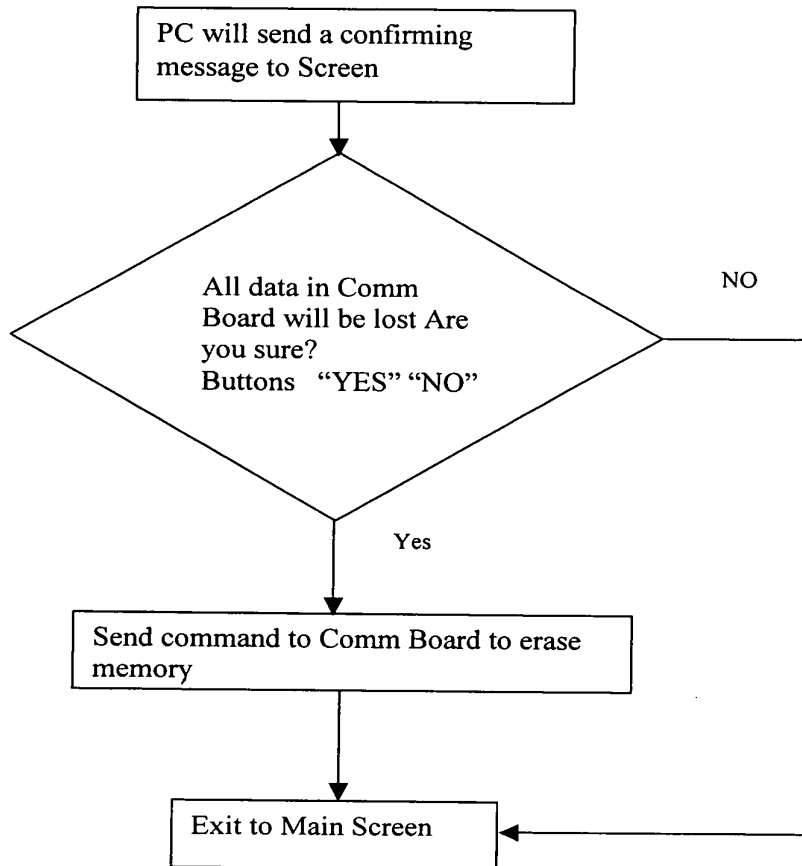


Figure 15m

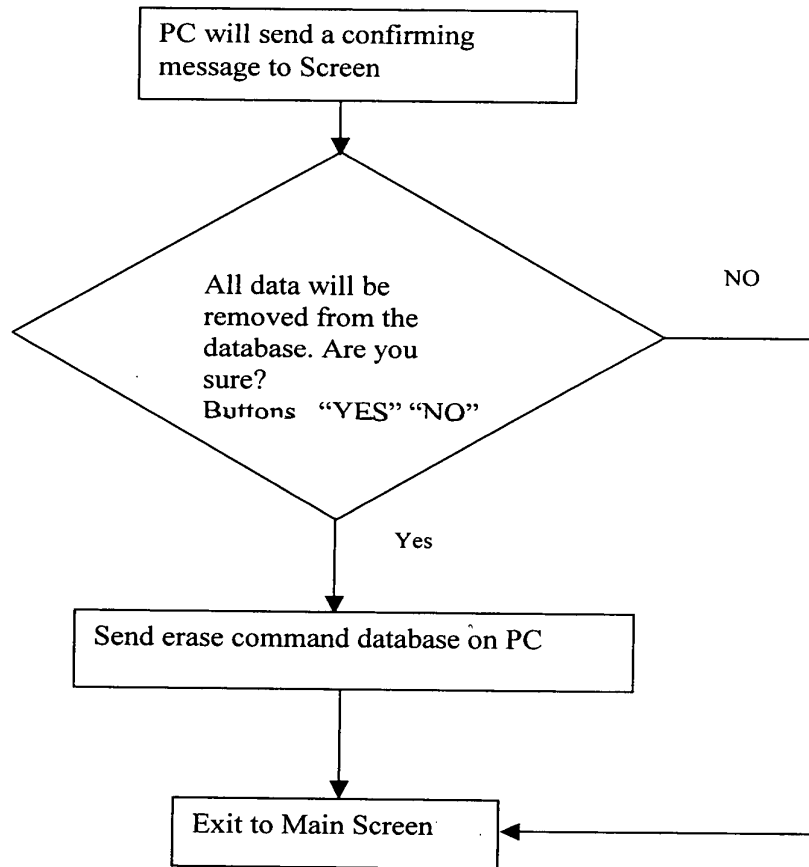


Figure 15n

29/29

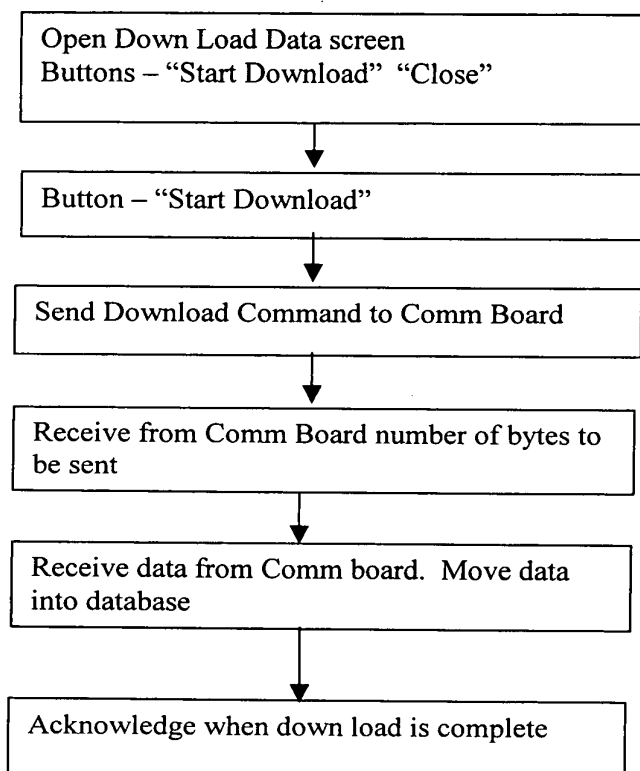


Figure 15o

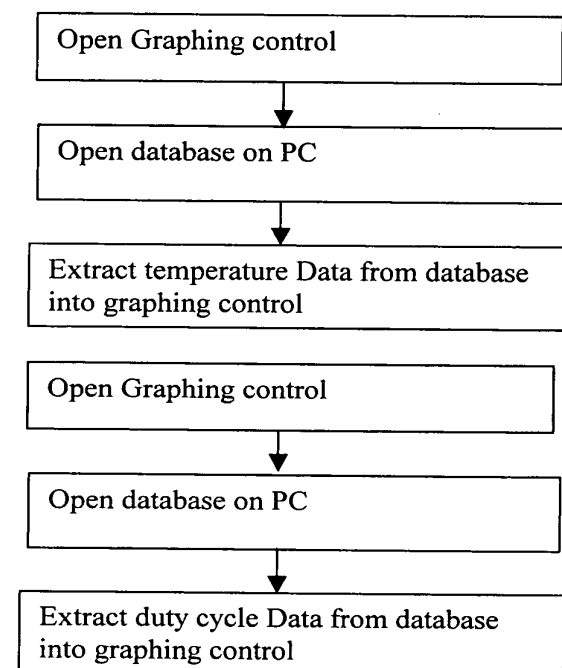


Figure 15p

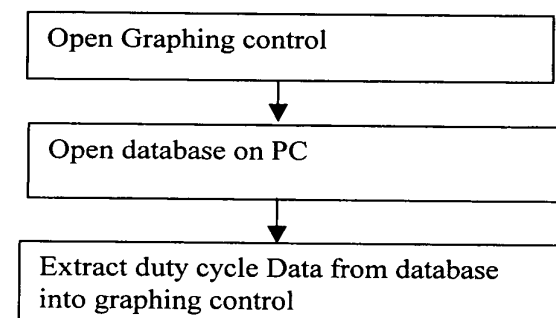


Figure 15q

United States application in the manner provided by the first paragraph of Title 35, United States Code 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>N/A</u>		
(Application Serial No)	(Filing Date)	(Status-patented, pending, abandoned)

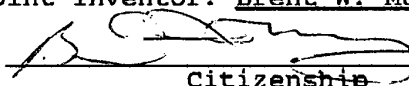
We hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Harold A. Burdick and Robert E. Harris
 Registration Nos.: 32,725 and 19,493, respectively
 Address all telephone calls to Harold A. Burdick
 at (303) 530-1355
 Address all correspondence to Customer No. 23121
 Label:

The Law Firm Of
HARRIS & BURDICK
6676 Gunpark Drive
Suite E
Boulder, Colorado 80301

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first joint inventor: Brent W. Murray

Inventor's signature 
 Date 5/1/05 Citizenship U.S.A.
 Residence: 1311 Ruby Way
Longmont, Colorado 80504
 Post Office Address Same as Residence

Full name of second joint inventor: Patrick M. Bertsch

Inventor's signature Patrick M. Bertsch

Date 3/1/2005 Citizenship U.S.A.

Residence: 1982 E. 129th Drive

Thornton, Colorado 80241

Post Office Address Same as Residence

Full name of third joint inventor: Robert A. Maizner

Inventor's signature Robert A. Maizner

Date 3/1/05 Citizenship U.S.A.

Residence: 1060 Stonehaven Avenue

Broomfield, Colorado 80020

Post Office Address Same as Residence



UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

AUGUST 03, 2005

PTAS



102958954A

HAROLD A. BURDICK
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, MAIL STOP: ASSIGNMENT SERVICES DIVISION, P.O. BOX 1450, ALEXANDRIA, VA 22313.

RECORDATION DATE: 03/01/2005

REEL/FRAME: 016350/0160

NUMBER OF PAGES: 4

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

MURRAY, BRENT W.

DOC DATE: 03/01/2005

ASSIGNOR:

BERTSCH, PATRICK M.

DOC DATE: 03/01/2005

ASSIGNOR:

MAJZNER, ROBERT A.

DOC DATE: 03/01/2005

ASSIGNEE:

GEUKE, BRADLEY W.
39553 RANGEVIEW DRIVE
AULT, COLORADO 80610

SERIAL NUMBER: 11069378

FILING DATE: 03/01/2005

PATENT NUMBER:

ISSUE DATE:

TITLE: REFRIGERATION UNIT CONDENSATION PREVENTION

016350/0160 PAGE 2

LENELL MACKALL, SUPERVISOR
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

03-15-2005

F



Tab settings → → → ▼

To the Honorable Commissioner of Patents and

102958954

original documents or copy thereof.

1. Name of conveying party(ies):

Brent W. Murray
Patrick M. Bertsch
Robert A. MajznerAdditional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3. Nature of conveyance:

- ☒ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Other _____

Execution Date: March 1, 2005

2. Name and address of receiving party(ies):

Name: Bradley W. Geuke

Internal Address: _____

Street Address: 39553 Rangeview DriveCity: Ault State: CO ZIP: 80610Additional name(s) & address(es) attached? ☐ Yes ☒ No

4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is: March 1, 2005

A. Patent Application No.(s)

B. Patent No.(s)

Additional numbers attached? ☐ Yes ☒ No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Harold A. Burdick

Internal Address: _____

Street Address: 6676 Gunpark Drive
Suite ECity: Boulder State: CO ZIP: 803016. Total number of applications and patents involved: 17. Total fee (37 CFR 3.41):..... \$ 40.00☒ Enclosed☐ Authorized to be charged to deposit account

8. Deposit account number: _____

(Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

9. Statement and signature.

*To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.*Harold A. Burdick

Name of Person Signing

SignatureMarch 1, 2005
Date

Total number of pages comprising cover sheet

1

ASSIGNMENT

WHEREAS, we Brent W. Murray, Patrick M. Bertsch and Robert A. Majzner (hereinafter referred to as "ASSIGNORS"), citizens of the United States of America and State of Colorado, whose post office and residence addresses are shown below next to our signatures, have invented certain new and useful improvements in REFRIGERATION UNIT CONDENSATION PREVENTION for which we are making application for Letters Patent of the United States;

AND WHEREAS, Bradley W. Geuke, (hereinafter referred to as "ASSIGNEE"), a United States citizen having an office and place of business at 39553 Rangeview Drive, Ault, Colorado 80610, is desirous of acquiring the whole right, title, and interest in and to said improvements or invention, and in and to said application, and in and to any and all Letters Patent, both in the United States and all foreign countries, that may be obtained therefor;

NOW THEREFORE, TO ALL WHOM IT MAY CONCERN, BE IT KNOWN, that we, the said ASSIGNORS, for and in consideration of the sum of One Dollar (\$1.00), lawful money of the United States to us in hand paid by said ASSIGNEE and for other good and valuable considerations unto us moving from said ASSIGNEE at or before the ensealing and delivery of these presents, and receipt whereof is hereby acknowledged, have sold, assigned, transferred, and set over, and by these presents do sell, assign, transfer, and set over unto said ASSIGNEE, its successors and assigns, the whole right, title, and interest, in the United States and all foreign countries, in and to the aforesaid improvements or invention as fully set forth and described in the application for Letters Patent of the United States thereof, prepared and executed by us on even date herewith, and in and to said application and in and to any and all Letters Patent, in the United States and all foreign countries, that may be obtained therefore, TO HAVE AND TO HOLD the same to the

full end of the term or terms for which any and all Letters Patent may be granted on said improvements and invention.

AND, we, the said ASSIGNORS, do hereby authorize and request the Commissioner of Patents to issue the said Letters Patent of the United States to said ASSIGNEE as the assignee of the whole right, title, and interest in and to the same, for the sole use and behoof of said ASSIGNEE, its successors and assigns.

AND, we, the said ASSIGNORS, hereby authorize and empower said ASSIGNEE, its successors, assigns, and nominees to invoke and claim for any application for Letters Patent for any improvements or invention filed by said ASSIGNEE, 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 hereafter be substituted for it, and to invoke and claim such right of priority without further written or oral authorization from us.

AND, we, the said ASSIGNORS, hereby consent that a copy of this Assignment shall be deemed a full legal and formal equivalent of any assignment, consent to file, or like document which may be required in any country for any purpose and more particularly is proof of the right of ASSIGNEE or its 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 hereafter be substituted for it.

AND, we, the said ASSIGNORS, for the considerations aforesaid, do hereby covenant and agree to and with the said ASSIGNEE, its successors and assigns, that we, our executors and administrators shall and will do all lawful acts and things, and make, execute, and deliver any and all papers, affidavits, assignments, and other documents, in the United States and all foreign countries, which, in the opinion of counsel for said ASSIGNEE, its successors and assigns, may be required or necessary more effectively to secure to and vest in said ASSIGNEE, its successors, or assigns, the whole right,

title, and interest, in the United States and all foreign countries, in and to said improvements and invention, application, Letters Patent, rights, titles, benefits, privileges, and advantages hereby sold, assigned, transferred, and conveyed or intended so to be.

IN WITNESS WHEREOF, we, the said ASSIGNORS, have hereunto set our hands this 15th day of March, ~~2005~~ 2005

Address: Brant W. Murkay (L.S.)
1311 Ruby Way
Longmont, Colorado 80504

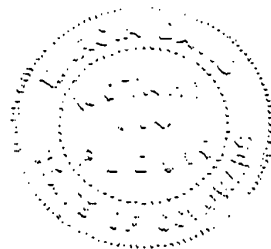
Patrick M. Bertsch (L.S.)
Address: 1982 E.129th Drive
Thornton, Colorado 80241

Robert A. Majzner (L.S.)
Address: 1060 Stonehaven Avenue
Broomfield, Colorado 80020

STATE OF COLORADO)
) SS
COUNTY OF WELD)

BE IT KNOWN, that on this 1st day of March, 2005, before me personally appeared Brent W. Murray, Patrick M. Bertsch and Robert A. Majzner to me known and known to me to be the persons mentioned in and who executed the foregoing instrument, and they acknowledged to me that they executed the same as their free act and deed for the uses and purposes therein mentioned.

Marcia David
Notary Public
My Commission Expires:
Address: 441 3rd Street, Mead, CO 80542



PATENT APPLICATION SERIAL NO. _____

**U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET**

04/23/2007 HDEMESS1 00000063 11788453

01 FC:2011	150.00 OP
02 FC:2111	250.00 OP
03 FC:2311	100.00 OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002- 489-267/69033

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.

PATENT APPLICATION FEE DETERMINATION RECORD					Application or Docket Number 11 788 453	
Substitute for Form PTO-875						
APPLICATION AS FILED – PART I						
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY
FOR	NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)	
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	\$150	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A		N/A	\$250	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	\$100	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	0		x \$25 =		OR x \$50 =
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	0		x \$100 =		x \$200 =
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			\$125		\$250
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				+180 =		+360 =
				TOTAL	500	TOTAL
* If the difference in column 1 is less than zero, enter "0" in column 2.						
APPLICATION AS AMENDED – PART II						
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	Minus	**	=	x \$25 =	OR x \$50 =
	Independent (37 CFR 1.16(h))	Minus	***	=	x \$100 =	OR x \$200 =
	Application Size Fee (37 CFR 1.16(s))			\$125		\$250
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			+180 =		+360 =
				TOTAL		TOTAL
				ADD'L FEE		ADD'L FEE
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	Minus	**	=	x \$25 =	OR x \$50 =
	Independent (37 CFR 1.16(h))	Minus	***	=	x \$100 =	OR x \$200 =
	Application Size Fee (37 CFR 1.16(s))			\$125		\$250
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			+180 =		+360 =
				TOTAL		TOTAL
				ADD'L FEE		ADD'L FEE

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. 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, 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.