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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number: 26753

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☒ The address associated with Customer Number: 26753

OR

☐	Firm or Individual Name		
	Address		
	City	State	Zip
	Country		
	Telephone	Email	

Assignee Name and Address: Prince Castle LLC
355 East Kehoe Blvd
Carol Stream, IL 60188

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	[signature]	Date	6/5/14
Name	Loren Vehrs	Telephone	630-462-4598
Title	VP Innovation		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Duke Manufacturing Co. EX1002
U.S. Patent No. 9,976,750

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	43376911
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Benjamin Ross Imhoff/Jill Jansen
Filer Authorized By:	Benjamin Ross Imhoff
Attorney Docket Number:	29178/50736
Receipt Date:	29-JUL-2021
Filing Date:	20-APR-2016
Time Stamp:	12:53:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	Prince_Castle_POA.pdf	778356 d97859cf899bd0d219d656d29f7a6bd77511c26c	no	2

Warnings:

Information:	
Total Files Size (in bytes):	778356

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	05/22/2018	9976750	29178/50736	1584

4743 7590 05/02/2018

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

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

Kyle Thomas Kestner, Schaumburg, IL;
PRINCE CASTLE LLC, Carol Stream, IL;
Christopher B. Lyons JR., LaGrange, IL;
Charles B. Hartfelder, Hanover Park, IL;
Zachary N. McCoy, South Elgin, IL;

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

4743 7590 04/26/2018

MARSHALL, GERSTEIN & BORUN LLP
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CHICAGO, IL 60606-6357

EXAMINER
PELHAM, JOSEPH MOORE

ART UNIT	PAPER NUMBER
3742	

NOTIFICATION DATE	DELIVERY MODE
04/26/2018	ELECTRONIC

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

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

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

mgbdocket@marshallip.com

Response to Rule 312 Communication	Application No.	Applicant(s)
	15/134,380	KESTNER ET AL.
	Examiner	Art Unit
	JOSEPH M. PELHAM	3742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

1. ☒ The amendment filed on *28 March 2018* under 37 CFR 1.312 has been considered, and has been:

a) ☒ entered.

b) ☐ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

/JOSEPH M PELHAM/
Primary Examiner, Art Unit 3742

Attorney Docket No. 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Kyle Thomas Kestner et al.	Allowed: December 28, 2017
Application No.: 15/134,380	Confirmation No.: 1584
Filed: April 20, 2016	Art Unit: 3742
For: Mutli-Zone Food Holding Bin	Examiner: J. M. Pelham

AMENDMENT AFTER ALLOWANCE UNDER 37 C.F.R. § 1.312

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

Dear Sir:

INTRODUCTORY COMMENTS

Prior to issuance of the patent, applicant respectfully requests entry of this amendment under 37 C.F.R. 1.312 for the above-captioned patent application.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the first food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment, the continuous and planar surface extending completely to the front face of the chassis, the continuous and planar surface ~~being formed of~~ comprising Aluminum;

a first food holding zone formed in the first food holding compartment, the first food holding zone having an independently controllable radiant first heating element disposed at a top portion of the first food holding compartment, and an independently controllable conductive second heating element disposed at a bottom portion of the first food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray;

a second food holding zone formed in the first food holding compartment, the second food holding zone having an independently controllable radiant third heating element disposed at the top portion of the first food holding compartment and an independently controllable conductive fourth heating element disposed at the bottom portion of the first food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray; and

a food holding tray disposed in the first food holding compartment, and in the first food holding bay, the food holding tray resting on the continuous and planar surface,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to maintain a first temperature and the second food holding zone is configured to maintain a second temperature, the first temperature and the second temperature capable of being different than one another, and

wherein the first independently controllable heating element heats the food holding tray radiantly from above and the second independently controllable heating element heats the food holding tray conductively from below.

2. (Original) The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. (Original) The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4.-5. (Canceled).

6. (Original) The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. (Original) The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. (Original) The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. (Canceled).

10. (Previously presented) The food holding bin of claim 1, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. (Original) The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. (Currently amended) A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface ~~formed of~~ comprising Aluminum, the uninterrupted continuous planar bottom surface extending to a front face of a chassis forming the food holding compartment, and a food holding tray disposed in the food holding compartment, the food holding tray resting on the uninterrupted

continuous planar bottom surface, the first food holding zone including a first independently controllable radiant heating element that heats radiantly from above and also includes a second independently controllable conductive heating element that heats conductively from below, and the second food holding zone includes a third independently controllable radiant heating element that heats radiantly from above and also includes a fourth independently controllable conductive heating element that heats conductively from below;

independently setting a first temperature in the first food holding zone by operating the first independently controllable heating element and by operating the second independently controllable heating element;

independently setting a second temperature in the second food holding zone by operating the third independently controllable heating element and by operating the fourth independently controllable heating element,

wherein the first temperature is different from the second temperature.

13. (Canceled).

14. (Currently amended) The method of claim [[13]]12, further comprising providing more heat energy from the first heating element than from the second heating element.

15.-18. (Canceled).

REMARKS

This paper is filed in response to the notice of allowance dated December 28, 2017.

By the foregoing, claims 1, 12, and 14 have been amended to improve their form. No new matter has been added by the foregoing amendments. Thus, the proposed amendments are proper under 37 C.F.R. § 1.312 practice.

Favorable consideration and entry of the accompanying amendments are therefore respectfully requested.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 13-2855, under Order No. 29178/50736.

Should the examiner wish to discuss any matter of form or procedure, the examiner is respectfully invited to telephone the undersigned attorney at the indicated telephone number.

Dated: March 28, 2018

Respectfully submitted,

By /Andrew M. Lawrence/
Andrew M. Lawrence
Registration No.: 46,130
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive
6300 Willis Tower
Chicago, Illinois 60606-6357
(312) 474-6300
Attorney for Applicant

Electronic Patent Application Fee Transmittal

Application Number:	15134380
Filing Date:	20-Apr-2016
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Filer:	Andrew Michael Lawrence/Grace Di Cosola
Attorney Docket Number:	29178/50736

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	32189130
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Andrew Michael Lawrence/Grace Di Cosola
Filer Authorized By:	Andrew Michael Lawrence
Attorney Docket Number:	29178/50736
Receipt Date:	28-MAR-2018
Filing Date:	20-APR-2016
Time Stamp:	19:52:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	032918INTEFSW19531200
Deposit Account	132855
Authorized User	Grace DiCosola

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal.PDF	33330 0848c561c28f86d48fdcaea5450af11b3903e702	no	1
Warnings:					
Information:					
2	Amendment after Notice of Allowance (Rule 312)	Amendment_After_Allowance_Under_37CFR1.PDF	31849 b1bf5aa6d567bce262ee2eecf42a439779565025	no	6
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30628 a934170bb3a340728c951489e19915b6decf4972	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	95807		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B–FEE(S) TRANSMITTAL

Complete and send this form, together with the applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22314-1450
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)

04743
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive
6300 Willis Tower
Chicago, Illinois 60606-6357

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, EFS-Web transmitted, or facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Andrew M. Lawrence	(Depositor's Name)
/Andrew M. Lawrence/	(S-signature)
March 28, 2018	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

TITLE OF INVENTION: Mutli-Zone Food Holding Bin

APPLN: TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960.00			$960.00	03/28/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
J. M. Pelham	3742	219-398000

1. Change of correspondence address or indication of "Fee Address" (37CFR 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 attorney or agent. If no name is listed, no name will be printed

1. MARSHALL, GERSTEIN & BORUN LLP
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.

1a. NAME OF ASSIGNEE: PRINCE CASTLE LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Carol Stream, Illinois

Please check the appropriate assignee 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 Fees(s): **(Please first reapply and previously paid fee shown above)**

☐ A check is enclosed

☒ Payment be credit card.

☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 13-2855.

5. Change of Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature	/Andrew M. Lawrence/	Date	March 28, 2018
Typed or printed name	Andrew M. Lawrence	Registration No.	46,130

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United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

4743 7590 12/28/2017

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

EXAMINER	
PELHAM, JOSEPH MOORE	
ART UNIT	PAPER NUMBER
3742	

DATE MAILED: 12/28/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

TITLE OF INVENTION: Multi-Zone Food Holding Bin

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

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)

4743 7590 12/28/2017
MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

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.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

TITLE OF INVENTION: Multi-Zone Food Holding Bin

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
PELHAM, JOSEPH MOORE	3742	219-398000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

4743 7590 12/28/2017

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EXAMINER	
PELHAM, JOSEPH MOORE	
ART UNIT	**PAPER NUMBER**
3742	

DATE MAILED: 12/28/2017

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

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/134,380	Applicant(s) KESTNER ET AL.	
	Examiner JOSEPH M. PELHAM	Art Unit 3742	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amdmt filed 11/16/17*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-3,6-8,10-12 and 14*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☒ Other *PTOL-2323*.

/JOSEPH M PELHAM/
Primary Examiner, Art Unit 3742

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Michael A. Chinlund, Esq., on 12/7/17.

The application has been amended as follows:

In claim 1, line 9, "a thermally conductive material" has been deleted and replaced by ---Aluminum---.

In claim 12, line 6, following "surface", there has been inserted ---formed of Aluminum---.

Claims 17 and 18 have been cancelled.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSEPH M. PELHAM whose telephone number is (571)272-4786. The examiner can normally be reached on M-F 8:30 AM to 5:00 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an

interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Angwin can be reached on 571-270-3735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOSEPH M PELHAM/
Primary Examiner, Art Unit 3742
12/7/17

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	52	(312/236 219/214,385,386,398,394,428).ccls. and ((tray bay stage staging service bin holding) with (food meal)) and ((tray pan vessel dish chafer chafing) same (aluminum Al)) and ((heater heating warmer warming) near5 (individual individually independent independently))	US-PGPUB; USPAT; USOCR	OR	ON	2017/12/07 16:06
L3	124	(A47J36/$ A47J39/$ F24C15/$).cpc. and ((tray bay stage staging service bin holding) with (food meal)) and ((tray pan vessel dish chafer chafing) same (aluminum Al)) and ((heater heating warmer warming) near5 (individual individually independent independently))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2017/12/07 17:19
L4	80	3 not 1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2017/12/07 17:19
L6	175	(A47J36/$ A47J39/$ F24C15/$).cpc. and ((tray bay stage staging service bin holding) with (food meal)) and ((bottom floor surface plate panel) same (aluminum Al)) and ((heater heating warmer warming) near5 (individual individually independent independently))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2017/12/07 17:24
L7	69	6 not (1 3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2017/12/07 17:24
L8	156	(A47J36/$ A47J39/$ F24C15/$).cpc. and ((tray bay stage staging service bin holding) with (food meal)) and ((bottom floor surface plate panel) same (aluminum Al)) and ((heater heating warmer warming) near5 (individual individually independent independently)) and ((tray pan vessel dish chafer chafing) same food)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2017/12/07 17:26
L9	52	8 not (1 3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2017/12/07 17:26

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L5	0	(((tray bay stage staging service bin holding) with (food meal)) and ((tray pan vessel dish chafer chafing) same (aluminum Al)) and ((heater heating warmer warming) near5 (individual individually independent independently))).clm.	US-PGPUB	OR	ON	2017/12/07 17:22
L10	0	(((tray bay stage staging service bin holding) with (food meal)) and ((bottom floor surface plate panel) same (aluminum Al)) and ((heater heating warmer warming) near5 (individual individually independent independently)) and ((tray pan vessel dish chafer chafing) same food)).clm.	US-PGPUB	OR	ON	2017/12/07 17:30

12/ 7/ 2017 5:31:28 PM
C:\ Users\ jpelham\ Documents\ EAST\ Workspaces\ 15.133220.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	Art Unit
	JOSEPH M PELHAM	3742

CPC- SEARCHED		
Symbol	Date	Examiner
See attached search history	9/30/16	JP
See attached search update history	11/7/17	JP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
See attached search history	9/30/16	JP
See attached search update history	11/7/17	JP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
See attached interference search history		11/7/17	JP

Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 Confirmation No.: 1584

Filed: April 20, 2016 Art Unit: 3742

For: Mutli-Zone Food Holding Bin Examiner: J. M. Pelham

AMENDMENT AFTER FINAL ACTION AND REQUEST FOR RECONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT (AFCP)

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

Dear Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated August 18, 2017, please amend the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 7 of this paper.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	**Art Unit**
	JOSEPH M PELHAM	3742

CPC						
Symbol					**Type**	**Version**
F24C		7	/	043	F	2013-01-01
H05B		3	/	0076	I	2013-01-01
F24C		15	/	34	I	2013-01-01
A47J		36	/	2483	I	2013-01-01
A47J		36	/	2488	I	2013-01-01
F24C		15	/	18	A	2013-01-01
A47J		39	/	006	I	2013-01-01
			/			
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	10	
/JOSEPH M PELHAM/ Primary Examiner.Art Unit 3742	12/07/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2, 5, 6

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	**Art Unit**
	JOSEPH M PELHAM	3742

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION														
CLASS	SUBCLASS	CLAIMED						NON-CLAIMED								
219	214	A	4	7	J	36 / 24 (2006.0)										
CROSS REFERENCE(S)		A	4	7	J	39 / 02 (2006.0)										
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)															
219	385	386	394	398	428											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	10	
/JOSEPH M PELHAM/ Primary Examiner.Art Unit 3742	12/07/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2, 5, 6

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	**Art Unit**
	JOSEPH M PELHAM	3742

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	10	
/JOSEPH M PELHAM/ Primary Examiner.Art Unit 3742	12/07/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2, 5, 6

AFCP 2.0 Decision	Application No.	Applicant(s)
	15/134,380	KESTNER ET AL.
	Examiner	Art Unit
	JOSEPH M. PELHAM	3742

This is in response to the After Final Consideration Pilot request filed 16 November 2017.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☐ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ A proper AFCP 2.0 request was submitted in response to the most recent final rejection.

   ☐ Other:

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☐ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☒ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action. See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☐ 5. Other:

   Examiner Note: Please attach an interview summary when necessary as described above.

Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
29178/50736	15/134,380-Conf. #1584	April 20, 2016

First Named Inventor:	Title:
Kyle Thomas Kestner	Mutli-Zone Food Holding Bin

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).

2. The above-identified application contains an outstanding final rejection.

3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.

4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.

5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.

6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).

7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]

8. By filing this certification and request, applicant acknowledges the following:

- Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
- The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
  - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
  - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
    - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
    - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	/Michael A. Chinlund/	Date	November 16, 2017
Name (Print/Typed)	Michael A. Chinlund	Practitioner Registration No.	55,064

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☐ * Total of 1 forms are submitted.

Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 Confirmation No.: 1584

Filed: April 20, 2016 Art Unit: 3742

For: Mutli-Zone Food Holding Bin Examiner: J. M. Pelham

AMENDMENT AFTER FINAL ACTION AND REQUEST FOR RECONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT (AFCP)

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

Dear Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated August 18, 2017, please amend the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the first food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment, the continuous and planar surface extending completely to the front face of the chassis, the continuous and planar surface being formed of a thermally conductive material;

a first food holding zone formed in the first food holding compartment, the first food holding zone having an independently controllable radiant first heating element disposed at a top portion of the first food holding compartment, and an independently controllable conductive second heating element disposed at a bottom portion of the first food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray;

a second food holding zone formed in the first food holding compartment, the second food holding zone having an independently controllable radiant third heating element disposed at the top portion of the first food holding compartment and an independently controllable conductive fourth heating element disposed at the bottom portion of the first food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray; and

a food holding tray disposed in the first food holding compartment, and in the first food holding bay, the food holding tray resting on the continuous and planar surface,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to maintain a first temperature and the second food holding zone is configured to maintain a second temperature, the first temperature and the second temperature capable of being different than one another, and

wherein the first independently controllable heating element heats the food holding tray radiantly from above and the second independently controllable heating element heats the food holding tray conductively from below.

2. (Original) The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. (Original) The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4. (Canceled).

5. (Canceled).

6. (Original) The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. (Original) The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. (Original) The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. (Canceled).

10. (Previously presented) The food holding bin of claim 1, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. (Original) The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. (Currently Amended) A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface, the uninterrupted continuous planar bottom surface extending to a front face of a chassis forming the food holding compartment, and a food holding tray disposed in the food holding compartment, the food holding tray resting on the uninterrupted continuous planar bottom surface, the first food holding zone including a first independently controllable radiant heating element that heats radiantly from above and also includes a second independently controllable conductive heating element that heats conductively from below, and the second food holding zone includes a third independently controllable radiant heating element that heats radiantly from above and also includes a fourth independently controllable conductive heating element that heats conductively from below;

independently setting a first temperature in the first food holding zone by operating the first independently controllable heating element and by operating the second independently controllable heating element;

independently setting a second temperature in the second food holding zone by operating the third independently controllable heating element and by operating the fourth independently controllable heating element,

wherein the first temperature is different from the second temperature.

13. (Canceled).

14. (Original) The method of claim 13, further comprising providing more heat energy from the first heating element than from the second heating element.

15. (Canceled).

16. (Canceled).

17. (New) The food holding bin of claim 1, wherein the continuous and planar bottom surface is formed from a metal.

18. (New) The food holding bin of claim 17, wherein the continuous and planar bottom surface is formed from aluminum.

REMARKS

This paper is presented in response to the final official action dated August 18, 2017, wherein (a) claims 1-8 and 10-16 were pending; (b) claims 1-7 and 10-16 were rejected under 35 U.S.C. §103 as assertedly being obvious over U.S. Patent No. 8,522,675 to Veltrop ("Veltrop") in view of U.S. Patent No. 7,385,160 to Jones ("Jones") and U.S. Patent No. 7,905,173 to Sus ("Sus"); and (c) claim 8 was rejected under 35 U.S.C. §103 as assertedly being obvious over Veltrop and Sus and in further view of U.S. Patent No. 7,105,779 to Shei ("Shei").

The applicant respectfully requests reconsideration and withdrawal of the rejections in view of the foregoing amendments and the following remarks.

Claims 1 and 12 are amended, claims 17 and 18 are new, and claims 4, 5, 13, 15, and 16 are cancelled. Support for the amendments to claims 1 and 12, and for new claims 17 and 18, may be found in the specification and claims as originally filed. More specifically, support may be found at least in original claims 4, 5, 13, 15, and 16, and in paragraphs [0018] and [0031]. No new matter is added. As a result, claims 1-3, 6-8, 10-12, 14, 17, and 18 are pending and at issue.

The applicant respectfully requests that the amendments after final rejection be entered because they could not have been made earlier as the final rejection includes new grounds for rejection and because entry of the amendments after final will reduce the number of issues on appeal.

The applicant respectfully requests reconsideration under the After Final Consideration Pilot (AFCP) program, as the amended claims can be determined to place the application in condition for allowance with only a limited amount of further search or consideration. A request for consideration under the AFCP is submitted herewith. In accordance with the requirements of the AFCP, amendments to independent claims 1 and

12 are included herewith and the amendments to independent claims 1 and 12 do not broaden the scope of independent claims 1 or 12 in any aspect.

This paper is timely filed.

The rejections are addressed below in the order in which they appear in the final official action.

35 U.S.C. §103 Rejections

Generally, the applicant respectfully traverses the rejections of claims 1-8 and 10-16 as being obvious over Veltrop in view of one or more of Jones, Sus, and Shei because Veltrop fails to disclose or all limitations and one having ordinary skill in the art would not modify Veltrop to include the missing limitations.

In summary, Veltrop fails to disclose or suggest a food holding compartment having a continuous and planar thermally conductive bottom surface, a first food holding zone having an independently controllable radiant first heating element disposed at a top portion of a food holding compartment, and an independently controllable conductive second heating element disposed at a bottom portion of the food holding compartment, the first independently controllable heating element heating a food holding tray radiantly from above and the second independently controllable heating element heating the food holding tray conductively from below, as claimed, and Veltrop teaches away from having a conductive heating element below a food holding tray.

In this respect, the applicant respectfully submits that Veltrop fails to disclose radiantly heating a food holding tray from above and conductively heating the food holding tray from below. Rather, Veltrop discloses a food tray that is elevated above a surface (i.e., a shelf) and is heated radiantly from both above and below.

More specifically, Veltrop discloses a heating cabinet 10 that includes an upper compartment 45 and a lower compartment 50 for storing food trays 44, as illustrated in FIGS. 1 and 3, which are reproduced below.

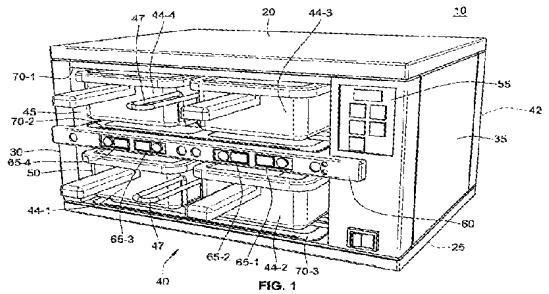


FIG. 1

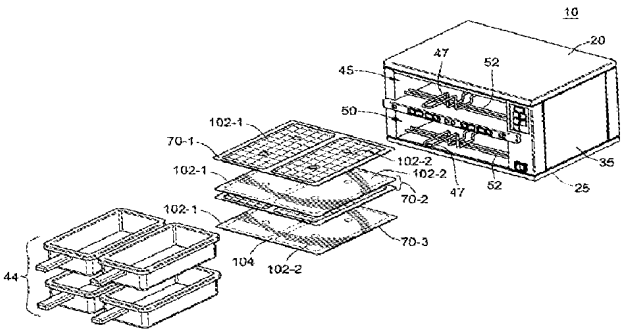


FIG. 3

The compartments 45, 50, use infrared heat to heat food in the trays 44 from both above and below. See e.g., col. 3, lines 48-52. Veltrop teaches using only infrared heating. Because infrared heating elements 85 are disposed in the shelf 70, the trays 44 are elevated above (i.e., spaced apart from) the shelves by heavy gauge wires or metal rods 47 that include horizontal bars 52. See e.g., col. 4, lines 4-14. The horizontal bars 52 "keep the trays 44 supported above and out of direct contact with the middle shelf assembly 70-2." Id., emphasis added. As a result, Veltrop fails to disclose or suggest a first food holding zone having an independently controllable radiant first heating element disposed at a top portion of a food holding compartment, and an independently controllable conductive second heating element disposed at a bottom portion of the food holding compartment.

One having ordinary skill in the art would not be motivated to modify Veltrop to include radiantly heating a food holding tray from above and conductively heating a food holding tray from below because Veltrop teaches away from using conductive heating and thus also teaches away from a continuous and planar surface being formed of a thermally conductive material as claimed. Veltrop teaches the use of glass shelves because metal

shelves eventually reach an equilibrium temperature, which prevents foods in adjacent compartments from maintaining different temperatures. See e.g., col. 1, lines 26-39 and col. 9, lines 16-19. As a result, Veltrop expressly teaches that thermally conductive shelves are unsuitable in the device disclosed therein.

Because Veltrop teaches away from conductively heating a food holding tray from below and thus teaches away from a continuous and planar surface being formed of a thermally conductive material as claimed, one having ordinary skill in the art would not be motivated to modify Veltrop to reach the claimed subject matter. Therefore, none of claims 1-8 and 10-16 can be rendered obvious over Veltrop in view of any other reference. For this reason, the applicant respectfully requests withdrawal of the rejections of claims 1-8 and 10-16.

CONCLUSION

The applicant respectfully submits that the application is in condition for allowance. Should the examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, the examiner is respectfully invited to contact the undersigned attorney at the indicated telephone number.

Dated: November 16, 2017

Respectfully submitted,

By__/Michael A. Chinlund/_____
Michael A. Chinlund
Registration No.: 55,064
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive
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Attorney for Applicant

Electronic Acknowledgement Receipt

EFS ID:	30978167
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Michael Alexander Chinlund/Tammi Bowden
Filer Authorized By:	Michael Alexander Chinlund
Attorney Docket Number:	29178/50736
Receipt Date:	16-NOV-2017
Filing Date:	20-APR-2016
Time Stamp:	22:52:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	After Final Consideration Program Request	Certification_and_Request_for_Consideration_Under_the_AFCP_29178_50736.PDF	35069 b282512c98f1b46b637c6f73ba30ed41d356a099	no	1

Warnings:

Information:					
2		Amendment_After_Final_Action_Under_37CFR1.PDF	130370 38d61532b55de94b8c864d1996ecfa242efa979c	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	10

Warnings:	
Information:	
Total Files Size (in bytes):	165439

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

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

4743 7590 08/18/2017

MARSHALL, GERSTEIN & BORUN LLP
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6300 WILLIS TOWER
CHICAGO, IL 60606-6357

EXAMINER
PELHAM, JOSEPH MOORE

ART UNIT	PAPER NUMBER
3742	

NOTIFICATION DATE	DELIVERY MODE
08/18/2017	ELECTRONIC

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

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

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

mgbdocket@marshallip.com

Office Action Summary	Application No. 15/134,380	Applicant(s) KESTNER ET AL.	
	Examiner JOSEPH M. PELHAM	Art Unit 3742	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/20/17*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-8 and 10-16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-8 and 10-16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *4/20/16* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The amendment filed 7/20/17 is acknowledged. Claims 1-8 and 10-16 remain pending.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

In view of the inadvertent omission of mention of the limitation specifying that the food holding trays are "resting on the continuous and planar surface" forming the bottom of the food holding compartment, in the previous Office action (4/20/17, p. 2), the previous final action is hereby withdrawn and replaced by the final action which follows. The examiner sincerely regret any inconvenience.

Claim Rejections - 35 USC § 103

Claims 1-7 and 10-16 are rejected under 35 U.S.C. 103 as being unpatentable over US Pat. 8522675 in view of US Pats. 7385160 and 7905173.

Referring to Figures 1, 2, 4A & 6 especially, *2:38 – 3:33* ("column:line"), *4:52-67, & 6:10-39*, '675 discloses the multi-zone food holding bin and method, including a food holding compartment 45 with an uncovered "first opening," a "continuous and planar surface [102-1, 102-2] forming a bottom of the food holding compartment," a "first food holding zone [102-1] formed in the food holding compartment... having an independently controllable *first heating element* [70-1] at a top portion of the… compartment " (see 12:64 – 13:13) and "an independently controllable *second heating element* [70-2]… at a bottom portion of the… compartment," a "second food holding zone [102-2] formed in the food holding compartment... having an independently controllable *third heating element* [70-1] at a top portion of the… compartment " and "an independently controllable *fourth heating element* [70-2]… at the bottom portion of the… compartment," ***wherein***, the heating elements utilize "an electrically resistive heating wire" 85 (4:59-61), the first and second zones are adjacent one another "across the continuous planar surface," the first and second zones maintaining different set point temperatures, a food holding tray 44 in the food holding compartment, and "***the continuous planar surface extends completely to the front face of the chassis***" (Exr's emphasis), as newly recited in claims 1, 11, 12 and 13.

As recited in claim 2, '675 discloses a "second food holding compartment [50] below the first… compartment" [45], a "shelf [70-2] located between the first and second holding compartments… the second and fourth heating elements being disposed in the shelf [70-2] and in thermal communication with" the top side of the shelf, the second and fourth heating elements being independently controllable, and a controller [125-2] independently controlling the second and fourth heating elements (see 8:45-61).

As recited in claim 3, '675 discloses the first and second food compartments to be open at the rear face of the bin (see 2:38-43).

As recited in claims 4, 5, 15, and 16, '675 discloses the first (top) heating element to be a radiant heating element, and the second (bottom) heating element to be a conductive heating element (4:59 – 5:6).

Claim 1 differs from '675 only in calling for the first and second zones to each comprise first and second food holding bays, each bay receiving a food holding tray, and the food holding trays "resting on the continuous and planar surface" forming the bottom of the food holding compartment.

'160 discloses, at Fig. 1B and 7:42 - 8:37, a single food heating zone comprising first and second food holding bays, each bay receiving a food holding tray 14.

It would have been obvious to enlarge the individual heating zones of '675 to accommodate two food holding trays, since the presence of the twin bays of '160 tacitly recognizes the fact that food service establishments often need more than one tray of a particular food item. Hence if demand for a food item held a given temperature is high, a restaurant need not incur the expense of holding bins with more individually heated food holding bays than required by customer preferences.

'173 discloses, at Fig. 1 and 5:64 – 6:14, food holding trays 30a-f resting on the continuous and planar surface 33a-c forming the bottom of an equivalent food holding compartment. *Noting that the glass ceramic surface 100 on which the trays of '675 would be placed are the same material of which a ceramic stove cooktop surface is made, allowing adjacent cooking zones to be set and stably maintained at different temperatures*, it would have been obvious to allow trays to rest on the continuous,

planar heated surface since ‘173 confirms that this, in combination with trays of good thermal conductivity, “allow[s] for a quick transfer of heat to the food product being stored” (6:1-2), this arrangement being “particularly suitable for storing breaded or otherwise fried foods” (5:7-12).

Claims 7 and 10 differ substantively from ‘675 only in calling for a tray lid inserted in a shelf in a top portion of the food holding compartment.

‘160 discloses, at Fig. 1A and 11-12, a tray lid 16, used in an analogous food staging chamber with upper and lower heaters 38, 39, inserted in a shelf 46R in a top portion of a food holding compartment. Note that 46R is effectively a shelf, on which rear tray lip 66 rests (see 11:45 – 12:4). It would have been obvious to adapt the tray lids of ‘160 to the trays of ‘675 to preserve moisture in food items in which minimal moisture loss is preferred, such as meat portions for fast food sandwiches.

Regarding claims 6 and 14, while ‘160 is silent about the first (or upper) heating element generating more power than the second (or lower), this does not patentably distinguish the claims from the prior art. It would have been obvious to use a higher power rating, or setting, for the upper heater depending strictly and routinely on the type of food in the tray, e.g., for such menu items as heating from above through a tray lid is desired.

Claim 8 is rejected under 35 U.S.C. 103 as being unpatentable over ‘675 in view of ‘160 and ‘173, as applied to claims 1-7 and 10-16 above, and further in view of US Pat. 7105779.

The claim differs from ‘675 in view of ‘160 and ‘173 only in calling for a latch rotatable with respect to the shelf between a locked and unlocked position.

‘779 discloses, at Fig. 1 and 5:8-25, a latch 85 rotatable with respect to an equivalent shelf in a food staging chamber, between a locked and unlocked position. It would have been obvious to adapt the latch of ‘779 to the food staging device of ‘675 in

view of '160, to secure the tray lids in the compartment while withdrawing the trays, in a manner requiring less complex structural support.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but their either moot because they do not apply to the references being used in the current rejection, or not persuasive.

Applicant argues preemptively against a modification of '675 (Veltrop) that would rest the food holding trays directly "on the continuous and planar surface" forming the bottom of the food holding compartment, on the assumption that the surface would be a metal of high thermal conductivity, and therefore would not allow different temperature settings to be maintained in adjacent heating zones. However, as explained above, the glass ceramic surface 100 of '675 is exactly the same material of which ceramic stove cooktop surfaces are made, allowing adjacent cooking 'zones' to be set and stably maintained at different temperatures.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, *THIS ACTION IS MADE FINAL*. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSEPH M. PELHAM whose telephone number is (571)272-4786. The examiner can normally be reached on M-F 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Angwin can be reached on 571-270-3735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOSEPH M PELHAM/
Primary Examiner, Art Unit 3742
8/11/17

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	Art Unit
	JOSEPH M PELHAM	3742

✓	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	10/01/2016	04/14/2017	08/11/2017						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	-	-						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	✓	✓						
	15	✓	✓	✓						
	16	✓	✓	✓						

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/134,380	Filing Date 04/20/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	07/24/2017	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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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.

Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 | Confirmation No.: 1584

Filed: April 20, 2016 | Art Unit: 3742

For: Mutli-Zone Food Holding Bin | Examiner: J. M. Pelham

RESPONSE TO FINAL ACTION UNDER 37 C.F.R. § 1.116

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

Dear Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated April 20, 2017, please consider the remarks set forth below:

A current listing of the Claims begins on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Previously presented) A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment, the continuous and planar surface extending completely to the front face of the chassis;

a first food holding zone formed in the food holding compartment, the first food holding zone having an independently controllable first heating element disposed at a top portion of the food holding compartment, and an independently controllable second heating element disposed at a bottom portion of the food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray;

a second food holding zone formed in the food holding compartment, the second food holding zone having an independently controllable third heating element disposed at the top portion of the food holding compartment and an independently controllable fourth heating element disposed at the bottom portion of the food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray; and

a food holding tray disposed in the first food holding compartment, and in the first food holding bay, the food holding tray resting on the continuous and planar surface,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to maintain a first temperature and the second food holding zone is configured to

maintain a second temperature, the first temperature and the second temperature capable of being different than one another.

2. (Original) The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. (Original) The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4. (Original) The food holding bin of claim 1, wherein the first heating element is a radiant heating element.

5. (Original) The food holding bin of claim 1, wherein the second heating element is a conductive heating element.

6. (Original) The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. (Original) The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. (Original) The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. (Canceled).

10. (Previously presented) The food holding bin of claim 1, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. (Original) The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. (Previously presented) A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface, the uninterrupted continuous planar bottom surface extending to a front face of a chassis forming the food holding compartment, and a food holding tray disposed in the food holding compartment, the food holding tray resting on the uninterrupted continuous planar bottom surface;

independently setting a first temperature in the first food holding zone;

independently setting a second temperature in the second food holding zone,

wherein the first temperature is different from the second temperature.

13. (Original) The method of claim 12, wherein the first food holding zone includes an independently controlled first heating element located in a top portion of the food holding compartment and an independently controlled second heating element located in a bottom portion of the food holding compartment.

14. (Original) The method of claim 13, further comprising providing more heat energy from the first heating element than from the second heating element.

15. (Original) The method of claim 13, further comprising providing radiant heat from the first heating element.

16. (Original) The method of claim 13, further comprising providing conduction heat from the second heating element.

REMARKS

This paper is presented in response to the final official action dated April 20, 2017, wherein (a) claims 1-8 and 10-16 were pending; (b) claims 1-7 and 10-16 were rejected under 35 U.S.C. §103 as assertedly being obvious over U.S. Patent No. 8,522,675 to Veltrop ("Veltrop") in view of U.S. Patent No. 7,385,160 to Jones ("Jones"); and (c) claim 8 was rejected under 35 U.S.C. §103 as assertedly being obvious over Veltrop and Jones and in further view of U.S. Patent No. 7,105,779 to Shei ("Shei").

The applicant respectfully requests reconsideration and withdrawal of the rejections of claims 1-8 and 10-16 in view of the following remarks.

This paper is timely filed.

The rejections are addressed below in the order in which they appear in the final official action.

35 U.S.C. §103 Rejections

Generally, the applicant respectfully traverses the rejections of claims 1-8 and 10-16 as being obvious over Veltrop in view of one or more of Jones and Shei because Veltrop fails to disclose a food holding tray disposed in a first food holding compartment, the food holding tray resting on a continuous and planar surface, and because one having ordinary skill in the art would not be motivated to modify Veltrop to include such an element.

Initially, the applicant respectfully submits that the final action fails to address the missing limitation in any way, let alone allege that Veltrop discloses a food holding tray resting on a continuous and planar surface. Regardless, the applicant respectfully submits that Veltrop fails to disclose a food holding tray disposed in a first food holding compartment, the food holding tray resting on a continuous and planar surface. Rather, Veltrop discloses a food tray that is elevated above a surface (i.e., a shelf).

More specifically, Veltrop discloses a heating cabinet 10 that includes an upper compartment 45 and a lower compartment 50 for storing food trays 44, as illustrated in FIGS. 1 and 3, which are reproduced below.

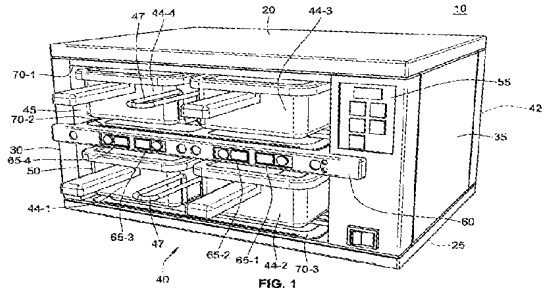


FIG. 1

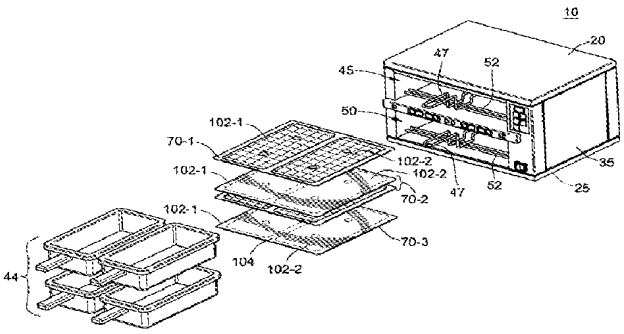


FIG. 3

The compartments 45, 50, use infrared heat to heat food in the trays 44. See e.g., col. 3, lines 48-52. Because infrared heating elements 85 are disposed in the shelf 70, the trays 44 are elevated above (i.e., spaced apart from) the shelves by heavy gauge wires or metal rods 47 that include horizontal bars 52. See e.g., col. 4, lines 4-14. The horizontal bars 52 "keep the trays 44 supported above and out of direct contact with the middle shelf assembly 70-2." Id., emphasis added. As a result, Veltrop fails to disclose a food holding tray disposed in a first food holding compartment, the food holding tray resting on a continuous and planar surface.

One having ordinary skill in the art would not be motivated to modify Veltrop to include a tray resting on a continuous and planar surface because doing so would impermissibly destroy a principal of operation of the Veltrop device. More specifically, modifying Veltrop to allow the food tray to rest on the shelf would significantly impair the transmission of infrared energy to the food trays.

As discussed above, Veltrop teaches that the food trays 44 are elevated above the heating surfaces by the horizontal bars 52. Veltrop teaches using heating elements covered

by a glass shelf to produce infrared heating. Veltrop teaches that it is advantageous to use the glass shelves because metal shelves eventually reach an equilibrium temperature, which prevents foods in adjacent compartments from maintaining different temperatures. See e.g., col. 1, lines 26-39 and col. 9, lines 16-19. The food trays 44 are elevated because glass is a poor conductor of heat and thus the infrared energy must be allowed to diffuse from the heating elements in the space between the shelf 70 and the bottom of the food tray 44 to uniformly heat the bottom of the food tray 44. See e.g., col. 2, lines 19-23. If the food trays 44 were placed in direct contact with the shelf (and thus the heating element), the heating elements would only transmit heat in the immediate vicinity of the heating elements themselves, due to the poor thermal conductivity of glass. In other words, placing the food trays 44 directly on the shelves would cause the food trays 44 to be heated unevenly in the shape of the racetrack heating elements, which are illustrated in FIG. 4B.

Veltrop relies on the spacing between the heating elements 85 and the food trays 44 to allow the radiant infrared energy to disperse evenly across the bottom of the food trays 44, and thus to evenly heat the food items within the tray. Any modification to Veltrop that would allow the food trays 44 to be placed directly on the shelves would substantially impair the ability of the heating elements to evenly heat the food trays 44. Thus, one having ordinary skill in the art would not be motivated to modify Veltrop to include a food holding tray resting on a continuous and planar surface of a shelf. Therefore, none of claims 1-8 and 10-16 can be rendered obvious in any part over Veltrop. For this reason, the applicant respectfully requests withdrawal of the rejection of claims 1-8 and 10-16.

CONCLUSION

The applicant respectfully submits that the application is in condition for allowance. Should the examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, the examiner is respectfully invited to contact the undersigned attorney at the indicated telephone number.

Dated: July 20, 2017

Respectfully submitted,

By__/Michael A. Chinlund/_____
Michael A. Chinlund
Registration No.: 55,064
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive
6300 Willis Tower
Chicago, Illinois 60606-6357
(312) 474-6300
Attorney for Applicant

Electronic Acknowledgement Receipt

EFS ID:	29844477
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Michael Alexander Chinlund/Diane Arpino
Filer Authorized By:	Michael Alexander Chinlund
Attorney Docket Number:	29178/50736
Receipt Date:	20-JUL-2017
Filing Date:	20-APR-2016
Time Stamp:	15:38:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Amendment_After_Final_Action_Under_37CFR1.PDF	127038 25227e9ff35d749b1c7dddb59b0a3241f9a2b4f9	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	10
Warnings:			
Information:			
	Total Files Size (in bytes):	127038	

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

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/134,380	Filing Date 04/20/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 07/20/2017

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 13	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

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

LIE
/POLIN ANG/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

4743 7590 04/20/2017

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EXAMINER
PELHAM, JOSEPH MOORE

ART UNIT	PAPER NUMBER
3742	

NOTIFICATION DATE	DELIVERY MODE
04/20/2017	ELECTRONIC

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

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

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

mgbdocket@marshallip.com

Office Action Summary	Application No. 15/134,380	Applicant(s) KESTNER ET AL.	
	Examiner JOSEPH M. PELHAM	Art Unit 3742	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/6/17*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-8 and 10-16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-8 and 10-16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *4/20/16* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The amendment filed 1/6/17 is acknowledged. Claims 1-8 and 10-16 are now pending.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 103

Claims 1-7 and 10-16 are rejected under 35 U.S.C. 103 as being unpatentable over US Pat. 8522675 in view of US Pat 7385160.

Referring to Figures 1, 2, 4A & 6 especially, *2:38 – 3:33* ("column:line"), *4:52-67, & 6:10-39*, '675 discloses the multi-zone food holding bin and method, including a food holding compartment 45 with an uncovered "first opening," a "continuous and planar surface [102-1, 102-2] forming a bottom of the food holding compartment," a "first food holding zone [102-1] formed in the food holding compartment... having an independently controllable *first heating element* [70-1] at a top portion of the… compartment " (see 12:64 – 13:13) and "an independently controllable *second heating element* [70-2]… at a bottom portion of the… compartment," a "second food holding zone [102-2] formed in the food holding compartment... having an independently controllable *third heating element* [70-1] at a top portion of the… compartment " and "an independently controllable *fourth heating element* [70-2]… at the bottom portion of the… compartment," ***wherein***, the heating elements utilize "an electrically resistive heating wire" 85 (4:59-61), the first and second zones are adjacent one another "across the continuous planar surface," the first and second zones maintaining different set point temperatures, a food holding tray 44 in the food holding compartment, and "***the continuous planar surface extends completely to the front face of the chassis***" (Exr's emphasis), as newly recited in claims 1, 11, 12 and 13.

As recited in claim 2, '675 discloses a "second food holding compartment [50] below the first… compartment" [45], a "shelf [70-2] located between the first and second holding compartments… the second and fourth heating elements being disposed in the shelf [70-2] and in thermal communication with" the top side of the shelf, the second and

fourth heating elements being independently controllable, and a controller [125-2] independently controlling the second and fourth heating elements (see 8:45-61).

As recited in claim 3, ‘675 discloses the first and second food compartments to be open at the rear face of the bin (see 2:38-43).

As recited in claims 4, 5, 15, and 16, ‘675 discloses the first (top) heating element to be a radiant heating element, and the second (bottom) heating element to be a conductive heating element (4:59 – 5:6).

Claim 1 differs from ‘675 only in calling for the first and second zones to each comprise first and second food holding bays, each bay receiving a food holding tray.

‘160 discloses, at Fig. 1B and 7:42 - 8:37, a single food heating zone comprising first and second food holding bays, each bay receiving a food holding tray 14.

It would have been obvious to enlarge the individual heating zones of '675 to accommodate two food holding trays, since the presence of the twin bays of '160 tacitly recognizes the fact that food service establishments often need more than one tray of a particular food item. Hence if demand for a food item held a given temperature is high, a restaurant need not incur the expense of holding bins with more individually heated food holding bays than required by customer preferences.

Claims 7 and 10 differ substantively from ‘675 only in calling for a tray lid inserted in a shelf in a top portion of the food holding compartment.

‘160 discloses, at Fig. 1A and 11-12, a tray lid 16, used in an analogous food staging chamber with upper and lower heaters 38, 39, inserted in a shelf 46R in a top portion of a food holding compartment. Note that 46R is effectively a shelf, on which rear tray lip 66 rests (see 11:45 – 12:4). It would have been obvious to adapt the tray lids of ‘160 to the trays of ‘675 to preserve moisture in food items in which minimal moisture loss is preferred, such as meat portions for fast food sandwiches.

Regarding claims 6 and 14, while ‘160 is silent about the first (or upper) heating element generating more power than the second (or lower), this does not patentably distinguish the claims from the prior art. It would have been obvious to use a higher power rating, or setting, for the upper heater depending strictly and routinely on the type

of food in the tray, e.g., for such menu items as heating from above through a tray lid is desired.

Claim 8 is rejected under 35 U.S.C. 103 as being unpatentable over '675 in view of '160, as applied to claims 1-7 and 10-16 above, and further in view of US Pat. 7105779.

The claim differs from '675 in view of '160 only in calling for a latch rotatable with respect to the shelf between a locked and unlocked position.

'779 discloses, at Fig. 1 and 5:8-25, a latch 85 rotatable with respect to an equivalent shelf in a food staging chamber, between a locked and unlocked position. It would have been obvious to adapt the latch of '779 to the food staging device of '675 in view of '160, to secure the tray lids in the compartment while withdrawing the trays, in a manner requiring less complex structural support.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot because the arguments do not apply to the references being used in the current rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, *THIS ACTION IS MADE FINAL*. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSEPH M. PELHAM whose telephone number is (571)272-4786. The examiner can normally be reached on M-F 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Angwin can be reached on 571-270-3735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOSEPH M PELHAM/
Primary Examiner, Art Unit 3742
4/14/17

PTO/SB/08a (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 10

Complete if Known	
Application Number	15/134,380-Conf. #1584
Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2,386,919	10-16-1945	Tobey	
		US-2,900,806	08-25-1959	Wurtz et al.	
		US-2,934,913	05-03-1960	Haines et al.	
		US-3,042,384	07-03-1962	Bauman	
		US-3,275,393	09-27-1966	Stentz et al.	
		US-3,301,618	01-31-1967	Feldser et al.	
		US-3,308,633	03-14-1967	Kritzer, Jr.	
		US-3,414,709	12-03-1968	Tricault	
		US-3,696,720	10-10-1972	Vinson	
		US-3,950,632	04-13-1976	Rivelli	
		US-3,979,056	09-07-1976	Barnes	
		US-4,036,995	07-19-1977	Koether et al.	
		US-4,077,690	03-07-1978	Koether	
		US-4,278,872	07-14-1981	Koether et al.	
		US-4,306,616	12-22-1981	Woods, Jr. et al.	
		US-4,355,521	10-26-1982	Tsai	
		US-4,388,689	06-14-1983	Hayman et al.	
		US-4,530,067	07-16-1985	Dorr	
		US-4,569,421	02-11-1986	Sandstedt	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		JP-10079088	03-24-1998	Toshiba Eng. Co. Ltd.		
		JP-11342061	12-14-1999	Shinwa Denshi Device Hanbai KK and NT Corporation:KK		
		JP-8000414	01-09-1996	Yamatake Honeywell Co. Ltd.		
		WO-01/31533-A1	05-03-2001	Salerno, Mark		
		WO-2005/034633-A1	04-21-2005	Duke Mfg Co		

Examiner Signature	/JOSEPH M PELHAM/	Date Considered	04/14/2017

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		US-4,610,238	09-09-1986	Veth	
		US-4,633,230	12-30-1986	Tam	
		US-4,644,931	02-24-1987	Veth	
		US-4,688,475	08-25-1987	Witt et al.	
		US-4,740,888	04-26-1988	Ceste, Sr. et al.	
		US-4,742,455	05-03-1988	Schreyer	
		US-4,782,445	11-01-1988	Pasquini	
		US-4,812,625	03-14-1989	Ceste, Sr.	
		US-4,812,963	03-14-1989	Albrecht et al.	
		US-4,864,498	09-05-1989	Pasquini et al.	
		US-4,911,068	03-27-1990	Koether et al.	
		US-4,922,435	05-01-1990	Cahlander et al.	
		US-5,003,472	03-26-1991	Perrill et al.	
		US-5,069,273	12-03-1991	O'Hearne	
		US-5,093,556	03-03-1992	Oelfke	
		US-5,128,862	07-07-1992	Mueller	
		US-5,132,914	07-21-1992	Cahlander et al.	
		US-5,172,328	12-15-1992	Cahlander et al.	
		US-5,188,020	02-23-1993	Buchnag	

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		US-5,216,918	06-08-1993	Landis et al.	
		US-5,218,527	06-08-1993	Ishikawa et al.	
		US-5,247,807	09-28-1993	Jarman et al.	
		US-5,253,564	10-19-1993	Rosenbrock et al.	
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		US-5,594,222	01-14-1997	Caldwell	
		US-5,616,269	04-01-1997	Fowler et al.	
		US-5,653,906	08-05-1997	Fowler et al.	
		US-5,724,886	03-10-1998	Ewald et al.	
		US-5,772,072	06-30-1998	Prescott et al.	
		US-5,812,393	09-22-1998	Drucker	
		US-5,900,173	05-04-1999	Robards, Jr.	

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		US-5,921,096	07-13-1999	Warren	
		US-5,931,083	08-03-1999	Stanger et al.	
		US-5,939,974	08-17-1999	Heagle et al.	
		US-5,944,324	08-31-1999	Schultheis et al.	
		US-5,947,012	09-07-1999	Ewald et al.	
		US-6,000,622	12-14-1999	Tonner et al.	
		US-6,006,996	12-28-1999	Bhatnagar	
		US-6,011,243	01-04-2000	Arnold et al.	
		US-6,026,372	02-15-2000	Savage	
		US-6,031,208	02-29-2000	Witt et al.	
		US-6,052,667	04-18-2000	Walker et al.	
		US-6,088,681	07-11-2000	Coleman et al.	
		US-6,114,659	09-05-2000	Finck et al.	
		US-6,116,154	09-12-2000	Vaseloff	
		US-6,119,587	09-19-2000	Ewald et al.	
		US-6,153,244	11-28-2000	Stanger et al.	
		US-6,158,885	12-12-2000	Landis	
		US-6,175,099	01-16-2001	Shei et al.	
		US-6,200,944	03-13-2001	Dovey et al.	

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Examiner Signature	/JOSEPH M PELHAM/	Date Considered	04/14/2017

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Examiner Name	J. M. Pelham
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		US-6,209,447	04-03-2001	Ewald et al.	
		US-6,257,010	07-10-2001	Shei et al.	
		US-6,261,621	07-17-2001	Stanger et al.	
		US-6,262,394	07-17-2001	Shei et al.	
		US-6,412,403	07-02-2002	Veltrop	
		US-6,434,961	08-20-2002	Richmond et al.	
		US-6,502,411	01-07-2003	Okamoto	
		US-6,541,739	04-01-2003	Shei et al.	
		US-6,637,322	10-28-2003	Veltrop	
		US-6,658,994-B1	12-09-2003	McMillan	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature	/JOSEPH M PELHAM/	Date Considered	04/14/2017

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 6 of 10

Complete if Known	
Application Number	15/134,380-Conf. #1584
Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

U. S. PATENT DOCUMENTS

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Sheet 7 of 10

Complete if Known	
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First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

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Examiner Signature	/JOSEPH M PELHAM/	Date Considered	04/14/2017

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Sheet	8	of	10

Complete if Known	
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Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet	9	of	10	Attorney Docket Number	29178/50736

Complete if Known	
Application Number	15/134,380-Conf. #1584
Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
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Examiner Signature	/JOSEPH M PELHAM/	Date Considered	04/14/2017

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		Thermodyne Food Products, Inc., Counter Top Holding Oven Model 300 NDNL specification (applicant admitted prior art).	
		Veltrop et al., U.S. Design Patent Application No. 29/450,074, "Food Warmer", filed March 15, 2013.	
		Veltrop et al., U.S. Design Patent Application No. 29/494,683, "Food Warmer", filed June 23, 2014.	

Examiner Signature	/JOSEPH M PELHAM/	Date Considered	04/14/2017

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M.P/

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	Art Unit
	JOSEPH M PELHAM	3742

✓	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	10/01/2016	04/14/2017							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	-							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							

Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 Confirmation No.: 1584

Filed: April 20, 2016 Art Unit: 3742

For: Mutli-Zone Food Holding Bin Examiner: J. M. Pelham

AMENDMENT IN RESPONSE TO NON-FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.111

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

Dear Sir:

INTRODUCTORY COMMENTS

In response to the Office Action dated October 6, 2016, please amend the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment, the continuous and planar surface extending completely to the front face of the chassis;

a first food holding zone formed in the food holding compartment, the first food holding zone having an independently controllable first heating element disposed at a top portion of the food holding compartment, and an independently controllable second heating element disposed at a bottom portion of the food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray; [[and]]

a second food holding zone formed in the food holding compartment, the second food holding zone having an independently controllable third heating element disposed at the top portion of the food holding compartment and an independently controllable fourth heating element disposed at the bottom portion of the food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray; and

a food holding tray disposed in the first food holding compartment, and in the first food holding bay, the food holding tray resting on the continuous and planar surface,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to maintain a first temperature and the second food holding zone is configured to maintain a second temperature, the first temperature and the second temperature capable of being different than one another.

2. (Original) The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. (Original) The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4. (Original) The food holding bin of claim 1, wherein the first heating element is a radiant heating element.

5. (Original) The food holding bin of claim 1, wherein the second heating element is a conductive heating element.

6. (Original) The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. (Original) The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. (Original) The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the

locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. (Canceled).

10. (Currently Amended) The food holding bin of claim [[9]] 1, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. (Original) The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. (Currently Amended) A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface, the uninterrupted continuous planar bottom surface extending to a front face of a chassis forming the food holding compartment, and a food holding tray disposed in the food holding compartment, the food holding tray resting on the uninterrupted continuous planar bottom surface;

independently setting a first temperature in the first food holding zone;

independently setting a second temperature in the second food holding zone, wherein the first temperature is different from the second temperature.

13. (Original) The method of claim 12, wherein the first food holding zone includes an independently controlled first heating element located in a top portion of the food holding compartment and an independently controlled second heating element located in a bottom portion of the food holding compartment.

14. (Original) The method of claim 13, further comprising providing more heat energy from the first heating element than from the second heating element.

15. (Original) The method of claim 13, further comprising providing radiant heat from the first heating element.

16. (Original) The method of claim 13, further comprising providing conduction heat from the second heating element.

REMARKS

This paper is presented in response to the non-final official action dated October 6, 2016, wherein (a) claims 1-16 were pending; (b) claims 1-7 and 9-16 were rejected under 35 U.S.C. §103 as assertedly being obvious over U.S. Patent No. 7,905,173 to Sus et al. ("Sus") in view of U.S. Patent No. 7,385,160 to Jones ("Jones"); and (c) claim 8 was rejected under 35 U.S.C. §103 as assertedly being obvious over Sus and Jones in further view of U.S. Patent No. 7,105,779 to Shei ("Shei").

The applicant respectfully requests reconsideration and withdrawal of the rejections of claims 1-16 in view of the foregoing amendments and the following remarks.

Claims 1, 10, and 12 are amended and claim 9 is cancelled. Support for the amendments to claims 1, 10, and 12 may be found in the specification and claims as originally filed. For example, support may be found at least in original claim 9, in paragraphs [0014] and [0026], and in FIGS. 1 and 2. No new matter is added. As a result, claims 1-8 and 10-16 remain pending and at issue.

This paper is timely filed.

The claim rejections are addressed below in the order in which they appear in the office action.

35 U.S.C. §103 Rejections

Independent claims 1 and 12

The applicant respectfully traverses the rejections of claims 1-16 under §35 U.S.C. 103(a) as allegedly being obvious over Sus in view of one or more of Jones and Shei because Sus fails to disclose or suggest all claim limitations and because one having ordinary skill in the art would not be motivated to modify Sus to include the missing limitations. More

specifically, Sus fails to disclose or suggest a continuous and planar bottom surface that extends completely to a front face of a chassis, and modifying Sus to include such a continuous and planar surface would destroy a principle of operation of the Sus device.

The claimed multi-zone food holding bin (and method) recites, *inter alia*, a chassis having a front face and a continuous and planar surface forming a bottom of a food holding compartment, the continuous and planar surface extending completely to the front face of the chassis. In one embodiment, the multi-zone food holding bin 10 includes a first food holding compartment 50 that includes a continuous and planar bottom surface 53 that extends completely to a front face 40 of a chassis 15 that forms the first food holding compartment 50, as illustrated in FIG. 1, which is reproduced below.

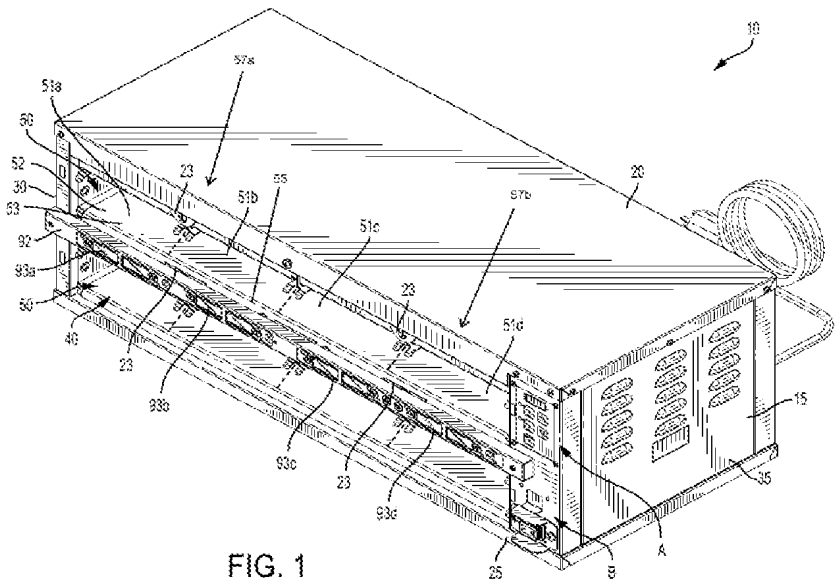


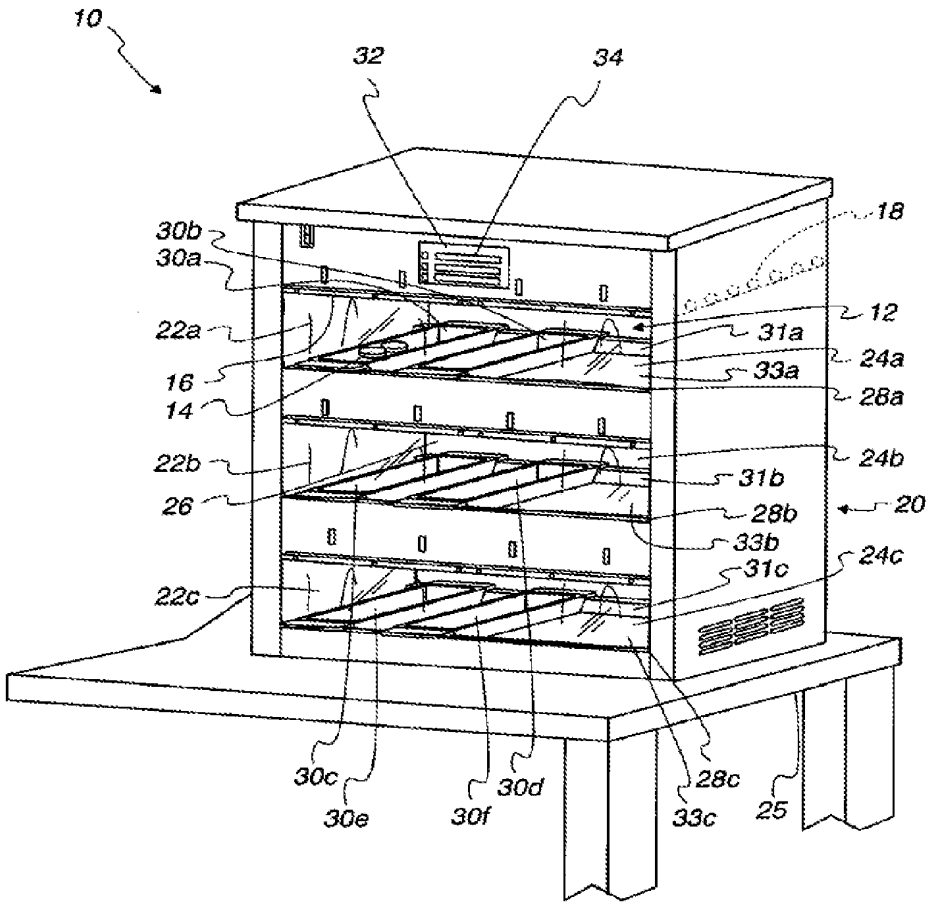
FIG. 1

The continuous and planar surface allows an operator to slide a food holding tray into the food holding compartment 50 and to remove the food holding tray from the food holding compartment 50 without the need to raise or lower the food holding tray, which is particularly useful in quick service restaurant environments. Additionally, the continuous and planar

surface allows easy cleaning of the multiple food holding zones 57a, 57b, and multiple food holding bays 51a-d.

Sus fails to disclose or suggest a continuous and planar surface that extends completely to the front face of the chassis. Rather, Sus teaches a reach-through food staging device 10 that includes a compartment 12 for holding a tray 30, as illustrated in FIG. 1, which is reproduced below.

Fig. 1



The compartment 12 includes a raised curb 31a-c attached to the lower surface 33a-c. *See* e.g., col. 6, lines 12-14. The purpose of the raised curb 31a-c is to restrain movement of the tray 30 when food is removed by reaching in from above the tray 30. *See* e.g., col. 2, lines 7-10. The lower surfaces 33a-c are recessed below a top edge of the raised curbs 31a-c (which forms an opening in the front face of the food staging device 10). Thus, Sus fails to disclose or suggest a continuous and planar surface that extends completely to the front face of a chassis, as recited in the pending claims.

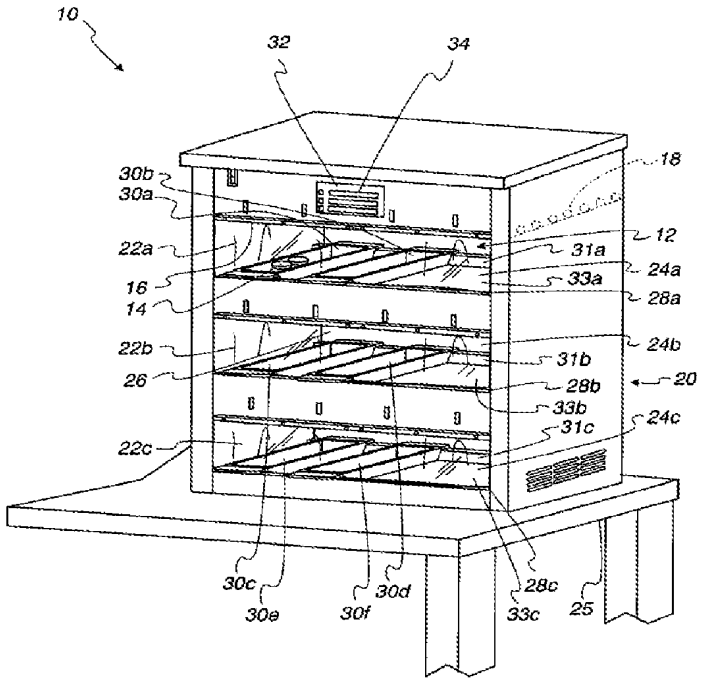
Moreover, one having ordinary skill in the art would not be motivated to extend the lower surfaces completely to a front face of the food staging device 10 because doing so would destroy a principle of operation of the Sus device. As discussed above, one principle of operation of the Sus device is to restrain movement of the trays 30 when food is removed. The trays 30 are restrained by the raised curbs 31a-c. Extending the lower surfaces 33a-c completely to the front face of the food staging device 10 would eliminate the raised curbs 31a-c, thereby preventing the Sus device from restraining the trays 30 in the compartment 12 when food is removed from the trays 30. As a result, one having ordinary skill in the art would not be motivated to modify Sus to extend the lower surfaces 33a-c completely to the front face of the food staging device 10 because doing so would destroy a principle of operation of the Sus device. For this reason, none of the pending claims can be rendered obvious over Sus in combination with Jones and/or Shei.

Additionally, the applicant respectfully submits that one having ordinary skill in the art would not be motivated to look to Jones to modify the Sus device (as alleged in the office action) because Jones and Sus are directed to different types of food holding devices and both Jones and Sus operate under completely different principles. For example, as described in further detail below, the Sus device is directed to a reach-through food holding device that is

structured and arranged to intentionally promote moisture removal from food contained in a food holding chamber and the Jones device is directed to a pan slide food holding device that expressly retains moisture in a food holding tray to keep the food contained therein moist.

More specifically, Sus discloses a reach-through food staging device 10 that includes a compartment 12 for holding a tray 30, as illustrated in FIG. 1, which is reproduced again below for convenience.

Fig. 1



As illustrated in Fig. 1, above, the trays 30 sit down in the compartment 12 so that most, if not all, of the tray 30 is located below a raised curb 31. An operator "reaches" into the compartment 12 to remove a food item without removing the tray. Additionally, a curtain-type flexible member 24 retains heat in the compartment 12 while airflow is allowed

through a gap 28 to remove moisture and prevent food from becoming soggy. *See* e.g., Sus, col. 5, line 30 to col. 6 line 14.

Jones teaches a pan slide food holding cabinet 12, a food holding tray 14, and a tray cover 16, as illustrated in FIG. 1, which is reproduced below.

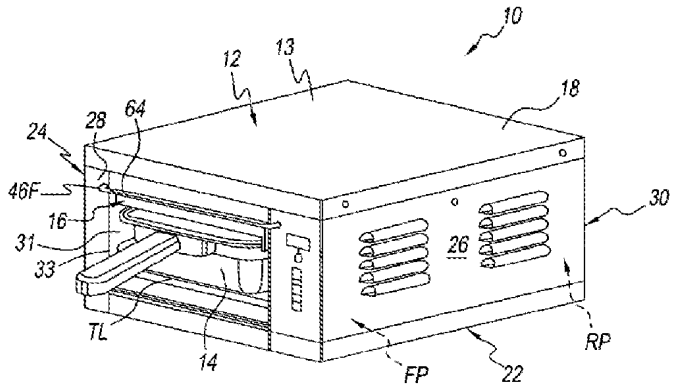


Fig. 1

An operator slides the tray 14 into the cabinet 12 and removes the entire tray 14 from the cabinet 12 when food items in the tray 14 are needed. Additionally, when the tray 14 slides into the cabinet 12 the cover 16 lowers onto the tray 12 to retain heat and moisture within the foods contained in the tray. *See* e.g., col. 10, lines 39-51. More specifically, Jones teaches that the covers retain heat and moisture to "maintain the food quality over the food holding period." *See* e.g., col. 2, lines 8-11.

One having ordinary skill in the art would not look to Jones to modify Sus because Jones and Sus operate are directed to different types of food holding devices (Jones is a pan-slide device and Sus is a reach-through device) and the Jones device and the Sus device operate on completely different principles (Jones expressly discloses retaining moisture in the heated foods while Sus expressly discloses removing moisture from the foods contained in its

compartments). For this reason, one having ordinary skill in the art would not combine the teachings of Jones and Sus in any way.

Dependent claim 10

The applicant respectfully traverses the rejection of claim 10 for the additional reason that Sus fails to disclose or suggest all claim limitations and one having ordinary skill in the art would not modify Sus to include the missing limitation because doing so would render the Sus device unable to accomplish its primary purpose. More specifically, Sus fails to disclose or suggest a lid on a food holding tray in a food holding compartment and modifying Sus to include a lid on a food holding tray would cause moisture to be retained within the food holding tray, thus preventing the primary purpose of the Sus device, which is to circulate air around bread-type food items to remove moisture and to keep the bread-type food items from becoming soggy. For this additional reason, the applicant respectfully requests withdrawal of the rejection of claim 10.

U.S. Patent 8,422,675

The applicant has reviewed U.S. Patent No. 8,422,657, as suggested in the office action, and the applicant respectfully submits that the amended claims distinguish over U.S. Patent No. 8,422,675.

CONCLUSION

The applicant respectfully submits that the application is in condition for allowance. Should the examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, the examiner is respectfully invited to contact the undersigned attorney at the indicated telephone number.

Dated: January 6, 2017

Respectfully submitted,

By_/Michael A. Chinlund/_____
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Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 Confirmation No.: 1584

Filed: April 20, 2016 Art Unit: 3742

For: Mutli-Zone Food Holding Bin Examiner: J. M. Pelham

INFORMATION DISCLOSURE STATEMENT (IDS)

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

Dear Sir:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the United States Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of the above-identified application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed after the mailing date of a first Office Action on the merits, but before the mailing date of any of a Final Action under 37 C.F.R.§ 1.113, a Notice of Allowance under 37 C.F.R. § 1.311 or an action that otherwise closes prosecution in this application (37 C.F.R. § 1.97(c)).

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), copies of U.S. patents and U.S. patent application publications are not submitted. Submitted herewith are copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed as a representation that a search has been made.

In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an admission that the information cited in this Information Disclosure Statement is, or is considered to be, material to the patentability as defined in 37 C.F.R. § 1.56(b).

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98, and the Examiner is respectfully requested to consider the listed references.

Please charge our Credit Card in the amount of $180.00 covering the fee set forth in 37 C.F.R. § 1.17(p). The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 13-2855, under Order No. 29178/50736.

Dated: January 6, 2017

Respectfully submitted,

Electronic signature: /Michael A. Chinlund/
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 10

Complete if Known	
Application Number	15/134,380-Conf. #1584
Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2,386,919	10-16-1945	Tobey	
		US-2,900,806	08-25-1959	Wurtz et al.	
		US-2,934,913	05-03-1960	Haines et al.	
		US-3,042,384	07-03-1962	Bauman	
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		US-4,355,521	10-26-1982	Tsai	
		US-4,388,689	06-14-1983	Hayman et al.	
		US-4,530,067	07-16-1985	Dorr	
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		JP-10079088	03-24-1998	Toshiba Eng. Co. Ltd.		
		JP-11342061	12-14-1999	Shinwa Denshi Device Hanbai KK and NT Corporation:KK		
		JP-8000414	01-09-1996	Yamatake Honeywell Co. Ltd.		
		WO-01/31533-A1	05-03-2001	Salerno, Mark		
		WO-2005/034633-A1	04-21-2005	Duke Mfg Co		

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Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

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		US-4,610,238	09-09-1986	Veth	
		US-4,633,230	12-30-1986	Tam	
		US-4,644,931	02-24-1987	Veth	
		US-4,688,475	08-25-1987	Witt et al.	
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		US-5,132,914	07-21-1992	Cahlander et al.	
		US-5,172,328	12-15-1992	Cahlander et al.	
		US-5,188,020	02-23-1993	Buchnag	

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First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

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		US-5,216,918	06-08-1993	Landis et al.	
		US-5,218,527	06-08-1993	Ishikawa et al.	
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		US-5,812,393	09-22-1998	Drucker	
		US-5,900,173	05-04-1999	Robards, Jr.	

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Application Number	15/134,380-Conf. #1584
Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

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		US-5,921,096	07-13-1999	Warren	
		US-5,931,083	08-03-1999	Stanger et al.	
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Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

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		US-6,209,447	04-03-2001	Ewald et al.	
		US-6,257,010	07-10-2001	Shei et al.	
		US-6,261,621	07-17-2001	Stanger et al.	
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		US-7,235,762	06-26-2007	Gagas et al.	
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Sheet 6 of 10

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First Named Inventor	Kyle Thomas Kestner
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Attorney Docket Number	29178/50736

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		US-7,258,064	08-21-2007	Vaseloff et al.	
		US-7,279,659	10-09-2007	Gagas et al.	
		US-7,376,485	05-20-2008	Salerno	
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Examiner Signature		Date Considered	

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Sheet 7 of 10

Complete if Known	
Application Number	15/134,380-Conf. #1584
Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

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Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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Sheet	8	of	10

Complete if Known	
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Examiner Name	J. M. Pelham
Attorney Docket Number	29178/50736

U. S. PATENT DOCUMENTS

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Sheet	9	of	10	Attorney Docket Number	29178/50736

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Filing Date	April 20, 2016
First Named Inventor	Kyle Thomas Kestner
Art Unit	3742
Examiner Name	J. M. Pelham

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	15/134,380-Conf. #1584
				Filing Date	April 20, 2016
				First Named Inventor	Kyle Thomas Kestner
(Use as many sheets as necessary)				Art Unit	3742
				Examiner Name	J. M. Pelham
Sheet	10	of	10	Attorney Docket Number	29178/50736

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
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Patent Record Full View Tuesday, October 11 2016 THOMSON INNOVATION

Patent/Publication: JP10079088A

Bibliography

DWPI Title

Food-drink freshness management system for POS system in restaurant includes judging unit which judges freshness of food-drink placed on dish, based on time data calculated by calculator

Original Title

FOOD SALES MANAGING SYSTEM

Assignee/Applicant

Standardized: **TOSHIBA ENGINEERING CO**

Original: TOSHIBA ENG CO LTD

Inventor

KANEKO TAKESHI, NOZAKI KAZUNORI, TAKAHARA YOSHIO,

Publication Date (Kind Code)

1998-03-24 (A)

Application Number / Date

JP1996231881A / 1996-09-02

Priority Number / Date / Country

JP1996231881A / 1996-09-02 / JP

Abstract

Abstract

PROBLEM TO BE SOLVED: To surely manage the freshness of food.

SOLUTION: A data carrier 40 capable of recording/reading information on a supplying time is fixed to a plate 9. A questioning device 70 is provided at one position on a carrying round path. At the time of carrying round a plate 9 mounting Sushi on the carrying round path, the plate 9 is supplied onto the carrying round part 7 after writing information on a supplying time to the data carrier by means of an ID register 60. Then whenever the plate 9 makes around on the path 7, the device 70 obtains supplying time information from the data carrier 40. A sorting controller 73 calculates the staying time of food from the supplying time information and judges its freshness. A plate 9 judged to mount the food of deteriorated freshness as the result of this judgement is selected from the carrying round path by a sorting device 80.

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Classes/Indexing

IPC

IPC Code(1-7) **G07G 1/12** G06F 17/60

(6)

Current IPC	Invention	Version	Additional	Version
Full	G07G 1/12 G06Q 10/00 G06Q 10/06 G06Q 30/06 G06Q 50/00 G06Q 50/12	20060101 20120101 20120101 20120101 20120101 20120101	-	-
Main Group	-	-	-	-
Subclass	-	-	-	-

Original IPC	Invention	Version	Additional	Version
Advanced/Full	G07G 1/12	20060101	-	-
Core/Main Group	G07G 1/12	20060101	-	-
Subclass	-	-	-	-

Legal Status

INPADOC Legal Status

Gazette Date	Code	Description
2007-02-07	A02 -	DECISION OF REFUSAL JAPANESE INTERMEDIATE CODE: A02 2007-02-06
2006-09-02	A521	WRITTEN AMENDMENT JAPANESE INTERMEDIATE CODE: A523 2006-09-01
2006-07-05	A131 -	NOTIFICATION OF REASONS FOR REFUSAL JAPANESE INTERMEDIATE CODE: A131 2006-07-04
2006-01-31	A521	WRITTEN AMENDMENT JAPANESE INTERMEDIATE CODE: A523 2006-01-30
2005-11-30	A131 -	NOTIFICATION OF REASONS FOR REFUSAL JAPANESE INTERMEDIATE CODE: A131 2005-11-29
2005-11-17	A977	REPORT ON RETRIEVAL JAPANESE INTERMEDIATE CODE: A971007 2005-11-17

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Expand INPADOC Family (1)

Expand DWPI Family (1); Countries (1)

Claims

No Claims exist for this Record

Description

Description

Expand Description

Citations

Citation *Record level*

Expand Citing Patents (18)

Cited Patents (0)

Cited Non-patents (0)

DPCI Citation *Patent family level*

Expand DPCI Citing Patents (15)

DPCI Cited Patents (0)

DPCI Cited Non-patents (0)

Expand DPCI Citation Counts

DPCI Field of Search

-

DPCI Citing Patents Country

JP; US

DPCI Cited Patents Country

-

Other

No Other exists for this Record

Custom Fields

Expired / Abandoned

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Ｇ０６Ｆ　17/60			Ｇ０６Ｆ　15/21	３３０	

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(22)出願日　平成８年(1996)９月２日

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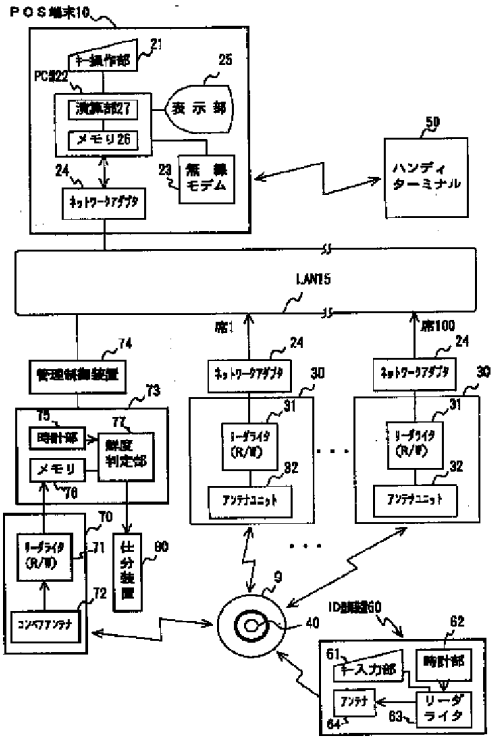
(74)代理人　弁理士　須山　佐一

(54)【発明の名称】　飲食物販売管理システム

(57)【要約】

【課題】　飲食物の鮮度管理を確実に行う。

【解決手段】　皿９に投入時刻の情報を記録／読出可能なデータキャリア４０を取り付ける。巡回搬送路７上の１つの位置に質問器７０を設ける。寿司を載せた皿９を巡回搬送路７上に巡回させるときに、ＩＤ登録装置６０でデータキャリア４０に投入時刻の情報を書き込んでから巡回搬送路７上に投入する。そして巡回搬送路７上を皿９が１周する毎に質問器７０がデータキャリア４０から投入時刻情報を取得する。仕分制御装置７３はその投入時刻情報から飲食物の滞留時間を計算し鮮度を判定する。この判定結果、鮮度の低下したと判定された皿９を仕分装置８０が巡回搬送路７から選別する。



【特許請求の範囲】
【請求項１】　飲食物をそれぞれの価格毎に色または柄で識別可能な皿に載せて所定巡回搬送路を巡回させて顧客に前記飲食物を販売する飲食物販売管理システムにおいて、
前記皿に取り付けられ、前記皿の種別情報と前記皿に載せた飲食物の情報と時刻情報を記憶／読出し可能なデータキャリアと、
飲食物を載せた皿を前記巡回搬送路に投入する際に、前記データキャリアに対して皿の種別情報と皿に載せた飲食物の情報と皿を投入した時刻の情報とを登録するＩＤ登録手段と、
前記巡回搬送路の所定位置またはその近傍の所定位置に配置され、前記巡回搬送路上を巡回中に前記皿のデータキャリアから皿種別情報、飲食物情報および皿投入時刻情報を読出す質問器と、
前記質問器により読み出された皿投入時刻情報とデータ読み出し時刻とから、前記巡回搬送路上における皿の滞留時間を計算する滞留時間計算手段と、
前記滞留時間計算手段により計算された滞留時間を基に前記皿に載せられている飲食物の鮮度を判定する鮮度判定手段とを具備したことを特徴とする飲食物販売管理システム。
【請求項２】　請求項１記載の飲食物販売管理システムにおいて、
前記鮮度判定手段は、
前記滞留時間計算手段により計算された滞留時間と予め飲食物毎に設定された規定時間とを基に、前記飲食物毎に鮮度を判定することを特徴とする飲食物販売管理システム。
【請求項３】　請求項１、２記載の飲食物販売管理システムにおいて、
前記鮮度判定手段による鮮度判定結果、前記滞留時間が規定時間を越えていた皿を前記巡回搬送路上から選別する皿仕分手段をさらに具備したことを特徴とする飲食物販売管理システム。
【請求項４】　飲食物をそれぞれの価格毎に色または柄で識別可能な皿に載せて所定巡回搬送路を巡回させて顧客に前記飲食物を販売する飲食物販売管理システムにおいて、
前記皿に取り付けられ、前記皿の種別情報と前記皿に載せた飲食物の情報と時刻情報を記憶／読出し可能なデータキャリアと、
飲食物を載せた皿を前記巡回搬送路に投入する際に、前記データキャリアに対して皿の種別情報と皿に載せた飲食物の情報と皿を投入した時刻の情報とを登録するＩＤ登録手段と、
前記巡回搬送路の所定位置またはその近傍の所定位置に配置され、前記巡回搬送路上を巡回中に前記皿のデータキャリアから皿種別情報、飲食物情報および皿投入時刻情報を読出す質問器と、
前記質問器により読み出された皿投入時刻情報とデータ読み出し時刻とから、前記巡回搬送路上における皿の滞留時間を計算する滞留時間計算手段と、
この滞留時間計算手段により算出された滞留時間と前記質問器により得られた飲食物情報を基に、飲食物の販売状況を分析する分析手段とを具備したことを特徴とする飲食物販売管理システム。
【請求項５】　請求項４記載の飲食物販売管理システムにおいて、
前記分析手段は、
前記飲食物情報と滞留時間とから前記飲食物の売れ筋、死に筋を分析することを特徴とする飲食物販売管理システム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、例えば回転式の飲食台を設置した飲食店などで利用される飲食物販売管理システムに関する。
【０００２】
【従来の技術】近年、回転式の飲食台を設置した飲食店、例えば回転寿司などと称する寿司店は、大勢の家族でも気軽に入れ、しかも値段が安いことから急激に普及しており、店舗の大規模化が進む中で飲食物の鮮度を管理することが急務になっている。
【０００３】一般に、回転寿司店などに設置されている回転式の飲食台は、異なる種類の寿司をその値段に応じて色や柄で分けた皿（ネタ皿）に載せて巡回搬送路上を巡回搬送し、飲食台の周囲に設置した客席に着席した顧客が所望のネタ皿を手元に取ってそのネタ皿の寿司を食べ、残った皿を飲食台の上に積み重ねておくよう構成されている。
【０００４】ところで、寿司というものは生物であるため、巡回搬送路上をあまり長い時間巡回させると、品質が劣化することがある。
【０００５】そこで、従来は、従業員、つまり板前が、巡回搬送路上を巡回中のネタ皿に載せられた寿司のネタ部分の艶や色具合を見て鮮度を判断し、品質が変わりつつある寿司を巡回搬送路上から皿毎排除していた。
【０００６】しかしながら、この判断基準は、あくまでも板前の経験と勘に頼るところが多く、特に寿司を巡回し始めてからの時間などを正確に管理していたわけではない。　また巡回搬送路上を巡回中の寿司の中で、どの寿司が顧客に好まれ、どの寿司が鮮度が落ちて排除したかを把握することが難しかった。
【０００７】
【発明が解決しようとする課題】このように上述した従来の飲食物の販売形態では、巡回搬送路上を巡回中の皿に載せられた飲食物の鮮度は、従業員が目で判断していたため管理が不確実であるという問題があった。

【０００８】また従来の飲食物の販売形態では、巡回搬送路上を巡回中の飲食物の販売状況を把握することができないという問題があった。

【０００９】本発明はこのような課題を解決するためになされたもので、飲食物の鮮度管理を確実に行うことのできる飲食物販売管理システムを提供することを目的としている。

【００１０】また本発明はこのような課題を解決するためになされたもので、飲食物の販売状況を確実に把握することのできる飲食物販売管理システムを提供することを目的としている。

【００１１】

【課題を解決するための手段】上記した目的を達成するために、請求項１記載の発明の飲食物販売管理システムは、飲食物をそれぞれの価格毎に色または柄で識別可能な皿に載せて所定巡回搬送路を巡回させて顧客に前記飲食物を販売する飲食物販売管理システムにおいて、前記皿に取り付けられ、前記皿の種別情報と前記皿に載せた飲食物の情報と時刻情報を記憶／読出し可能なデータキャリアと、飲食物を載せた皿を前記巡回搬送路に投入する際に、前記データキャリアに対して皿の種別情報と皿に載せた飲食物の情報と皿を投入した時刻の情報とを登録するＩＤ登録手段と、前記巡回搬送路の所定位置またはその近傍の所定位置に配置され、前記巡回搬送路上を巡回中に前記皿のデータキャリアから皿種別情報、飲食物情報および皿投入時刻情報を読出す質問器と、前記質問器により読み出された皿投入時刻情報とデータ読み出し時刻とから、前記巡回搬送路上における皿の滞留時間を計算する滞留時間計算手段と、前記滞留時間計算手段により計算された滞留時間を基に前記皿に載せられている飲食物の鮮度を判定する鮮度判定手段とを具備したことを特徴としている。

【００１２】この請求項１記載の発明では、飲食物を載せた皿を前記巡回搬送路に投入する際に、ＩＤ登録手段によって皿の種別情報と皿に載せた飲食物の情報と皿を投入した時刻の情報とを皿に取り付けたデータキャリアに登録する。そして、皿が巡回搬送路上を巡回中する毎に質問器でデータキャリアから情報を読み取り、皿投入時刻情報とデータ読み出した時刻とから巡回搬送路上における皿の滞留時間を計算し、その計算結果を基に皿に載せられている飲食物の鮮度を判定するので、巡回搬送路上を巡回中の飲食物の鮮度を、従業員の目に頼ることなく確実に管理することができる。

【００１３】請求項２記載の発明の飲食物販売管理システムは、請求項１記載の飲食物販売管理システムにおいて、前記鮮度判定手段は、前記滞留時間計算手段により計算された滞留時間と予め飲食物毎に設定された規定時間とを基に、前記飲食物毎に鮮度を判定することを特徴としている。

【００１４】この請求項２記載の発明では、鮮度判定手段は飲食物毎に鮮度を判定するので、飲食物の種類に応じた鮮度管理を行うことができる。

【００１５】請求項３記載の発明の飲食物販売管理システムは、請求項１、２記載の飲食物販売管理システムにおいて、前記鮮度判定手段による鮮度判定結果、前記滞留時間が規定時間を越えていた皿を前記巡回搬送路上から選別する皿仕分手段をさらに具備したことを特徴としている。

【００１６】この請求項３記載の発明では、鮮度判定結果、滞留時間が規定時間を越えていた皿は、皿仕分手段によって巡回搬送路上から自動的に選別されるので、人の目などに頼ることなく鮮度管理を確実に行うことができる。

【００１７】請求項４記載の発明の飲食物販売管理システムは、飲食物をそれぞれの価格毎に色または柄で識別可能な皿に載せて所定巡回搬送路を巡回させて顧客に前記飲食物を販売する飲食物販売管理システムにおいて、前記皿に取り付けられ、前記皿の種別情報と前記皿に載せた飲食物の情報と時刻情報を記憶／読出し可能なデータキャリアと、飲食物を載せた皿を前記巡回搬送路に投入する際に、前記データキャリアに対して皿の種別情報と皿に載せた飲食物の情報と皿を投入した時刻の情報とを登録するＩＤ登録手段と、前記巡回搬送路の所定位置またはその近傍の所定位置に配置され、前記巡回搬送路上を巡回中に前記皿のデータキャリアから皿種別情報、飲食物情報および皿投入時刻情報を読出す質問器と、前記質問器により読み出された皿投入時刻情報とデータ読み出し時刻とから、前記巡回搬送路上における皿の滞留時間を計算する滞留時間計算手段と、この滞留時間計算手段により算出された滞留時間と前記質問器により得られた飲食物情報を基に、飲食物の販売状況を分析する分析手段とを具備したことを特徴としている。

【００１８】この請求項４記載の発明では、巡回搬送路上に設けられている質問器により巡回中の皿のデータキャリアから皿種別情報、飲食物情報および皿投入時刻情報が読出され、皿投入時刻情報とデータ読み出し時刻とから巡回搬送路上における皿の滞留時間が計算され、それらの情報を基に分析手段によって飲食物の販売状況が分析されるので、回転式飲食台において解り難かった飲食物の販売状況を確実に把握することができる。

【００１９】請求項５記載の発明の飲食物販売管理システムは、請求項４記載の飲食物販売管理システムにおいて、前記分析手段は、前記飲食物情報、滞留時間から前記飲食物の売れ筋、死に筋を分析することを特徴としている。

【００２０】この請求項５記載の発明では、分析手段により飲食物の売れ筋、死に筋が分析されるので、日毎または時間毎などで巡回させる飲食物の種類を変え、飲食物を効率よく顧客に提供することができる。

【００２１】上記各発明により、飲食物の鮮度管理を確

実に行うことができる。また、飲食物の販売状況を確実に把握することができる。

【００２２】

【発明の実施の形態】以下、本発明の実施の形態を図面を参照して詳細に説明する。

【００２３】図１は本発明の飲食物販売管理システムに係る一つの実施形態の回転式飲食台の設置された店舗の構成を示す図、図２は図１の店舗に適用した寿司販売管理システムの構成を示す図である。

【００２４】図１において、１は回転寿司と称される外食産業の店舗である。この店舗１には、顧客が出入りするための出入口のドア２と、このドア２付近に配置され、従業員としての会計係りの店員３ａが滞在する会計コーナ４と、従業員としての板前３ｂなどが滞在する厨房５と、回転式飲食台としての半円形状のカウンタ６と、このカウンタ６の内縁に沿ってカウンタ６から少し高い位置に設置された巡回（循環）搬送路７と、厨房５を除いたカウンタ６の周囲に配置され、顧客が座る複数の座席８とが設けられている。座席８は例えば100 席程度設けられている。会計コーナ４には、販売時点情報管理システム：Point Sale of Scaning 端末１０（以下ＰＯＳ端末１０と称す）が設置されている。厨房５内の巡回搬送路７には質問器７０が設けられている。厨房５には、板前３ｂ用の各種のネタ（マグロ、イカなどの切り身）や海苔、ガリ、ワサビ、酢飯などを載せた作業台１１と、この作業台１１に設置されたＩＤ登録装置６０と、作業台１１に色や柄の異なる複数種の皿９が用意されている。これら皿９の色や柄によって皿９に載せられている寿司の価格が解る。また厨房５には、巡回搬送路７から分岐した分岐路１２と、この分岐路１２に選別された皿９を貯留するための貯留部１３とが設けられている。巡回搬送路７としては、ベルトコンベアなどを利用しているが、この他、例えば流水などでもよい。各座席８の前のカウンタ６上には、ネタを食した後の使用済みの皿９を載せるためにプレート状の質問器３０が配設されている。この店舗１のカウンタ６側には、常に従業員としての接客係りの店員３ｃが滞在しており、ハンディターミナル５０を所持している。

【００２５】図２に示すように、この店舗１の飲食物販売管理システム、すなわち、寿司販売管理システムは、通信網、例えばローカル・エリア・ネットワーク（以下ＬＡＮ１５と称す）などに接続されたＰＯＳ端末１０と、各座席８の前のカウンタ６上（循環搬送路８の下部など）に設けられ、ＰＯＳ端末１０とＬＡＮ１５を介して接続された質問器３０、７０と、顧客側（カウンタ６側）に常に滞在する店員３ｃが所持する無線通信機能を有するハンディターミナル５０と、ＩＤ登録装置６０と、質問器７０に接続された仕分制御装置７３と、この仕分制御装置７３に接続された管理制御装置７４とから構成されている。

【００２６】ＰＯＳ端末１０は、キー操作部２１、ＰＣ部２２、無線モデム２３、ネットワークアダプタ２４、表示部２５とを有している。ＰＣ部２２は、このシステムの中枢としてのＰＯＳ機能、ハンディターミナル５０と無線モデム２３を介してデータを授受する機能、および各皿９に取り付けられているデータキャリア４０からデータを取得するためのリード／ライト（R/W ）制御機能などを有している。表示部２５は会計金額などを店員３ａおよび顧客に提示するものである。

【００２７】無線モデム２３は、ハンディターミナル５０とＰＯＳ端末１０との間でメディア変換（無線からRS232Cへの変換）を行う。リーダライタ３１は、アンテナユニット３２で受信されたデータキャリア４０側からのデータを解読して、皿９の種別情報や皿９に載せられていた飲食物の情報、皿９の投入時刻情報などを得るものである。アンテナユニット３２は、皿置きとして利用するように外観上、プレート状（お盆のような形）に成形されており、各座席毎にカウンタ６上に配設されている。このアンテナユニット３２は、自身の上に積まれた複数の皿９それぞれに取り付けられているデータキャリア４０に対してデータ読出要求を行うために内部に形成されたコイルアンテナへ所定制御周波数帯、例えば50～500KHzの長中波帯の中の例えば125KHzなどの周波数の電流を通することで誘導電磁界を発生し、読出要求コマンドをデータキャリア４０へ送ると共に、その読出要求コマンドに応じてデータキャリア４０側から返信されてきた共振による電磁波を受信してデータに復調してリーダライタ３１に渡すものである。

【００２８】質問器３０は、ネットワークアダプタ２４、リーダライタ３１、アンテナユニット３２とからなる。ネットワークアダプタ２４は、ＰＯＳ端末１０と質問器３０間でＬＡＮ１５を介したデータ通信を行うために所定の規約に基づいてプロトコル変換を行う変換機能とデータの送受信機能を有するものである。このネットワークアダプタ２４は、各座席８にそれぞれ割り付けられている固有の番号（席番号）に対応したネットワークアドレスを有しており、ＰＣ部２２からのコマンドを解釈してR/W の動作を制御する。この質問器３０は、マルチリード機能を有している。このマルチリード機能とは、アンテナユニット３２上には複数の皿９が積み重ねられることから、データキャリア４０も同一誘導電磁界内（通信エリア内）に複数存在することになり、これらデータキャリア４０をそれぞれ個別に識別しつつデータを読み取るための機能である。

【００２９】ＩＤ登録装置６０は、キー入力部６１、時計部６２、リーダライタ６３、アンテナ６４などからなり、リーダライタ６３は時計部６２によって計時された時刻情報と、キー入力部６１から入力されたネタ情報とをアンテナ６４を介してデータキャリア４０に書き込み登録する機能を有している。

【００３０】質問器７０は、リーダライタ７１、コンベアアンテナ７２とからなり、巡回搬送路７上に一つだけ設けられている。

【００３１】仕分制御装置７３は、時計部７５、メモリ７６、鮮度判定部７７などから構成されている。メモリ７６には予めネタ毎に鮮度の規定時間が設定されている。

【００３２】管理制御装置７４は、仕分制御装置７３から渡された皿番号、ネタ情報、滞留時間情報を基に巡回中の飲食物（寿司など）の売れ筋および死に筋などの分析処理を実行する。この管理制御装置７４はＬＡＮ１５に接続されており、分析処理結果をＬＡＮ１５を通じてＰＯＳ端末１０へ送信する。

【００３３】ＰＯＳ端末１０では、これらの分析処理結果のデータが一括管理される。この一括管理の一環として、例えば会計時の会計処理、会計金額に基づく売上管理、飲食物の仕入れ管理などが行われる。

【００３４】図３に示すように、各皿９の裏側底面には、質問器３０、７０との間で非接触でデータを読出／記憶を行うことのできる無線通信機能を有するデータキャリア４０が取り付けられている。このデータキャリア４０は、ボタン状のものであり、例えば無線タグまたは非接触タグなどと呼ばれている。

【００３５】図４に示すように、このデータキャリア４０は、円板状のモールド材４１と、このモールド材４１にループ状に形成された空芯コイル（ループコイルアンテナ）４２と、このループコイルアンテナ４２に接続してモールド材４１に実装された半導体チップ４３とからなる。半導体チップ４３内には、データキャリア４０自体の外形寸法の制限や通信に必要なデータ量などの兼ね合いで、例えば2KBit程度の記憶容量のデータメモリが内蔵されている。

【００３６】図５に示すように、半導体チップ４３のデータメモリには、皿９自体を個別に識別するために割り当てた皿固有情報としての皿番号４６、皿９に載せた飲食物の情報として、例えばマグロ、イカなどといったネタや納豆巻きなどといった名称を特定するためのネタ情報４７と、皿９の単価情報４８、投入時刻の情報（時刻情報）４９などが記憶可能である。皿９の単価情報４８は、例えば 100円、 200円、 300円などといっ価格データである。なおこの単価情報４８、皿番号４６などは、皿種別情報として、皿９にデータキャリア４０を取り付けた際に記録されている。これら皿番号４６、単価情報４８以外の各情報は、ネタを載せた皿９を巡回搬送路７に投入する際にＩＤ登録装置６０によりデータキャリア４０に書き込まれる。

【００３７】データキャリア４０と質問器３０、７０間のやりとりは、両方向であるが、伝送を片方づつ交互に行う半二重通信方式が採用されている。したがって質問器３０、７０からデータキャリア４０側にデータ読出要求があったとき（読出要求コマンドが受信されたとき）、データメモリのデータを読出しアンテナ４２から送信するという手順で通信が行われる。

【００３８】図６に示すように、ハンディターミナル５０は、キー入力部５１、制御部５２、無線通信部５３、表示部５４、プリンタ５５などから構成されている。制御部５２は、ＣＰＵ５６とデータ記憶部５７とを有している。キー入力部５１は、席情報として席の番号を入力する席情報入力部５１ａと、皿１０以外で顧客へ販売する飲食物の情報、例えばビール、ジュース、ソフトドリンクなどの飲料や飲茶、茶碗蒸し、持ち帰り品などの品目を入力する品目入力部５１ｂとを有している。制御部５２は、上記各部を制御するものである。無線通信部５３は、席番号や品目などのデータを変調してアンテナ５３ａから送信するものである。表示部５４は、入力された席番号や品目などを表示するものである。プリンタ５５は、席番号や飲食内訳などを記したレシートを印刷するものである。データ記憶部５７は、入力された席番号や品目などのデータを記憶するものである。

【００３９】以下、この寿司販売管理システムの動作を説明する。

【００４０】まず、この寿司販売管理システムの会計処理について説明する。

【００４１】この寿司販売管理システムでは、板前３ｂが、さまざまな種類のネタを酢飯に載せて寿司、例えばマグロ寿司などを握り、そのマグロ寿司を対応する価格、例えば 100円の色や柄の皿９に載せた後、板前３ｂがＩＤ登録装置６０の上にマグロ寿司を載せた皿９を置き、ＩＤ登録装置６０のキー入力部６１からネタ情報としてマグロのキーを操作することにより、ＩＤ登録装置６０から誘導電磁界が発生し、皿９のデータキャリア４０にその時の時刻情報４９とネタ情報４７が書き込まれ、その後、マグロ寿司を載せた皿９は、ＩＤ登録装置６０から巡回搬送路７上に投入される。

【００４２】このようにして巡回搬送路７上にさまざまな種類の寿司ネタが載せられた皿（ネタ皿）９が巡回される。

【００４３】ここで、この店舗１に顧客が来店し、空いている座席８に着席した後、巡回搬送路７を巡回中のネタ皿９の中から、所望のネタ皿９を自ら選択して手元へとって自身の座席８の前のカウンタ６に置いてネタ皿９の寿司を食した後、用済みの皿９を自分の座席の前のプレート（アンテナユニット３０）に積み上げておく。また顧客が巡回中のネタ皿９以外のものを注文するときは、最寄りの接客係りの店員３ｃに、所望の飲食物、例えばビールなどを注文する。

【００４４】この際、店員３ｃは、ハンディターミナル５０の席情報入力部５１ａを操作して顧客が着席している座席８の番号を入力し、その後、品目入力部５１ｂのビールのキーと本数を入力し、最後に席情報入力部５１

ａの注文キーを操作する。すると、そのデータは、ハンディターミナル５０から無線通信により無線モデム１４を通じてＰＯＳ端末１０に蓄積される。注文されたビール自体は、店員３ｃが厨房５へ行くなり、通知するなりして顧客へ提供する。

【００４５】一方、顧客が会計する際には、最寄りの接客係りの店員３ｃに会計することを告げる。

【００４６】この際、店員３ｃは、ハンディターミナル５０の席情報入力部５１ａを操作して顧客が着席している座席８の番号と会計キーなどを入力する。

【００４７】すると、そのデータは、ハンディターミナル５０から無線通信により無線モデム１４を通じてＰＯＳ端末１０に送信される。

【００４８】またハンディターミナル５０からは、座席番号を印字したレシートがプリントアウトされ、このプリントアウトされた座席番号のレシートを店員３ｃが顧客手渡して会計コーナ４での精算をお願いする。

【００４９】ＰＯＳ端末１０は、座席番号と会計を指示するデータを受信すると、座席番号に対応する質問器３０に対して、データ読取要求のコマンドを発行するよう指示する。すると、対応する質問器２０は、マルチリード機能を活用してアンテナユニット３０から誘導電磁界を発生し、データ読取要求のコマンドを複数の皿９に順次送信する。そして、この要求コマンドに応じてアンテナユニット３０の上に積まれた皿９に取り付けられている複数のデータキャリア４０から応答の電波（共振波）が順次返信されてくると、質問器３０は、それぞれを一づづつ解読して皿番号４６、ネタ情報４７、単価情報４８、皿９が巡回搬送路７へ投入された時刻情報４９を取得し、ＬＡＮ１１を通じてＰＯＳ端末１０へ送信する。

【００５０】ＰＯＳ端末１０では、質問器３０からの皿番号４６、ネタ情報４７、単価情報４８、時刻情報４９を受信すると、今までにメモリ２６に蓄積されていた他の注文情報と共に会計金額を演算し、表示部２５に表示する。

【００５１】これにより、顧客が会計コーナ４に来たときには、会計金額が判り、座席番号の印刷されレシートを会計コーナ４の会計係りの店員３ａに提示することで本人であることが判り、店員３ａと顧客との間で精算がスムーズに行われる。

【００５２】続いて、販売管理について説明する。

【００５３】この寿司販売管理システムでは、巡回搬送路７上にさまざまな種類の寿司ネタが載せられた皿９が巡回されているが、この巡回搬送路７上には、厨房５内の１か所に質問器７０が設置されている。したがって、各種寿司ネタが載せられた皿９は、顧客に選ばれ、取られなければ、１周毎に質問器７０の近傍を通過する。質問器７０は、コンベアアンテナ７２から巡回搬送路７を搬送される皿９に届く範囲内に誘導電磁界を発生しており、皿９が誘導電磁界内に入ると、上記質問器３０と同様にして皿９のデータキャリア４０からの共振波を受信してリーダライタ７１へ送り、リーダライタ７１にてデータが読み取られ解析される。このデータは、皿番号４６、ネタ情報４７、単価情報４８、時刻情報４９であり、質問器７０から仕分制御装置７３に転送される。

【００５４】仕分制御装置７３では、転送されてきた皿番号４６、ネタ情報４７、単価情報４８、時刻情報４９を基に、鮮度判定部７７がその皿９の巡回搬送路７上における滞留時間を計算し、寿司ネタの鮮度を判定する。

【００５５】この場合、鮮度判定部７７は、皿種別情報の皿番号をキーとして、時計部７５によって計時されている現在の時刻から、読み出した投入時刻を引き算してその皿９の滞留時間を計算する。

【００５６】続いて、鮮度判定部７７では、計算により求めた滞留時間と、メモリ７６に予めネタ毎に設定されている規定時間とを比較して、滞留時間がこの規定時間を経過したか否かを判定する。

【００５７】ここで、滞留時間が規定時間を経過していた場合、鮮度判定部７７は、鮮度が低下したものと判定する。この判定結果に基づき、仕分制御装置７３は、その皿９を巡回搬送路７から外すよう仕分装置８０を制御する。

【００５８】すると、仕分装置８０は、巡回搬送路７上の質問器７０の位置を通過した皿９が巡回搬送路７上の自身の位置に来たときに巡回搬送路７へ突出動作し、皿９を分岐路１２側へ誘導する。この皿９が分岐路１２側へ入ると、仕分装置８０は次の皿９がくる前に元の巡回搬送路７に沿った位置へ戻る。分岐路１２へ入った皿９は、貯留部１３に貯留される。

【００５９】また、仕分制御装置７３で鮮度を判定した皿９の種別情報、ネタ情報、滞留時間情報は、管理制御装置７４へ渡される。なお管理制御装置７４へ渡す情報は、仕分したもの、仕分しなかったもの全てである。

【００６０】管理制御装置７４では、皿種別情報、飲食物情報、滞留時間情報（皿投入時刻情報でもよい）から飲食物の売れ筋、死に筋を分析する。例えば滞留時間が長い飲食物は死に筋、滞留時間の短いものは売れ筋と分析する。また飲食物の売れ筋、死に筋の分析結果を基に、仕入れ分析なども行われる。

【００６１】この分析結果は、ＬＡＮ１５を通じてＰＯＳ端末１０へ通知される。

【００６２】ＰＯＳ端末１０では、管理制御装置７４から受信した皿出しの飲食物の各種情報と、ハンディターミナル５０から得た皿９以外で顧客へ提供した飲食物の情報とをまとめて店舗全体の販売状況を一元管理する。

【００６３】このようにこの寿司販売管理システムによれば、皿９に投入時刻の情報を記録／読出可能なデータキャリア４０を取り付けると共に、巡回搬送路７上に質問器７０を設け、巡回搬送路７上に寿司を載せた皿９を投入するときに、その時の時刻情報４９とネタ情報４７

とをデータキャリア４０に書き込んで巡回搬送路７上に投入し、巡回搬送路７上を皿９が巡回する毎に質問器７０にて皿９のデータキャリア４０から時刻情報４９を取得してその皿９に載せられている寿司の滞留時間を計算して鮮度を判定するので、飲食物の鮮度管理を確実に行うことができる。　また管理制御装置７４が、仕分制御装置７３から取得したネタ情報４７とその滞留時間とを基に、寿司の売れ筋および死に筋を分析するので、回転式飲食台において寿司の販売状況を確実に把握することができる。

【００６４】また顧客が会計を希望した時に、店員３ｃが所持しているハンディターミナル５０に顧客の座席番号のみを入力操作すれば、ＰＯＳ端末１０側で顧客が食した飲食物の情報と皿の情報と時刻情報とを取得し会計金額が求められるので、店員３ｃによる皿９の数え間違えや計算ミス、伝票への誤記入などがなくなる。また、この際、顧客に座席番号を印刷したレシートを渡して、会計コーナ４の会計処理結果と本人とを照合するので、複数の顧客が同時に会計コーナ４に来たときの精算間違えもなくなる。さらに、会計コーナ４の店員３ａも伝票の内容をキャッシュレジスタに打ち込む必要がないことから、キャッシュレジスタへの打ち間違えもない。また、皿９以外での注文品は、注文と同時にそのデータがハンディターミナル５０からＰＯＳ端末１０へ送られて蓄積されるので、精算時に漏れることもない。

【００６５】なお電磁誘導方式のデータキャリア４０は、比較的広い通信エリアを確保できると共に、金属を除く物体は通信障害にならないので、カウンタ６などの上に積み上げられるプラスチック製の皿９などに取り付け、データを記憶／読出しを行うのに最適である。

【００６６】なおこの実施形態では、店員３ｃにハンディターミナル５０を携帯させて会計を指示するようにしたが、店員３ｃがハンディターミナル５０を持たないシステム構成も考えられる。

【００６７】例えばＰＯＳ端末１０が、カウンタ６に積まれた皿９のデータキャリア４０から情報を常に読取り転送するよう各質問器３０を制御し、各質問器３０から転送されてきた情報を内部のメモリ２６に席毎に蓄積しておき、会計時に、顧客の席情報を基にメモリ２６から皿の情報を読み出して会計演算処理すればよい。なお、この場合は、会計時に店員３ｃが伝票に顧客の席番号を記入し、それを顧客に渡し、会計コーナ４まで持ってきてもらうなど、顧客と席とを対応付ける必要がある。

【００６８】

【発明の効果】以上説明したようにこの発明によれば、寿司を載せた皿に取り付けたデータキャリアに投入時刻の情報を記録してから巡回搬送路上に投入し、巡回搬送路上を皿が巡回する毎に質問器にてデータキャリアから少なくとも投入時刻の情報を取得して飲食物の滞留時間を計算して鮮度を判定するので、飲食物の鮮度管理を確実に行うことができる。

【００６９】また巡回搬送路上を皿が巡回する毎に得られた飲食物の情報とその滞留時間を基に、飲食物の売れ筋および死に筋を分析するので、回転式飲食台において寿司の販売状況を確実に把握することができる。

【図面の簡単な説明】

【図１】本発明を実現した一つの実施形態の店舗を示す図である。

【図２】図１の店舗に適用した寿司販売管理システムの構成を示すブロック図である。

【図３】この寿司販売管理システムの皿を示す図である。

【図４】図３の皿に取り付けられているデータキャリアの斜視図である。

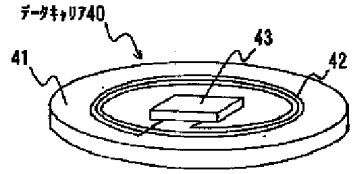
【図５】図４のデータキャリアに記憶される情報を示す図である。

【図６】この寿司自動会計システムのハンディターミナルの構成を示すブロック図である。

【符号の説明】

１…店舗、２…出入口のドア、３ａ、３ｃ…店員、３ｂ…板前、４…会計コーナ、５…厨房、６…カウンタ、７…巡回搬送路、８…座席、９…皿、１０…ＰＯＳ端末、１１…作業台、１２…分岐路、１３…貯留部、１５…ＬＡＮ、２１…キー操作部、２２…ＰＣ部、２４…ネットワークアダプタ、２５…表示部、３０…アンテナユニット、３１…リーダライタ、４０…データキャリア、５０…ハンディターミナル、６０…ＩＤ登録装置、６１…キー入力部、６２…時計部、６３…リーダライタ、６４…アンテナ、７０…質問器、７１…リーダライタ、７２…コンベアアンテナ、７３…仕分制御装置、７４…管理制御装置、７５…時計部、７６…メモリ、７７…鮮度判定部、８０…仕分装置。

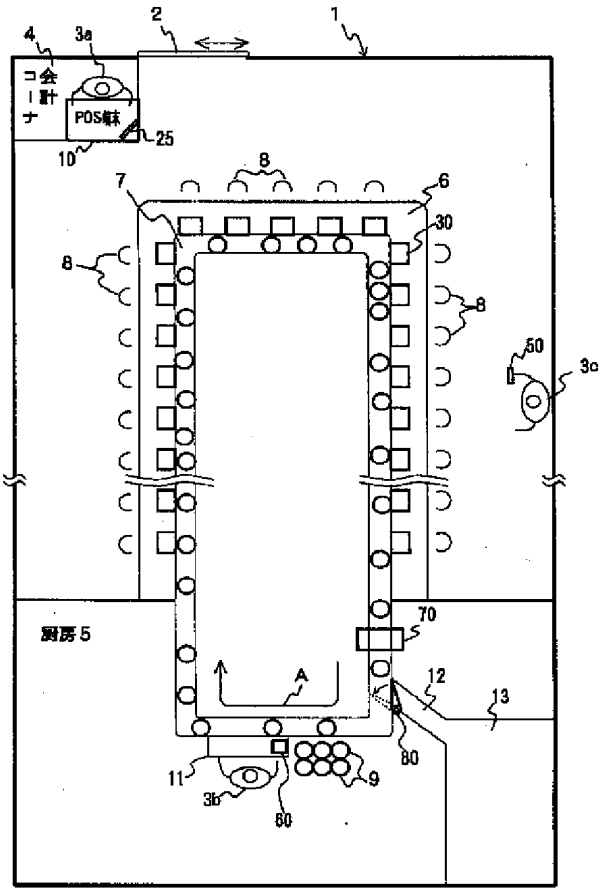
【図４】



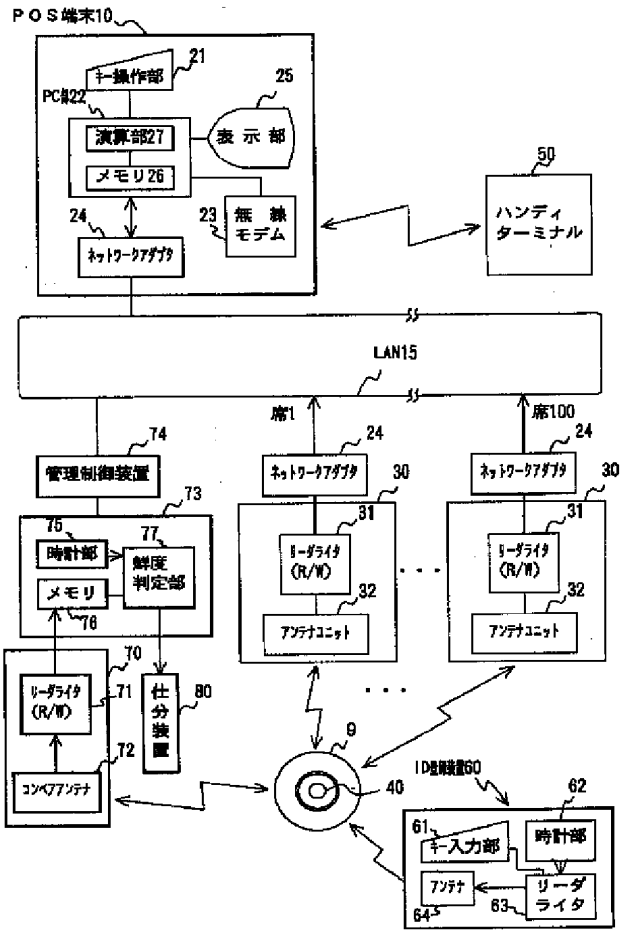
【図５】



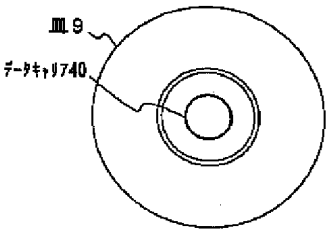
【図１】


レジ会計ナ
POS端末
厨房5
A

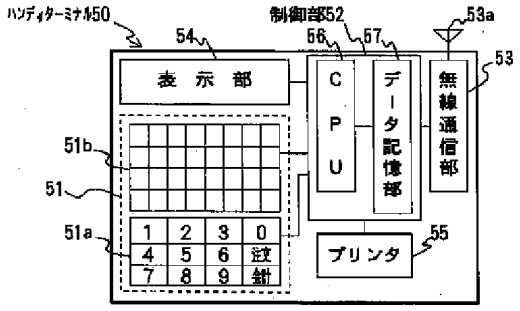
【図２】


POS端末10
キー操作部
PC部22
演算部27
メモリ26
表示部
無線モデム
ネットワークアダプタ
ハンディターミナル
LAN15
席1
席100
管理制御装置
時計部
メモリ
鮮度判定部
リーダライタ(R/W)
アンテナユニット
仕分装置
コンベアアンテナ
IC登録装置60
キー入力部
アンテナ

【図３】


皿9
データキャリア40

【図６】


ハンディターミナル50
制御部52
表示部
CPU
データ記憶部
無線通信部
プリンタ
1 2 3 0
4 5 6 注文
7 8 9 訂

Patent Record Full View Tuesday, October 11 2016 THOMSON INNOVATION

Patent/Publication: JP11342061A

Bibliography

DWPI Title

Freshness management procedure of food and beverage products in restaurant, involves providing information pertaining to time for which food and beverage products remain fresh, while tableware is collected by user

Original Title

FRESHNESS MANAGEMENT METHOD FOR FOOD IN ROUND CARRYING TYPE RESTAURANT

English Title

FRESHNESS MANAGEMENT METHOD FOR FOOD IN ROUND CARRYING TYPE RESTAURANT

Assignee/Applicant

Standardized: **SHINWA DENSHI DEVICE HANBAI KK NT CORP KK**

Original: SHINWA DENSHI DEVICE HANBAI KK NT CORPORATION KK

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1999-12-14 (A)

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Abstract

Abstract

PROBLEM TO BE SOLVED: To manage the appreciation limit time of the food at the time of a round at the time of carrying the food round and selling it.

SOLUTION: A plate provided with a non-contact/non-battery type data carrier capable of reading and writing information is used, and at the time of housing the food on the plate, feeding it on a round carrying path and providing a customer with it, an antenna 7 shared by read/write of the information is arranged facing a round carrying path 4. When the plate 1' housing the food is passed through the arranging point of an antenna 7 for the first time, the appreciation limit time for which the passing time and the freshness maintainable residence time of the food set beforehand are added is written in the storage part of the data carrier of the plate 1'. Then, the appreciation limit time is read by the antenna 7 every time of passing

through the arranging point of the antenna 7 for the second and succeeding times and compared with the present time. When the present time is before the appreciation limit time, it is carried as it is and provided for the customer. On the other hand, when the present time is after the appreciation limit time, the plate 1' is recovered by the notification signal.

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Classes/Indexing

IPC

IPC Code(1-7) **A47G 23/08** A47F 10/06 G06F 17/60

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Current IPC	Invention	Version	Additional	Version
Full	A47G 23/08 A47F 10/06 G06Q 30/06 G06Q 50/00 G06Q 50/12	20060101 20060101 20120101 20120101 20120101	-	-
Main Group	-	-	-	-
Subclass	-	-	-	-

Original IPC	Invention	Version	Additional	Version
Advanced/Full	A47F 10/06 A47G 23/08	20060101 20060101	-	-
Core/Main Group	A47F 10/00 A47G 23/00	20060101 20060101	-	-
Subclass	-	-	-	-

Legal Status

INPADOC Legal Status

Get Family Legal Status

Family

Family

Expand INPADOC Family (1)

Expand DWPI Family (1); Countries (1)

Claims

No Claims exist for this Record

Description

Description

Expand Description

Citations

Citation *Record level*

Expand Citing Patents (11)

Cited Patents (0)

Cited Non-patents (0)

DPCI Citation *Patent family level*

Expand DPCI Citing Patents (11)

DPCI Cited Patents (0)

DPCI Cited Non-patents (0)

Expand DPCI Citation Counts

DPCI Field of Search

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DPCI Cited Patents Country

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Other

No Other exists for this Record

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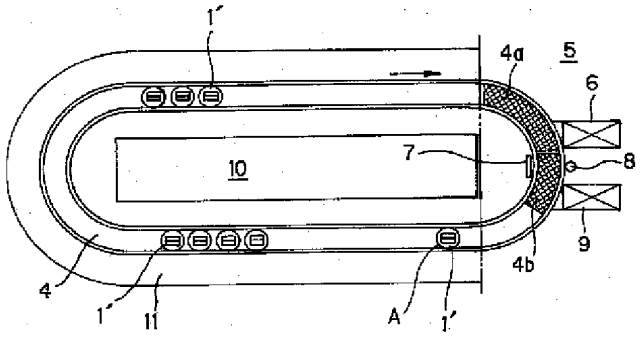
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(54)【発明の名称】　巡回搬送式飲食店における飲食品の鮮度管理方法

(57)【要約】

【課題】　飲食品を巡回搬送して販売するに際し、その飲食品の賞味限度時刻を巡回時に管理できるようにする。

【解決手段】　情報の読み取り及び書き込みができる非接触・無電池式データキャリアが設けられている食器を用い、この食器に飲食品を収容して巡回搬送路上に投入し客に提供するに際して、情報の読み書き共用アンテナ７を巡回搬送路４上に臨ませて配置し、このアンテナ７配置点を飲食品を収容した食器１′が初回通過する時、食器１′のデータキャリアの記憶部にその通過時刻と予め設定されている当該飲食品の鮮度維持可能滞留時間とを加算した賞味限度時刻を書き込み、その賞味限度時刻を次回以降のアンテナ７配置点通過時毎に該アンテナ７により読み取って現在の時刻と比較し、現在の時刻が賞味限度時刻以内ならそのまま搬送して客に提供する一方、現在の時刻が賞味限度時刻を過ぎていればその告知信号により当該食器１′を回収する。



【特許請求の範囲】
【請求項１】　電磁誘導によって情報の読み取り及び書き込みができる非接触・無電池式データキャリアが設けられている食器を用い、この食器に飲食品を収容して巡回搬送路上に投入し客に提供するに際して、情報の読み取り及び書き込み用アンテナを上記巡回搬送路上に臨ませて配置し、このアンテナ配置点を飲食品を収容した食器が初回通過する時、当該食器のデータキャリアのデータ記憶部にその通過時刻と予め設定されている当該飲食品の鮮度維持可能滞留時間とを加算した賞味限度時刻を書き込み、その賞味限度時刻を次回以降の上記アンテナ配置点通過時毎に該アンテナにより読み取って現在の時刻と比較し、現在の時刻が賞味限度時刻以内ならそのまま搬送して客に提供する一方、現在の時刻が賞味限度時刻を過ぎていればその告知信号により当該食器を回収することを特徴とする巡回搬送式飲食店における飲食品の鮮度管理方法。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、飲食品を食器に載せて巡回搬送し客に提供するための巡回搬送式飲食店における飲食品の鮮度管理方法に関する。
【０００２】
【従来の技術】この種の巡回搬送式飲食店における飲食品の鮮度管理方法として、飲食品を載せる皿にＩＤ媒体を取り付け、巡回搬送路の飲食品皿（飲食品を載せた皿）を供給する手前に配置されている読み取り器（又は計測センサー）によりＩＤナンバーを事前に読み取り、皿に載せた飲食品の情報をキィーボードや入力器によりコンピュータに入力して、ＩＤナンバーと飲食品の情報を関連づけてコンピュータに順次記憶させた後、この飲食品皿を巡回搬送路上に投入し巡回搬送して客に提供する。そして、巡回搬送路上に配置されている別の読み取り器により巡回してきた飲食品皿のＩＤナンバーを読み取り、先にコンピュータに記憶されているＩＤナンバー及び飲食品情報と照合して巡回回数をコンピュータに順次記憶させ、その巡回回数が規定回数を超えた飲食品皿は巡回搬送路上から撤去する方法が知られている（例えば、特開平８－２３８１５７号、特開平９－４４７５３号を参照）。
【０００３】
【発明が解決しようとする課題】上記従来技術のものは、巡回搬送路上に投入する前にコンピュータに記憶されている飲食品皿のＩＤナンバー及び食品情報を、巡回搬送されてきた飲食品皿のＩＤナンバーを別の読み取り器により読み取ることで、その巡回搬送されてきた飲食品皿のものと照合して、該飲食品皿の巡回回数をコンピュータにより管理している方式のため、回転寿司店のようにカウンター（店側の厨房）内で握った寿司を皿に載せて直接巡回搬送路に投入すると、その寿司皿は、該寿司皿のＩＤナンバー及び飲品情報が事前にコンピュータに記憶されていないので、巡回回数管理対象外となる。
【０００４】したがって、このような巡回回数管理対象外の飲食品皿は客が取り出さない限り巡回搬送を続けることになって、寿司等の飲食品は不当に乾燥して賞味が悪化し、客の不評を受ける要因になっている。また、かかる方式では複数個の読み取り器や計測センサー及び入力器やコンピュータ（パソコン）等を必要として、設備費が高価になるという問題がある。そこで、本発明の目的は、巡回搬送される飲食品の鮮度管理のために単一機能を採用し、その単一機能によって飲食品の賞味限度時刻を管理することにより、従来技術の問題を解決した巡回搬送式飲食店における飲食品の鮮度管理方法を提供することにある。
【０００５】
【課題を解決するための手段】上記目的を達成するために、本発明の特徴とする巡回搬送式飲食店における飲食品の鮮度管理方法は、電磁誘導によって情報の読み取り及び書き込みができる非接触・無電池式データキャリアが設けられている食器を用い、この食器に飲食品を収容して巡回搬送路上に投入し客に提供するに際して、情報の読み取り及び書き込み用アンテナを上記巡回搬送路上に臨ませて配置し、このアンテナ配置点を飲食品を収容した食器が初回（初回の判定は、前回賞味限度時刻を１巡回時刻以上経過したものとする。）通過する時、当該食器のデータキャリアのデータ記憶部にその通過時刻と予め設定されている当該飲食品の鮮度維持可能滞留時間とを加算した賞味限度時刻を書き込み、その賞味限度時刻を次回以降の上記アンテナ配置点通過時毎に該アンテナにより読み取って現在の時刻と比較し、現在の時刻が賞味限度時刻以内ならそのまま搬送して客に提供する一方、現在の時刻が賞味限度時刻を過ぎていればその判別信号により当該食器を回収するようにした。
【０００６】また、飲食品を収容した食器が情報の読み取り及び書き込み用アンテナの配置点を初回通過するとき、その通過時刻をデータキャリアのデータ記憶部に書き込んで搬送し、２回目以降通過する時は、読み取った初回通過時刻に予め決めてある賞味時間を毎回加算して賞味限度時刻とし、この賞味限度時刻を現在の時刻と比較する方法により実施することもできる。
【０００７】なお、本発明方法での回転寿司店のようにカウンター（店側の厨房）内で握った寿司を皿に載せて直接巡回搬送路に投入した場合、情報の読み取り及び書き込み用アンテナの配置点に巡回搬送されてきた皿（食器）のデータキャリアに賞味限度時刻の書き込みをする時には既に最大で１周回したことになり、書き込まれる賞味限度時刻は１周回時間程度に相当するだけ延長することになるが、その延長した時間は数分程度であり、鮮度維持可能滞留時間（賞味時間）に対して問題とはならないのであって、巡回搬送中の飲食品を収容した食器が

不当に鮮度管理対象外となる不具合は解消できる。

【０００８】

【発明の実施の形態】以下に、本発明の実施例を図面を参照しながら説明する。本発明方法を実施するには、図２に示すように電磁誘導によって情報の読み取り及び書き込みができる非接触・無電池式のデータキャリア２が糸底１ａ内に埋設されている食器１を用いる。図中、３はデータキャリア２の埋設に用いられた液体封止樹脂による硬化層である。そして、本発明方法を実施するために、例えば回転寿司店等の店内には、図１に示すように無端状のコンベアである巡回搬送路４が設置されており、その巡回搬送路４の一部は厨房室５側へ張り出している。その張り出し部は巡回方向の手前側の部分が飲食品を収容した食器（寿司皿）１′の投入エリヤ４ａとして、また先方側の部分が食器回収エリヤ４ｂとして位置付けられている。

【０００９】投入エリヤ４ａには、巡回搬送路４に臨ませて必要に応じて飲食品を収容した食器（寿司皿）１′の自動投入機６が設けられており、また、その先には情報の読み取り及び書き込み用アンテナ（以下、読み書き共用アンテナという）７と警報表示機８が設けられている。一方、食器回収エリヤ４ｂには、巡回搬送路４に臨ませて必要に応じて食器（寿司皿）１′の自動回収機９が設けられている。１０は店側の厨房、１１はカウンターである。

【００１０】次に、巡回搬送路４上を巡回搬送されて客に提供される飲食品の鮮度を管理する方法を説明する。通常は、厨房室５内に張り出している巡回搬送路４上の投入エリア４ａに食器１′を載せて巡回搬送させ、該食器１′が開店後初めて読み書き共用アンテナ７の配置点を通過する時、データキャリア２のデータ記憶部の前回賞味限度時刻（前回食器１が使用されたときの情報）を読み取って現在の時刻と比較し、前回賞味限度時刻が書き込まれていないもの、または前回賞味限度時刻が書き込まれているもので、その時刻が予め設定されている１巡回相当時間以上経過しているものは何れも初回通過と判断して、現在の通過時刻と予め設定されている飲食品の鮮度維持可能滞留時間（賞味時間）とを加算した賞味限度時刻（情報）がデータキャリア２に書き込まれる。

【００１１】データキャリア２に情報が書き込まれた食器１′はカウンター１１側へ搬送されて客に提供されることになるが、もし、客が搬送されてきた食器１′を取らないで（食べないで）該食器１′が巡回搬送路４上を１周して再び読み書き共用アンテナ７配置点を通過する時は、読み書き共用アンテナ７はデータキャリア２の情報を読み取って、その賞味限度時刻を現在の時刻と比較して現在の時刻が賞味限度時刻以内であることを確認して、食器１′をそのまま搬送して客に提供することになる。

【００１２】そして、客が取らない食器１′は巡回搬送路４上での巡回が繰り返されるが、その巡回時に読み書き共用アンテナ７を通過する時刻が賞味限度時刻を過ぎていれば、そのアンテナ７により鮮度が落ちていると判断して信号を出力し、警報表示機８を起動して点灯やブザー音等により告知を行う。この告知により、当該食器１′は巡回搬送路４より除去されることになる。この場合、上記判段による回収信号によって自動回収機９を起動し、食器１′を自動回収させることが可能である。

【００１３】また、店側の厨房１０で飲食品を収容した食器１′が巡回搬送路４の途中である店側のＡ点から該巡回搬送路４上へ載せられて客に供給された場合（事前のコンピュータへの記録なし）、客がそれを取らないで厨房室５側に搬送されると、その食器１′が読み書き共用アンテナ７を通過する時に前述したと同様に判断して、これを初回通過とみなし、そのデータキャリア２のデータ記憶部に通過時刻と予め設定されている鮮度維持可能滞留時間とを加算した賞味限度時刻を書き込んで客に提供する。即ち、データキャリア２には巡回搬送路４を最大約１周した後に賞味限度時刻が書き込まれるので、約１周分の時間だけ予め設定されている鮮度維持可能滞留時間より長く滞留することになるが、これは鮮度管理対象外になることから回避できる。そして、その後の食器１′の経過については前述したものと同様である。

【００１４】以上説明の鮮度管理を行う非接触・無電池式のデータキャリアシステムの動作状体を図３により説明する。先ず、リーダ部（送信・読み取り識別部）１２の発信器１２ａより１２５ＫＨｚの周波数の電波を発信し、この電波に管理コンピュータ１２ｂからの複数のデータキャリア内部インピーダンスを制御する信号及びデータキャリア２のデータ記憶部２ｃに書き込む情報信号を変調器１２ｃにより重畳・変調して、アンテナ１２ｄを介してデータキャリア２のアンテナ２ａに受信する。１２ｅは復調器である。なお、アンテナ１２ｄは図１の読み書き共用アンテナ７に相当する。

【００１５】そして、データキャリア２においては、受信した信号の一部が整流されて信号解読指示器２ｂとデータ記憶部２ｃに給電され、信号解読指示器２ｂでは受信信号を検波・復調して、データ記憶部２ｃから該データ信号に対応する記憶データ信号をスイッチ部２ｄへ送り、データキャリア２の内部インピーダンスを変化させる。これによって、リーダ部のアンテナ１２ｄにはデータキャリア２内の識別データ信号と情報データ信号に応じた振幅の電波が生じる。即ち、リーダ部ではＡＭ変調電波を受信した場合と同じ状態になり、これを検波・復調することによって、管理コンピュータ１２ｂで読み取り、識別・認識する。

【００１６】

【発明の効果】本発明は上記の如くであって、従来方法では不可欠であるコンピュータ（パソコン）・入力器及

び複数個の読み取り器・計測センサー等が不要であり、本発明方法を実施するための設備コストは大巾にダウンできる。そして、コンピュータ（パソコン）に各種情報を集めて集中管理する必要がないため、鮮度管理単機能としてオフラインでの使用も可能であるし、また、例えば、コンピュータに事前に記録させないで、厨房室外の店側の厨房等から巡回搬送路上に任意の個所から新たな飲食品が載せられた場合でも、それらの鮮度管理は確実に実行できて客からのクレームを解消できる等、その実用的価値はきわめて多大である。

【図面の簡単な説明】

【図１】本発明方法の実施の形態を概略的に示す平面図である。

【図２】本発明方法の実施に使用される食器の正断面図である。

【図３】本発明方法の実施に使用されるデータキャリアシステムの一例を示す回路図である。

【符号の説明】

１は食器

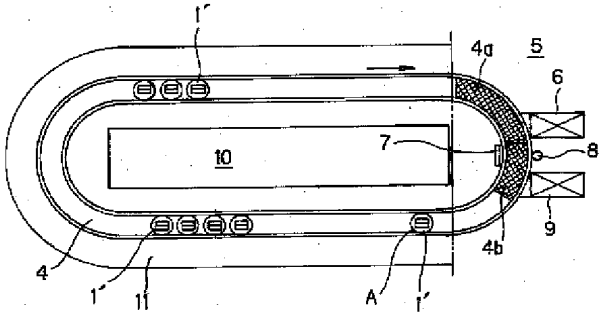
１′は飲食品を収容した食器

２はデータキャリア

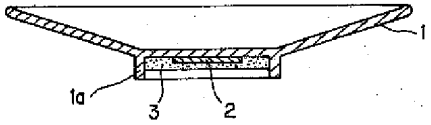
４は巡回搬送路

７はアンテナ

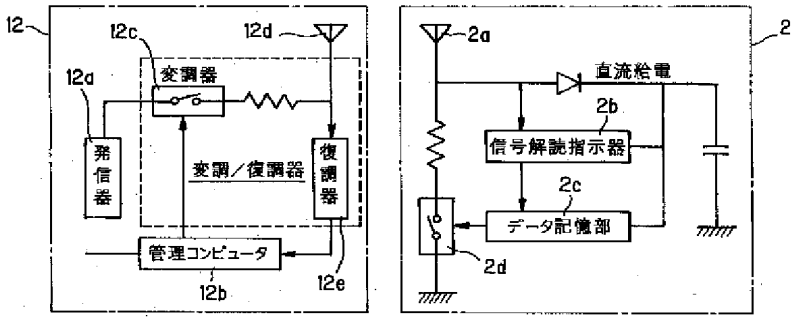
【図１】



【図２】



【図３】



Patent Record Full View Tuesday, October 11 2016 THOMSON INNOVATION

Patent/Publication: JP8000414A

Bibliography

DWPI Title

Managing fresh food to control freshness by reading out data written in data holding part in storage part for food

Original Title

METHOD FOR PRESERVING PERISHABLE FOOD AND ITS APPARATUS

Assignee/Applicant

Standardized: **YAMATAKE HONEYWELL CO LTD**

Original: YAMATAKE HONEYWELL CO LTD

Inventor

MOGAMI TAKEO,

Publication Date (Kind Code)

1996-01-09 (A)

Application Number / Date

JP1994135976A / 1994-06-17

Priority Number / Date / Country

JP1994135976A / 1994-06-17 / JP

Abstract

Abstract

PURPOSE: To perform with high accuracy management of freshness, selling direction and loss of each perishable food in a manufacturing place and a selling place wherein perishable foods with different manufacturing times and tasting periods or a number of kinds of the perishable foods are mixed. CONSTITUTION: A method for controlling wherein under a condition where each perishable food 22 is stored in a storing means 21, this storing means 21 is carried by a carrying means 23 and each information at the preparing time of the perishable food 22 is written on a data holding means provided on the storing means 21 and the stored information on the data holding means is read by a reading means and the condition of the perishable food 22 is controlled from read information by this reading means, is provided. COPYRIGHT: (C)1996, JPO&Japio

Classes/Indexing

IPC

IPC Code(1-7) **A47F 10/06** A23L 1/00 A47G 23/08 B65G 43/08 G06F 17/60

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Current IPC	Invention	Version	Additional	Version
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Main Group	-	-	-	-
Subclass	-	-	-	-

Legal Status

INPADOC Legal Status

Gazette Date	Code	Description
2014-06-17	EXPY -	CANCELLATION BECAUSE OF COMPLETION OF TERM
2014-01-21	R250 +	RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250
2012-01-10	FPAY +	RENEWAL FEE PAYMENT (EVENT DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20130218
2011-01-18	FPAY +	RENEWAL FEE PAYMENT (EVENT DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20120218
2008-01-08	FPAY +	RENEWAL FEE PAYMENT (EVENT DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20110218
2007-12-27	FPAY +	RENEWAL FEE PAYMENT (EVENT DATE IS RENEWAL DATE OF DATABASE) PAYMENT UNTIL: 20080218
2005-02-15	R250 +	RECEIPT OF ANNUAL FEES JAPANESE INTERMEDIATE CODE: R250
2004-09-10	R350	WRITTEN NOTIFICATION OF REGISTRATION OF TRANSFER JAPANESE INTERMEDIATE CODE: R350
2004-09-02	S111	REQUEST FOR CHANGE OF OWNERSHIP OR PART OF OWNERSHIP JAPANESE INTERMEDIATE CODE: R313113

Get Family Legal Status

Family

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Expand INPADOC Family (2)

Expand DWPI Family (2); Countries (1)

Claims

No Claims exist for this Record

Description

Description

Expand Description

Citations

Citation *Record level*

Expand Citing Patents (25)

Expand Cited Patents (3)

Cited Non-patents (0)

DPCI Citation *Patent family level*

Expand DPCI Citing Patents (13)

Expand DPCI Cited Patents (3)

DPCI Cited Non-patents (0)

Expand DPCI Citation Counts

DPCI Field of Search

-

DPCI Citing Patents Country

JP; US

DPCI Cited Patents Country

JP

Other

No Other exists for this Record

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Ａ４７Ｇ　23/08		Ｚ		
// Ｂ６５Ｇ　43/08		Ｃ		
			Ｇ０６Ｆ　15/ 21	Ｚ

審査請求　未請求　請求項の数３　ＯＬ　（全　６　頁）　最終頁に続く

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(22)出願日　平成６年(1994)６月17日

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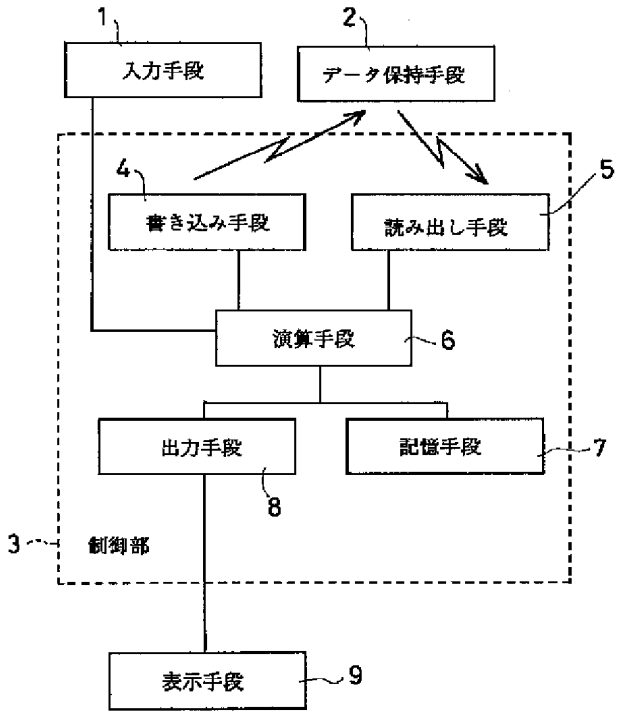
(74)代理人　弁理士　田澤　博昭　（外１名）

(54)【発明の名称】　生鮮食品の管理方法およびその装置

(57)【要約】

【目的】　製造時期や賞味期間が異なる生鮮食品ないしは多数の種類の生鮮食品が混在する製造場所や販売場所において、個々の生鮮食品の鮮度や売れ筋、あるいは損失の管理を高い精度をもって行なう。

【構成】　生鮮食品２２を収容手段２１に入れた状態で、この収容手段２１を搬送手段２３によって搬送し、収容手段２１に設けたデータ保持手段２に、生鮮食品２２の調整時点における個々の情報を書き込み、かつデータ保持手段２が記憶している情報を読み取り手段５によって読み取り、この読み取り手段５によって読み取った情報から上記生鮮食品２２の状況を管理する方法である。



【特許請求の範囲】
【請求項１】　生鮮食品を収容手段に入れた状態で、この収容手段を搬送手段によって搬送するとともに、上記収容手段に設けたデータ保持手段に、上記生鮮食品の調整時点における個々の情報を書き込み、かつ上記データ保持手段が記憶している情報を読み取り手段によって読み取り、この読み取り手段によって読み取った情報から上記生鮮食品の状況を管理する生鮮食品の管理方法。
【請求項２】　生鮮食品を入れる収容手段と、この収容手段を搬送する搬送手段と、上記収容手段に設けられ、上記生鮮食品の情報を記憶するデータ保持手段と、このデータ保持手段に上記生鮮食品の情報を書き込む書き込み手段と、この書き込み手段に外部からデータを入力する入力手段と、上記データ保持手段が記憶している情報を読み取る読み取り手段を備えた生鮮食品の管理装置。
【請求項３】　エンドレスに構成された搬送手段と、この搬送手段によって搬送され、かつ生鮮食品を入れる収容手段と、この収容手段に設けられ、上記生鮮食品の情報を記憶するデータ保持手段と、このデータ保持手段に上記生鮮食品の情報を書き込む書き込み手段と、この書き込み手段に外部からデータを入力する入力手段と、上記データ保持手段が記憶している情報を読み取る読み取り手段を備えた生鮮食品の管理装置。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】この発明は、例えば回転寿司等の生鮮食品の管理に適用することが可能な生鮮食品の管理方法およびその装置に関するものである。
【０００２】
【従来の技術】図７は従来の生鮮食品の管理の対象となる装置を示す図である。以下、従来の生鮮食品の管理を回転寿司の装置に適用した場合について説明する。すなわち図７において、２７は回転寿司店に置けるカウンター、２３はこのカウンター２７に沿って設置された搬送手段で、例えばコンベア、２１はこの搬送手段２３上に載せられた収容手段で、例えば皿である。２２はこの皿に載せられた生鮮食品、例えば寿司である。
【０００３】次に動作について説明する。図７に示す構成において、生鮮食品２２例えば寿司等は寿司職人によって調理された後、収容手段２１に入れられ、すなわち寿司鉢に入れられたり、皿などの器に載せられ、必要に応じて透明のプラスチックカバー等をかけた状態で、搬送手段２３上に置かれる。搬送手段２３は例えばカウンター２７に沿ってエンドレスで移動する。ところで、カウンター２７についた客は搬送手段２３上から好みの生鮮食品２２の載った収容手段２１容器を自ら取る。そして搬送手段２３上の収容手段２１が減少すると、寿司職人は新たに寿司を調整し、これを収容手段２１に盛って、順次搬送手段２３上に追加する。このため搬送手段２３上には新旧両調理食品が混在することになる。ところが人気のない生鮮食品２２はカウンター２７の同じ地点を何回も通過し、その間にその生鮮食品２２の鮮度が落ちてくる。そこで寿司職人は調整の合間、より具体的には昼食の繁忙期が過ぎた頃から夕方の来客が増え始めるまでの閑散期に搬送手段２３上を見渡し、経験と感によって生鮮食品２２の鮮度を観察する。そして売れ残った場合にはそれを処分する。さらに閉店時に搬送手段２３上に残った生鮮食品２２も同様に処分する。
【０００４】
【発明が解決しようとする課題】従来の生鮮食品の管理は上述のように、一人の調理師が生鮮食品２２を調整する場合で、搬送手段２３そのものが小規模のときには調理師の感や熟練によって比較的管理がしやすいものの、調理師が複数人になった場合、調理品目が多い場合、あるいは回転寿司の装置が大規模になったときには調理師は回転中の生鮮食品２２が調理時点からさほど時間が経っていないものなのか、あるいはその生鮮食品２２が調理時点からかなり経過したものなのか、すなわち生鮮食品２２の鮮度を判別することが困難となる。このため、調理時点から時間がかなり経過した生鮮食品２２であるにもかかわらず、取り除かれない生鮮食品２２すなわち売れ残った商品は長時間にわたって回り続けることになる。これは営業上の無駄となるばかりか、客に対し、不快な印象を与え、店のイメージダウンに繋がりかねない。しかも人気のない商品は季節、または同じ日でも時刻や気候、あるいは客層によって変化するもので、さらに生鮮食品２２の調理時点からの経過時間も正確に把握できないという問題点があった。同時に商品の売れ筋管理や損失管理も難しいという問題点があった。
【０００５】この発明は、上記のような問題点を解決するためになされたものであり、製造時期や賞味期間が異なる生鮮食品ないしは多数の種類の生鮮食品が混在する製造場所や販売場所において、個々の生鮮食品の鮮度や売れ筋、あるいは損失の管理を高い精度をもって行なうことを目的とするものである。
【０００６】
【課題を解決するための手段】請求項１の発明は、生鮮食品を収容手段に入れた状態で、この収容手段を搬送手段によって搬送し、収容手段に設けたデータ保持手段に、生鮮食品の調整時点における個々の情報を書き込み、かつデータ保持手段が記憶している情報を読み取り手段によって読み取り、この読み取り手段によって読み取った情報から上記生鮮食品の状況を管理する生鮮食品の管理方法である。
【０００７】請求項２の発明は、生鮮食品を入れる収容手段と、この収容手段を搬送する搬送手段と、収容手段に設けられ、生鮮食品の情報を記憶するデータ保持手段と、このデータ保持手段に生鮮食品の情報を書き込む書き込み手段と、この書き込み手段に外部からデータを入力する入力手段と、データ保持手段が記憶している情報

を読み取る読み取り手段を備えている。

【０００８】請求項３の発明は、エンドレスに構成された搬送手段と、この搬送手段によって搬送され、かつ生鮮食品を入れる収容手段と、この収容手段に設けられ、生鮮食品の情報を記憶するデータ保持手段と、このデータ保持手段に生鮮食品の情報を書き込む書き込み手段と、この書き込み手段に外部からデータを入力する入力手段と、データ保持手段が記憶している情報を読み取る読み取り手段を備えている。

【０００９】

【作用】請求項１の発明は、搬送手段によって生鮮食品を搬送する過程で、読み取り手段によってデータ保持手段に記憶された生鮮食品に関する種々の情報を読み取り、この読み取った情報から生鮮食品の各種状況を管理する。

【００１０】請求項２の発明は、請求項１の発明と同様に、搬送手段によって生鮮食品を搬送する過程で、読み取り手段によってデータ保持手段に記憶された生鮮食品に関する種々の情報を読み取り、この読み取った情報から生鮮食品の各種状況を管理する。

【００１１】請求項３の発明は、請求項１の発明と同様に、搬送手段によって生鮮食品を搬送する過程で、読み取り手段によってデータ保持手段に記憶された生鮮食品に関する種々の情報を読み取り、この読み取った情報から生鮮食品の各種状況を管理するもので、情報の読み出しは搬送手段上に設けられた読み取り手段を経過する旅に繰り返し行なわれる。

【００１２】

【実施例】以下、この発明における生鮮食品の管理方法およびその装置の一実施例を回転寿司に適用した場合について、図を参照して説明する。図１はこの発明における生鮮食品の管理方法およびその装置を適用した回転寿司のブロック図、図２は図１における主要部の詳細を示すブロック図、図３は回転寿司装置の概要を示す平面図、図４は回転寿司装置の縦断面図、図５はこれら回転寿司装置の動作を示すフローチャート、図６は入力装置のモニター表示である。なお、この発明において、生鮮食品２１とは魚介類、卵、牛乳、肉、野菜あるいは調理師によって作られる料理を指す。また収容手段２１とは生鮮食品２２を載せたり、入れたり包装するもので、例えば器、トレイ、皿、鍋等である。

【００１３】図１ないし図３において、１は入力手段で、この入力手段１は例えばキーボードやタッチパネルセンサー、静電容量式パネルセンサー等により構成される。２はデータ保持手段で、このデータ保持手段２は例えばＩＤタグにより構成される。３は制御部である。制御部３は書き込み手段４、読み取り手段５、演算手段６、記憶手段７および出力手段８から構成される。そして入力手段１は演算手段６に接続され、データ保持手段２に書き込むべきデータを入力するようにされている。書き込み手段４は演算手段６に接続され、また読み取り手段５は演算手段６に接続される。さらに演算手段６には記憶手段７および出力手段８が接続される。出力手段８は表示手段９に接続される。なお、入力手段１は例えば図６に示すような表示画面１０を有している。

【００１４】図２において、書き込み手段４は、演算手段６とのアクセスを司るインターフェイス１１、ＣＰＵ１２および書き込みデータをデータ保持手段２に送出する送信機１３を備えている。また読み取り手段５はデータ保持手段２からのデータを受信する受信機１４、ＣＰＵ１５および演算手段６とのアクセスを司るインターフェイス１６を備えている。なお、それらインターフェイス１１、ＣＰＵ１２、送信機１３、受信機１４、ＣＰＵ１５およびインターフェイス１６は回路的に適宜共通化でき、またＣＰＵ１２および１５は演算手段６と共通にすることができることはいうまでもない。

【００１５】一方データ保持手段２は書き込み手段４の送信機１３とアクセスする送受信機１７、ＣＰＵ１８、メモリ１９および電源２０を備えている。なおこの電源２０は電池などで構成されるかあるいは送受信機１７を通して、書き込み手段４側から供給される信号の一部を電力に変換することにより実現することができる。

【００１６】図３および図４において、データ保持手段２は収容手段２１例えば皿に対し、貼り付けあるいは埋設等の手段により設けられる。２２は生鮮食品で、例えば調理師によって調整された寿司である。２３は収容手段２１を搬送する搬送手段で、例えば閉ループを形成するように無端のコンベア等により構成されている。書き込み手段４は搬送手段２３の搬送ライン上において、例えば製造部門２４すなわち調理部に側に設けられる。読み取り手段５は搬送手段２３の搬送ライン上において、例えば販売部門２５側に設けられる。２６は搬送手段２３に近接して設けた排出手段で、出力手段８の選択的な出力により収容手段２１を搬送手段２３すなわち搬送ラインから排除するものである。なお、２７はカウンターである。

【００１７】上記構成において、生鮮食品２２の管理について図５を中心に、図１、図３、図４および図６を参照して説明する。

（ステップＳ１，Ｓ２）製造部門２４において調理師すなわち寿司職人は生鮮食品２２すなわち寿司を調整し、この寿司を収容手段２１に入れるとともに、入力手段１によって生鮮食品２２すなわち寿司の種類を入力する。

（ステップＳ３）演算手段６は入力手段１からの入力信号を受け、寿司の種類に、入力時点における時刻や金額を必要に応じて順次付け加えて基本データを作成する。

（ステップＳ４）入力手段１のディスプレイには例えば図６に示すような内容の基本データが表示される。

（ステップＳ５）同時に基本データは記憶手段７に蓄えられる。

（ステップＳ６）一方、演算手段６は基本データを書き込み手段４に出力する。この出力をインターフェイス１１を通して受けた書き込み手段４はＣＰＵ１２および送信機１４を通して基本データをデータ保持手段２に任意の手段例えば磁気結合あるいは無線通信により送信する。

（ステップＳ７）データ保持手段２は基本データを送受信機１７およびＣＰＵ１８を通してメモリ１９に保存する。

（ステップＳ８）寿司の載せられた収容手段２１すなわち皿は搬送手段２３によって搬送ライン上を搬送され、搬送の途中において、皿は読み取り手段５に接近する。このときデータ保持手段２はこのデータ保持手段２に記憶しているデータを任意の方法例えば磁気結合や無線通信により交信する。

（ステップＳ９）読み取り手段５はその各データ保持手段２が記憶している基本データを演算手段６に出力する。演算手段６はこの基本データと自己が保有する現在のデータとからその寿司の鮮度を演算する。

（ステップＳ１０）その鮮度があらかじめ設定された範囲にあるときには、表示手段９はその旨表示する。

（ステップＳ１１）生鮮食品２２を載せた皿は引き続き搬送手段２３によって搬送される。

（ステップＳ１２）演算手段６は搬送を継続している生鮮食品２２のデータを算出し、これを記憶手段７に記憶させる。

（ステップＳ１３）その鮮度があらかじめ設定された範囲外にあるときすなわち調理してから所定の時間が経過しているときや賞味期間を過ぎているときには、演算手段６は出力手段８を通して表示手段９にその旨出力する。表示手段９はその旨を表示する。

（ステップＳ１４）賞味期間が過ぎている生鮮食品２２は排出手段２６によって搬送手段２３すなわち搬送ラインから排除される。

（ステップＳ１５）演算手段６は排除した生鮮食品２２の数量を演算し、これを記憶手段８に記憶させる。

（ステップＳ１６）演算手段６は搬送を継続している生鮮食品２２の数量や排除した数量等のデータから、生鮮食品２２の売上高や、売れ筋、平均滞留時間あるいは損失などの管理情報を演算する。

【００１８】

【発明の効果】以上説明したように、請求項１の発明にかかる生鮮食品生鮮食品の管理方法は、収容手段にデータ保持手段を設け、かつ生鮮食品を収容手段に入れ、この収容手段を搬送手段によって搬送し、この過程において収容手段に設けたデータ保持手段に、生鮮食品の調整時点における個々の情報を書き込み、さらにデータ保持手段が記憶している情報を読み取り手段によって読み取り、その情報から生鮮食品の状況を管理するようにしているので、製造時期や賞味期間が異なる生鮮食品ないしは多数の種類の生鮮食品が混在する製造場所や販売場所において、個々の生鮮食品の鮮度管理を高い精度をもって行なうことができ、しかも生鮮食品の売れ筋管理あるいは損失の管理を正確に行なうことができるという効果がある。

【００１９】請求項２の発明は、生鮮食品を入れる収容手段と、この収容手段を搬送する搬送手段と、収容手段に設けられ、生鮮食品の情報を記憶するデータ保持手段と、このデータ保持手段に生鮮食品の情報を書き込む書き込み手段と、この書き込み手段に外部からデータを入力する入力手段と、データ保持手段が記憶している情報を読み取る読み取り手段を備えているので、請求項１と同様に製造時期や賞味期間が異なる生鮮食品ないしは多数の種類の生鮮食品が混在する製造場所や販売場所において、個々の生鮮食品の鮮度管理を高い精度をもって行なうことができ、かつ生鮮食品の売れ筋管理あるいは損失の管理を正確に行なうことができるという効果がある。

【００２０】請求項３の発明は、エンドレスに構成された搬送手段と、この搬送手段によって搬送され、かつ生鮮食品を入れる収容手段と、この収容手段に設けられ、生鮮食品の情報を記憶するデータ保持手段と、このデータ保持手段に生鮮食品の情報を書き込む書き込み手段と、この書き込み手段に外部からデータを入力する入力手段と、データ保持手段が記憶している情報を読み取る読み取り手段を備えているので、請求項１と同様に製造時期や賞味期間が異なる生鮮食品ないしは多数の種類の生鮮食品が混在する製造場所や販売場所において、個々の生鮮食品の鮮度管理を高い精度をもって行なうことができ、とくに生鮮食品をエンドレスで搬送させる必要がある場合には極めて効率的であるという利点がある。しかも生鮮食品の売れ筋管理あるいは損失の管理を正確に行なうことができるなどの効果がある。

【図面の簡単な説明】

【図１】この発明における生鮮食品の管理方法およびその装置の一実施例を示すブロック図である。

【図２】図１における書き込み手段、読み取り手段およびデータ保持手段のより具体的な構成を説明するためのブロック図である。

【図３】この発明における生鮮食品の管理方法およびその装置を回転寿司に適用した状態の平面図である。

【図４】図３の４－４線に添って切断し、これを矢印方向に見た縦断面図である。

【図５】この発明におけ生鮮食品の管理方法およびその装置のフローチャートである。

【図６】入力手段の表示画面の例を示す説明図である。

【図７】従来の装置を示す回転寿司の平面図である。

【符号の説明】

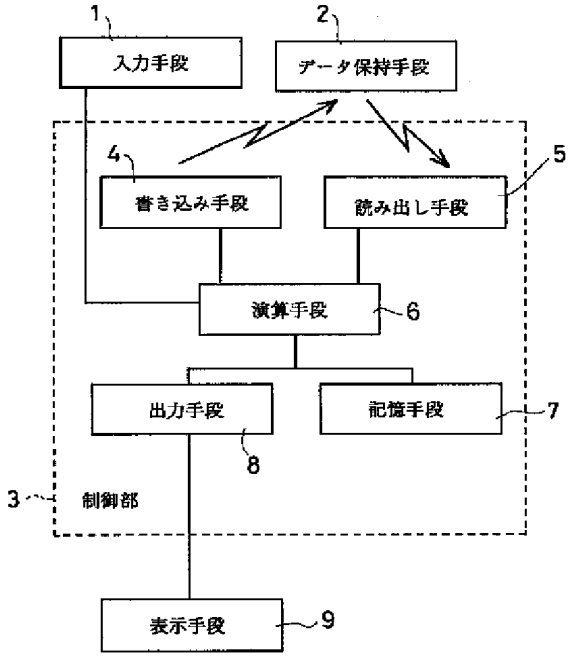
１　入力手段

２　データ保持手段

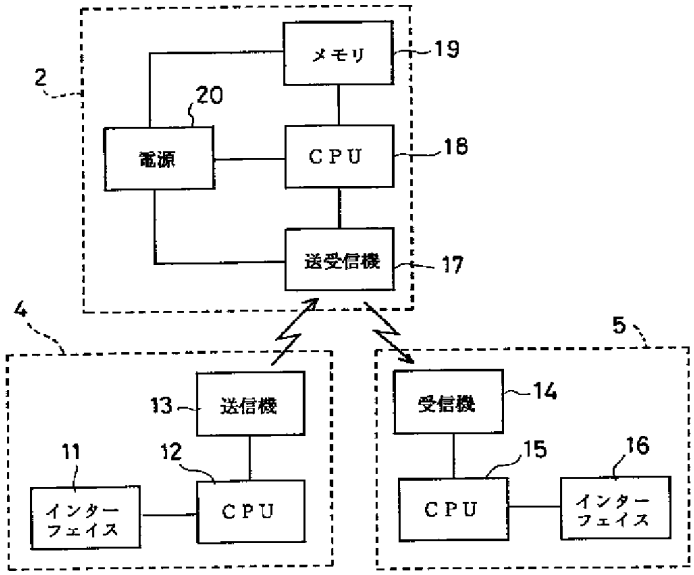
４　書き込み手段
５　読み取り手段
６　演算手段

２１　収容手段
２３　搬送手段

【図１】

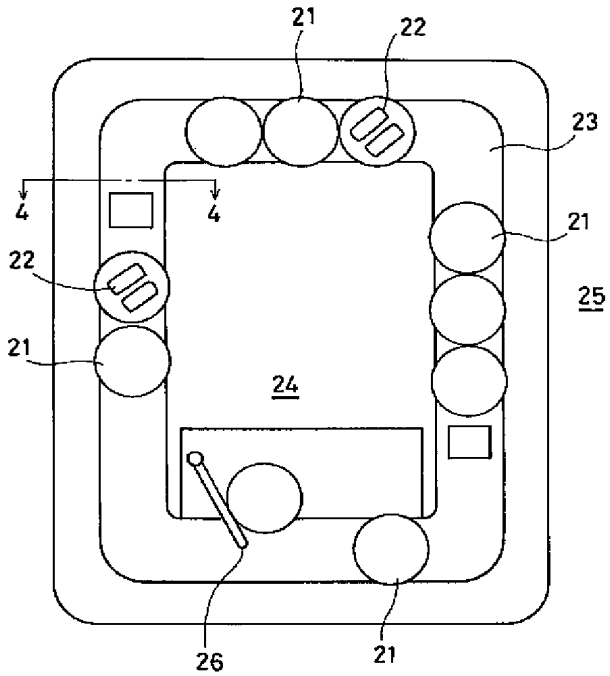


【図２】

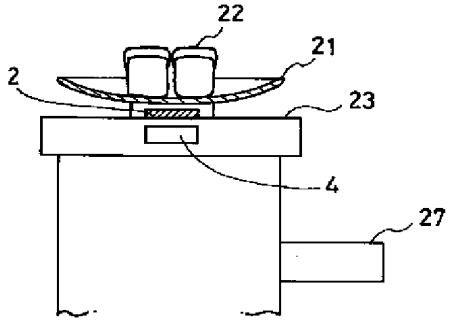


【図４】

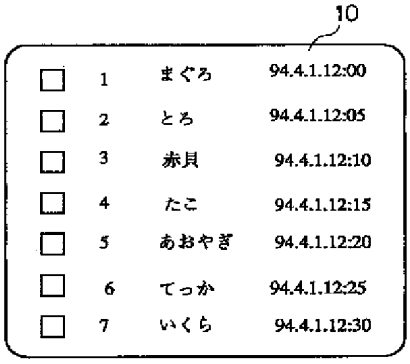
【図３】



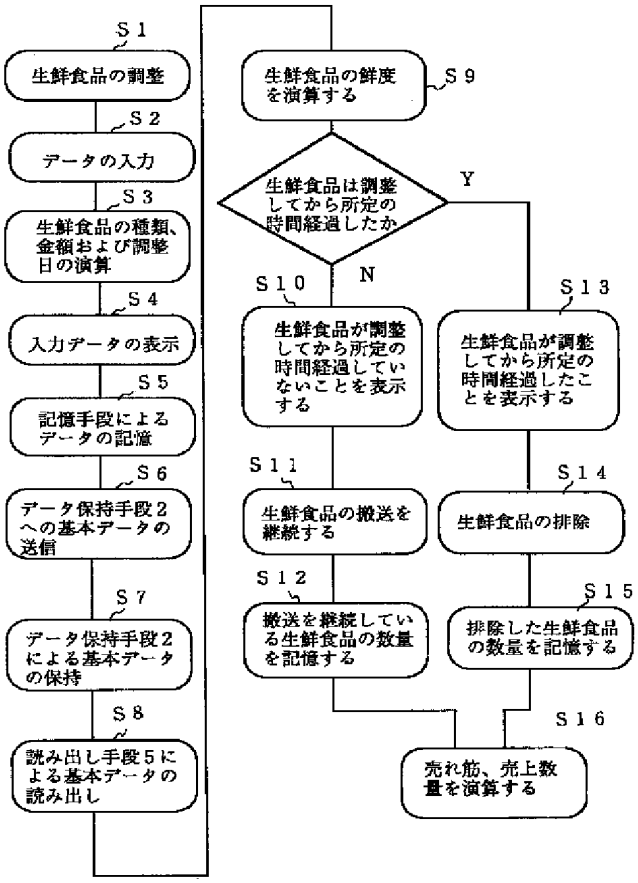
２１：収容手段
２３：搬送手段



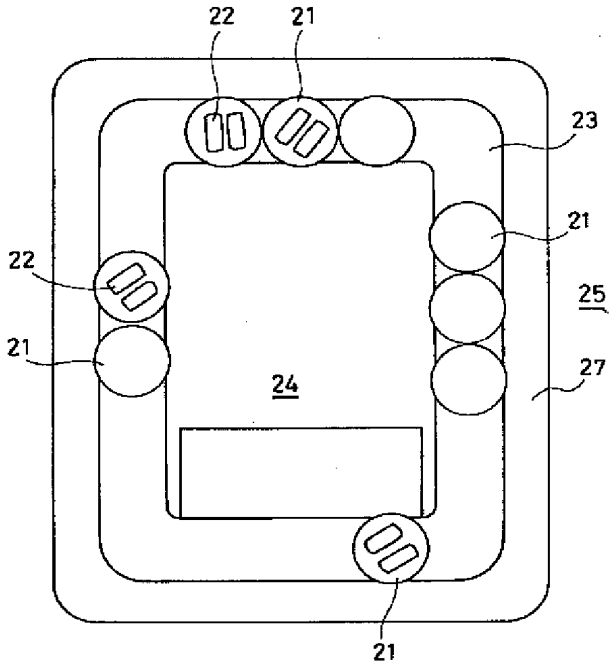
【図６】



【図５】



【図７】



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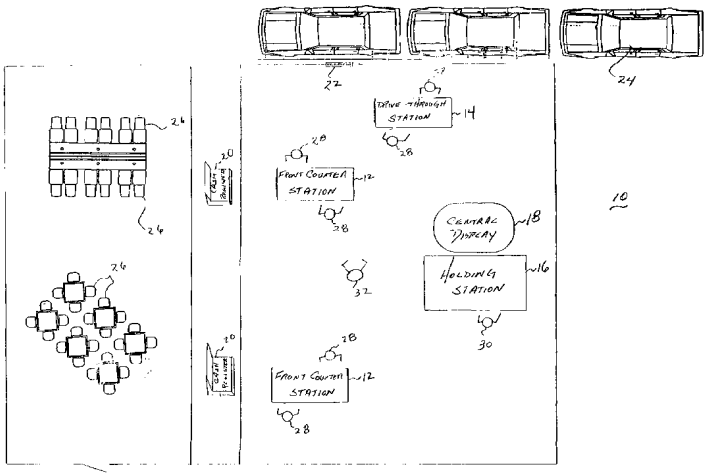
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(54) Title: METHOD AND APPARATUS FOR MONITORING THE STATUS AND TRANSFER OF FOOD PRODUCTS



(57) Abstract: A system (10) and method is provided for monitoring a status of plural products, such as prepared food, located in product locations (12, 14, 16) throughout a restaurant. The status of each product indicates whether that product exists in a particular storage location, and whether that product has exceeded its shelf life or hold time. A cook time, which is that duration of time required to cook a particular product, is also maintained for each of the products. The status indicates when additional product should be cooked in order to have new product prior to the expiration of existing product by indicating when the hold time less the cook time has elapsed. The status also indicates which product is the oldest to facilitate the transfer and use of the oldest product first. A transfer of one product to another product location automatically transfers the corresponding elapsed storage time with that product.

WO 01/31533 A1

METHOD AND APPARATUS FOR MONITORING THE STATUS AND TRANSFER OF FOOD PRODUCTS

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/160,878, filed October 22, 1999, which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to systems which monitor a status of a product, such as prepared food, and more specifically relates to automated product status systems which communicate the status of multiple food products to food preparers, and enable the transfer of food products within the system.

Description of the Prior Art

The control of product freshness and quality has always been a major concern with industries, such as restaurants, dealing with the sale of perishable goods, such as prepared foods. Numerous inventory control systems exist which track parameters such as the origin, quantity used, quantity stored and the age of products. However, an automated system, which monitors the shelf life of perishable goods, has not yet been placed into practice. In addition, many of the systems and methods for monitoring product status currently in use cannot ensure that the oldest product is used first or that available product is optimally used to minimize waste. Therefore, it would be advantageous if such a system or method could accurately and efficiently track the status of perishable goods while providing a means for reducing the amount of waste.

In the restaurant industry, at least two durations of time become important variables to monitor. One is a hold time, which is the shelf life of prepared food or the duration of time during which a particular product meets a set of standards imposed by the food provider. The second variable is a cook time, which is the duration of time required to cook and/or prepare additional product. The cook time must be accounted for if product is to be continually available. In conventional product status systems, employees or workers engaged in the preparation of food typically monitor the hold and cook times, and are required to set, monitor and reset a different timer for each of the large number of food products being sold. Such a situation results in a tremendous inefficiency in the use of manpower and a reduction in productivity. In addition, the potential for human error can lead to an unacceptable or dangerous product being sold to the consumer. Therefore, it would be advantageous if the hold time, cook time and other variables relevant to the preparation and sale of the food product could be automatically monitored and provided to the worker in summary format without undue human intervention.

In most restaurants, the status of products and the need for additional products is communicated by shouting requests or commands across the kitchen or other food preparation area. This results in additional noise, confusion and often misinformation, which ultimately affects the quality of the food being provided to the consumer as well as the environment, provided for the consumers enjoyment within the restaurant. Therefore, a system and method that could effectively communicate the status of each of many products being offered for sale to all workers without the need for individual communication between workers would be advantageous.

Conventional methods of tracking product status do not provide an efficient means for collecting and processing information concerning loss or waste of perishable goods once they have been prepared for sale; the rate of sale for each product during different periods of the day and promotional events; and worker productivity. Therefore, it would be advantageous if a product status system could

provide information on such variables for use in management databases and as a planning tool.

Many of the product status systems in the prior art, such as those using individual timers monitored by workers for each of a number of different products being sold, require that additional timers be used, and that the workers become familiar with additional hold and cook times when new and/or different products are sold. Therefore, it would be advantageous if a product status system was flexible and readily upgradeable to adapt to different types and quantities of food products without burdening the workers and decreasing productivity.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the present invention to provide a product status system and a method for indicating the stock status of food products, which communicate the status of food products to all workers rather than requiring individual communication between workers.

It is another object of the present invention to provide a product status system and a method for indicating the stock status of food products, which monitor shelf life and displays stock status corresponding to a pan of food product in digital format to reduce errors.

It is yet another object of the present invention to provide a product status system and a method for monitoring the status of food products, which enable complete or partial transfers of a food product throughout the system to ensure availability of the food product according to demand from different locations in the system.

It is a further object of the present invention to provide a product status system and a method for monitoring the status of food products, which do not permit cross

transfers between pans of food products located in non-corresponding locations unless specifically programmed to do so.

It is an object of the present invention to provide a product status system and a method for monitoring the status of food products, which enable station worker interface boards to be substantially identical regardless of whether they are mounted on the front or rear of the station.

It is another object of the present invention to provide a product status system and a method for programming and displaying the amount of food products to be prepared that can be manually adjusted or automated according to the time, the day, promotional events, the anticipated rate of sale, and the like.

It is yet another object of the present invention to provide a product status system and a method for monitoring the status of food products that facilitates the use of the oldest food product first, thereby decreasing the waste of perishable goods.

It is a further object of the present invention to provide a product status system, which is flexible and readily upgradeable and/or programmable to meet the requirements imposed by different types and quantities of food products offered for sale.

It is an object of the present invention to provide a product status system and a method for monitoring the status of food products, which eliminate the need for workers to monitor individual variables for a variety of food products being sold, such as a shelf life, a stock status and a quantity of food product to cook, which improves overall operational efficiency, decreases waste associated with a perishable food product, decreases the manpower required to prepare the food product for sale and increases the efficiency of individual workers.

In accordance with the present invention, a product status system is provided which monitors the status and storage location of a prepared food product including a

processing circuit, a food product status switch, a food product status indicator, and a storage timer. The food product status indicator displays the status of the food product in a particular storage location. The storage timer counts the duration of time the food product has been stored at the storage location. The status indicates whether or not the prepared food product is available in the storage location, whether the storage time of the food product has exceeded an acceptable food product hold time, and when additional food product should be cooked in order to be ready before the storage time of existing food product exceeds the hold time.

The product status system can include a plurality of storage locations, such as a source storage location and a destination storage location, between which the food product is transferred along with the storage time associated therewith. In this case, the storage time from the source storage location is transferred to a destination storage timer associated with the destination storage location, and the destination storage timer counts the duration of time the food product has been stored at both the source and destination storage locations. The status can also indicate which of two or more source storage locations contains the food product, which has been stored for the greatest length of time to facilitate use of the oldest product first. In addition, the status can indicate which of two or more destination storage locations to transfer a given food product into.

The product status system can include a display which displays the status, a pan fill level, an activity level and a day part associated with the prepared food product. Each of the food products can have a different pan fill level associated therewith, which represents a quantity of food product to prepare when the associated storage location becomes empty. The activity level represents an overall rate of sale for all of the food products in a restaurant, and can affect the pan fill level for any or all of the food products.

In further accordance with the present invention, a method for monitoring the status and storage location of a prepared food product is provided, which includes the steps of supplying the prepared food product to the storage location, changing the state

of the food product status indicator, initiating a storage timer to count the storage time for the food product in the storage location, comparing the storage time with the acceptable food product hold time, changing the state of the food product status indicator if the storage time exceeds the hold time and changing the state of the food product status indicator when the storage location no longer contains the food product.

The storage time can be transferred with the food product if there are two or more storage locations, such as the source storage location and the destination storage location. In this case, the state of the food product status indicator is changed to indicate when the duration of time the food product has been stored at both the source and destination storage location exceeds the hold time. The state of the food product status indicator can also be changed to indicate which of two or more storage locations contains food product which has been stored longer, and which of two or more storage locations a given food product undergoing a transfer can be transferred into.

These and other objects, features, and advantages of the present invention will be apparent from the following detailed description of illustrative embodiments thereof, which is to be read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a product status and transfer system formed in accordance with the present invention and applied to a restaurant.

Figure 2 is a front view of a workstation, such as a drive-through station, a front counter station, or a holding station of the product status and transfer system formed in accordance with the present invention.

Figure 3 is a front view of a display and the holding station of the product status and transfer system formed in accordance with the present invention.

Figure 4 is an enlarged view of the display shown in Figure 3.

Figure 5A shows a product label, product status switches, and product status indicators, which are located on the stations formed in accordance with the present invention.

Figure 5B shows an active switch, an active indicator, a transfer switch, and a transfer indicator, which are located on the stations formed in accordance with the present invention.

Figure 6 is a flowchart of an active/inactive station routine used in a method formed in accordance with the present invention.

Figures 7A & 7B are flowcharts of a product transfer routine used in the method formed in accordance with the present invention.

Figure 8A is a flowchart summarizing the product transfer routine shown in Figures 7A and 7B.

Figure 8B is a block diagram showing the operation of a multiple transfer used in the method formed in accordance with the present invention.

Figure 8C is a flowchart of a minimum stock level routine formed in accordance with the present invention.

Figures 8D and 8E show a front and rear view of the holding station, respectively.

Figure 8F shows a flowchart for a product transfer algorithm formed in accordance with the present invention.

Figures 9A and 9B are flowcharts of the method for monitoring a status for each of a plurality of products formed in accordance with the present invention.

Figure 10 is a circuit board level block diagram of the product status and transfer system formed in accordance with the present invention.

Figure 11 is a schematic diagram of a station/worker interface board (SWIB) of the product status and transfer system formed in accordance with the present invention.

Figure 12 is a schematic diagram of an active/transfer board (ATB) of the product status and transfer system formed in accordance with the present invention.

Figure 13 is a schematic diagram of a station interface board (SIB) of the product status and transfer system formed in accordance with the present invention.

Figures 14A and 14B are schematic diagrams of a station control board (SCB) of the product status and transfer system formed in accordance with the present invention.

Figures 15A-15L are schematic diagrams of a display board (CDB) of the product status and transfer system formed in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Top Level Description of Product Status and Transfer System

Figure 1 shows a top-level block diagram of a product status and transfer system 10 formed in accordance with the present invention and applied to a restaurant serving prepared food. The product status and transfer system (PSTS) 10 preferably

includes one or more front counter stations 12, one or more drive-through stations 14, a holding station 16, and a display 18. The display 18 may be centrally located. The front counter station 12 is preferably located near a serving counter and a corresponding cash register 20. The drive-through station 14 is preferably located near a window 22 through which workers service drive-up customers in their cars 24. The holding station 16 and the display 18 are preferably located in a centralized location, which is readily accessible to the front counter stations 12 and the drive-through station 14. Seating 26 may also be provided within the restaurant.

The drive-through station 14 and the front counter stations 12 preferably each enable two sandwich makers 28 standing on opposing sides of the stations 12, 14 to remove cooked product from the stations 12, 14 and to prepare the cooked product for sale to a consumer. The holding station 16 preferably enables at least one expeditor 30 to cook the food product and place the cooked product into the holding station 16. A store manager 32 is preferably responsible for managing the operation of the restaurant. The sandwich makers 28 and the expeditor 30 are collectively referred to as workers 28 or workers 30 according to the station they are working at.

Figure 2 shows a pictorial representation of a front view of the front counter station 12, drive-through station 14 and holding station 16, which are collectively referred to as the station 12, 14, 16. The station 12, 14, 16 preferably includes at least one active switch 34, at least one active indicator 36, at least one transfer switch 38, at least one transfer indicator 40, product status switches 42, product status indicators 44 and product labels 46. The holding station 16 is substantially the same as the front counter station 12 and the drive-through station 14, except that the holding station 16 is preferably designed for use by one worker 30. Thus, since the product located in the holding station 30 is intended to be accessed by only one worker 30, preferably only one active switch 34, one active indicator 36, one transfer switch 38 and one transfer indicator 40 exist on the holding station 16. In contrast, two of each of these switches and indicators exist on each of the front counter station 12 and the drive-through stations 14.

The stations 12, 14, 16 can preferably each accommodate up to 24 different pans 48 of food product as shown in Figure 2. Each product status switch 42 and product status indicator 44 corresponds to a particular pan 48 of product. The stations 12, 14, 16 preferably include three rows 50 of product status switches 42, product status indicators 44 and product labels 46. Each row 50 corresponds to an upper row of pans 52 and a lower row of pans 54. The upper row of pans 52 is preferably used by the worker 28 on one side of the station 12, 14, while the lower row of pans 54 is preferably used by the worker 28 on the opposing side of the station 12, 14. Thus, the upper row of pans 52 holds what is preferably considered to be primary pans by the worker on one side of the station 12, 14, while the lower row of pans 54 holds what is preferably considered to be secondary pans by the worker 28 on the opposing side of the station 12, 14. Conversely, the lower row of pans 54 holds what is considered to be primary pans by the worker 28 on one side of the station 12, 14, while the upper row of pans 52 holds what is considered to be secondary pans by the worker 28 on the opposing side of the station 12, 14. The primary pan corresponding to a particular side of the station 12, 14 is preferably used exclusively by the worker 28 located on that side of the station 12, 14. However, should the primary pan be empty, the worker 28 can use the product located in what is considered to be the secondary pan (which is considered the primary pan for the worker 28 on the opposing side of the station 12, 14).

The use of upper and lower rows of pans 52, 54 effectively enables two workers 28 to work at the station 12, 14 simultaneously without interfering with each other. Since as already described, there is preferably only one worker 30 at the holding station 16, that worker 30 preferably has equal access to both upper and lower rows of pans 52, 54. The food products are preferably located within pans 48 at the stations 12, 14, 16 which are ergonomically advantageous according to a rate of sale for that product. In other words, those products that are sold most often are preferably placed in the location most easily accessed by the worker at the station 12, 14, 16. Also, the same product is preferably placed in substantially the same location in each of the stations 12, 14, 16.

The product label 46 preferably indicates the identity of the food product or the selectable menu, which is located in the pan 48 immediately above and immediately below the product label 46. It is important to note that the product label 46, the food product status switch 42, and the food product status indicator 44 are preferably located in alignment with the corresponding food product pan 48. Alternatively, the identity of the food product or selectable menu associated with the pan 48 may be electronically displayed and changed in response to a selectable menu switch. The products immediately above and below the product label 46 are preferably the same since this allows two workers 28 to access the same product at the same station simultaneously, as well as the concept of primary and secondary pans described above.

The product status indicators 44 are preferably shaped in the form of an arrow. The product status switch 42 and the product status indicator 44 modify and indicate, respectively, the status of the products located in the pan pointed to by the corresponding product status indicator 44. For instance, as shown in Figure 2, the product label 46, the product status indicator 44A and the product status switch 42A correspond to an upper pan 48A. Likewise, the product label 46, the product status indicator 44B and the product status switch 42B correspond to a lower pan 48B. If the products in corresponding upper and lower pans are different, the product label 46 can be divided into an upper portion indicating the identity of the product in the upper pan 48A, and a lower portion indicating the identity of the product in the lower pan 48B.

The active switch 34 and the active indicator 36 can modify and display the activity of the station 12, 14, 16. The transfer switch 38 and the transfer indicator 40 are used to initiate and indicate a transfer of the food product between locations in the same or different stations 12, 14, 16.

Figure 3 shows the holding station 16, which is equivalent to the drive-through station 14 and the front counter station 12, except that one worker 30 preferably operates the holding station 16, and both the upper and lower rows of product pans 52, 54 are accessed by that worker 30. In addition, the display 18 is preferably located in

a position which is viewable by the worker 30 operating the holding station 16, such as above the holding station 16 as shown in Figure 3.

Top Level Summary of Operation

At the beginning of a day in the restaurant, the worker 30 situated in front of the holding station 16 cooks a predetermined quantity or pan fill level of each product as indicated on the display 18, and stores the cooked product in the appropriate pan 48 in the holding station 16. Each product has a corresponding hold time, which represents a shelf life of the cooked product or a duration of time during which the product has an acceptable quality and can be served to consumers. The worker 30 then presses the product status switch 42 on the holding station 16 corresponding to the pan 48 just filled indicating the presence of cooked product, and triggering a timer corresponding to the location just filled to initiate a count of the storage time for the corresponding food product. The cooked product is then transferred from the holding station 16 to the front station 12 and the drive-through station 14 along with the storage time corresponding to the product being transferred.

As product is prepared and sold to consumers, the cooked food products at the stations 12, 14 are depleted. When the last unit of a particular product has been removed from one of the stations 12, 14, the worker 28 presses the product status switch 42 corresponding to the depleted product, which indicates that there is an absence of the depleted product in a particular location in the station 12, 14 via a corresponding product status indicator 44 on the display 18. The worker 30 at the holding station 16 observes the product status indicator 44 corresponding to the depleted product, and either cooks fresh product or transfers existing cooked product from the holding station 16 to the station 12, 14 requiring the cooked product.

If one of the cooked food products is retained in one of the stations 12, 14, 16 for a time which exceeds the hold time for that particular product, the corresponding product status indicator 44 will indicate that the product should be discarded rather than being sold to the consumer. The product status indicator 44 will also warn the workers 28, 30 that the hold time is about to expire by turning yellow to indicate that

additional product must be cooked in order to have cooked product before the existing product expires. A cook time represents a duration of time required to cook the corresponding product. The product status indicator 44 preferably turns yellow when the storage time for the product equals the hold time minus the cook time. Thus, enough time is provided to cook additional product prior to the expiration of existing cooked product. The product status indicators turn green to indicate that unexpired food product is available at a particular location in a station 12, 14, 16, and turn red to indicate the absence of the food product at a particular location in the station 12, 14, 16.

Detailed Description of Common Functions and Components

Active/Inactive Station

As already described, each of the stations 12, 14, 16 includes at least one active switch 34 and at least one active indicator 36. Additional active switches and indicators may be included to indicate activity of the upper and lower pans of the station 12, 14, as shown in Figure 5B. The front counter station 12 and the drive-through station 14 each have two active switches 34 and two active indicators 36. One active switch 34 and one active indicator 36, as shown in Figure 5B, correspond to each side of the station 12, 14. Initially upon power-up, all stations 12, 14, 16 are placed in an active mode in which each of the active indicators 36 is illuminated. Thereafter, the workers 28, 30 may select any of the active switches 34 which function to place the station 16 or side of the station 12, 14 corresponding to the active switch 34 in an inactive mode. The active indicator 36 is not illuminated in the inactive mode.

When the station 12, 14, 16 is in the active mode, each of the product status indicators 44 are illuminated and indicate the status of the corresponding product. When the station 12, 14, 16 is in the inactive mode, each of the product status indicators 44 on the corresponding station 16 or side of the station 12, 14, as well as the product status indicator 44 corresponding to the inactive station 12, 14, 16 located on the display 18 are turned off. Activating any one of the active switches 34 causes

the corresponding station 16 or side of the station 12, 14 to toggle between the active mode and the inactive mode.

Figure 6 is a flowchart showing the operation of the stations 12, 14, 16 during an active/inactive station routine. The station idles in step 56 until the active switch is depressed or selected, and then determines whether the station is currently in the active mode in step 58. If the station is not in the active mode, the station enters the active mode in step 60 wherein the active indicator on the inactive station is illuminated and the product status indicators on the active station indicate the status of the corresponding products. However, if the station is in the active mode in step 58, the station enters the inactive mode in step 62 wherein the corresponding active indicator and the product status indicators on the inactive station are turned off. However, timing for any products being timed prior to entry into the inactive mode continues during the inactive mode. Following steps 60 and 62, the routine again idles in step 56 waiting for the next selection of the active switch. It is to be noted that the product status indicators on the display reflect the same status as the corresponding product status indicators on the stations. Therefore, if the station is in the inactive mode, the product status indicators on the display corresponding to the inactive station are off.

Product Timers

The product status and transfer system 10 includes at least one timer for each of the preferably 12 different products in the preferably 24 different product locations in each of the stations 12, 14, 16. When fresh product is placed in a particular pan 48 in the station 12, 14, 16, the corresponding product status switch 42 is selected by the worker 28, 30 until the corresponding product status indicator 44 turns green, which triggers the timer to begin counting the storage time. The green product status indicator 44 indicates that the pan 48 contains unexpired product. Preferably, the storage time is counted by loading the hold time into the timer when fresh product is first placed into a particular pan 48, and continuing to count down the hold time until

the corresponding food product has been depleted, or the timer reaches zero indicating that the storage time has reached the hold time.

The cook time corresponding to any given product is that duration of time necessary to cook the particular product. If the value remaining on the timer is less than or equal to the cook time, then the corresponding product status indicators 44 turn yellow indicating to the worker 30 at the holding station 16 that additional product should be cooked since the product corresponding to the yellow light is about to expire. When the timer has counted down to zero, the corresponding product status indicator 44 flashes slow red indicating that the product remaining in the corresponding pan has expired and should be discarded rather than being served to the consumer.

Product Status

As already described above, each of the 24 locations in each of the stations 12, 14, 16 has a corresponding product label 46, product status switch 42 and product status indicator 44 as shown in Figures 2, 3 and 5A. Each of the product status indicators 44 on each of the stations 12, 14, 16 has a corresponding product status indicator 44 on the display 18, which displays substantially the same status displayed to the workers 28, 30 at the stations 12, 14, 16. Table 1 provides a summary of the status and action to be taken for each of the colors and flashing speeds provided by the product status indicators 44.

COLOR	FLASHING SPEED	ACTIVE/INACTIVE SIDE/STATION	STATUS OF PRODUCT	ACTION TO BE TAKEN
Green	static	active	unexpired, existing	serve product
Red	static	active	no product	replenish product
Yellow	static	active	product is within cook	begin cooking more product

			time of expiring	
Red	slow	active	expired	discard product
Red	fast	active	product can be transferred into location during a pending transfer	transfer product into location
Green	slow	active	oldest product available to transfer out of location	transfer this product first
Off	static	inactive	none	none or place station in active mode

TABLE 1

Product Transfer

Each of the stations 12, 14, 16 preferably includes at least one transfer switch 38 and transfer indicator 40, as shown in Figures 2, 3 and 5B. The front counter station 12 and drive-through station 14 both have two transfer switches 38 and two transfer indicators 40. One transfer switch 38 and one transfer indicator 40 correspond to each side of the station 12,14. The holding station 16 has one transfer switch 38 and one transfer indicator 40 since preferably only one side is accessed.

Figures 7A and 7B are flowcharts of the operation of a product transfer routine. The station idles in step 64 until the transfer switch is selected. Once the transfer switch is selected, the routine continues to step 66 in which the transfer indicator on the corresponding station or side of the station, which is now considered to be a source station or location, is illuminated. The source station enters a transfer mode in step 68, and the routine performs a background process in step 70, which

determines whether a predetermined transfer time has expired. If the transfer time has expired, the system exits the transfer mode in step 71, and the routine proceeds back to step 64. If the transfer time has not expired, the background process in step 70 continues to idle.

After pressing the transfer switch on the source station, the product status indicator corresponding to the product which has been stored the longest flashes fast green, which indicates to the worker which product is the oldest and facilitates the use of the oldest product first. The product status indicators corresponding to locations holding products having a transfer in progress flash fast red indicating that the hold time may be transferred into these locations in step 74. The worker removes the product to be transferred from a source location in the source station, which is preferably the product corresponding to the product status indicator which is flashing fast green, and presses the corresponding product status switch which makes the corresponding storage time available to be transferred out in step 76. The worker then places the product being transferred into a destination location in a destination station in step 78. The destination station can be the same station as the source station. The destination location can also be the same location in the same station as the source location. The products are preferably transferred while in the pans 48. However, a portion of the food product in the pan may be transferred to more than one destination location. The destination location may be the same as the source location.

The flowchart continues on Figure 7B in which the worker presses the transfer switch on the destination station and fills the destination location with the product being transferred in step 80. The empty pans in the destination station corresponding to product with a transfer in progress will flash fast red indicating an empty pan with a potential for accepting the product being transferred. The worker presses the product status switch in step 82 corresponding to the destination location filled in step 78, and the corresponding product status indicator turns green in step 84 indicating that the hold time, which was transferred out of the source station, has now been transferred into the destination location along with the product that was transferred. If only a portion of the product transferred out of the source location was transferred into the

destination during a so-called "multiple transfer", the remaining product can be transferred to additional destination locations including back to the source location in step 85. If additional transfers are desired, the routine returns to repeat steps 78, 80, 82 and 84 until no additional transfers are desired and the routine returns. This completes the product transfer routine until the transfer switch is again selected.

The product transfer routine is essentially a very straightforward and simple process, which can readily be performed by workers having almost any level of skill. Figure 8A shows a summarized form of the product transfer routine taken from the viewpoint of the worker. If the worker wishes to transfer product from one location to another, the worker selects or presses the transfer switch corresponding to the source station in step 86 and removes the product to be transferred in step 88. The worker then presses the product status switch corresponding to the source location in step 90. The worker transfers the product to the destination location and selects the transfer switch corresponding to the destination location in step 92. The worker selects the product status switch corresponding to the destination location in step 96. If some of the product transferred from the source location has not been transferred to the destination location, additional transfers can be made in step 97 via the reiteration of steps 92, 94 and 96 until additional transfers are no longer desired, at which point the routine returns. It is to be understood that the product transfer routine transfers not only product from one station to another, but also transfers the elapsed storage time corresponding to the product being transferred. This ensures the accurate maintenance of the storage time for each product regardless of the transfer of products within the system.

Figure 8F is a flowchart of an algorithm that enables the product status system to perform the product status transfer routine shown in Figure 7A. The holding station queries the stations in step 65 to determine if the corresponding transfer switch has been selected at any of the stations. If the transfer switch has been selected in step 67, the holding stations obtains an array of storage times from the station corresponding to the transfer switch selected in step 69. The array includes twelve numbers representing the storage times for each of the twelve products stored in either

the upper or lower pans in any of the stations. If the transfer switch has not been selected at any of the stations, the algorithm returns to re-execute step 65 from step 67.

The array of storage times is stored in a buffer within each of the stations in step 71. If the transfer switch has been selected at the same or another station in step 73, that station will transfer the array of storage times from its buffer to its storage timers in step 75. If the transfer switch has not been selected in step 73 or after the array of storage times is transferred to the storage timers, the algorithm determines whether the predetermined transfer time has expired in step 77. If the transfer time has expired, the algorithm returns to step 65. If the transfer time has not expired, the algorithm returns to re-execute step 73.

Figure 8B is a block diagram showing the multiple transfer of food product between the source location and one or more destination locations. The food product and the elapsed storage time corresponding to the food product are transferred from the source location to the destination location in response to activation of the transfer switch corresponding to the source station and the product status switch corresponding to the source location as well as activation of the transfer switch corresponding to each of the destination stations and the product status switch corresponding to each of the destination locations. The source location can also be one of the destination locations by activating the transfer switch corresponding to the source station and the product status switch corresponding to the source station as indicated by arrow 79. In this way, the multiple transfer of product can be made from the source location back to the source location and one or more destination locations.

As an alternative to selecting the transfer switch 38, the transfer of food product may be initiated by pressing and holding the product status switch 36. This results in a significant reduction in the quantity of electromechanical components required by the system, which increases reliability and reduces manufacturing costs.

Minimum Stock Levels

Figure 8C shows a flowchart of a minimum stock level routine, which is designed to inactivate or close storage locations when there are more storage locations are open than are required to hold a given stock level of the prepared food product. The stock level is equal to the total number of open stations for a given prepared food product multiplied by the pan fill level for that product. For instance, if the total number of stations open for burgers is 5 and the pan fill level for burgers is 8, the stock fill level is 40. However, the stock level indicates a preferred quantity of units of a given prepared food product, which should be present in the restaurant at any given time. Therefore, the stock level typically represents an initial value from which the pan fill level and number of open stations are determined. Thus, given a stock level of 42 for burgers, one possible result after rounding is that there are 5 open stations with a pan fill level of 8 for burgers.

The routine begins with step 160 in which a product type section pointer and a closure priority list pointer are preferably initialized to 1. The product type section pointer selects different product type sections 132 as shown in Figure 4. The product type section pointed to or selected by the product type section pointer is selected in step 162, and each of the sides of the stations are polled to determine whether the storage location corresponding to the product type selected are open (active) or closed (inactive). The order of polling the storage locations is provided by the closure priority list, which is ordered in an increasing order of priority. Stated differently, those storage locations that have a higher priority of being closed are listed before those storage locations having a lower priority of being closed in the closure priority list. The number of storage locations to close is calculated in step 164 by subtracting the stock level from the total number of open storage locations for the given product type section. If the number of storage locations to close is a negative number in step 166, none of the storage locations are closed and the product type section pointer is incremented in step 168 to point to the next product type section.

If the number of storage locations to close is a positive number in step 166, the storage location indicated by the closure priority list pointer is polled in step 170. If

the polled location is open in step 172, the storage location is closed in step 174, and the number of storage locations to close is decremented in step 176. However, if the storage location is not open in step 172, the number of storage locations to close is decremented in step 176, and the closure priority list pointer is incremented in step 178. If the number of storage locations to close is equal to zero in step 180, the product type section pointer is incremented in step 168. However, if the number of storage locations to close is not equal to zero in step 180, the routine returns to step 170 to select the next storage location to poll as indicated by the closure priority list pointer. Following step 168, if the product type section pointer is not equal to 13 in step 182, indicating that the routine has not been performed for each of the 12 product type sections, the routine returns to step 162. However, if the product type section is equal to 13 in step 182, the routine terminates.

Conversely, it is also possible that the demand for one or more food products exceeds the number of storage locations allocated to that food product given a maximum pan fill level for each of the storage locations. In this case, more than one storage location can be assigned to the same prepared food product, and transfers of the food product and the associated storage time can be made between each of these storage locations. Such a transfer is termed a "cross-transfer", and is not ordinarily permitted during normal operation, but can be programmed in response to increased demand for a particular food product.

The pan fill level represents the desired quantity of food product to be prepared on a per-pan basis. In order to calculate the pan fill level, a food product per unit sale volume is preferably determined, which represents the quantity of a particular food product sold at a predetermined unit of sale volume. For instance, if the unit of sale volume is selected to be $500 and the quantity of hamburgers sold is 50 when the volume of sale is $500, then the food product per unit sale volume would be 50. It is anticipated that the food product per unit sale volume will be calculated by sampling actual data under different conditions, such as at different times of the day and different days of the week to establish an acceptable degree of statistical certainty.

The current activity level is then preferably established as a multiple of the unit of sale volume in dollars. Thus, if the current activity level is $2000, then the activity level is equal to 4 since the current activity level is four times the unit of sale volume, which is $500. The food product per unit sale volume is then preferably multiplied by the current activity level and the product is divided by the total number of open pans to yield the pan fill level. Therefore, with a food product per unit sale volume equal to 50, an activity level equal to 4, and the quantity of open pans equal to 2, the pan fill level would preferably be equal to 100.

Method of Operation

Figures 9A and 9B show flowcharts of a method for monitoring the status of a food product using the product status and transfer system formed in accordance with the present invention. Upon power-on of the product status and transfer system, all stations enter the active mode wherein all active indicators are illuminated, and all product status indicators are red indicating that the product pans are empty and require product in step 98. The worker then cooks the food product, places the cooked product into the pan in step 100, and places the pan into the station, which is preferably the holding station in step 102. The worker selects the product status switch corresponding to the location in the station just filled until the corresponding product status indicator turns green in step 104 indicating that there is unexpired product in the location just filled. The timer then initiates the count of the storage time by counting down the hold time in step 106 in response to the product status indicator turning green. Preferably following power-on, steps 100-106 will be repeated via step 108 until a sufficient quantity of each of the different products offered for sale is cooked and available at the holding station.

The flowchart continues on Figure 9B with step 110, which determines whether the timer has counted down to zero. If the timer has counted down to zero, the corresponding product status indicators change to flashing slow red in step 112 indicating that the corresponding product has expired and is no longer of acceptable quality. The worker then discards the expired product in step 114, and selects the

corresponding product status switch until the corresponding product status indicator turns red in step 116. The routine continues with step 118, which determines whether cooked product is available, and if it is, the worker selects the transfer switch which triggers the product transfer routine to be performed in step 120. When the transfer routine has been completed, the routine returns to step 110. If cooked product is not available, the routine returns to step 100 and the worker cooks additional product.

If the timer has not counted down to zero in step 110, the routine determines whether the timer has counted down to the hold time less the cook time in step 122. If the timer has counted down to the hold time less the cook time, the corresponding product status indicators change from green to yellow in step 124 indicating that the hold time is within the duration of the cook time of expiring and that additional product must be cooked. The routine continues with step 126 wherein the worker removes product from the station and prepares it for sale to the consumer. If the last food product has been removed from a particular location in step 128, the worker presses the corresponding product status switch and the corresponding product status indicator changes from green or yellow to red in step 130 indicating that the pan is empty and requires product. If cooked product is available in step 118, the product transfer routine is performed in step 120 and the routine continues with step 110. If cooked product is not available in step 118, the routine continues with step 100, which provides additional cooked product. If the last product has not been removed in step 128, the routine continues with step 110.

Detailed Description of Display

The display 18 shown in Figure 4 includes a separate product type section 132 corresponding to each upper and lower pan combination found in the stations 12, 14, 16. Thus, the display 18 includes twelve total product type sections 132. Each product type section 132 includes a product name display 134, the product status indicators 44 corresponding to each of the stations 12, 14, 16 and a pan fill level display 136. It is to be noted that each product type section 132 preferably corresponds to upper and lower pan combinations in each of the stations 12, 14, 16, which are located in the same place on the station 12, 14, 16. For instance, the

product type section 132 located in a first column and a first row of the display 18 corresponds to the upper and lower pan combinations in the first row and the first column of each of the stations 12, 14, 16. Thus, the product described by the product name display 134 in the first row and first column on the display 18, e.g., "Burg", preferably corresponds to the product noted in the product label 46 in the first row and the first column on each of the stations 12, 14, 16.

Similarly, the product status indicators 44 in each of the product type sections 132 on the display 18 correspond to their counterparts on each of the stations 12, 14, 16 and display the same status. For instance, the product status indicators 44 corresponding to the holding station 16 in the product type section 132 in the first column and the first row of the display 18 preferably correspond to the product status indicators 44 in the first column and the first row of the holding station 16. Likewise, the product status indicators 44 in the product type section 132 located in the first row and the first column of the display 18 corresponding to the front counter station 12, preferably correspond to the product status indicators 44 in the first row and the first column of the front counter station 12. Within each product type section 132 there are two product status indicators 44 (upper and lower) for each station 12, 14, 16. The upper product status indicator 44 preferably corresponds to the upper pan for that location in the station 12, 14, 16, and the lower product status indicator preferably corresponds to the lower pan for that location in the station 12, 14, 16.

Thus, the worker 30 responsible for cooking product at the holding station 16 can monitor the status of each of the products at each of the stations by looking at the display 18. In addition, the product status indicators 44 in each of the product type sections 132 are arranged such that the priority for replenishing the food products in each of the corresponding stations preferably decreases from left to right. The product status indicators 44 corresponding to the holding station 16 are positioned the farthest to the left, followed by the product status indicators 44 corresponding to the front counter station 12 and the drive-through station 14. Thus, the holding station 16 is to be refilled before the front counter station 12, which is to be refilled before the drive-through station 14. The pan fill level display 136 indicates the pan fill level for each

product, which is the number of units of each product that should be prepared when new product is cooked.

The display 18 also includes an activity level switch 138, a day part switch 140 and an alphanumeric display panel 142 for electronically displaying an activity level and a day part. The activity level is preferably stored in memory. The pan fill level for each of the twelve different products displayed in the product type sections 132 is a function of the activity level, which represents an overall rate of sale for all of the products. Therefore, if the activity level is increased, the pan fill level for each of the products may increase causing additional product to be cooked and ready to meet an increase in demand. The worker can manually adjust the activity level by depressing the activity level switch 138 until the desired activity level is displayed on the alphanumeric display panel 142. The activity level can also be automatically adjusted as a function of the time, the day, promotional events, sales, and the like. A change in the activity level preferably causes changes in the pan fill level for each of the products independently. For example, when changing from activity level 1 to activity level 2, the number of chicken sandwiches can be increased from 6 to 10 whereas the number of burgers can remain at 10.

The day part switch 140 can be used to select a desired period of the day, such as morning, afternoon, early evening and late evening. The day part preferably affects the identity of the products shown in the product name displays 134 for each of the product type sections 132. For instance, if the day part is set to morning, typical products shown in the product name displays 134 might be eggs, muffins, sausages, and the like. In contrast, if the day part is set to afternoon, the product name displays 134 might indicate such products as burgers, chicken sandwiches, fish sandwiches, and the like.

The day part can be manually modified by activating the day part switch 140, which sequences through the possible values for the day part shown on the alphanumeric display 142 until the desired day part is obtained. The day part can also be automatically modified as a function of the time.

25

The display 18 includes a menu switch 144, editing cursor switches 146 and an enter switch 148, which enable the product name displays 134, pan fill level displays 136, and potential values for the activity level and day part to be entered and modified by the workers 28, 30 using means well known in the art. An external terminal (not shown) can optionally be connected to the display 18 and used to modify, download and upload versions of operational software, variables, constants, data, and the like as well as editing any of the parameters associated with and/or displayed on the display 18.

Circuit Board Level Block Diagram

Figure 10 shows a circuit board level block diagram of the product status and transfer system 10 formed in accordance with the present invention. The product status and transfer system 10 preferably includes six station/worker interface boards (SWIB) 150 for each of the stations 12, 14. Three of the SWIB 150 correspond to the front of the front counter station 12 or drive-through station 14, and three of the SWIB 150 correspond to the rear of the front counter station 12 or drive-through station 14. The holding station 16 preferably requires only three SWIB 150 since the worker 30 accesses only one side of the holding station 150. The SWIB 150 corresponding to each of the stations 12, 14, 16 is indicated by dashed lines surrounding sets of SWIB 150 bearing reference numerals corresponding to the stations 12, 14, 16.

Each station/worker interface board 150 includes four sets of two product status switches 42, two product status indicators 44 and one product label 46 corresponding to each of the four columns in the station 12, 14, 16. Each station 12, 14 also includes two active/transfer boards (ATB) 154. Each ATB 154 has one active switch 34, one active indicator 36, one transfer switch 38 and one transfer indicator 40. The holding station 16 preferably includes only one ATB 154 since only one worker 30 accesses the holding station 150. Each station 12, 14, 16 also includes a station interface board (SIB) 152 electrically coupled to each of the three or six SWIB 150, and one or two ATB 154. Each of the SIB 152 are electrically coupled to a station control board (SCB) 156, which is electrically coupled to a display board 158.

Detailed Description of Board Level Schematics

Tables 2A-2E are parts list for the display board (CDB), station control board (SCB), station interface board (SIB), station worker interface board (SWIB) and active transfer board (ATB), respectively, shown in the circuit board level block diagram of Figure 10.

Tables 3A-3E are netlists for the display board (CDB), station control board (SCB), station interface board (SIB), station worker interface board (SWIB) and active transfer board (ATB), respectively, shown in the circuit board level block diagram of Figure 10. The netlists provide a listing of connectivity between components located on the circuit boards according to the reference designations corresponding to the components and pin numbers on the components shown in the schematic diagrams for each of the circuit boards.

Bill of Material

810191

Title: **PCB Assy, PMS Scoreboard Display**
Detail: PCB Assy, CENTRAL DISPLAY BOARD(CDB)
Rev: **A**
Status: **U** Date: 02/05/1999

Item	Qty	Part	Type Stat	Title Detail	Reference
1	1	880289	PL	**LABOR, Protein Status System**	
			U	Protein Status System, Scoreboard, Display Board	
2	1	820006	PS	**Purchased PCB Assy**	VFD1
			R	VFD Display 2x20	
3	1	635-1-20-RA	PS	**Connector**	J2
			U	Connector, IDC 20 Pin Header Right-Angle	
4	1	634042	PS	**Header**	VFD1
			R	Header, Dual Row .1 Straight 14 Pos	
5	1	634014	PS	**Header**	J1
			R	Header, 8 Pos RT Angle .100	
6	1	634-3-2RA	PS	**Header .156**	J3
			U	Header, 2 Pos Right Angle .156 Locked	
7	12	632040	PS	**IC Socket**	DS1/DS2 - DS23/ DS24
			R	IC Socket, Low Profile 40 PIN DIP	
8	12	632018	PS	**IC Socket**	DS25-DS36
			R	IC Socket, Low Profile 18 Pin Wide	
9	1	620602	PS	**Thermal Pad**	VR1
			R	Thermal Pad TO-220 Sil-Pad-400	
10	1	620504	PS	**Heat Sink**	VR1
			R	Heat Sink, TO220 4.5W	
11	1	550000	PS	**Transistor**	Q1
			R	Transistor, FET 2N7000	
12	1	530062	PS	**Voltage Regulator**	VR1
			U	Voltage Reg, +5 Volt Switching LM2576T-5.0 3ATO220	
13	2	520107	PS	IC	U13 U15
			R	IC, 8bit Latch 74HCT574	
14	1	520089	PS	IC	U14
			R	IC, Octal Buffer 74HCT540E Tri State	
15	6	520047	PS	IC	U1 U2 U3 U4 U5 U6
			R	IC Led Driver 8 Character ALPHA CC	
16	6	520046	PS	IC	U7 U8 U9 U10 U11 U12
			R	IC LED Driver 8 digit Numeric CA, ICM7228AIPI	
17	3	520008	PS	IC	U16 U17 U18
			R	IC, Decoder 1 of 8, 74LS138	
18	1	510010	PS	**Diode**	CR1
			U	Diode, ShoctKey 40V, 3A, 1N5822	
19	12	500025	PS	**Display**	DS25 - DS36
			U	Display-Green, LED Numeric Dual, Common Anode	

TABLE 2A

Bill of Material

Item	Qty	Part	Type Stat	Title Detail	Reference
20	24	500024	PS	**Display**	DS1 - DS24
			U	Display, LED Alphanumeric Dual Green CC	
21	96	500018	PS	**Display**	LD1 - LD84 LD89-LD100
			R	LED, Bi Color Red Green	
22	8	500004	PS	**Display**	LD85 - LD88 LD101- LD104
			U	Display, LED Green T1 3/4	
23	1	400191	PS	**PCB, Protein Status System**	
			R	PCB, Scoreboard Display Board	
24	18	308-0-0.1UF-50V	PS	**Cap., Ceramic Monolithic, Radial**	C1 - C18
			U	Cap .1uF, 10%, 50V (.2 space)	
25	1	305-4-1000UF-16V	PS	**Cap., Electrolytic Axial**	C21
			U	Cap 1000uF, 20%, 16V	
26	1	305-3-100UF-25V	PS	**Cap., Electrolytic Axial**	C19
			U	Cap 100uF, 20%, 25V	
27	1	190006	PS	**Inductor**	L2
			U	Inductor, 150 uH Low EMI Torroid	
28	1	156103	PS	**SIP Resistor**	RN1
			R	Sip, 9 Res 10K, 10 Pin Bussed	
29	1	10-0-180	PS	**Res. 1/4 W 5% Carbon Film**	R3
			U	Resistor 180 Ohm 1/4W, 5%	
30	5	013408	PS	**Hardware**	Processor board mount
			R	Thread Stnd Off 4-40 1/4 Hex x 1/4 Alu	
31	4	011602	PS	**Hardware**	VFD1
			U	Nylon Spacer #6 x .062H x .25 OD - F/W	
32	104	011105	PS	**Display**	LD1 - LD104
			U	LED Spacer, .175 High,ELM 3-Series 3 lead .100 sp	
33	10	002406	PS	**Hardware**	Processor Board Mount
			R	Screw, 4-40 x 3/16Pan Hd Phil SS SEMS	
34	5	002401	PS	**Hardware**	VR1, VFD1
			R	Nut, 4-40 Keps External Lock SS	
35	5	001412	PS	**Hardware**	VR1 VFD1
			R	Screw, 4-40 x 3/8 Pan Head Phil SS	

TABLE 2A

Bill of Material

810192

Title: **PCB Assy, PMS Scoreboard Processor**
Detail: PCB Assy, STATION CONTROL BOARD
Rev: **B**
Status: **U** Date: 02/05/1999

Item	Qty	Part	Type Stat	Title Detail	Reference
1	1	880290	PL	**LABOR, Protein Status System**	
			U	Protein Status System, Scoreboard, Processor Bd.	
2	1	635-1-20-RA	PS	**Connector**	J11
			U	Connector, IDC 20 Pin Header Right-Angle	
3	1	634-3-2RA	PS	**Header .156**	J9
			U	Header, 2 Pos Right Angle .156 Locked	
4	0	634-1-6-RA	PS	**Post Header .1**	J10
			U	Post Header, Right Angle 6 pos	
5	6	633-1-8X8-T	PS	**Modular Jack**	J3 J4 J5 J6 J7 J8
			U	Modular Jack 8x8 Top Entry Without Stops	
6	1	633-8-2.5	PS	**Power Jack**	J2
			U	DC Power Jack 2.5 MM Panel Mount, PCB Term,PC712	
7	1	632040	PS	**IC Socket**	U1
			R	IC Socket, Low Profile 40 PIN DIP	
8	1	620602	PS	**Thermal Pad**	VR1
			R	Thermal Pad TO-220 Sil-Pad-400	
9	1	620504	PS	**Heat Sink**	VR1
			R	Heat Sink, TO220 4.5W	
10	1	600033	PS	**Switch**	S1
			U	Switch, Slide DPDT ON OFF PCB Mount	
11	1	560009	PS	**Crystal**	Y1
			U	Crystal, 11.0592 MHZ HC49USHalf Height	
12	1	560005	PS	**Crystal - S563**	Y2
			R	Crystal, Quartz 32.768KHZ	
13	0	540-PLD-813	PS	**IC, Surface Mount**	U3
			U	IC, PSD813F Rom,Ram,I/O	
14	1	530008	PS	**Voltage Regulator +5**	VR1
			U	LM7805 TO220 Case	
15	1	520115	PS	**IC**	Q2
			R	IC, Microprocessor Reset, TO-92, DS1833	
16	1	520112	PS	**IC**	U2
			R	IC, Oct D Latch Tri State Dip 74ALS573	
17	1	520101	PS	**IC**	U1
			U	IC Microcontroller 16KROM 87C54	
18	1	520-M-24C32	PS	**IC, Memory**	U6 do not use U7
			U	IC EEProm 4K x 8 Serial 24LC32	
19	1	520067	PS	**IC**	U14
			R	IC Real Time Clock /w Ram PCF8583PN	

TABLE 2B

Bill of Material

Item	Qty	Part	Type Stat	Title Detail	Reference
20	1	520008	PS	IC	U17
			R	IC, Decoder 1 of 8, 74LS138	
21	3	520005	PS	IC	U19 U20 U21
			R	IC RS232 Transmitter and Receiver	
22	1	520004	PS	IC	U5
			R	IC HEX Inverter 7406	
23	0	520-M-8570	PS	IC, Memory	U15
			U	IC Ram, 256 Byte Static Ram PCF8570	
24	1	520-LS-251	PS	IC	U18
			U	74LS251 Tri-State Data Selectors/Multiplexer	
25	1	510012	PS	Diode	CR1
			R	Diode Bridge Rectifier MB805 8Amp Bridge(BR6)	
26	1	510007	PS	Diode	CR6
			U	Diode, Germanium 1N270	
27	1	500002	PS	Display	LD1
			U	Display, LED Red T 1-3/4 - 5mm	
28	1	400192ECN	PS	PCB, Protein Status System	
			U	PCB, Scoreboard Processor Board	
29	1	310-0-0.1F-5.5V	PS	Cap., Gold	C29
			U	Cap .1F, +/-30% 5.5V NF Series	
30	1	308-2-18PF-100V	PS	Cap., Ceramic Monolithic	C25
			U	Cap, 18pF, 5%, 100V	
31	10	308-0-0.1UF-50V	PS	Cap., Ceramic Monolithic, Radial	C1- C3 C14 C15 C17 - C21
			U	Cap .1uF, 10%, 50V (.2 space)	
32	18	306-2-10UF-16V	PS	Cap., Electrolytic,Radial	C26 C31- C47
			U	Cap, 10uF, 20%, 16V	
33	2	305-3-470UF-35V	PS	Cap., Electrolytic Axial	C27 C28
			U	Cap 470uF, 20%, 35V	
34	2	303-2-30PF-500V	PS	Cap., Dipped Mica	C22 C23
			U	Cap 30pF, 5%, 500V	
35	2	300000	PS	Choke	FB1 FB2
			U	Wide Band Shield Bead Ferrite Choke	
36	1	151472	PS	SIP Resistor	RN1
			R	SIP, 9 Res 4.7K 10 Pin Bussed	
37	1	11-3-001.43K	PS	Resistor, 1/4W 1% Metal Film	R2
			U	Resistor, 1.43K 1/4W 1%	
38	3	10-3-004.7K	PS	Res. 1/4 W 5% Carbon Film	R3 R4 R7
			U	Resistor 4.7K Ohm 1/4W, 5%	
39	1	002401	PS	Hardware	VR1
			R	Nut, 4-40 Keps External Lock SS	
40	1	001412	PS	Hardware	VR1
			R	Screw, 4-40 x 3/8 Pan Head Phil SS	

TABLE 2C

Bill of Material

810195

Title: **PCB Assy, PMS Station Interface**
Detail: PCB Assy,
Rev: **B2**
Status: **U** Date: 06/25/1999

Item	Qty	Part	Type Stat	Title Detail	Reference
1	1	880291	PL	**LABOR, PMS, Station Interface Board**	
			U	PMS, Station Interface Board	
2	0	634-1-6-RA	PS	**Post Header .1**	J7
			U	Post Header, Right Angle 6 pos	
3	3	633032	PS	**Connector**	J3 J4 J5
			U	Phone Jack , 6x6 Top Entry Without Stops	
4	0	633-8-2.5	PS	**Power Jack**	J1
			U	DC Power Jack 2.5 MM Panel Mount, PCB Term,PC712	
5	1	633-1-8X8-T	PS	**Modular Jack**	J2
			U	Modular Jack 8x8 Top Entry Without Stops	
6	0	633-1-4X4-T	PS	**Modular Jack**	J6
			U	Modular Jack 4x4 Top Entry	
7	1	632040	PS	**IC Socket**	U1
			R	IC Socket, Low Profile 40 PIN DIP	
8	1	560009	PS	**Crystal**	Y1
			U	Crystal, 11.0592 MHZ HC49USHalf Height	
9	0	540-PLD-813	PS	**IC, Surface Mount**	U6
			U	IC, PSD813F Rom,Ram,I/O	
10	1	530055	PS	**Voltage Regulator**	VR1
			U	Switching Regulator LM2574N Dip .5 amp	
11	1	520115	PS	**IC**	Q1
			R	IC, Microprocessor Reset, TO-92, DS1833	
12	1	520044	PS	**IC**	U4
			U	IC Serial EEProm , 24C02 256 X 8 No Write prote	
13	1	520091	PS	**IC**	U1
			R	IC Microcontroller P87C52 1 Shot Cmos	
14	1	520005	PS	**IC**	U2
			R	IC RS232 Transmitter and Receiver	
15	1	520004	PS	**IC**	U5
			R	IC HEX Inverter 7406	
16	1	510015	PS	**Diode**	D1
			R	Diode, Schotky 1A 40V 1N5819	
17	0	510005	PS	**Diode**	CR1
			U	Diode, Bridge Rectifier 1 Amp	
18	1	510003	PS	**Diode**	D2
			R	Diode, Rectifier 1N4004	
19	2	500002	PS	**Display**	LD1 LD2
			U	Display, LED Red T 1-3/4 - 5mm	

TABLE 2C

Bill of Material

Item	Qty	Part	Type Stat	Title Detail	Reference
20	1	400195ECN	PS	**PCB, PMS, Station Interface**	
			U	PCB, PMS, Station Interface, Rev. B2	
21	1	311-3-220UF-10V	PS	**Cap., Electrolytic Axial**	C15
			U	Cap 220uF,20%, 10V Low ESR	
22	1	308-0-0.1UF-50V	PS	**Cap., Ceramic Monolithic, Radial**	C4(DO NOT USE C6)
			U	Cap .1uF, 10%, 50V (.2 space)	
23	5	306-2-10UF-16V	PS	**Cap., Electrolytic,Radial**	C2 C7 C8 C9 C10
			U	Cap, 10uF, 20%, 16V	
24	1	305-3-470UF-35V	PS	**Cap., Electrolytic Axial**	C14
			U	Cap 470uF, 20%, 35V	
25	2	303-2-30PF-500V	PS	**Cap., Dipped Mica**	C11 C12
			U	Cap 30pF, 5%, 500V	
26	1	302-2-10.0UF-16V	PS	**Cap., Tantalum**	C1
			U	Cap 10uf 10% 16V	
27	1	190004	PS	**Inductor**	L1
			R	330 uH Coil in plastic enclosure. PE-52627	
28	1	151472	PS	**SIP Resistor**	RN1
			R	SIP, 9 Res 4.7K 10 Pin Bussed	
29	1	10-3-004.7K	PS	**Res. 1/4 W 5% Carbon Film**	R1 (DO NOT USE R2 R3)
			U	Resistor 4.7K Ohm 1/4W, 5%	
30	2	10-0-330	PS	**Res. 1/4 W 5% Carbon Film**	R4 R5
			U	Resistor 330 Ohm 1/4W, 5%	
31	2	011606	PS	**Hardware**	LD1 LD2
			R	Nylon Spacer .141hole x .188h x .25od	
32	1	670403	PS	**Wire**	R6
			R	Wire Cut 24 AWG Buss Wire 2.00"	

TABLE 2C

Bill of Material

810196

Title: **PCB Assy, PMS, Pan Status Keyboard**
Detail: PCB Assy, PMS, Pan Status Keyboard
Rev: **B7**
Status: **U** Date: 06/30/1999

Item	Qty	Part	Type Stat	Title Detail	Reference
1	1	880196	PS	**Labor**	
			U	Labor, Pan Status Keyboard PCB assy.	
2	1	681-6X6-18	PS	**Cable, Tele Flat Pre Made**	
			U	Tele, Flat 6 Cond., 18", 6x6 Modular-Tinned Assy	
3	8	601009	PS	**Switch, Cap, Yellow**	SW1-SW8
			U	Switch, Cap, Yellow	
4	8	600032	PS	**Switch**	SW1- SW8
			U	Switch, Momentarty Tactile Surface mount On Reel	
5	3	540-8574	PS	**IC, Surface Mount**	U1 U3 U4
			U	8-Bit I/O Expander	
6	2	540-2981	PS	**IC, Surface Mount**	U2 U5
			U	IC, UDN2981LW 8-Channel Source Driver	
7	8	500018	PS	**Display**	LD1 - LD8
			R	LED, Bi Color Red Green	
8	1	400196	PS	**PCB, PMS Pan Status Key Board**	
			R	PCB, Pan Status Key Board, Rev. B7	
9	3	313-0-.1UF-25V	PS	**Surface Mount Multilayer Ceramic Chip Cap.**	C1 C3 C4
			U	Cap .1uF, 25V, +/-10%	
10	3	08-3-004.7K	PS	**Surface Mount Thick Film Chip Resistor**	R17 R18 R19
			U	Resistor, 4.7K, 1/8W, 5%	
11	16	08-0-330	PS	**Surface Mount Thick Film Chip Resistor**	R1 - R16
			U	Resistor, 330, 1/8W, 5%,	

TABLE 2D

Bill of Material

810197

Title: **PCB Assy, PMS, Transfer Keyboard**
Detail: PCB Assy, PMS, Transfer Keyboard Rev. C , ACTIVE TRANSFER BOARD
Rev: **C**
Status: **U** Date: 07/02/1999

Item	Qty	Part	Type Stat	Title Detail	Reference
1	1	880292	PL	**LABOR, PMS, Transfer Keyboard**	
			U	PMS, Transfer Keyboard	
2	1	681-6X6-18	PS	**Cable, Tele Flat Pre Made**	
			U	Tele, Flat 6 Cond., 18", 6x6 Modular-Tinned Assy	
3	3	601009	PS	**Switch, Cap, Yellow**	SW1 SW2 SW3
			U	Switch, Cap, Yellow	
4	2	600032	PS	**Switch**	SW1 SW2 SW3
			U	Switch, Momentarty Tactile Surface mount On Reel	
5	1	540-8574	PS	**IC, Surface Mount**	U1
			U	8-Bit I/O Expander	
6	2	500004	PS	**Display**	LD1 LD2
			U	Display, LED Green T1 3/4	
7	2	500002	PS	**Display**	LD3
			U	Display, LED Red T 1-3/4 - 5mm	
8	1	400197	PS	**PCB, PMS, Transfer Keyboard**	
			U	PCB, PMS, Transfer Keyboard, Rev. C	
9	1	313-0-.1UF-25V	PS	**Surface Mount Multilayer Ceramic Chip Cap.**	C1
			U	Cap .1uF, 25V, +/-10%	
10	1	08-3-004.7K	PS	**Surface Mount Thick Film Chip Resistor**	R4
			U	Resistor, 4.7K, 1/8W, 5%	
11	3	08-0-330	PS	**Surface Mount Thick Film Chip Resistor**	R1 R2 R3
			U	Resistor, 330, 1/8W, 5%,	

TABLE 2E

TABLE 3A

net NET00118	U13-1	U5-22
U1-37	C13-B	U5-16
DS1-10	U8-28	U5-31
DS2-10	C8-B	C5-B
DS4-10	U7-28	U6-22
DS3-10	C7-B	U6-16
	U10-28	U6-31
net GND	C10-B	C6-B
U15-10	U9-28	
U15-1	C9-B	Net D1
U14-10	U12-28	U15-3
C15-B	U11-28	U14-17
C14-B	C12-B	VFD1-8
VFD1-1	C11-B	J2-5
C19-2	U1-22	U13-3
CR1-2	U1-16	U8-11
VR1-3	U1-31	U7-11
VR1-5	C1-B	U10-11
C21-MINUS	U2-22	U9-11
J3-2	U2-16	U12-11
Q1-1	U2-31	U11-11
U17-8	C2-B	U1-9
C18-B	U3-22	U2-9
U18-8	U3-16	U3-9
U16-8	U3-31	U4-9
C16-B	C3-B	U5-9
C17-B	U4-22	U6-9
U13-10	U4-16	
	U4-31	Net D3
	C4-B	U15-5

U14-15	U2-12	U11-5
VFD1-10	U3-12	
J2-6	U4-12	Net D5
U13-5	U5-12	U15-7
U8-14	U6-12	U14-13
U7-14		VFD1-12
U10-14	net D7	J2-7
U9-14	U15-9	U13-7
U12-14	U14-11	U8-6
U11-14	VFD1-14	U7-6
U1-11	J2-8	U10-6
U2-11	U13-9	U9-6
U3-11	U8-7	U12-6
U4-11	U7-7	U11-6
U5-11	U10-7	U1-13
U6-11	U9-7	U2-13
	U12-7	U3-13
net D4	U11-7	U4-13
U15-6		U5-13
U14-14	net D6	U6-13
VFD1-11	U15-8	
J2-15	U14-12	Net D2
U13-6	VFD1-13	U15-4
U8-10	J2-14	U14-16
U7-10	U13-8	VFD1-9
U10-10	U8-5	J2-16
U9-10	U7-5	U13-4
U12-10	U10-5	U8-13
U11-10	U9-5	U7-13
U1-12	U12-5	U10-13

U9-13	U15-18	net NET00064
U12-13	J1-8	U14-2
U11-13		RN1-2
U1-10	Net VFD_RS	J1-1
U2-10	VFD1-4	
U3-10	J2-9	net NET00069
U4-10		U14-4
U5-10	Net VFD_RW	RN1-4
U6-10	VFD1-5	J1-3
	J2-12	
net D0		net NET00070
U15-2	Net VFD_ENABLE	U14-5
U14-18	VFD1-6	RN1-5
VFD1-7	Q1-3	J1-4
J2-17	R3-B	
U13-2		net NET00071
U8-12	Net NET00004	U14-6
U7-12	U15-19	RN1-6
U10-12	J1-7	J1-5
U9-12		
U12-12	Net EARTH	net NET00072
U11-12	U14-3	U14-7
U1-8	RN1-3	RN1-7
U2-8	J1-2	
U3-8		net NET00095
U4-8	Net READ_KEY_ROW	U14-8
U5-8	U14-19	RN1-8
U6-8	U14-1	
	U18-15	net NET00096
net NET00020		U14-9

RN1-9	U12-9	net ALPHA_DISP_A0
	U11-9	U13-19
net NET00019		U1-30
U11-15	net A1	U2-30
DS33-14	J2-20	U3-30
LD85-A	U17-1	U4-30
	U18-1	U5-30
net WRITE_KEYCOL	U16-1	U6-30
U15-11		
U17-7	net A2	net NET00001
	J2-2	Q1-2
Net SEL_WRITELATCH1	U17-2	U17-9
J2-10	U18-2	
U16-6	U16-2	net ALPHA_DISP_A1
		U13-18
Net SEL_WRITELATCH2	net A3	U1-29
J2-11	J2-19	U2-29
U17-6	U17-3	U3-29
	U18-3	U4-29
net WRITE_PORT	U16-3	U5-29
J2-18		U6-29
U17-4	net READ_PORT	
U16-4	J2-13	net ALPHA_DISP_A2
	U18-4	U13-17
net A0		U1-28
J2-1	Net	U2-28
U8-9	IO\\FLASH_SELECT	U3-28
U7-9	J2-4	U4-28
U10-9	U17-5	U5-28
U9-9	U18-5	
	U16-5	

U6-28	net 7SEG_DISP5	U15-20
	U17-11	U14-20
Net NET00104	U11-8	C15-A
U16-7		RN1-1
U13-11	net 7SEG_DISP6	C14-A
	U17-10	VFD1-2
Net	U12-8	L2-1
ALPHA_DISP1_WR		VR1-4
U16-15	net ALPHA_DISP2_WR	C21-PLUS
U1-17	U16-14	U17-16
	U2-17	C18-A
Net NET00036		U18-6
U11-22	net ALPHA_DISP3_WR	U18-16
DS34-13	U16-13	U16-16
LD88-A	U3-17	C16-A
		R3-A
Net 7SEG_DISP1	net ALPHA_DISP4_WR	C17-A
U17-15	U16-12	U13-20
U7-8	U4-17	C13-A
		U8-19
Net 7SEG_DISP2	net ALPHA_DISP5_WR	C8-A
U17-14	U16-11	U7-19
U8-8	U5-17	C7-A
		U10-19
Net 7SEG_DISP3	net ALPHA_DISP6_WR	C10-A
U17-13	U16-10	U9-19
U9-8	U6-17	C9-A
		U12-19
Net 7SEG_DISP4	net +5V	U11-19
U17-12		C12-A
U10-8		

C11-A	net NET00080	net NET00117
U1-1	L2-2	U1-7
U1-15	CR1-1	DS1-12
U1-14	VR1-2	DS2-12
C1-A		DS4-12
U2-1	net NET00000	DS3-12
U2-15	U9-21	
U2-14	LD40-R	net NET00272
C2-A	LD41-R	U7-20
U3-1	LD39-R	LD1-G
U3-15	LD36-R	LD2-G
U3-14	LD37-R	LD3-G
C3-A	LD38-R	LD4-G
U4-1	LD92-R	LD5-G
U4-15	LD42-R	LD6-G
U4-14		LD7-G
C4-A	net +12V	LD89-G
U5-1	C19-1	
U5-15	VR1-1	net NET00157
U5-14	J3-1	U7-23
C5-A		LD1-R
U6-1	net NET00003	LD2-R
U6-15	U9-4	LD3-R
U6-14	LD91-C	LD4-R
C6-A	LD92-C	LD5-R
	LD103-C	LD6-R
net NET00016	LD102-C	LD7-R
U11-17	LD101-C	LD89-R
DS34-14	LD104-C	
LD87-A		

net NET00351	LD11-R	LD2-C
U7-15	LD10-R	DS26-18
DS25-14	LD9-R	DS26-12
	LD8-R	LD9-C
net NET00352	LD90-R	
U7-16		net NET00394
DS25-13	net NET00309	U7-26
	U7-18	DS25-17
net NET00372	LD12-G	DS25-7
U7-17	LD14-G	LD3-C
DS26-14	LD13-G	DS26-17
	LD11-G	DS26-7
net NET00353	LD10-G	LD10-C
U7-4	LD9-G	
DS25-4	LD8-G	net NET00395
DS25-9	LD90-G	U7-2
DS26-4		DS25-1
DS26-9	net NET00392	DS25-5
LD89-C	U7-25	LD4-C
LD90-C	DS25-2	DS26-1
	DS25-6	DS26-5
net NET00373	LD1-C	LD11-C
U7-22	DS26-2	
DS26-13	DS26-6	net NET00396
	LD8-C	U7-1
net NET00308		DS25-3
U7-21	net NET00393	DS25-8
LD12-R	U7-24	LD5-C
LD14-R	DS25-18	DS26-3
LD13-R	DS25-12	DS26-8

LD12-C	DS28-14	DS28-10
		LD27-C
net NET00397	net NET00404	
U7-3	U8-22	Net NET00426
DS25-15	DS28-13	U8-27
DS25-10		DS27-16
LD6-C	net NET00416	DS27-11
DS26-15	U8-2	LD21-C
DS26-10	DS27-1	DS28-16
LD13-C	DS27-5	DS28-11
	LD18-C	LD28-C
net NET00398	DS28-1	
U7-27	DS28-5	Net NET00427
DS25-16	LD25-C	U8-20
DS25-11		LD15-G
DS26-16	net NET00418	LD16-G
DS26-11	U8-1	LD95-G
LD7-C	DS27-3	LD21-G
LD14-C	DS27-8	LD17-G
	LD19-C	LD18-G
net NET00399	DS28-3	LD20-G
U8-15	DS28-8	LD19-G
DS27-14	LD26-C	
		Net NET00428
net NET00400	net NET00425	U8-23
U8-16	U8-3	LD15-R
DS27-13	DS27-15	LD16-R
	DS27-10	LD95-R
net NET00403	LD20-C	LD21-R
U8-17	DS28-15	LD17-R

LD18-R	LD15-C	LD96-C
LD20-R	DS28-2	
LD19-R	DS28-6	net NET00006
	LD22-C	U9-23
Net NET00037		LD29-R
U8-21	net NET00432	LD30-R
LD22-R	U8-24	LD33-R
LD23-R	DS27-18	LD34-R
LD24-R	DS27-12	LD31-R
LD25-R	LD16-C	LD32-R
LD26-R	DS28-18	LD91-R
LD27-R	DS28-12	LD35-R
LD28-R	LD23-C	
LD96-R		net NET00021
	net NET00433	U9-15
Net NET00430	U8-26	DS29-14
U8-18	DS27-17	LD101-A
LD22-G	DS27-7	
LD23-G	LD17-C	net NET00435
LD24-G	DS28-17	U9-16
LD25-G	DS28-7	DS29-13
LD26-G	LD24-C	LD102-A
LD27-G		
LD28-G	net NET00023	net NET00438
LD96-G	U8-4	U9-17
	DS27-4	DS30-14
Net NET00431	DS27-9	LD103-A
U8-25	LD95-C	
DS27-2	DS28-4	net NET00439
DS27-6	DS28-9	U9-22

DS30-13	DS30-8	
LD104-A		net NET00465
	Net NET00460	U9-18
net NET00002	U9-3	LD40-G
U11-21	DS29-15	LD41-G
LD67-R	DS29-10	LD39-G
LD66-R	LD34-C	LD36-G
LD65-R	LD41-C	LD37-G
LD64-R	DS30-15	LD38-G
LD68-R	DS30-10	LD92-G
LD69-R		LD42-G
LD70-R	Net NET00461	
LD94-R	U9-27	net NET00466
	DS29-16	U9-25
net NET00451	DS29-11	DS29-2
U9-2	LD35-C	DS29-6
DS29-1	DS30-16	LD29-C
DS29-5	DS30-11	LD36-C
LD32-C	LD42-C	DS30-2
LD39-C		DS30-6
DS30-1	Net NET00462	
DS30-5	U9-20	net NET00467
	LD29-G	U9-24
net NET00453	LD30-G	DS29-18
U9-1	LD33-G	DS29-12
DS29-3	LD34-G	LD30-C
DS29-8	LD31-G	LD37-C
LD33-C	LD32-G	DS30-18
LD40-C	LD91-G	DS30-12
DS30-3	LD35-G	

net NET00468	DS31-6	net NET00484
U9-26	LD43-C	U10-2
DS29-17	DS32-2	DS31-1
DS29-7	DS32-6	DS31-5
LD31-C	LD50-C	LD46-C
LD38-C		DS32-1
DS30-17	net NET00478	DS32-5
DS30-7	U10-15	LD53-C
	DS31-14	
net NET00475		net NET00486
U10-26	net NET00479	U10-1
DS31-17	U10-16	DS31-3
DS31-7	DS31-13	DS31-8
LD45-C		LD47-C
DS32-17	net NET00480	DS32-3
DS32-7	U10-17	DS32-8
LD52-C	DS32-14	LD54-C
net NET00476	net NET00481	net NET00489
U10-24	U10-22	U10-23
DS31-18	DS32-13	LD44-R
DS31-12		LD43-R
LD44-C	net NET00482	LD97-R
DS32-18	U10-4	LD47-R
DS32-12	DS31-4	LD49-R
LD51-C	DS31-9	LD48-R
	LD97-C	LD46-R
net NET00477	DS32-4	LD45-R
U10-25	DS32-9	
DS31-2	LD98-C	

net NET00490	U10-18	net NET00498
U10-20	LD53-G	U11-24
LD44-G	LD52-G	DS33-18
LD43-G	LD51-G	DS33-12
LD97-G	LD50-G	LD58-C
LD47-G	LD55-G	DS34-18
LD49-G	LD54-G	DS34-12
LD48-G	LD98-G	LD65-C
LD46-G	LD56-G	
LD45-G		net NET00499
	net NET00496	U11-25
net NET00491	U10-21	DS33-2
U10-27	LD53-R	DS33-6
DS31-16	LD52-R	LD57-C
DS31-11	LD51-R	DS34-2
LD49-C	LD50-R	DS34-6
DS32-16	LD55-R	LD64-C
DS32-11	LD54-R	
LD56-C	LD98-R	net NET00018
	LD56-R	U11-16
net NET00492		DS33-13
U10-3	net NET00497	LD86-A
DS31-15	U11-26	
DS31-10	DS33-17	net NET00506
LD48-C	DS33-7	U11-2
DS32-15	LD59-C	DS33-1
DS32-10	DS34-17	DS33-5
LD55-C	DS34-7	DS34-1
	LD66-C	DS34-5
net NET00017		LD60-C

LD67-C	net NET00517	net NET00119
	U11-27	U1-5
net NET00508	DS33-16	DS1-9
U11-1	DS33-11	DS2-9
DS33-3	DS34-16	DS4-9
DS33-8	DS34-11	DS3-9
DS34-3	LD63-C	
DS34-8	LD70-C	net NET00536
LD61-C		U12-24
LD68-C	net NET00518	DS35-18
	U11-3	DS35-12
net NET00535	DS33-15	LD72-C
U12-26	DS33-10	DS36-18
DS35-17	DS34-15	DS36-12
DS35-7	DS34-10	LD79-C
LD73-C	LD62-C	
DS36-17	LD69-C	net NET00537
DS36-7		U12-25
LD80-C	net NET00015	DS35-2
	U11-23	DS35-6
net NET00516	LD59-R	LD71-C
U11-20	LD58-R	DS36-2
LD59-G	LD57-R	DS36-6
LD58-G	LD63-R	LD78-C
LD57-G	LD93-R	
LD63-G	LD61-R	net NET00538
LD93-G	LD62-R	U12-15
LD61-G	LD60-R	DS35-14
LD62-G		
LD60-G		net NET00539

U12-16	U12-1	DS35-15
DS35-13	DS35-3	DS35-10
	DS35-8	LD76-C
Net NET00540	LD75-C	DS36-15
U12-17	DS36-3	DS36-10
DS36-14	DS36-8	LD83-C
	LD82-C	
Net NET00541		net NET00555
U12-22	net NET00550	U12-20
DS36-13	U12-23	LD71-G
	LD71-R	LD72-G
Net NET00542	LD72-R	LD73-G
U12-4	LD73-R	LD74-G
DS35-4	LD74-R	LD75-G
DS35-9	LD75-R	LD76-G
LD99-C	LD76-R	LD77-G
DS36-4	LD77-R	LD99-G
DS36-9	LD99-R	
LD100-C		net NET00563
	net NET00552	U12-21
Net NET00544	U12-27	LD78-R
U12-2	DS35-16	LD79-R
DS35-1	DS35-11	LD80-R
DS35-5	LD77-C	LD81-R
LD74-C	DS36-16	LD82-R
DS36-1	DS36-11	LD83-R
DS36-5	LD84-C	LD84-R
LD81-C		LD100-R
	net NET00554	
Net NET00546	U12-3	net NET00572

U12-18	DS1-1	DS4-17
LD78-G	DS2-1	DS3-17
LD79-G	DS4-1	
LD80-G	DS3-1	Net NET00126
LD81-G		U1-36
LD82-G	net NET00122	DS1-15
LD83-G	U1-35	DS2-15
LD84-G	DS1-18	DS4-15
LD100-G	DS2-18	DS3-15
	DS4-18	
net NET00120	DS3-18	Net NET00127
U1-6		U1-32
DS1-7	net NET00123	DS1-14
DS2-7	U1-3	DS2-14
DS4-7	DS1-13	DS4-14
DS3-7	DS2-13	DS3-14
	DS4-13	
net NET00014	DS3-13	Net NET00128
U11-18		U1-4
LD67-G	net NET00124	DS1-5
LD66-G	U1-38	DS2-5
LD65-G	DS1-6	DS4-5
LD64-G	DS2-6	DS3-5
LD68-G	DS4-6	
LD69-G	DS3-6	Net NET00129
LD70-G		U1-39
LD94-G	net NET00125	DS1-4
	U1-33	DS2-4
net NET00121	DS1-17	DS4-4
U1-2	DS2-17	DS3-4

net NET00130	net NET00136	net NET00141
U1-40	U1-21	U2-19
DS1-2	DS3-16	DS8-16
DS2-2		
DS4-2	net NET00137	net NET00142
DS3-2	U1-20	U2-20
	DS3-11	DS7-11
net NET00131		
U1-34	net NET00138	net NET00143
DS1-8	U1-19	U2-21
DS2-8	DS4-16	DS7-16
DS4-8		
DS3-8	net NET00139	net NET00146
	U1-18	U2-23
net NET00132	DS4-11	DS6-11
U1-26		
DS1-16	net NET00012	net NET00147
	U11-4	U2-24
net NET00133	LD93-C	DS6-16
U1-25	LD94-C	
DS1-11	LD87-C	net NET00148
	LD86-C	U2-25
net NET00134	LD85-C	DS5-11
U1-24	LD88-C	
DS2-16		net NET00149
	net NET00140	U2-26
net NET00135	U2-18	DS5-16
U1-23	DS8-11	
DS2-11		net NET00165
		U2-7

DS5-12	DS8-1	net NET00174
DS6-12	DS7-1	U2-36
DS8-12		DS5-15
DS7-12	net NET00170	DS6-15
	U2-35	DS8-15
net NET00166	DS5-18	DS7-15
U2-37	DS6-18	
DS5-10	DS8-18	net NET00175
DS6-10	DS7-18	U2-32
DS8-10		DS5-14
DS7-10	net NET00171	DS6-14
	U2-3	DS8-14
net NET00167	DS5-13	DS7-14
U2-5	DS6-13	
DS5-9	DS8-13	net NET00176
DS6-9	DS7-13	U2-4
DS8-9		DS5-5
DS7-9	net NET00172	DS6-5
	U2-38	DS8-5
net NET00168	DS5-6	DS7-5
U2-6	DS6-6	
DS5-7	DS8-6	net NET00177
DS6-7	DS7-6	U2-34
DS8-7		DS5-8
DS7-7	net NET00173	DS6-8
	U2-33	DS8-8
net NET00169	DS5-17	DS7-8
U2-2	DS6-17	
DS5-1	DS8-17	net NET00178
DS6-1	DS7-17	

U2-40	U3-21	U3-7
DS5-2	DS11-16	DS9-12
DS6-2		DS10-12
DS8-2	net NET00185	DS12-12
DS7-2	U3-20	DS11-12
	DS11-11	
Net NET00179		net NET00191
U2-39	net NET00186	U3-6
DS5-4	U3-19	DS9-7
DS6-4	DS12-16	DS10-7
DS8-4		DS12-7
DS7-4	net NET00187	DS11-7
	U3-18	
Net NET00180	DS12-11	net NET00192
U3-26		U3-2
DS9-16	net NET00188	DS9-1
	U3-37	DS10-1
Net NET00181	DS9-10	DS12-1
U3-25	DS10-10	DS11-1
DS9-11	DS12-10	
	DS11-10	net NET00193
Net NET00182		U3-35
U3-24	net NET00189	DS9-18
DS10-16	U3-5	DS10-18
	DS9-9	DS12-18
Net NET00183	DS10-9	DS11-18
U3-23	DS12-9	
DS10-11	DS11-9	net NET00194
		U3-3
Net NET00184	net NET00190	DS9-13

DS10-13	DS11-14	net NET00203
DS12-13		U4-26
DS11-13	net NET00199	DS13-16
	U3-4	
net NET00195	DS9-5	net NET00204
U3-38	DS10-5	U4-25
DS9-6	DS12-5	DS13-11
DS10-6	DS11-5	
DS12-6		net NET00205
DS11-6	net NET00200	U4-24
	U3-34	DS14-16
net NET00196	DS9-8	
U3-33	DS10-8	net NET00206
DS9-17	DS12-8	U4-23
DS10-17	DS11-8	DS14-11
DS12-17		
DS11-17	net NET00201	net NET00207
	U3-40	U4-21
net NET00197	DS9-2	DS15-16
U3-36	DS10-2	
DS9-15	DS12-2	net NET00208
DS10-15	DS11-2	U4-20
DS12-15		DS15-11
DS11-15	net NET00202	
	U3-39	net NET00209
net NET00198	DS9-4	U4-19
U3-32	DS10-4	DS16-16
DS9-14	DS12-4	
DS10-14	DS11-4	net NET00210
DS12-14		U4-18

DS16-11	net NET00215	DS13-17
	U4-2	DS14-17
Net NET00211	DS13-1	DS16-17
U4-37	DS14-1	DS15-17
DS13-10	DS16-1	
DS14-10	DS15-1	net NET00220
DS16-10		U4-36
DS15-10	net NET00216	DS13-15
	U4-35	DS14-15
Net NET00212	DS13-18	DS16-15
U4-5	DS14-18	DS15-15
DS13-9	DS16-18	
DS14-9	DS15-18	net NET00221
DS16-9		U4-32
DS15-9	net NET00217	DS13-14
	U4-3	DS14-14
Net NET00213	DS13-13	DS16-14
U4-7	DS14-13	DS15-14
DS13-12	DS16-13	
DS14-12	DS15-13	net NET00222
DS16-12		U4-4
DS15-12	net NET00218	DS13-5
	U4-38	DS14-5
Net NET00214	DS13-6	DS16-5
U4-6	DS14-6	DS15-5
DS13-7	DS16-6	
DS14-7	DS15-6	net NET00223
DS16-7		U4-34
DS15-7	net NET00219	DS13-8
	U4-33	DS14-8

DS16-8	U5-23	DS20-9
DS15-8	DS18-11	DS19-9
net NET00224	net NET00230	Net NET00236
U4-40	U5-21	U5-7
DS13-2	DS19-16	DS17-12
DS14-2		DS18-12
DS16-2	net NET00231	DS20-12
DS15-2	U5-20	DS19-12
	DS19-11	
net NET00225		Net NET00237
U4-39	net NET00232	U5-6
DS13-4	U5-19	DS17-7
DS14-4	DS20-16	DS18-7
DS16-4		DS20-7
DS15-4	net NET00233	DS19-7
	U5-18	
net NET00226	DS20-11	Net NET00238
U5-26		U5-2
DS17-16	net NET00234	DS17-1
	U5-37	DS18-1
net NET00227	DS17-10	DS20-1
U5-25	DS18-10	DS19-1
DS17-11	DS20-10	Net NET00239
	DS19-10	U5-35
net NET00228		DS17-18
U5-24	net NET00235	DS18-18
DS18-16	U5-5	DS20-18
	DS17-9	DS19-18
net NET00229	DS18-9	

net NET00240
U5-3
DS17-13
DS18-13
DS20-13
DS19-13

net NET00241
U5-38
DS17-6
DS18-6
DS20-6
DS19-6

net NET00242
U5-33
DS17-17
DS18-17
DS20-17
DS19-17

net NET00243
U5-36
DS17-15
DS18-15
DS20-15
DS19-15

net NET00244
U5-32
DS17-14
DS18-14
DS20-14
DS19-14

net NET00245
U5-4
DS17-5
DS18-5
DS20-5
DS19-5

net NET00246
U5-34
DS17-8
DS18-8
DS20-8
DS19-8

net NET00247
U5-40
DS17-2
DS18-2
DS20-2
DS19-2

net NET00248
U5-39
DS17-4
DS18-4
DS20-4
DS19-4

net NET00249
U6-26
DS21-16

net NET00250
U6-25
DS21-11

net NET00251
U6-24
DS22-16

net NET00252
U6-23
DS22-11

net NET00253
U6-21
DS23-16

net NET00254
U6-20
DS23-11

net NET00255
U6-19
DS24-16

net NET00256
U6-18
DS24-11

net NET00257
U6-37
DS21-10
DS22-10
DS24-10
DS23-10

net NET00258
U6-5
DS21-9
DS22-9
DS24-9
DS23-9

net NET00259
U6-7
DS21-12
DS22-12
DS24-12
DS23-12

net NET00260
U6-6
DS21-7
DS22-7
DS24-7
DS23-7

net NET00261
U6-2
DS21-1
DS22-1
DS24-1
DS23-1

net NET00262
U6-35
DS21-18
DS22-18
DS24-18
DS23-18

net NET00263
U6-3
DS21-13
DS22-13
DS24-13
DS23-13

net NET00264
U6-38
DS21-6
DS22-6
DS24-6
DS23-6

net NET00265
U6-33
DS21-17
DS22-17
DS24-17
DS23-17

net NET00266
U6-36
DS21-15
DS22-15
DS24-15
DS23-15

net NET00267
U6-32
DS21-14
DS22-14
DS24-14
DS23-14

net NET00268
U6-4
DS21-5
DS22-5
DS24-5
DS23-5

net NET00269

U6-34	net NET00032	
DS21-8	J1-8	
DS22-8	S4-2	
DS24-8	S5-2	
DS23-8	S6-2	
	S7-2	
Net NET00270	S8-2	
U6-40		
DS21-2	net NET00054	
DS22-2	J1-1	
DS24-2	S4-1	
DS23-2		
	net EARTH	
Net NET00271	J1-2	
U6-39	S1-1	
DS21-4	S5-1	
DS22-4		
DS24-4	net NET00003	
DS23-4	J1-7	
	S1-2	
Net NET00052	S2-2	
J1-3	S3-2	
S2-1		
S6-1	net NET00034	
	J1-5	
Net NET00051	S8-1	
J1-4		
S7-1		
S3-1		

TABLE 3B

net VCC	C31-1	U1-20
C15-A	U18-16	C22-B
U15-1	C18-A	C23-B
U15-8	U17-6	U3-1
R4-B	C17-A	U3-16
R3-B	C19-A	U3-26
U7-1	U19-16	Q2-1
U7-2	C34-2	C26-2
CR6-2	C35-1	U6-1
U1-31	C20-A	U6-3
U1-40	C39-2	U6-7
U3-38	C40-1	C45-2
U3-15	U17-16	C1-B
Q2-3	U5-14	C3-B
C26-1	U2-20	U2-1
U6-2	U6-8	C2-B
C45-1	U7-8	CR1-3
C1-A		U20-15
C3-A	net GND	C21-B
C2-A	C14-B	U21-15
RN1-1	U14-3	C46-2
R7-B	U14-4	C47-1
U20-16	C29-2	C27-MINUS
C21-A	C15-B	VR1-2
U21-16	U15-2	C28-MINUS
C44-2	U15-3	C31-2
C46-1	U15-7	R2-A
VR1-3	U15-4	U18-8
	U7-3	C18-B
	U7-7	C17-B

60

C19-B	J8-7	U18-7
U19-15	J9-2	U17-5
C35-2	U17-8	
C36-1	U5-7	net NET00159
C20-B	U2-10	U20-14
C40-2	U6-4	J5-6
C41-1	U7-4	
J5-3		net NET00160
J5-1	net RS232_ADDR0	U21-13
J5-5	U1-1	J7-2
J5-7	U18-11	
J4-3	U17-1	net TXD
J4-1		U1-11
J4-5	net RS232_ADDR1	U17-4
J4-7	U1-2	
J3-3	U18-10	net NET00073
J3-1	U17-2	U19-6
J3-5		C36-2
J3-7	net RS232_ADDR2	
J6-3	U1-3	net NET00074
J6-1	U18-9	C32-2
J6-5	U17-3	U19-3
J6-7		
J7-3	net WRITE_LATCH_1	net NET00076
J7-1	R7-A	C33-1
J7-5	U5-6	U19-4
J7-7	J11-10	
J8-3		net +12V
J8-1	net RS232_CE	CR1-4
J8-5	U1-4	C27-PLUS

VR1-1	U19-14	net NET00047
C28-PLUS	J3-6	U20-4
LD1-A		C38-1
J5-4	net NET00009	
J5-8	U19-13	net NET00145
J4-4	J3-2	U17-15
J4-8		U19-11
J3-4	net NET00016	
J3-8	U19-7	net NET00049
J6-4	J4-6	U20-1
J6-8		C37-1
J7-4	net NET00029	
J7-8	U20-11	net NET00050
J8-4	U17-13	U20-5
J8-8		C38-2
J9-1	net NET00030	
	U20-12	net NET00051
net NET00005	U18-2	U20-2
C32-1		C39-1
U19-1	net NET00044	
	U20-6	net NET00150
net NET00006	C41-2	U18-4
U19-2		U19-12
C34-1	net NET00028	
	U19-8	net NET00112
net NET00007	J4-2	U20-10
C33-2		U17-12
U19-5	net NET00045	
	U20-3	net NET00054
net NET00008	C37-2	

U20-7 J6-6 Net NET00062 U20-8 J6-2 Net NET00063 U20-13 J5-2 Net RXD U1-10 U18-5 Net NET00092 U21-7 J8-6 Net NET00093 U21-8 J8-2 Net NET00048 U20-9 U18-1 Net NET00113 U21-11 U17-11	net NET00098 U21-14 J7-6 net NET00114 U21-12 U18-15 net NET00116 U21-10 U17-10 net NET00144 U21-9 U18-14 net NET00151 U17-14 U19-10 net NET00152 U18-3 U19-9 net NET00106 U21-2 C44-1 net NET00107	U21-5 C43-2 net NET00108 U21-1 C42-1 net NET00109 U21-4 C43-1 net NET00110 U21-3 C42-2 net NET00111 U21-6 C47-2 net I/O SELECT U1-5 J11-4 net NET00065 U3-14 J10-3 net NET00066 U3-13 J10-2

net NET00037	U1-36	U2-7
CR1-1	U3-33	RN1-7
FB2-2	U2-5	J11-7
FB2-3	RN1-5	
	J11-6	Net D2
net NET00072		U1-37
FB1-2	net D4	U3-32
FB1-3	U1-35	U2-4
S1-2	U3-34	RN1-4
S1-5	U2-6	J11-16
	RN1-6	
net NET00011	J11-15	Net D0
FB1-1		U1-39
FB1-4	net D7	U3-30
J2-1	U1-32	U2-2
	U3-37	RN1-2
net NET00012	U2-9	J11-17
FB2-1	RN1-9	
FB2-4	J11-8	Net A0
J2-3		U3-29
	net D6	U2-19
net D1	U1-33	J11-1
U1-38	U3-36	
U3-31	U2-8	Net NET00064
U2-3	RN1-8	U14-6
RN1-3	J11-14	U15-6
J11-5		R3-A
	net D5	U7-6
net D3	U1-34	U1-14
	U3-35	U6-6

net NET00035	R4-A	net WRITE_LATCH_2
U1-21	U7-5	U1-12
U3-39	U1-15	U5-5
	U6-5	J11-11
net WRITE_PORT		
U1-16	net A1	net NET00002
U3-47	U3-28	U1-9
J11-18	U2-18	U5-3
	J11-20	Q2-2
net VFD_RS		
U1-6	net READ_PORT	net A2
J11-9	U1-17	U3-27
	U3-50	U2-17
net VFD_RW	J11-13	J11-2
U1-7		
J11-12	net NET00067	net NET00032
	U3-12	U3-20
net NET00013	J10-1	J10-6
R2-B		
LD1-C	net NET00025	net A3
	U3-19	U3-25
net NET00001	J10-5	U2-16
CR1-2		J11-19
S1-1	net NET00026	
S1-4	U3-17	net ~RESET
	J10-4	U3-48
net NET00061		U5-4
U14-5	net NET00003	
U15-5	U1-27	net NET00004
	U3-45	

U1-26	Y2-1	
U3-44	C25-B	
	U14-1	
net NET00010		
U1-25	Net NET00019	
U3-43	U1-22	
	U3-40	
net NET00017		
U1-24	Net NET00000	
U3-42	C25-A	
	C14-A	
net NET00018	U14-8	
U1-23	C29-1	
U3-41	CR6-1	
net NET00274	Net NET00031	
U1-18	U1-28	
Y1-2	U3-46	
C23-A		
	Net ALE	
net NET00041	U1-30	
U1-29	U3-10	
U3-49	U2-11	
net NET00277	Net NET00043	
U1-19	Y2-2	
C22-A	U14-2	
Y1-1		
net NET00033		

TABLE 3C

net GND	U6-26	U1-2
CR1-3	C6-B	RN1-3
SW1-2	J3-5	J3-4
U4-1	J3-6	
U4-3	J4-5	Net SDATA
U4-7	J4-6	U4-5
Q1-1	J5-5	U1-8
U1-20	J5-6	RN1-9
VR1-4	J6-4	
VR1-2	U5-7	Net NET00028
VR1-3	U4-4	CR1-1
D1-2		J1-1
C15-2	net NET00000	
C14-MINUS	SW1-1	Net NET00032
C4-B	R1-B	U1-15
J2-3	U5-11	U5-5
J2-1		U5-1
J2-5	net NET00001	
J2-7	U5-10	Net NET00036
U2-10	U1-14	U5-12
U2-8		U6-48
U2-15	net NET00002	
C7-1	LD2-C	Net NET00037
C2-2	U5-4	U1-11
C1-2		U2-11
C11-B	net NET00003	
C12-B	J2-6	Net VCC
U6-1	U2-13	R1-A
U6-16		U4-2
	net NET00043	Q1-3

U1-31	J4-4	U6-30
U1-40		
VR1-1	net EE_SCLK	net NET00040
L1-2	U4-6	U1-38
L1-4	U1-7	U6-31
C15-1	RN1-8	
C4-A		net NET00041
U2-16	net NET00005	U1-37
C8-2	U1-1	U6-32
C2-1	RN1-2	
C1-1	J3-3	net NET00044
U6-38		U1-36
U6-15	net NET00008	U6-33
C6-A	CR1-4	
RN1-1	VR1-5	net NET00045
R6-B	D2-1	U1-35
R5-A	C14-PLUS	U6-34
R4-A		
R3-A	net NET00006	net NET00046
R2-A	U1-3	U1-34
U5-14	RN1-4	U6-35
U4-8	J4-3	
		net NET00026
Net NET00038	net RESET	U1-5
U1-10	Q1-2	RN1-6
U2-12	U1-9	J5-3
	U5-13	
Net NET00042		net NET00031
U1-4	net NET00039	U1-6
RN1-5	U1-39	RN1-7

J5-4	net NET00054	U6-20
	U1-26	
net NET00047	U6-44	Net NET00062
U1-33		J7-5
U6-36	net NET00055	U6-19
	U1-27	
net NET00048	U6-45	Net NET00064
U1-32		J7-4
U6-37	net NET00056	U6-17
	U1-28	
net NET00049	U6-46	Net NET00065
U1-21		J7-3
U6-39	net NET00057	U6-14
	U1-16	
net NET00050	U6-47	Net NET00066
U1-22		J7-2
U6-40	net NET00058	U6-13
	U1-17	
net NET00051	U6-50	Net NET00067
U1-23		J7-1
U6-41	net NET00059	U6-12
	U1-29	
net NET00052	U6-49	Net NET00009
U1-24		J3-2
U6-42	net NET00060	J4-2
	U1-30	R6-A
net NET00053	U6-10	J5-2
U1-25		
U6-43	net NET00061	Net NET00274
	J7-6	U1-18

Y1-2	C9-2	R2-B
C12-A		U5-9
	net NET00076	U5-6
Net NET00277	U2-4	J6-1
U1-19	C10-1	
Y1-1		net NET00267
C11-A	net +12V	CR1-2
	D2-2	J1-3
Net NET00138	J2-4	
U2-1	J2-8	net NET00010
C9-1		VR1-6
	net NET00020	VR1-8
Net NET00143	LD1-C	
U2-2	U5-3	net NET00013
C8-1	U5-2	VR1-7
		L1-1
Net NET00069	net NET00022	L1-3
U2-5	R4-B	D1-1
C10-2	LD1-A	
Net NET00070	net NET00025	
J2-2	R5-B	
U2-14	LD2-A	
Net NET00073	net NET00027	
U2-6	R3-B	
C7-2	U5-8	
	J6-2	
Net NET00074		
U2-3	net NET00030	

TABLE 3D

Net NET00000	LD3-C	U2-18
U2-1	LD4-C	R1-B
U1-4	J1-1	
	J2-2	Net NET00009
net NET00001		U2-17
U2-2	net NET00002	R2-B
U1-5	U2-3	
	U1-6	Net NET00012
net GND		U2-13
J1-5	net NET00003	R6-B
U3-1	U2-5	
U3-8	U1-9	Net NET00015
C3-B		R14-A
SW1-3	net NET00004	LD7-G
SW1-4	U2-7	
SW2-3	U1-11	Net NET00025
SW2-4		R3-A
SW3-3	net NET00005	LD2-R
SW3-4	U2-4	
SW4-3	U1-7	Net NET00027
SW4-4		R7-A
U2-10	net NET00006	LD4-R
U1-2	U2-6	
U1-1	U1-10	Net NET00029
U1-8		R11-A
C1-B	net NET00007	LD6-R
LD1-C	U2-8	
LD2-C	U1-12	Net NET00031
		R16-A
	net NET00008	LD8-G

net NET00034	U3-4	U4-6
U5-8	SW1-1	
U4-12	SW1-2	net NET00049
		U5-2
net NET00035	net NET00040	U4-5
U5-6	U5-12	
U4-10	R15-B	net NET00045
		U5-17
net NET00036	net NET00041	R10-B
U5-7	U5-14	
U4-11	R13-B	net NET00052
		U3-5
net NET00037	net NET00042	SW2-1
U5-5	U5-18	SW2-2
U4-9	R9-B	
		net NET00053
net NET00033	net NET00043	U3-6
U5-1	U2-14	SW3-1
U4-4	R5-B	SW3-2
net NET00038	net NET00044	net NET00054
U5-11	U5-16	U3-7
R16-B	R11-B	SW4-1
		SW4-2
net NET00039	net NET00047	
U5-13	U5-4	net NET00055
R14-B	U4-7	U3-9
		J2-6
net NET00051	net NET00048	
	U5-3	net NET00056

U3-10	U5-10	R17-A
J2-7	U4-2	J2-1
	U4-8	
net SCLK	C4-B	net NET00016
J1-3	J4-5	R1-A
U3-14	SW5-3	LD1-R
U1-14	SW5-4	
R17-B	SW6-3	net NET00017
J2-4	SW6-4	R2-A
	SW7-3	LD1-G
net NET00068	SW7-4	
U3-11	SW8-3	net NET00018
J2-8	SW8-4	R5-A
	LD5-C	LD3-R
net SDATA	LD6-C	
J1-4	LD7-C	net NET00019
R18-B	LD8-C	R9-A
U3-15	J4-1	LD5-R
U1-15	J3-2	
J2-5		net NET00020
	net VCC	U2-12
net VCC_1	J1-2	R7-B
U5-9	R18-A	
U4-16	U3-16	net NET00021
U4-1	U3-2	R6-A
C4-A	C3-A	LD3-G
J4-2	U2-9	
J3-1	U1-16	net NET00022
	C1-A	R10-A
net GND-COM	R19-A	LD5-G

net NET00023	R12-A	
U2-11	LD6-G	
R8-B		
	net NET00032	
net NET00010	R15-A	
U2-16	LD8-R	
R3-B		
	net NET00014	
net NET00011	U5-15	
U2-15	R12-B	
R4-B		
	net FRONT/~BACK	
net NET00013	J1-6	
U3-12	U3-3	
J2-9	U1-3	
	R19-B	
net NET00024	J2-3	
R13-A		
LD7-R	net NET00050	
	U4-14	
net NET00026	J4-3	
R4-A	J3-4	
LD2-G		
	net NET00057	
net NET00028	U4-3	
R8-A	J4-6	
LD4-G	J3-3	
net NET00030	net NET00060	
	U4-15	

TABLE 3E

net GND: C1-B, J1-5, J1-1, U1-8, SW1-3, SW1-4, SW2-3, SW2-4, SW3-3, SW3-4,

net NET00001: J1-6, R4-B, U1-3

net VCC: R1-A, R3-A, R2-A,C1-A, J1-2, R4-A,U1-16, U1-2, U1-1

net NET00002: J1-4, U1-15

net NET00003: J1-3,U1-14

net NET00006: U1-4, LD1-C

net NET00007: LD2-C, U1-5

net NET00008: LD3-C, U1-6

net NET00009: R1-B, LD1-A

net NET00010: R2-B, LD2-A

net NET00011: R3-B, LD3-A

net NET00012: U1-10, SW3-1, SW3-2

net NET00013: U1-9, SW2-1, SW2-2

net NET00014: U1-7, SW1-1, SW1-2

Station/Worker Interface Board

Figure 11 is a schematic diagram of the station/worker interface board (SWIB) 150 shown in Figure 10. The SWIB 150 includes serially-addressable ports PCF8574T U1, U3, U4, drivers UDN2982LW U2, U5, LED's LD1-LD8, 330 ohm resistors R1-R16, 4.7k ohm resistors R17-R19, 0.1uF capacitor C1, C3, C4 and switches SW1-SW8. The LED's LD1-LD8 correspond to the product status indicators 44 on the SWIB 150, and the switches SW1-SW8 correspond to the product status switches 42 on the SWIB 150.

A connector J1 provides electrical connection between selected signals on the SWIB 150 and the station interface board (SIB) 152. The serially-addressable ports PCF8574T U1, U3, U4 and the drivers UDN2982LW U2, U5 enable control of the product status indicators 44, and monitoring of the product status switches 42 via serialized data to and from the SIB 152. Groups of two LED's and two switches, such as LED's LD1-LD2 and switches SW1-SW2 correspond to one column on one of the stations 12, 14, 16. The 4.7k ohm resistors R17, R18 and R19 are used to pull the

corresponding signals up to VCC, and the 0.1uF capacitors C1, C3, C4 provide bypass capacitance for the SWIB 150.

The connector J1 for the SWIB 150 corresponding to the front of the station and the connector J1 for the SWIB 150 corresponding to the rear of station are connected to a modular T-connector (not shown) , such as those used for telephones. A front/back signal coupled to connector J1 provides a unique address, which determines whether the corresponding SWIB 150 corresponds to the front or rear of the station. In the preferred embodiment, the pin on connector J1 corresponding to the front/back signal on the front SWIB 150 is cut, and since the front/back signal is pulled up to VCC on the SWIB 150, this SWIB 150 corresponds to the front of the station. Similarly, the front/back signal on the SWIB 150 corresponding to the rear of the station is tied to ground, which indicates that this SWIB 150 corresponds to the rear of the station. Thus, the preferred embodiment is advantageous in that the front/back signal is not required for the SWIB 150 corresponding to the front of the station, which results in a significant reduction in the number of wires between the SWIB 150 and the SIB 152.

Remapping of Product Status Switches

Figures 8D and 8E show the display 18 mounted facing the front of the holding station 16 and the rear of the holding station 16, respectively. It is preferred that the position of a given product type section 132 on the display 18 spatially corresponds to one of the upper and lower tray combinations on the holding station 16 as shown by dashed lines A on Figure 8D. Each of the upper and lower tray combinations includes the product status indicators 42, product status switches 44, product label 46 and upper and lower trays 48. It is sometimes desirable to mount the display 18 facing the rear of the holding station 16 if, for instance, access to an ac outlet can only be obtained by doing so. When this is done, the product type sections 132 on the display no longer correspond spatially to the correct upper and lower tray combinations as shown by dashed lines B on Figure 8E. However, by remapping the addresses of the serially addressable ports PCF8574T U1-U3 the spatial correspondence shown in Figure 8D can again be achieved. This remapping can be

achieved through software in the operational program of the SIB 152 or the SCB 156 based upon a switch selected by the user to indicate whether the display 18 is mounted facing the front of the holding station 16 or the rear of the holding station 16.

Active/Transfer Board

Figure 12 is a schematic diagram of the active/transfer board (ATB) 154. The ATB 154 includes connector J1, LED's LD1-LD3, 330 ohm resistors R1-R3 and switches SW1-SW3. The switches SW1-SW3 correspond to the active switch 34A, for the front of the station, the active switch 34B for the rear of the station and the transfer switch 38, respectively. The LED's LD1-LD3 correspond to the active indicator 36A for the front of the station, the active switch 36B for the rear of the station, and the transfer indicator 40, respectively. The 330 ohm resistors R1-R3 limit the series current seen by the LED's LD1-LD3, and the connector J1 provides electrical connection between the ATB 154 and the SIB 152. A serially-addressable port PCF8574A7 U1 is electrically connected to and disposed between the connector J1 and the switches SW1-SW3 and LED's LD1-LD3. The serially-addressable port PCF85747 U1 enables the SIB 152 to access each of the switches and LED's via a serial data and address stream.

Station Interface Board

Figure 13 is a schematic diagram of the station interface board (SIB) 152. The SIB 152 includes a microcontroller 80C32A U1, which monitors and controls the SIB 152, the ATB 154 and the SWIB 150. A serial data bus is pulled up to VCC using a 4.7k ohm resistor pack RN1. Three sets of serial ports, which are electrically connected to three connectors J3-J5, enable the microcontroller 80C32A U1 to monitor the product status switches 44 located on the SWIB 150.

The combination of an 11.059MHz crystal Y1 and 30 pF capacitors C11, C12 provide a clock signal to the microcontroller 80C32A U1. A reset circuit DS1833-10 provides a reset signal having the required rise time, fall time and duration to the microcontroller 80C32A U1. A serial interface MAX 232 U2 and 10uF capacitors C7-C10 in electrical connection thereto, provide an RS-232 bidirectional serial

interface between the microcontroller 80C32A U1 on the SIB 152 and components on the station control board 156 via a connector J2.

A set of capacitors C1, C2, C4, C5 provide bypass capacitance, and a 4.7k ohm resistor R1-R3 is used to pull corresponding signals up to VCC. An inverter 7406 U10 is used to logically invert the reset signal before being applied to a memory device PSD813F U8, which provides external RAM and ROM for the microcontroller 80C32A U1. A set of LED's LD1, LD2 provide a visual indication of the day part, and whether the microcontroller 80C32A U1 is running, which is also provided to an optional warmer daypart temperature select board (not shown) via a connector J6. A set of 330 ohm resistors R4, R5 are used to limit the series current seen by the LED LD1, LD2 and inverters 7405 U5 provide the necessary drive current.

Connectors J3-J5 provide electrical connection between signals on the SIB 152 and those on each of up to six SWIB 150 and two ATB 154. A voltage regulator LM2575T-5.0 VR1, L1, diodes D1, D2, a 470uF capacitor C14, a 220uF capacitor C15, and a bridge rectifier CR1 provide regulation of a 12 volt supply to a 5 volt VCC via a connector J1 on the SIB 152. A programmable read only memory (PROM) 24C164 U4 provides additional permanent memory storage for the microcontroller 80C32A U1.

Station Control Board

Figures 14A and 14B are schematic diagrams for the station control board (SCB) 156. The SCB 156 is substantially similar to the SIB 152 with the exception of an additional bank of serial PROM 24C164 U6, U7 and a serial RAM PCF8570 U15, which provide additional external memory for the microcontroller 80C32 U1. A time-of-day clock PCF8583 U14 in combination with a 32.768KhZ oscillator Y2, a 0.1uF capacitors C29, C14 an 18pF capacitor C25 and a diode 1N270 CR5 provide a battery-backed time of day to the microcontroller 80C32 U1 to permit, for instance, automated control of the day part and the activity level.

The schematic diagram for the SCB 156 continues on Figure 14B with a decoder 74LS138 U17 and a multiplexer 74LS251N U18, which provide address decoding and data directivity for three bidirectional serial channels provided by a set of serial interfaces MAX232 U19-U21, and 10uF capacitors C32-C47 which are electrically connected to connectors J3-J8. The connectors J3-J8 then connect to J2 on Figure 13 of the SIB 153. A connector J11 on the SCB 156 provides electrical connection between signals such as the data bus on the SCB 156 and the display board 158.

A connector J2 provides a 12v ac power signal from the display board to ferrite beads FB1, FB2, a switch S1, a bridge rectifier CR1, 470μF capacitors C27, C28, an LED LD1 and a 1.43k ohm resistor R2, which convert the 12v ac power signal to a 12v dc power signal. The 12v dc power signal is regulated down to 5v dc by a voltage regulator LM7805CT VR1 and a 10μF capacitor C31. The 12v dc power signal is also provided to the display board via a connector J9. The remaining components shown in Figures 14A and 14B and their associated functions and connectivity are substantially similar to those described above for the SIB 152 shown in Figure 13.

Display Board

The display board 158 is shown in Figures 15A-15L. The connector J11 on the station control board 156 shown in Figure 14A is coupled to a connector J2 on the display board 158 shown in Figure 15A, and provides the multiplexed address and data bus to decoders 74LS138 U16-U18, latches 74HCT574 U13, U15 and a buffer 74HCT540 U14. The outputs of the buffer 74HCT540 U14 are pulled up to VCC with a 10K ohm resistor pack RN1. These devices along with a transistor 2N7000 Q1 and a 180 ohm resistor R3 enable control of the displays and indicators located on the display board 158 shown in Figures 15C-15K, as well as a vacuum fluorescent display VFD1 shown in Figure 15A, by the station control board 156. A set of 0.1μF capacitors C1-C18 provide bypass capacitance for the devices on the display board 158.

The vacuum fluorescent display VFD1 shown in Figure 15A corresponds to the alphanumeric display 142 shown in Figure 4. Groups of four 14-segment displays LTP3784E DS1-DS24 shown in Figures 15C-15H correspond to one product name display 134 shown in Figure 4. Each of the 14-segment displays LTP3784E DS1-DS24 is capable of indicating two alphanumeric digits. The decoders, latches and buffer shown in Figures 15A and 15B are electrically connected to six 14-segment drivers ICM7243B U1-U6 shown in Figures 15C and 15H. These drivers provide the signals required by the 14-segment displays LTP3784 DS1-DS24 to display the identities of the different products sold. It is to be noted that there are twelve groups of four 14-segment displays LTP3784E DS1-DS24 shown in Figures 15C and 15H, which correspond to the twelve product name displays 134 on Figure 4.

Figures 15I and 15K show the pan fill level display 136 and the product status indicators 44 located on the display 18 as shown in Figure 4. Twelve groups of two 7-segment displays LN524RA DS25-DS36 correspond to the twelve pan fill level displays 136 shown in Figure 4. Likewise, groups 160 of eight LED's LD1-LD100 correspond to the product status indicators 44 in each product type section 132 shown in Figure 4. For instance, LED LD1 on Figure 15I corresponds to the product status indicator 44 in the first column and upper first row in the front counter station 12, and LED LD2 corresponds to the product status indicator 44 corresponding to the first column and lower first row in the front counter station 12. Six 7-segment display drivers ICM7228A U7-U12 are electrically connected to the decoders, latches and buffer shown in Figures 15A and 15B, and provide signals required for the LED's LD1-LD100 and the 7-segment displays LN524RA DS25-DS36 to display the status and the pan fill levels for each product, respectively.

Figure 16F is a schematic diagram of the activity level switch 138, the day part select switch 140, the menu switch 144, the editing cursor switches 146 and the enter switch 148 shown in the lower portion of the display 18 on Figure 4. Each of the switches include two terminals interconnected in a column and row matrix and provided as signals via a connector J1 to the buffer 74HCT540 U14 and the latch 74HCT574 U15 shown in Figure 15A. The microcontroller 80C32 U1 on the SCB

156 can readily determine which of the switches was selected by accessing the buffer and latch by means well known in the art.

Additional Embodiments

The product status indicators 44 may include a liquid crystal display (LCD) or light emitting diode (LED) display, which is used to display the current value of the storage time for the corresponding food product. The worker may then use the storage time to determine whether a particular action should be taken with respect to the corresponding food product, such as cooking replenishment product or discarding the product.

Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawing, it is to be understood that the invention is not limited to those precise embodiments, and that various other changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention.

WHAT IS CLAIMED IS:

1. A method for monitoring the status and storage location of a prepared food product in a restaurant, which comprises the steps of:

a. supplying a prepared food product to a storage location, the storage location having associated therewith a food product status indicator, the food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated storage location, at least a second state which indicates that the prepared food product is not stored at the associated storage location and at least a third state which indicates that a storage time exceeds an acceptable food product hold time;

b. changing the state of the food product status indicator associated with the storage location from the second state to the first state in response to the prepared food product being supplied to the storage location;

c. initiating a storage timer in response to the food product status indicator changing from the second state to the first state, the storage timer counting the storage time representative of the duration of time that the prepared food product has been stored at the storage location;

d. comparing the storage time with the acceptable food product hold time;

e. changing the state of the food product status indicator associated with the storage location to the third state if the storage time exceeds the acceptable food product hold time; and

f. changing the state of the food product status indicator associated with the storage location from the first state to the second state in response to the storage location no longer containing the prepared food product.

2. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 1, wherein the food product status indicator has at least a fourth state which indicates that the cooking of a replenishment

food product should commence, and wherein the method further comprises the steps of:

g. comparing the storage time with a cook start time, the cook start time being equal to the difference between the acceptable food product hold time and the time required to cook the replenishment food product; and

h. changing the state of the food product status indicator associated with the storage location to the fourth state in response to the storage time exceeding the cook start time.

3. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 1, further comprising the step of displaying the state of the food product status indicator on a display, the display being located remotely from the storage location.

4. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 1, wherein the storage location has an active switch associated therewith, wherein the food product status indicator has at least a seventh state which indicates that the storage location is not being used, the method further comprising the step of changing the state of the food product status indicator to the seventh state in response to activation of the active switch.

5. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 1, wherein the food product status indicator has at least a seventh state which indicates that the storage location is not being used, the method further comprising the step of changing the state of the food product status indicator to the seventh state in response to at least one of a time, a day and an event.

6. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 1, further comprising the step of providing a pan fill level associated with the storage location, the pan fill level indicating a

quantity of the prepared food product to cook in response to the state of the food product status indicator changing to the second state.

7. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 6, further comprising the step of displaying the pan fill level on a display, the display being located remotely from the storage location.

8. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 6, further comprising the steps of:

i. electronically displaying an activity level associated with the storage location, the activity level indicating a rate of sale of the prepared food product; and

j. changing the pan fill level as a function of the activity level.

9. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 8, further comprising the step of storing the activity level in a memory.

10. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 8, wherein the storage location has an activity level switch associated therewith, further comprising the step of changing the activity level in response to activation of the activity level switch.

11. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 8, further comprising the step of changing the activity level in response to at least one of a time, a day and an event.

12. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 8, further comprising the step of displaying the activity level on a display, the display being located remotely from the storage location.

13. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 6, further comprising the steps of:

k. providing a selectable menu associated with the storage location, the selectable menu having associated therewith at least one pan fill level; and

l. electronically displaying the selectable menu on a display, the display being located remotely from the storage location.

14. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 6, wherein the step of providing a pan fill level further comprises the steps of:

m. calculating a food product per unit sale volume, the food product per unit sale volume being representative of a quantity of food product sold at a unit sale volume, the unit sale volume being representative of a volume of sale in dollars;

n. determining an activity level, the activity level being representative of a quantity of unit sale volume substantially equal to a current volume of sale; and

o. multiplying the food product per unit sale volume by the activity level and dividing the product of the food product per unit sale volume and the activity level by a quantity of open pans to yield the pan fill level.

15. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 13, wherein the storage location has a selectable menu switch associated therewith, the method further comprising the step of changing the selectable menu in response to activation of the selectable menu switch.

16. In a method for monitoring the status and storage location of a prepared food product in a restaurant wherein the prepared food product is removed from a source

storage location and transferred to a destination storage location, wherein the improvement comprises the steps of:

a. supplying a prepared food product to a source storage location, the source storage location having at least a source food product status indicator and a source food product transfer mode associated therewith, the source food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated source storage location, at least a second state which indicates that the prepared food product is not stored at the associated source storage location and at least a third state which indicates that a source storage time exceeds an acceptable food product hold time;

b. changing the state of the source food product status indicator from the second state to the first state in response to the prepared food product being supplied to the source storage location;

c. initiating a source storage timer associated with the source storage location in response to the source food product status indicator changing from the second state to the first state, the source storage timer counting a source storage time representative of the duration of time that the prepared food product has been stored at the source storage location;

d. selecting the source food product transfer mode, the destination storage location having at least a destination food product status indicator and a destination food product transfer mode associated therewith, the destination food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated destination storage location, at least a second state which indicates that the prepared food product is not stored at the associated destination storage location and at least a third state which indicates that a cumulative storage time exceeds the acceptable food product hold time;

e. changing the state of the source food product status indicator from the first state to the second state in response to the prepared food product being removed from the source storage location and the source food product transfer mode being selected;

f. selecting the destination food product transfer mode;

g. changing the state of the destination food product status indicator from the second state to the first state in response to the prepared food product being supplied to the destination storage location and the destination food product transfer mode being selected;

h. initiating a destination storage timer associated with the destination storage location in response to the destination food product status indicator changing from the second state to the first state, the destination storage timer counting the cumulative storage time representative of the duration of time that the prepared food product has been stored at the source storage location and the destination storage location;

i. comparing the destination storage time with the acceptable food product hold time; and

j. changing the state of the destination food product status indicator to the third state in response to the cumulative storage time exceeding the acceptable food product hold time.

17. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, wherein the destination food product status indicator has at least a fourth state which indicates that the cooking of a replenishment food product should commence, and wherein the method further comprises the steps of:

k. comparing the cumulative storage time with a cook start time, the cook start time being equal to the difference between the acceptable food product hold time and the time required to cook the replenishment food product; and

l. changing the state of the destination food product status indicator to the fourth state in response to the cumulative storage time exceeding the cook start time.

18. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, further comprising the step of displaying the state of at least one of the source food product status indicator and the destination food product status indicator on a display, the display being located

remotely from at least one of the source storage location and the destination storage location.

19. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, wherein at least one of the source storage location and the destination storage location has an active switch associated therewith, wherein at least one of the source food product status indicator and the destination food product status indicator has at least a seventh state which indicates that at least one of the source storage location and the destination storage location is not being used, the method further comprising the step of changing the state of at least one of the source food product status indicator and the destination food product status indicator to the seventh state in response to activation of the active switch.

20. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, at least one of the source food product status indicator and the destination food product status indicator has at least a seventh state which indicates that at least one of the source storage location and the destination storage location is not being used, the method further comprising the step of changing the state of at least one of the source food product status indicator and the destination food product status indicator to the seventh state in response to at least one of a time, a day and an event.

21. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, further comprising the step of providing a pan fill level associated with at least one of the source storage location and the destination storage location, the pan fill level indicating a quantity of the prepared food product to cook in response to the state of at least one of the source food product status indicator and the destination food product status indicator changing to the second state.

22. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 21, further comprising the step of

displaying the pan fill level on a display, the display being located remotely from at least one of the source storage location and the destination storage location.

23. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 21, further comprising the steps of:

m. electronically displaying an activity level associated with at least one of the source storage location and the destination storage location, the activity level indicating a rate of sale of the prepared food product; and

n. changing the pan fill level as a function of the activity level.

24. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 23, further comprising the step of storing the activity level in a memory.

25. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 23, wherein at least one of the source storage location and the destination storage location has an activity level switch associated therewith, further comprising the step of changing the activity level in response to activation of the activity level switch.

26. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 23, further comprising the step of changing the activity level in response to at least one of a time, a day and an event.

27. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 23, further comprising the step of displaying the activity level on a display, the display being located remotely from at least one of the source storage location and the destination storage location.

28. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 21, further comprising the steps of:

o. providing a selectable menu associated with at least one of the source storage location and the destination storage location, the selectable menu having associated therewith at least one pan fill level; and

p. electronically displaying the selectable menu on a display, the display being located remotely from at least one of the source storage location and the destination storage location.

29. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 21, wherein the step of providing a pan fill level further comprises the steps of:

q. calculating a food product per unit sale volume, the food product per unit sale volume being representative of a quantity of food product sold at a unit sale volume, the unit sale volume being representative of a volume of sale in dollars;

r. determining an activity level, the activity level being representative of a quantity of unit sale volume substantially equal to a current volume of sale; and

s. multiplying the food product per unit sale volume by the activity level and dividing the product of the food product per unit sale volume and the activity level by a quantity of open pans to yield the pan fill level.

30. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 28, wherein at least one of the source storage location and the destination storage location has a selectable menu switch associated therewith, the method further comprising the step of changing the selectable menu in response to activation of the selectable menu switch.

31. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, further comprising the step of positioning the source storage location and the destination storage location in substantially similar spatial locations in different stations.

32. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 16, wherein the destination food product indicator has at least a sixth state which indicates that the food product can be transferred into the associated destination storage location, the method further comprising the step of changing the state of the destination food product status indicator to the sixth state in response to selecting the destination food product transfer mode.

33. In a method for monitoring the status and storage location of a prepared food product in a restaurant wherein the prepared food product is removed from a first source storage location and transferred to a destination storage location, wherein the improvement comprises the steps of:

a. supplying a prepared food product to a first source storage location, the first source storage location having a first source food product status switch, a first source food product status indicator and a source food product transfer mode associated therewith, the source food product transfer mode being associated with a first source product location, the first source food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated first source storage location, at least a second state which indicates that the prepared food product is not stored at the associated first source storage location, at least a third state which indicates that a first source storage time for the associated first source storage location exceeds an acceptable food product hold time and at least a fifth state which indicates which of the first source storage location and the second source storage location has a longer storage time associated therewith;

b. changing the state of the first source food product status indicator from the second state to the first state in response to the prepared food product being supplied to the first source storage location;

c. initiating a first source storage timer associated with the first source storage location in response to the first source food product status indicator changing from the second state to the first state, the first source storage timer counting a first source storage time representative of the duration of time that the prepared food product has been stored at the first source storage location;

d. supplying the prepared food product to the second source storage location following the step of initiating the first source storage timer, the second source storage location having a second source food product status switch, a second source food product status indicator and the source food product transfer mode associated therewith, the second source food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated second source storage location, at least a second state which indicates that the prepared food product is not stored at the associated second source storage location, at least a third state which indicates that a second source storage time for the associated second source storage location exceeds the acceptable food product hold time and at least a fifth state which indicates which of the first source storage location and the second source storage location has a longer storage time associated therewith;

e. changing the state of the second source food product status indicator from the second state to the first state in response to the prepared food product being supplied to the second source storage location;

f. initiating a second source storage timer associated with the second source storage location in response to the second source food product status indicator changing from the second state to the first state, the second source storage timer counting a second source storage time representative of the duration of time that the prepared food product has been stored at the associated second source storage location;

g. selecting the source food product transfer mode associated with the first and second source storage locations;

h. selecting the first source food product status switch associated with the first source storage location;

i. changing the state of the first source food product status indicator to the fifth state in response to the source food product transfer mode being selected the destination storage location having a destination food product status switch, a destination food product status indicator and a destination food product transfer mode associated therewith, the destination food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated destination storage location, at least a second state which indicates that

the prepared food product is not stored at the associated destination storage location and least a third state which indicates that a cumulative storage time exceeds the acceptable food product hold time;

j. changing the state of the first source food product status indicator from the first state to the second state in response to the prepared food product being removed from the first source storage location;

k. selecting the destination food product transfer mode;

l. selecting the destination food product status switch;

m. changing the state of the destination food product status indicator from the second state to the first state in response to the prepared food product being supplied to the destination storage location;

n. initiating the destination storage timer in response to the destination food product status indicator changing from the second state to the first state, the destination storage timer counting the cumulative storage time representative of the duration of time that the prepared food product has been stored at the first source storage location and the destination storage location

o. comparing the cumulative storage time with the acceptable food product hold time; and

p. changing the state of the destination food product status indicator to the third state in response to the cumulative storage time exceeding the acceptable food product hold time.

34. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, wherein the destination food product status indicator has at least a fourth state which indicates that the cooking of a replenishment food product should commence, and wherein the method further comprises the steps of:

q. comparing the cumulative storage time with a cook start time, the cook start time being equal to the difference between the acceptable food product hold time and the time required to cook the replenishment food product; and

r. changing the state of the destination food product status indicator to the fourth state in response to the cumulative storage time exceeding the cook start time.

35. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, further comprising the step of displaying the state of at least one of the first source food product status indicator, the second source food product status indicator and the destination food product status indicator on a display, the display being located remotely from at least one of the first source storage location, the second source storage location and the destination storage location.

36. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, wherein at least one of the first source storage location, the second source storage location and the destination storage location has an active switch associated therewith, wherein at least one of the first source food product status indicator, second source food product status indicator and destination food product status indicator has at least a seventh state which indicates that at least one of the first source storage location, the second source storage location and the destination storage location is not being used, the method further comprising the step of changing the state of at least one of the first source food product status indicator, the second source food product status indicator and the destination food product status indicator to the seventh state in response to activation of the active switch.

37. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, wherein the first source food product status indicator, the second source food product status indicator and the destination food product status indicator has at least a seventh state which indicates that at least one of the first source storage location, the second source storage location and the destination storage location is not being used, the method further comprising the step of changing the state of at least one of the first source food product status indicator,

the second source food product status indicator and the destination food product status indicator to the seventh state in response to at least one of a time, a day and an event.

38. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, further comprising the step of providing a pan fill level associated with at least one of the first source storage location, the second source storage location and the destination storage location, the pan fill level indicating a quantity of the prepared food product to cook in response to the state of at least one of the first source food product status indicator, the second source food product status indicator and the destination food product status indicator changing to the second state.

39. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 38, further comprising the step of displaying the pan fill level on a display, the display being located remotely from at least one of the first source storage location, the second source storage location, and the destination storage location.

40. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 38, further comprising the steps of:

s. electronically displaying an activity level associated with at least one of the first source storage location, the second source storage location and the destination storage location, the activity level indicating a rate of sale of the prepared food product; and

t. changing the pan fill level as a function of the activity level.

41. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 40, further comprising the step of storing the activity level in a memory.

42. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 40, wherein at least one of the first source

storage location, the second source storage location and the destination storage location has an activity level switch associated therewith, further comprising the step of changing the activity level in response to activation of the activity level switch.

43. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 40, further comprising the step of changing the activity level in response to at least one of a time, a day and an event.

44. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 40, further comprising the step of displaying the activity level on a display, the display being located remotely from at least one of the first source storage location, the second source storage location and the destination storage location.

45. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 38, further comprising the steps of:

u. providing a selectable menu associated with at least one of the first source storage location, the second source storage location and the destination storage location, the selectable menu having associated therewith at least one pan fill level; and

v. electronically displaying the selectable menu on a display, the display being located remotely from at least one of the first source storage location, the second source storage location and the destination storage location.

46. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 38, wherein the step of providing a pan fill level further comprises the steps of:

w. calculating a food product per unit sale volume, the food product per unit sale volume being representative of a quantity of food product sold at a unit sale volume, the unit sale volume being representative of a volume of sale in dollars;

x. determining an activity level, the activity level being representative of a quantity of unit sale volume substantially equal to a current volume of sale; and

y. multiplying the food product per unit sale volume by the activity level and dividing the product of the food product per unit sale volume and the activity level by a quantity of open pans to yield the pan fill level.

47. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 45, wherein the at least one of the first source storage location, the second source storage location and the destination storage location has a selectable menu switch associated therewith, the method further comprising the step of changing the selectable menu in response to activation of the selectable menu switch.

48. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, further comprising the step of positioning at least one of the first source storage location, the second source storage location and the destination storage location in substantially similar spatial locations in different stations.

49. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 33, wherein the destination food product indicator has at least a sixth state which indicates that the food product can be transferred into the associated destination storage location, the method further comprising the step of changing the state of the destination food product status indicator to the sixth state in response to selecting the destination food product transfer mode.

50. A method for monitoring the status and storage location of a prepared food product in a restaurant as defined by Claim 36, further comprising the steps of:

z. calculating a quantity of open source storage locations, the source storage location being open when the associated food product status indicator

is not in the seventh state, the storage location being closed in response to the associated food product status indicator changing to the seventh state;

aa. calculating a close quantity, the close quantity being equal to a quantity of source storage locations which are open less a stock level, the stock level being equal to a quantity of the prepared food product desired in the restaurant;

bb. closing the source storage locations which are open according to a predetermined order of priority, the source storage locations which are open being closed in response to the close quantity being a positive integer, a quantity of source storage locations which are closed being equal to the close quantity.

51. A product status system for monitoring the status and storage location of a prepared food product, which comprises:

a processing circuit;

a food product status switch associated with a storage location, the food product status switch being coupled to the processing circuit;

a food product status indicator associated with the storage location, the food product status indicator being coupled to the processing circuit, the food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated storage location and at least a second state which indicates that the prepared food product is not stored at the associated storage location, the state of the food product status indicator associated with the storage location changing from the second state to the first state in response to the prepared food product being supplied to the storage location and the food product status switch being selected, the state of the food product status indicator associated with the storage location changing from the first state to the second state in response to the storage location no longer containing prepared food product and the food product status switch being selected;

a storage timer associated with the storage location, the storage timer being coupled to the processing circuit, the storage timer being initiated in response to the food product status indicator changing from the second state to the first state, the storage timer counting a storage time, the storage time being representative of the duration of time that the prepared food product has been stored at the storage location,

the food product status indicator having at least a third state which indicates that the storage time exceeds an acceptable food product hold time, the processing circuit comparing the storage time with the acceptable food product hold time, the state of the food product status indicator associated with the storage location changing to the third state in response to the storage time exceeding the acceptable food product hold time.

52. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 51, wherein the food product status indicator has at least a fourth state which indicates that the cooking of a replenishment food product should commence, wherein the processing circuit compares the storage time with a cook start time, the cook start time being equal to the difference between the acceptable food product hold time and the time required to cook the replenishment food product, and wherein the state of the food product status indicator associated with the storage location is changed to the fourth state in response to the storage time exceeding the cook start time.

53. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 51, further comprising a display, the display indicating the state of the food product status indicator associated with the storage location, the display being located remotely from the storage location.

54. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 51, further comprising an active switch associated with the storage location, wherein the food product status indicator has at least a seventh state which indicates that the storage location is not being used, the state of the food product status indicator changing to the seventh state in response to activation of the active switch.

55. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 51, wherein the food product status indicator has at least a seventh state which indicates that the storage

location is not being used, the state of the food product status indicator changing to the seventh state in response to at least one of a time, a day and an event.

56. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 51, further comprising a pan fill level associated with the storage location, the pan fill level indicating a quantity of the prepared food product to cook in response to the state of the food product status indicator changing to the second state.

57. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 56, further comprising a display, the display being located remotely from the storage location, the pan fill level being displayed on the display.

58. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 56, further comprising an activity level associated with the storage location, the activity level indicating a rate of sale of the prepared food product, the pan fill level changing as a function of the activity level.

59. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 58, further comprising a memory, the activity level being stored in the memory.

60. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 58, further comprising an activity level switch associated with the storage location, the activity level switch changing in response to activation of the activity level switch.

61. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 58, wherein the activity level is changed in response to at least one of a time, a day and an event.

62. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 58, further comprising a display, the display being located remotely from the storage location, the activity level being displayed on the display.

63. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 56, further comprising a display and a selectable menu associated with the storage location, the selectable menu having associated therewith a pan fill level, the selectable menu being electronically displayed on the display.

64. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 63, wherein the storage location has a selectable menu switch associated therewith, the selectable menu changing in response to activation of the selectable menu switch.

65. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 51, wherein the storage location has a food product pan associated therewith, at least one of the food product status switch and the food product status indicator being located in alignment with the food product pan.

66. In a product status system which monitors the status and storage location of a prepared food product wherein at least a portion of the prepared food product is removed from a source storage location and transferred to a destination storage location, wherein the improvement comprises:

a processing circuit;

a source food product status switch associated with a source storage location, the source food product status switch being coupled to the processing circuit;

means for selecting a source food product transfer mode associated with the source storage location, the means for selecting the source food product transfer mode being coupled to the processing circuit;

a source food product status indicator associated with the source storage location, the source food product status indicator being coupled to the processing circuit, the source food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated source storage location and at least a second state which indicates that the prepared food product is not stored at the associated source storage location, the state of the source food product status indicator changing from the second state to the first state in response to the prepared food product being supplied to the source storage location and the source food product status switch being selected, the state of the source food product status indicator changing from the first state to the second state in response to the source storage location no longer containing prepared food product and the source food product status switch being selected;

a source storage timer associated with the source storage location, the source storage timer being coupled to the processing circuit, the source storage timer being initiated in response to the source food product status indicator changing from the second state to the first state, the source storage timer counting a source storage time, the source storage time being representative of the duration of time that the prepared food product has been stored at the source storage location, the source food product status indicator having at least a third state which indicates that the source storage time exceeds an acceptable food product hold time, the processing circuit comparing the source storage time with the acceptable food product hold time, the state of the source food product status indicator changing to the third state in response to the source storage time exceeding the acceptable food product hold time;

a destination food product status switch associated with a destination storage location, the destination food product status switch being coupled to the processing circuit;

means for selecting a destination food product transfer mode associated with the destination storage location, the means for selecting the destination food product transfer mode being coupled to the processing circuit;

a destination food product status indicator associated with the destination storage location, the destination food product status indicator being coupled to the processing circuit, the destination food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated destination storage location and at least a second state which indicates that the prepared food product is not stored at the associated destination storage location, the state of the destination food product status indicator changing from the second state to the first state in response to the prepared food product being supplied to the destination storage location and the destination food product status switch being selected, the state of the destination food product status indicator changing from the first state to the second state in response to the destination storage location no longer containing prepared food product and the destination food product status switch being selected; and

a destination storage timer associated with the destination storage location, the destination storage timer being coupled to the processing circuit, the destination storage timer being initiated in response to the destination food product status indicator changing from the second state to the first state, the destination storage timer counting a cumulative storage time, the cumulative storage time being representative of the duration of time that the prepared food product has been stored at the source storage location and the destination storage location, the destination food product status indicator having at least a third state which indicates that the cumulative storage time exceeds the acceptable food product hold time, the processing circuit comparing the cumulative storage time with the acceptable food product hold time, the state of the destination food product status indicator changing to the third state in response to the cumulative storage time exceeding the acceptable food product hold time.

67. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, wherein the destination food product status indicator has at least a fourth state which indicates that the cooking of a replenishment food product should commence, the processing circuit comparing the cumulative storage time with a cook start time, the cook start time

being equal to the difference between the acceptable food product hold time and the time required to cook the replenishment food product, the state of the destination food product status indicator changing to the fourth state in response to the cumulative storage time exceeding the cook start time.

68. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, further comprising a display, the display indicating the state of at least one of the source food product status indicator and the destination food product status indicator, the display being located remotely from at least one of the source storage location and the destination storage location.

69. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, further comprising an active switch associated with at least one of the source storage location and the destination storage location, wherein at least one of the source food product status indicator and the destination food product status indicator has at least a seventh state which indicates that at least one of the source storage location and the destination storage location is not being used, the state of at least one of the source food product status indicator and the destination food product status indicator changing to the seventh state in response to activation of the active switch.

70. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, wherein at least one of the source food product status indicator and the destination food product status indicator has at least a seventh state which indicates that at least one of the source storage location and the destination storage location is not being used, the state of at least one of the source food product status indicator and the destination food product status indicator changing to the seventh state in response to at least one of a time, a day and an event.

71. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, further comprising a pan fill level associated with at least one of the source storage location and the destination storage location, the pan fill level indicating a quantity of the prepared food product to cook in response to the state of at least one of the source food product status indicator and the destination food product status indicator changing to the second state.

72. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 71, further comprising a display, the display being located remotely from at least one of the source storage location and the destination storage location, the pan fill level being displayed on the display.

73. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 71, further comprising an activity level associated with at least one of the source storage location and the destination storage location, the activity level indicating a rate of sale of the prepared food product, the pan fill level changing as a function of the activity level.

74. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 73, further comprising a memory, the activity level being stored in the memory.

75. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 73, further comprising an activity level switch associated with at least one of the source storage location and the destination storage location, the activity level switch changing in response to activation of the activity level switch.

76. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 73, wherein the activity level is changed in response to at least one of a time, a day and an event.

77. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 73, further comprising a display, the display being located remotely from at least one of the source storage location and the destination storage location, the activity level being displayed on the display.

78. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 71, further comprising a display and a selectable menu associated with at least one of the source storage location and the destination storage location, the selectable menu having associated therewith a pan fill level, the selectable menu being electronically displayed on the display.

79. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 78, wherein at least one of the source storage location and the destination storage location has a selectable menu switch associated therewith, the selectable menu changing in response to activation of the selectable menu switch.

80. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, wherein the source storage location and the destination storage location are positioned in substantially similar spatial locations in different stations.

81. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, wherein the destination food product status indicator has at least a sixth state which indicates that the prepared food product can be transferred into the destination storage location, the state of the destination food product status indicator changing to the sixth state in response to the source food product transfer mode and the destination food product status switch being selected.

82. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 66, wherein at least one of the source storage location and the destination storage location has a food product pan associated therewith, at least one of the source food product status switch, the destination food product status switch, the source food product status indicator and the destination food product status indicator being located in alignment with the food product pan.

83. In a product status system which monitors the status and storage location of a prepared food product wherein at least a portion of the prepared food product is removed from a first source storage location and transferred to a destination storage location, wherein the improvement comprises:

a processing circuit;

a first source food product status switch associated with a first source storage location, the first source food product status switch being coupled to the processing circuit;

means for selecting a source food product transfer mode associated with the first source storage location and a second source storage location, the means for selecting the first source food product transfer mode being coupled to the processing circuit;

a first source food product status indicator associated with the first source storage location, the first source food product status indicator being coupled to the processing circuit, the first source food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated first source storage location and at least a second state which indicates that the prepared food product is not stored at the associated first source storage location, the state of the first source food product status indicator changing from the second state to the first state in response to the prepared food product being supplied to the first source storage location and the first source food product status switch being selected, the state of the first source food product status indicator changing from the first state

to the second state in response to the first source storage location no longer containing prepared food product and the first source food product status switch being selected;

a first source storage timer associated with the first source storage location, the first source storage timer being coupled to the processing circuit, the first source storage timer being initiated in response to the first source food product status indicator changing from the second state to the first state, the first source storage timer counting a first source storage time, the first source storage time being representative of the duration of time that the prepared food product has been stored at the first source storage location, the first source food product status indicator having at least a third state which indicates that the first source storage time exceeds an acceptable food product hold time, the processing circuit comparing the first source storage time with the acceptable food product hold time, the state of the first source food product status indicator changing to the third state in response to the first source storage time exceeding the acceptable food product hold time, the first source food product status indicator having at least a fifth state which indicates which of the first source storage location and the second storage location has the longest storage time associated therewith, the processing circuit comparing the first source storage time with a second source storage time, the state of that source food product status indicator associated with the source food product location having the longest storage time associated therewith changing to the fifth state in response to the source food product transfer mode being selected;

a second source food product status switch associated with the second source storage location, the second source food product status switch being coupled to the processing circuit;

a second source food product status indicator associated with the second source storage location, the second source food product status indicator being coupled to the processing circuit, the second source food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated second source storage location and at least a second state which indicates that the prepared food product is not stored at the associated second source storage location, the state of the second source food product status indicator changing from the second state to the first state in response to the prepared food product being

supplied to the second source storage location and the second source food product status switch being selected, the state of the second source food product status indicator changing from the first state to the second state in response to the second source storage location no longer containing prepared food product and the second source food product status switch being selected;

a second source storage timer associated with the second source storage location, the second source storage timer being coupled to the processing circuit, the second source storage timer being initiated in response to the second source food product status indicator changing from the second state to the first state, the second source storage timer counting the second source storage time, the second source storage time being representative of the duration of time that the prepared food product has been stored at the second source storage location, the second source food product status indicator having at least a third state which indicates that the second source storage time exceeds an acceptable food product hold time, the processing circuit comparing the second source storage time with the acceptable food product hold time, the state of the second source food product status indicator changing to the third state in response to the second source storage time exceeding the acceptable food product hold time, the first source food product status indicator having at least a fifth state which indicates which of the first source storage location and the second source storage location has the longest storage time associated therewith, the processing circuit comparing the first source storage time with the second source storage time, the state of that food product status indicator associated with the source food product location having the longest storage time associated therewith changing to the fifth state in response to the source food product transfer mode being selected;

a destination food product status switch associated with a destination storage location, the destination food product status switch being coupled to the processing circuit;

means for selecting a destination food product transfer mode associated with the destination storage location, the means for selecting the destination food product transfer mode being coupled to the processing circuit;

a destination food product status indicator associated with the destination storage location, the destination food product status indicator being

coupled to the processing circuit, the destination food product status indicator having at least a first state which indicates that the prepared food product is stored at the associated destination storage location and at least a second state which indicates that the prepared food product is not stored at the associated destination storage location, the state of the destination food product status indicator changing from the second state to the first state in response to the prepared food product being supplied to the destination storage location and the destination food product status switch being selected, the state of the destination food product status indicator changing from the first state to the second state in response to the destination storage location no longer containing prepared food product and the destination food product status switch being selected; and

a destination storage timer associated with the destination storage location, the destination storage timer coupled to the processing circuit, the destination storage timer being initiated in response to the destination food product status indicator changing from the second state to the first state, the first source storage time being longer than the second source storage time, the first source food product status switch and the destination food product transfer mode, the destination storage timer counting a cumulative storage time, the cumulative storage time being representative of the duration of time that the prepared food product has been stored at the first source storage location and the destination storage location, the destination food product status indicator having at least a third state which indicates that the cumulative storage time exceeds the acceptable food product hold time, the processing circuit comparing the cumulative storage time with the acceptable food product hold time, the state of the destination food product status indicator being changed to the third state in response to the cumulative storage time exceeding the acceptable food product hold time.

84. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, wherein the destination food product status indicator has at least a fourth state which indicates that the cooking of a replenishment food product should commence, the processing circuit comparing the cumulative storage time with a cook start time, the cook start time

being equal to the difference between the acceptable food product hold time and the time required to cook the replenishment food product, the state of the destination food product status indicator changing to the fourth state in response to the storage time exceeding the cook start time.

85. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, further comprising a display, the display indicating the state of at least one of the first source food product status indicator, the second source food product status indicator and the destination food product status indicator, the display being located remotely from at least one of the first source food product location, the second source food product location and the destination food product location.

86. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, further comprising an active switch associated with the first source storage location, wherein the first source food product status indicator has at least a seventh state which indicates that the first source storage location is not being used, the state of the first source food product status indicator changing to the seventh state in response to activation of the active switch.

87. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, wherein the first source food product status indicator has at least a seventh state which indicates that the first source storage location is not being used, the state of the first source food product status indicator changing to the seventh state in response to at least one of a time, a day and an event.

88. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, further comprising a pan fill level associated with the first source storage location, the pan fill level indicating a

quantity of the prepared food product to cook in response to the state of the first source food product status indicator changing to the second state.

89. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 88, further comprising a display, the display being located remotely from the first source storage location, the pan fill level being displayed on the display.

90. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 88, further comprising an activity level associated with the first source storage location, the activity level indicating a rate of sale of the prepared food product, the pan fill level changing as a function of the activity level.

91. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 90, further comprising a memory, the activity level being stored in the memory.

92. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 90, further comprising an activity level switch associated with the first source storage location, the activity level switch changing in response to activation of the activity level switch.

93. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 90, wherein the activity level is changed in response to at least one of a time, a day and a promotional event.

94. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 90, further comprising a display, the display being located remotely from the first source storage location, the activity level being displayed on the display.

95. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 88, further comprising a display and a selectable menu associated with at least one of the first source storage location, the second source storage location and the destination storage location, the selectable menu having associated therewith a pan fill level, the selectable menu being electronically displayed on the display.

96. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 95, wherein at least one of the first source storage location, the second source storage location and the destination storage location has a selectable menu switch associated therewith, the selectable menu changing in response to activation of the selectable menu switch.

97. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, wherein the first source storage location and the destination storage location are positioned in substantially similar spatial locations in different stations.

98. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, wherein the destination food product status indicator has at least a sixth state which indicates that the prepared food product can be transferred into the destination storage location, the state of the destination food product status indicator changing to the sixth state in response to the source food product transfer mode and the destination food product status switch being selected.

99. A product status system which monitors the status and storage location of a prepared food product in a restaurant as defined by Claim 83, wherein at least one of the first source storage location, the second source storage location and the destination storage location has a food product pan associated therewith, at least one of the first source food product status switch, second source food product status switch, destination food product status switch, first source food product status indicator,

second source food product status indicator and destination food product status indicator being located in alignment with the food product pan.

22
24
DRIVE-THROUGH STATION
14
26
26
26
20
CASH REGISTER
FRONT COUNTER STATION
12
28
28
28
28
28
CENTRAL DISPLAY
18
HOLDING STATION
16
32
30
20
CASH REGISTER
FRONT COUNTER STATION
12
10

FIGURE 1

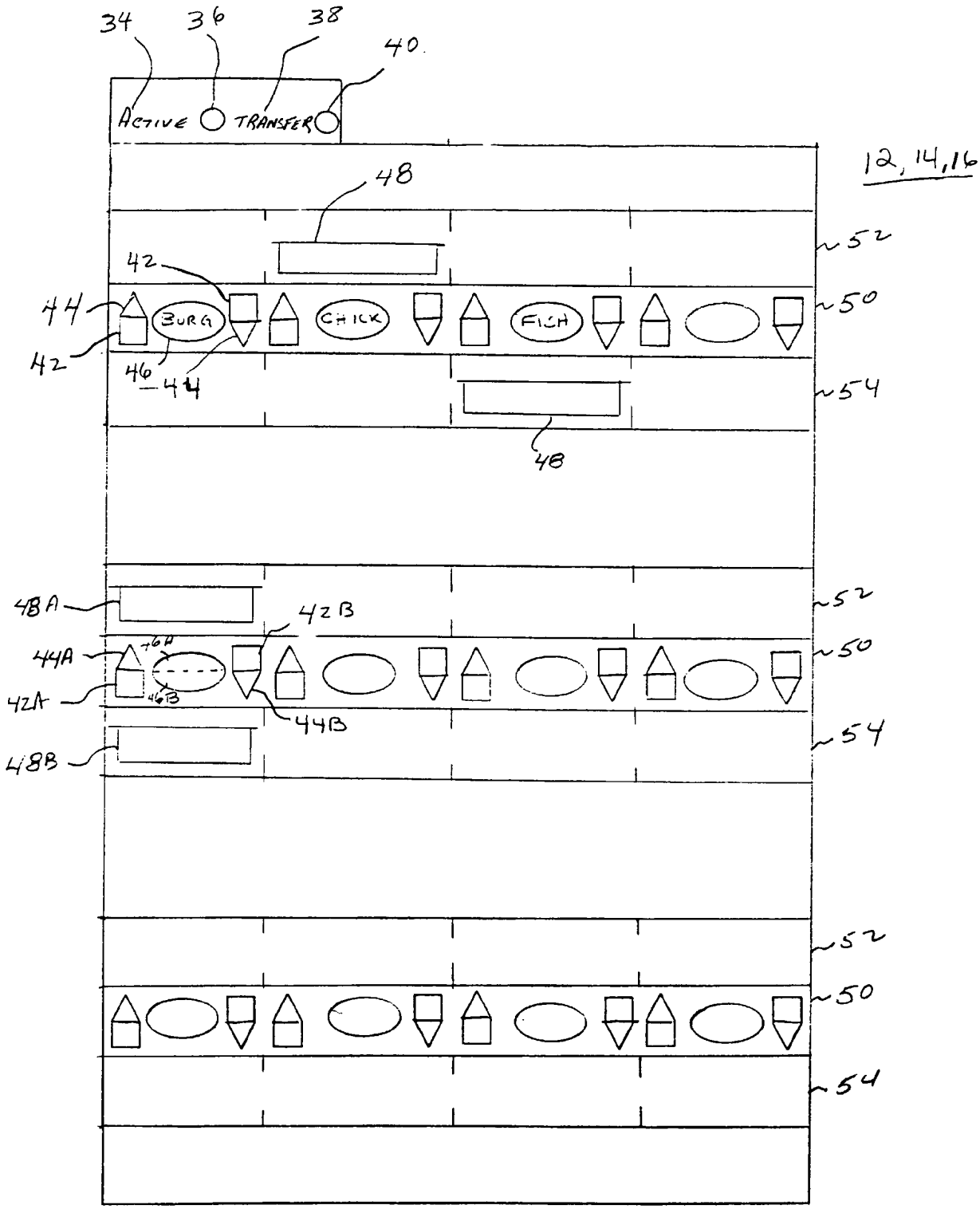

34
36
38
40
ACTIVE
TRANSFER
12, 14, 16
48
52
42
44
50
BURG
CHICK
FISH
42
46
44
54
48
48A
42B
52
44A
50
46A
46B
44B
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48B
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54

FIGURE 2

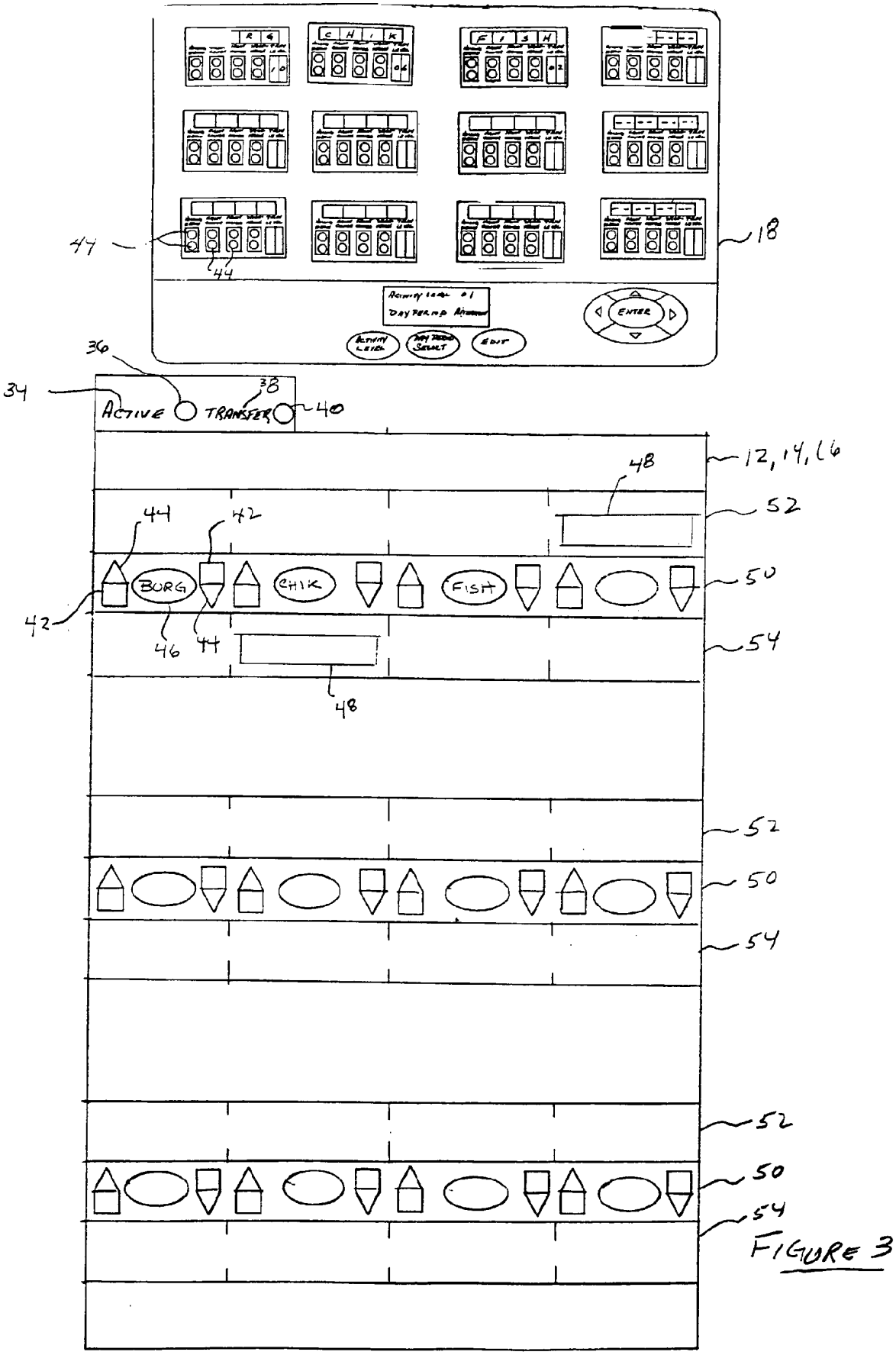

47
44
18
ENTER
36
34
38
ACTIVE
TRANSFER
40
12, 14, 16
48
52
44
42
50
BURG
CHIK
FISH
42
46
44
54
48
52
50
54
52
50
54

FIGURE 3

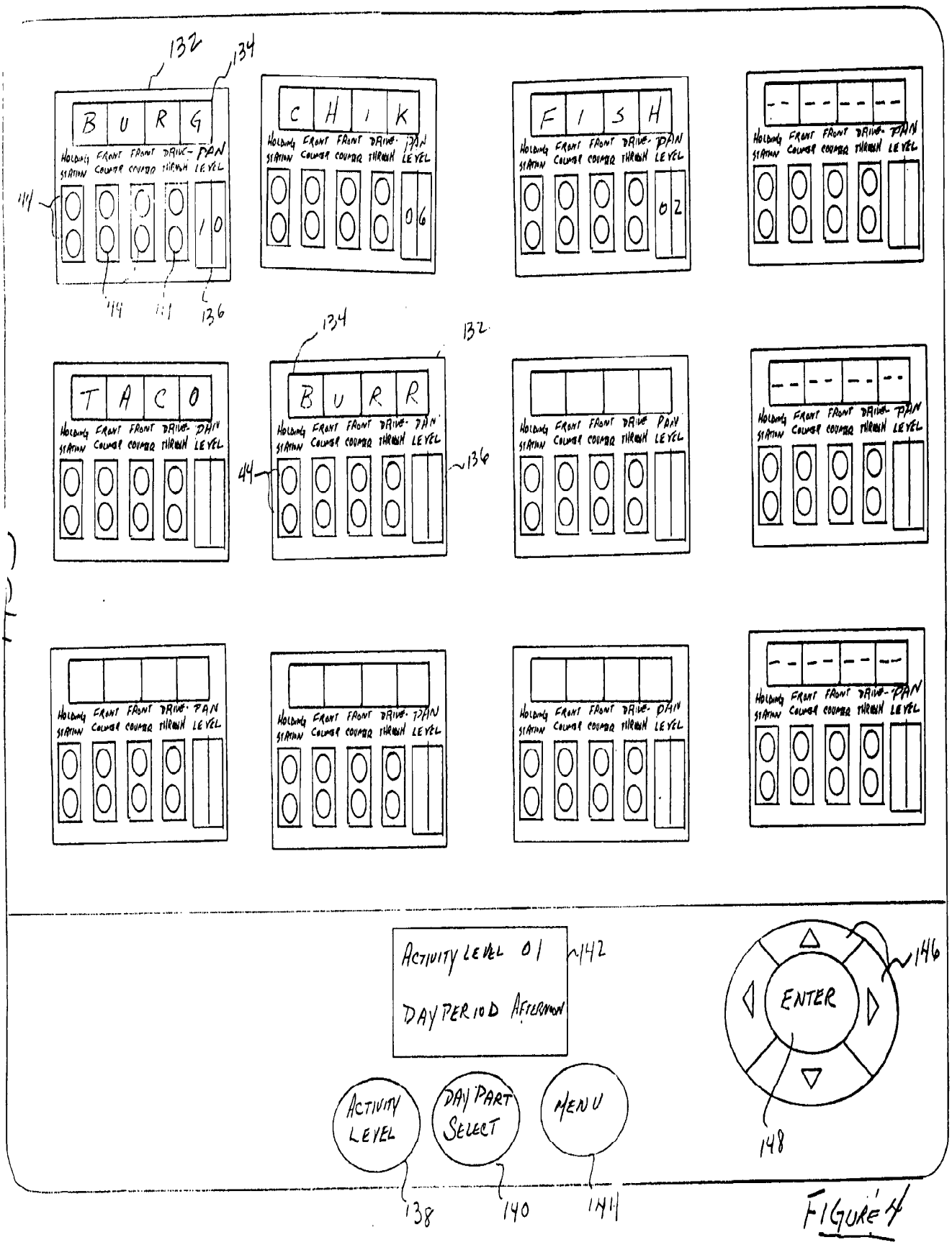

132
134
B U R G
HOLDING STATION
FRONT COUNTER
FRONT COUNTER
DRIVE-THROUGH
PAN LEVEL
10
114
C H I K
06
F I S H
02
T A C O
B U R R
44
136
ACTIVITY LEVEL 01
142
DAYPERIOD AFTERNOON
ENTER
146
148
ACTIVITY LEVEL
DAY PART SELECT
MENU
138
140
144
18

FIGURE 4

4/33

FIGURE 5A

FIGURE 5B

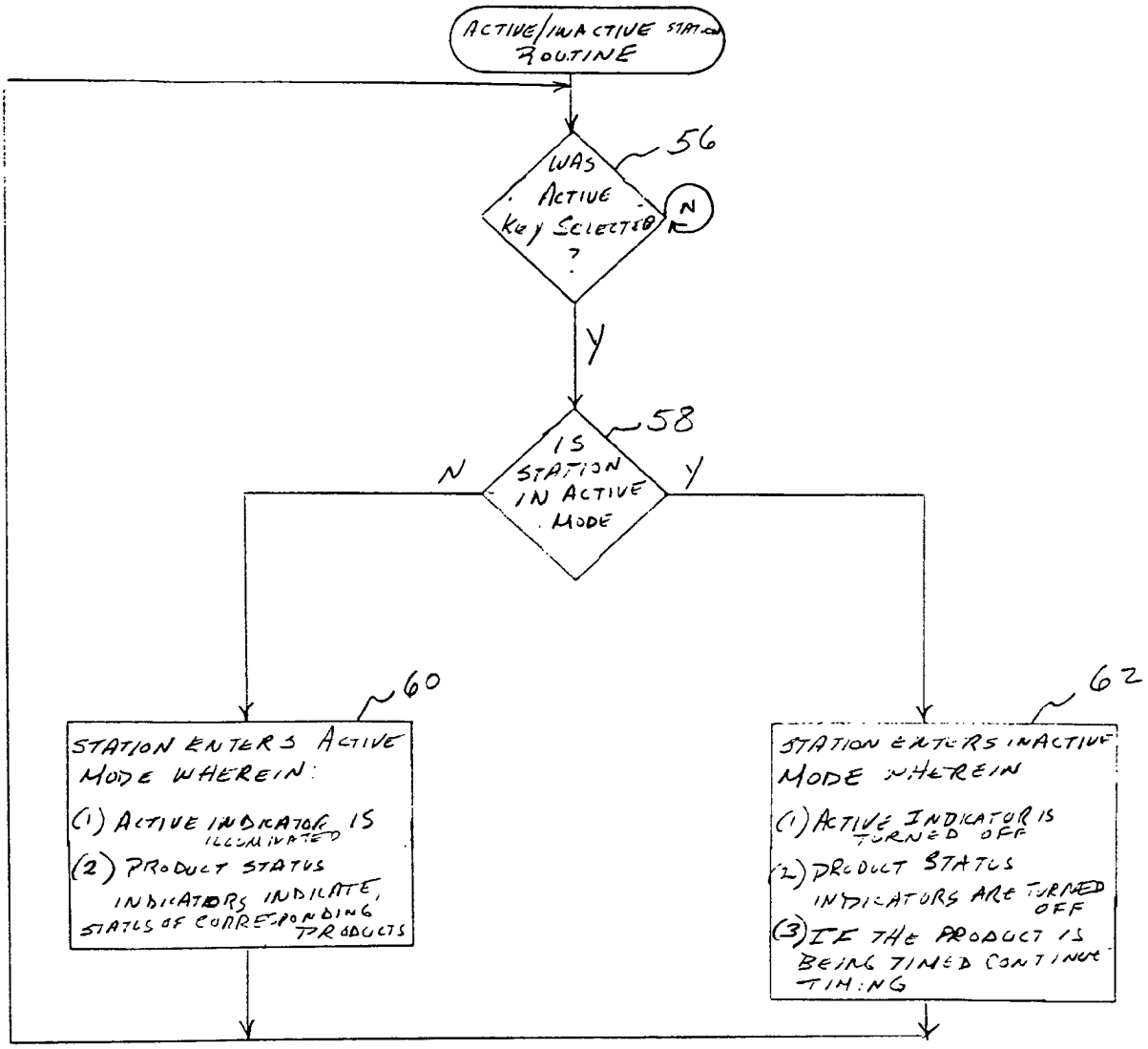

ACTIVE/INACTIVE STATION ROUTINE
56
WAS ACTIVE KEY SELECTED ?
N
Y
58
IS STATION IN ACTIVE MODE
N
Y
60
STATION ENTERS ACTIVE MODE WHEREIN:
(1) ACTIVE INDICATOR IS ILLUMINATED
(2) PRODUCT STATUS INDICATORS INDICATE STATUS OF CORRESPONDING PRODUCTS
62
STATION ENTERS INACTIVE MODE WHEREIN
(1) ACTIVE INDICATOR IS TURNED OFF
(2) PRODUCT STATUS INDICATORS ARE TURNED OFF
(3) IF THE PRODUCT IS BEING TIMED CONTINUE TIMING

FIGURE 6

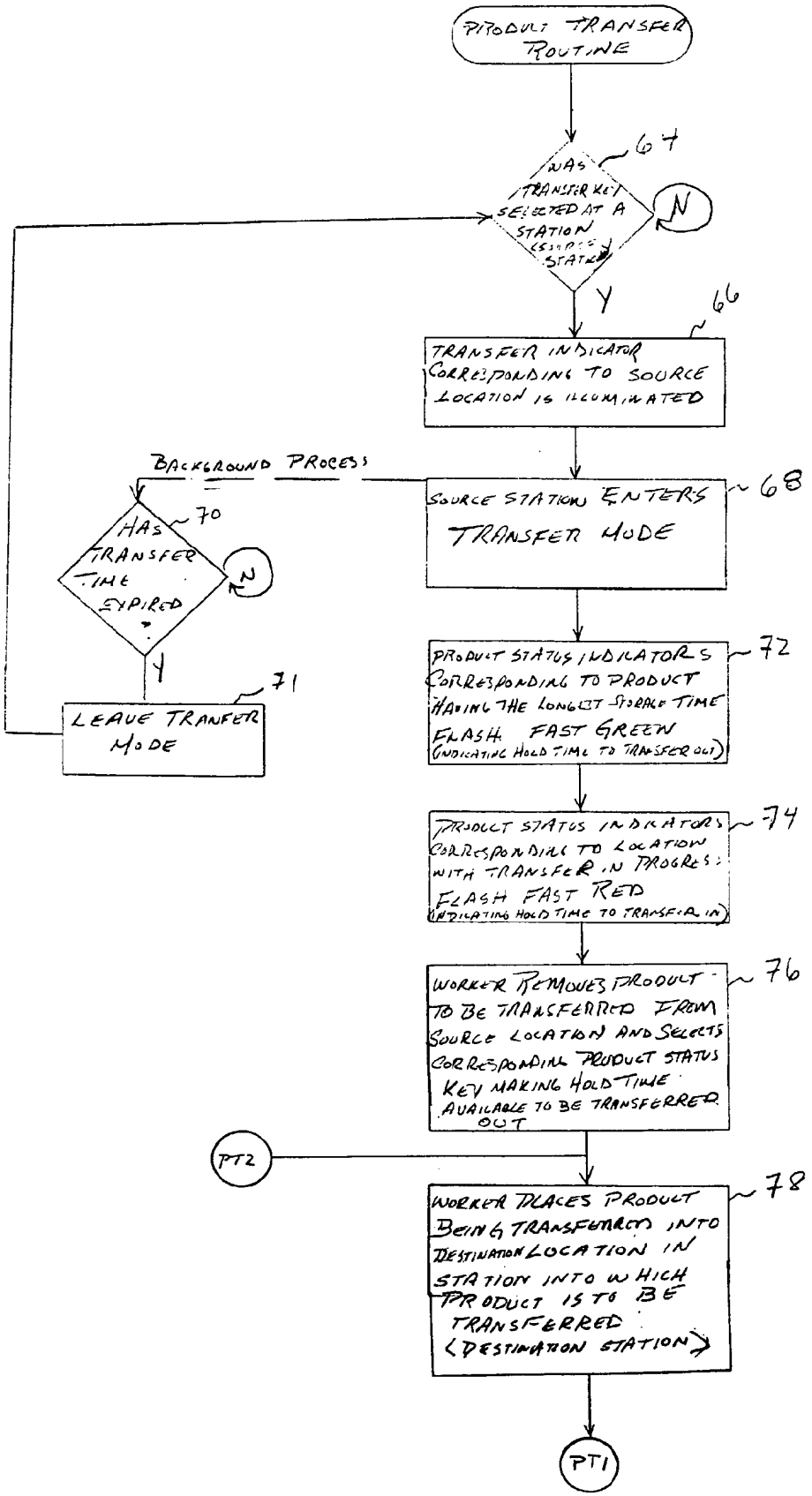

PRODUCT TRANSFER ROUTINE
67
HAS TRANSFER KEY SELECTED AT A STATION (SOURCE STATION)
N
Y
66
TRANSFER INDICATOR CORRESPONDING TO SOURCE LOCATION IS ILLUMINATED
BACKGROUND PROCESS
68
SOURCE STATION ENTERS TRANSFER MODE
70
HAS TRANSFER TIME EXPIRED
N
Y
71
LEAVE TRANFER MODE
72
PRODUCT STATUS INDICATORS CORRESPONDING TO PRODUCT HAVING THE LONGEST STORAGE TIME FLASH FAST GREEN (INDICATING HOLD TIME TO TRANSFER OUT)
74
PRODUCT STATUS INDICATORS CORRESPONDING TO LOCATION WITH TRANSFER IN PROGRESS FLASH FAST RED (INDICATING HOLD TIME TO TRANSFER IN)
76
WORKER REMOVES PRODUCT TO BE TRANSFERRED FROM SOURCE LOCATION AND SELECTS CORRESPONDING PRODUCT STATUS KEY MAKING HOLD TIME AVAILABLE TO BE TRANSFERRED OUT
PT2
78
WORKER PLACES PRODUCT BEING TRANSFERRED INTO DESTINATION LOCATION IN STATION INTO WHICH PRODUCT IS TO BE TRANSFERRED (DESTINATION STATION)
PT1

FIGURE 7A

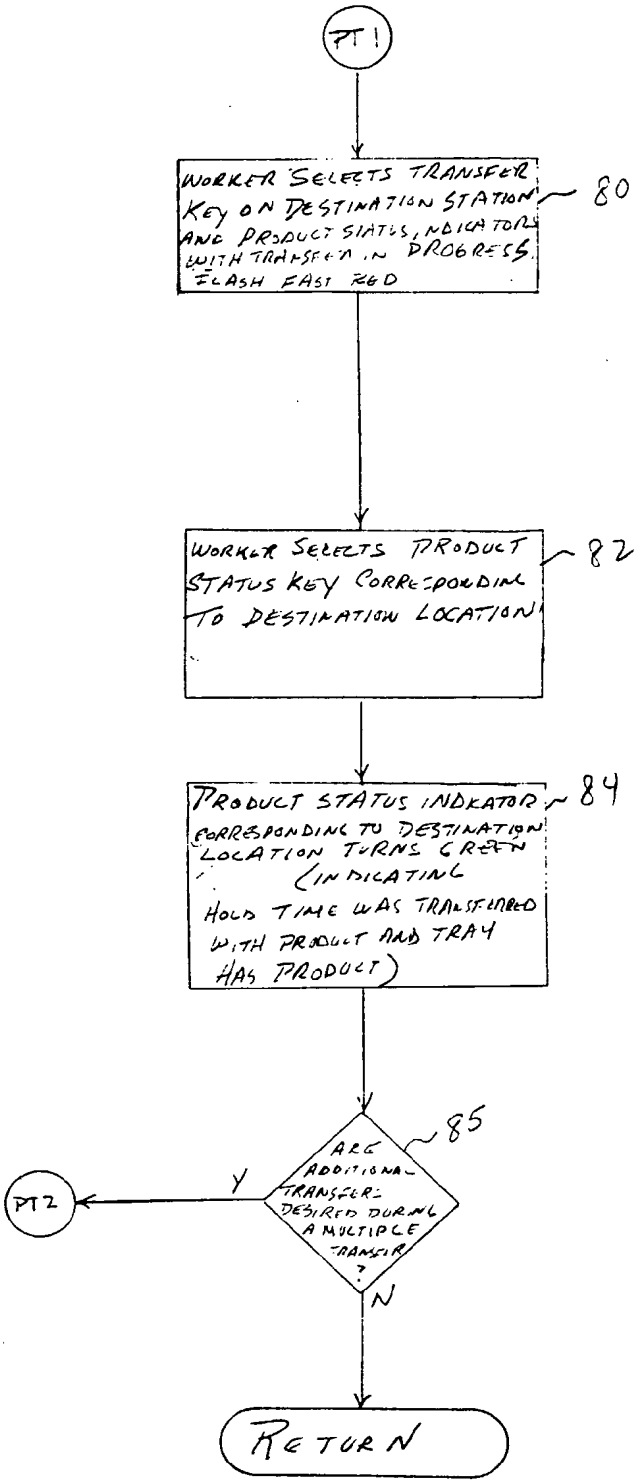

PT1
WORKER SELECTS TRANSFER KEY ON DESTINATION STATION AND PRODUCT STATUS INDICATOR WITH TRANSFER IN PROGRESS FLASH FAST RED
80
WORKER SELECTS PRODUCT STATUS KEY CORRESPONDING TO DESTINATION LOCATION
82
PRODUCT STATUS INDICATOR CORRESPONDING TO DESTINATION LOCATION TURNS GREEN (INDICATING HOLD TIME WAS TRANSFERRED WITH PRODUCT AND TRAY HAS PRODUCT)
84
ARE ADDITIONAL TRANSFERS DESIRED DURING A MULTIPLE TRANSFER ?
85
Y
PT2
N
RETURN

FIGURE 7B

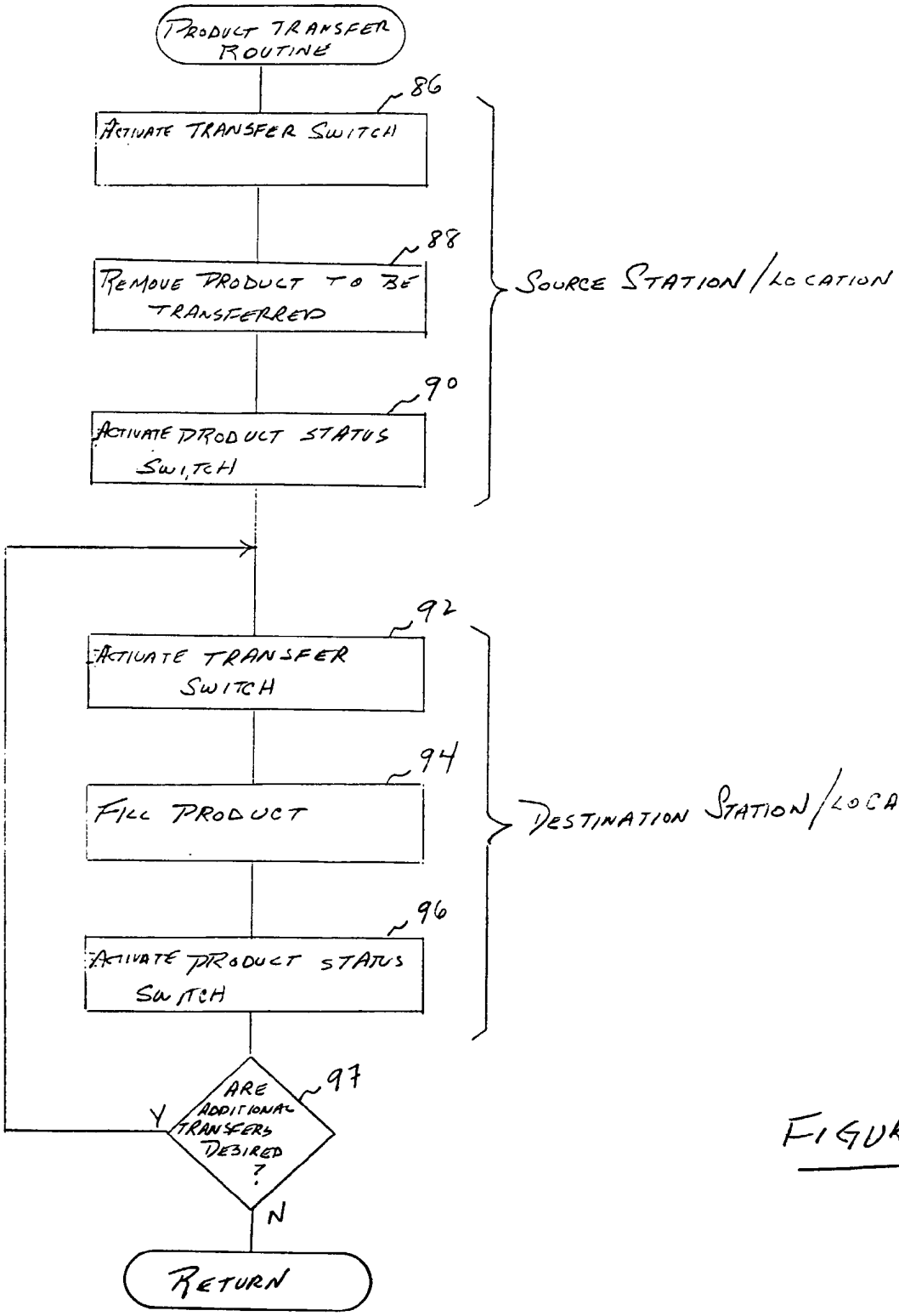

PRODUCT TRANSFER ROUTINE
86
ACTIVATE TRANSFER SWITCH
88
REMOVE PRODUCT TO BE TRANSFERRED
90
ACTIVATE PRODUCT STATUS SWITCH
SOURCE STATION/LOCATION
92
ACTIVATE TRANSFER SWITCH
94
FILL PRODUCT
96
ACTIVATE PRODUCT STATUS SWITCH
DESTINATION STATION/LOCATION
97
ARE ADDITIONAL TRANSFERS DESIRED ?
Y
N
RETURN

FIGURE 8A

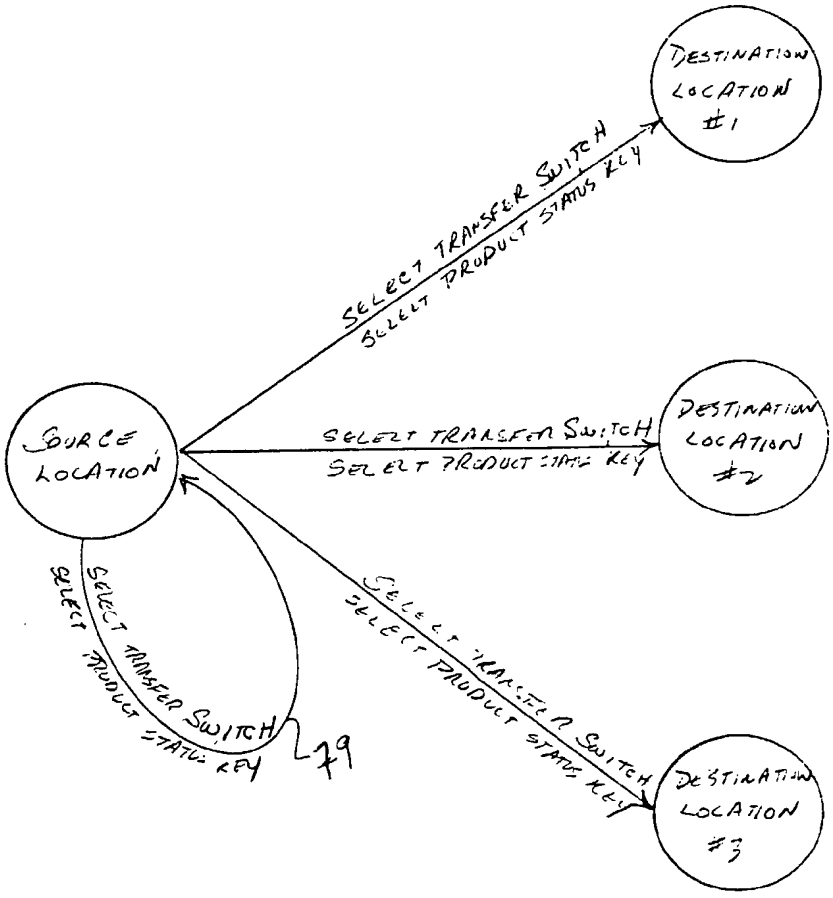

DESTINATION LOCATION #1
SELECT TRANSFER SWITCH
SELECT PRODUCT STATUS KEY
SOURCE LOCATION
DESTINATION LOCATION #2
SELECT TRANSFER SWITCH
SELECT PRODUCT STATUS KEY
SELECT TRANSFER SWITCH
SELECT PRODUCT STATUS KEY
DESTINATION LOCATION #3
SELECT TRANSFER SWITCH
SELECT PRODUCT STATUS KEY
79

FIGURE 8B

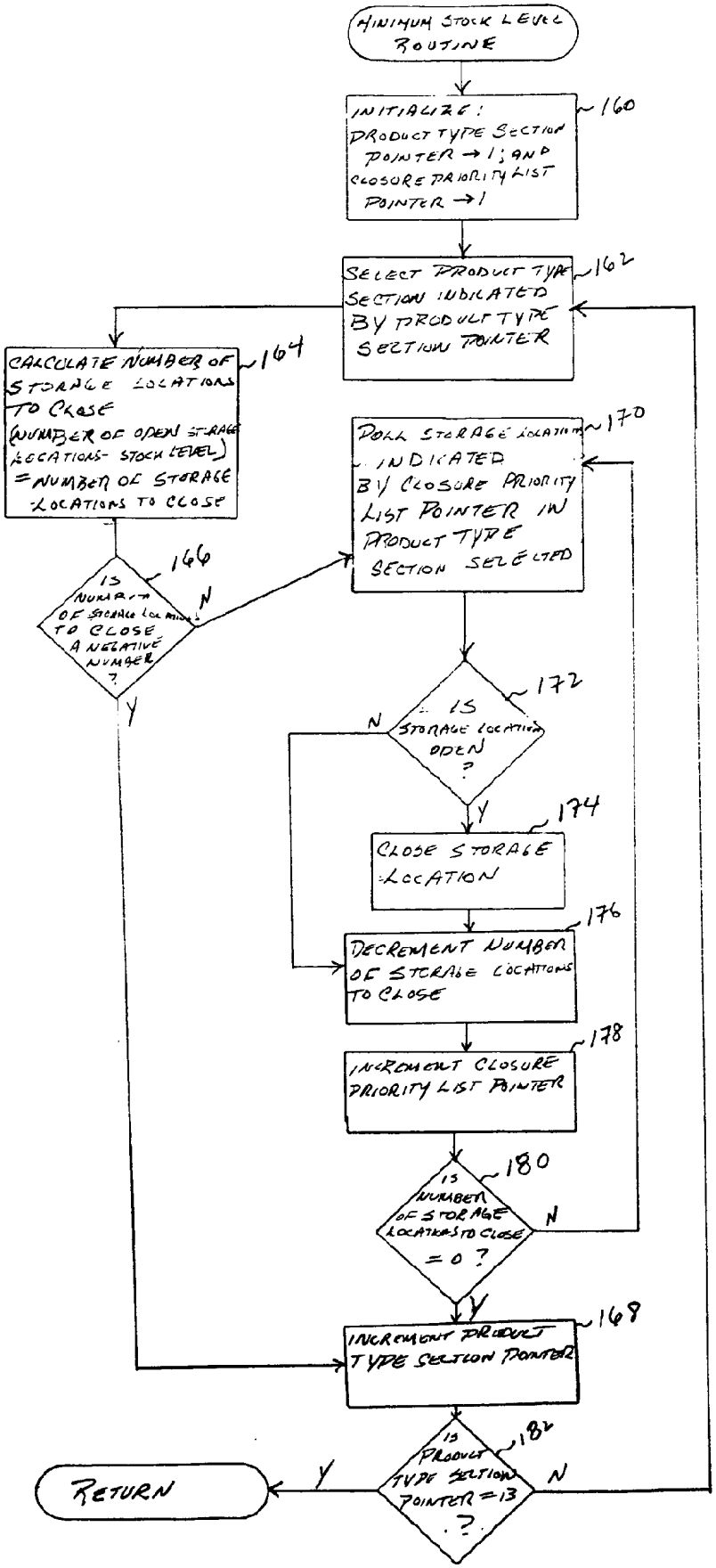

MINIMUM STOCK LEVEL ROUTINE
INITIALIZE: PRODUCT TYPE SECTION POINTER → 1; AND CLOSURE PRIORITY LIST POINTER → 1
160
SELECT PRODUCT TYPE SECTION INDICATED BY PRODUCT TYPE SECTION POINTER
162
CALCULATE NUMBER OF STORAGE LOCATIONS TO CLOSE (NUMBER OF OPEN STORAGE LOCATIONS - STOCK LEVEL) = NUMBER OF STORAGE LOCATIONS TO CLOSE
164
POLL STORAGE LOCATION INDICATED BY CLOSURE PRIORITY LIST POINTER IN PRODUCT TYPE SECTION SELECTED
170
IS NUMBER OF STORAGE LOCATIONS TO CLOSE A NEGATIVE NUMBER ?
166
N
Y
IS STORAGE LOCATION OPEN ?
172
N
Y
CLOSE STORAGE LOCATION
174
DECREMENT NUMBER OF STORAGE LOCATIONS TO CLOSE
176
INCREMENT CLOSURE PRIORITY LIST POINTER
178
IS NUMBER OF STORAGE LOCATIONS TO CLOSE = 0 ?
180
N
Y
INCREMENT PRODUCT TYPE SECTION POINTER
168
IS PRODUCT TYPE SECTION POINTER = 13 ?
182
N
Y
RETURN

FIGURE 8C

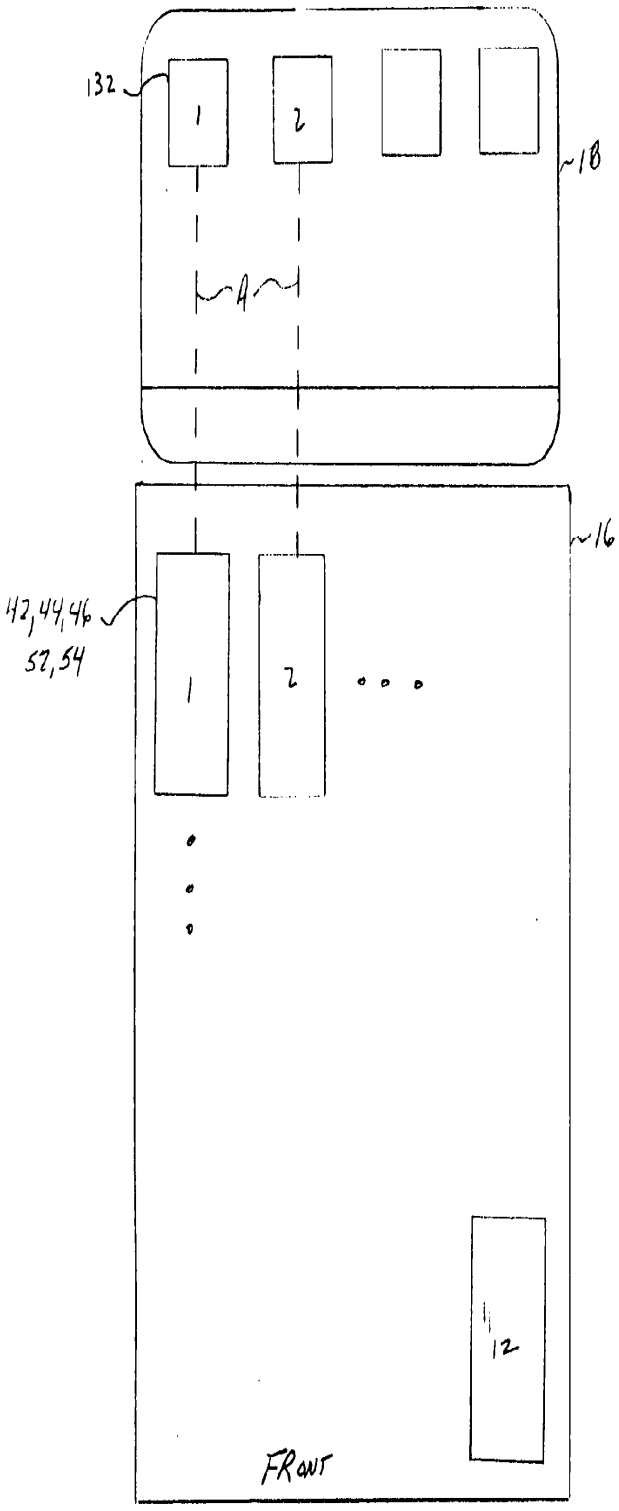


FIGURE 8D

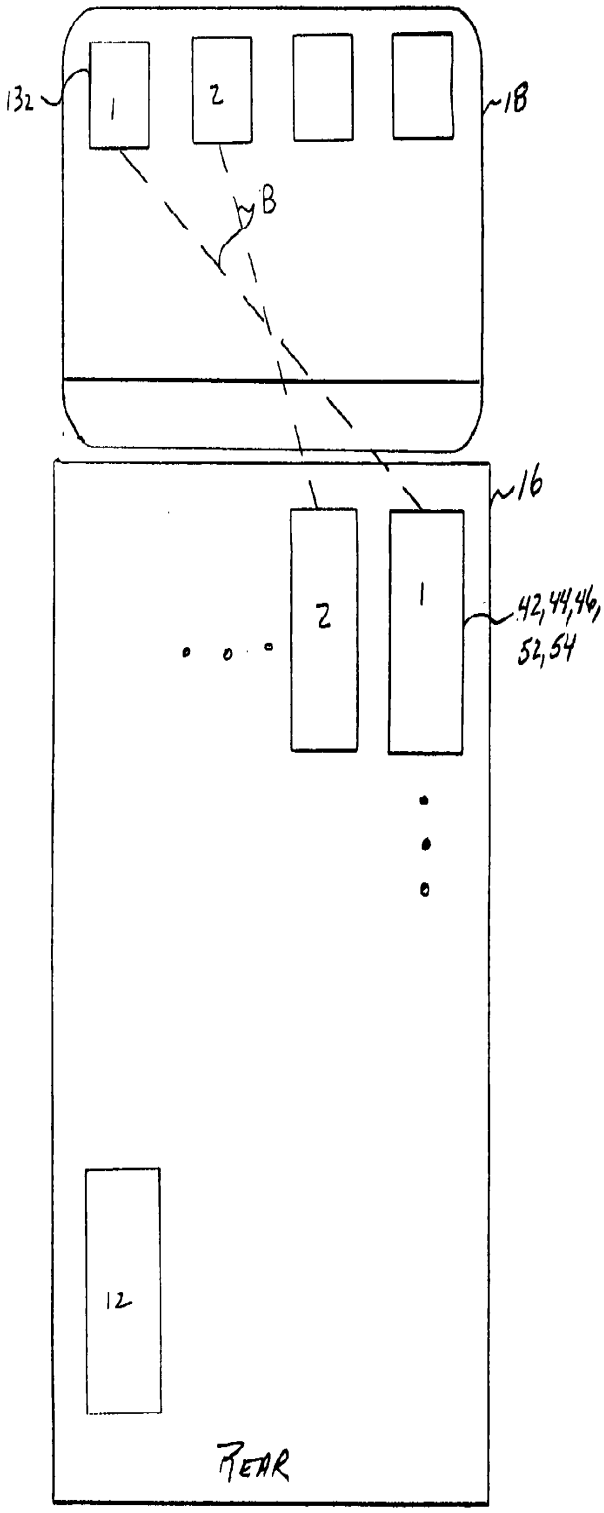


FIGURE 8E

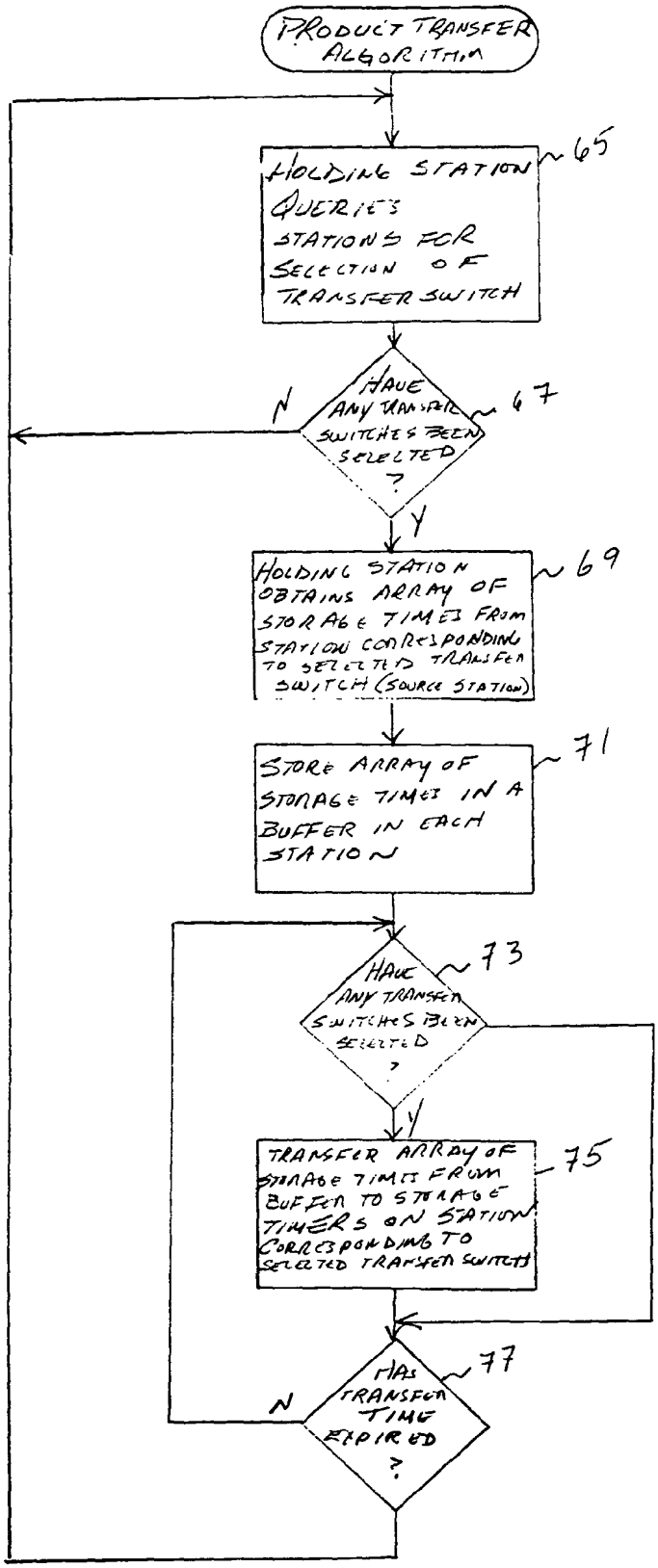

PRODUCT TRANSFER ALGORITHM
HOLDING STATION QUERIES STATIONS FOR SELECTION OF TRANSFER SWITCH
65
HAVE ANY TRANSFER SWITCHES BEEN SELECTED ?
67
N
Y
HOLDING STATION OBTAINS ARRAY OF STORAGE TIMES FROM STATION CORRESPONDING TO SELECTED TRANSFER SWITCH (SOURCE STATION)
69
STORE ARRAY OF STORAGE TIMES IN A BUFFER IN EACH STATION
71
HAVE ANY TRANSFER SWITCHES BEEN SELECTED ?
73
Y
TRANSFER ARRAY OF STORAGE TIMES FROM BUFFER TO STORAGE TIMERS ON STATION CORRESPONDING TO SELECTED TRANSFER SWITCH
75
HAS TRANSFER TIME EXPIRED ?
77
N

FIGURE 8F

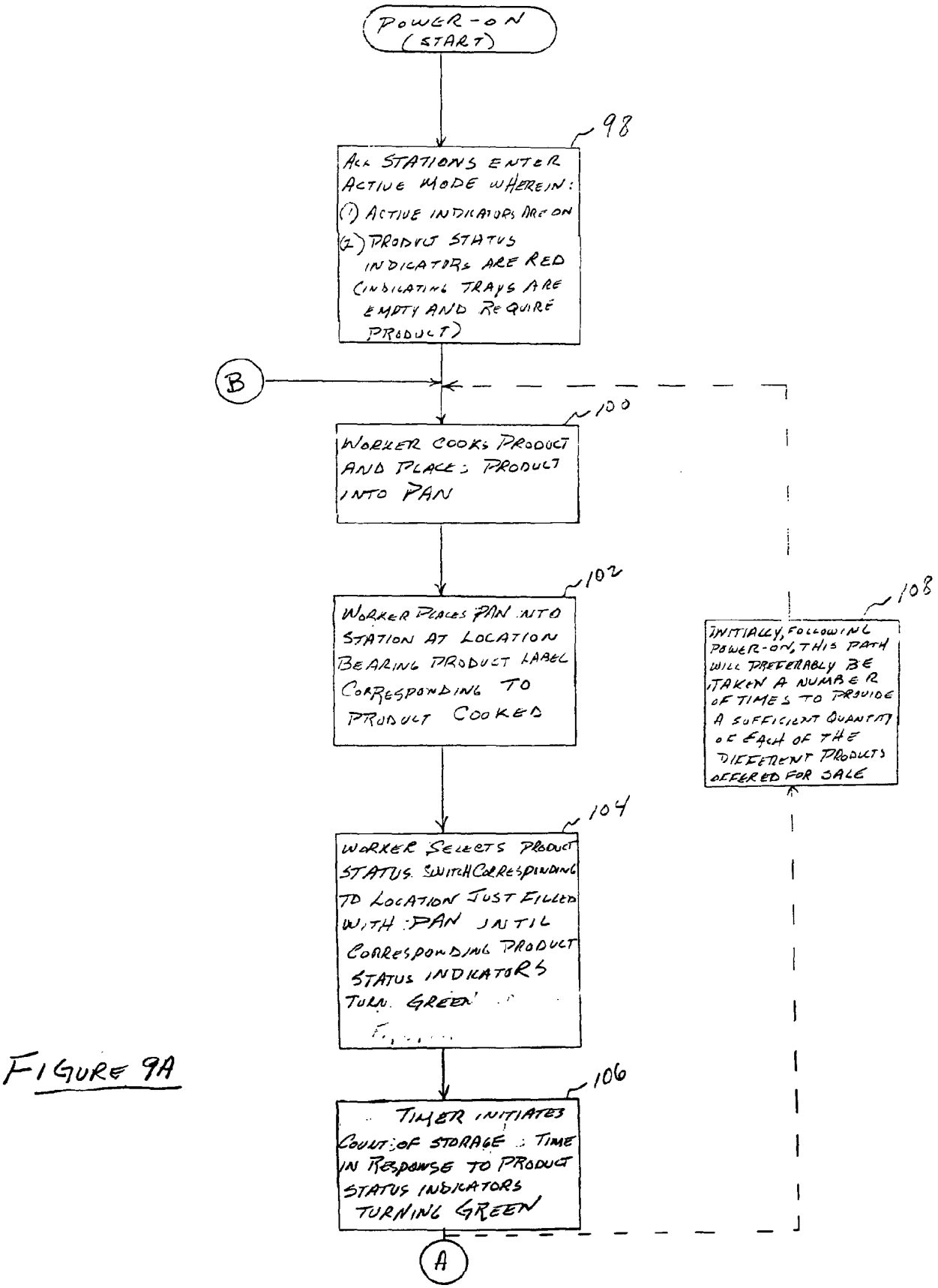

POWER-ON (START)
98
ALL STATIONS ENTER ACTIVE MODE WHEREIN: (1) ACTIVE INDICATORS ARE ON (2) PRODUCT STATUS INDICATORS ARE RED (INDICATING TRAYS ARE EMPTY AND REQUIRE PRODUCT)
B
100
WORKER COOKS PRODUCT AND PLACES PRODUCT INTO PAN
102
WORKER PLACES PAN INTO STATION AT LOCATION BEARING PRODUCT LABEL CORRESPONDING TO PRODUCT COOKED
104
WORKER SELECTS PRODUCT STATUS SWITCH CORRESPONDING TO LOCATION JUST FILLED WITH PAN UNTIL CORRESPONDING PRODUCT STATUS INDICATORS TURN GREEN
106
TIMER INITIATES COUNT OF STORAGE TIME IN RESPONSE TO PRODUCT STATUS INDICATORS TURNING GREEN
A
108
INITIALLY, FOLLOWING POWER-ON, THIS PATH WILL PREFERABLY BE TAKEN A NUMBER OF TIMES TO PROVIDE A SUFFICIENT QUANTITY OF EACH OF THE DIFFERENT PRODUCTS OFFERED FOR SALE

FIGURE 9A

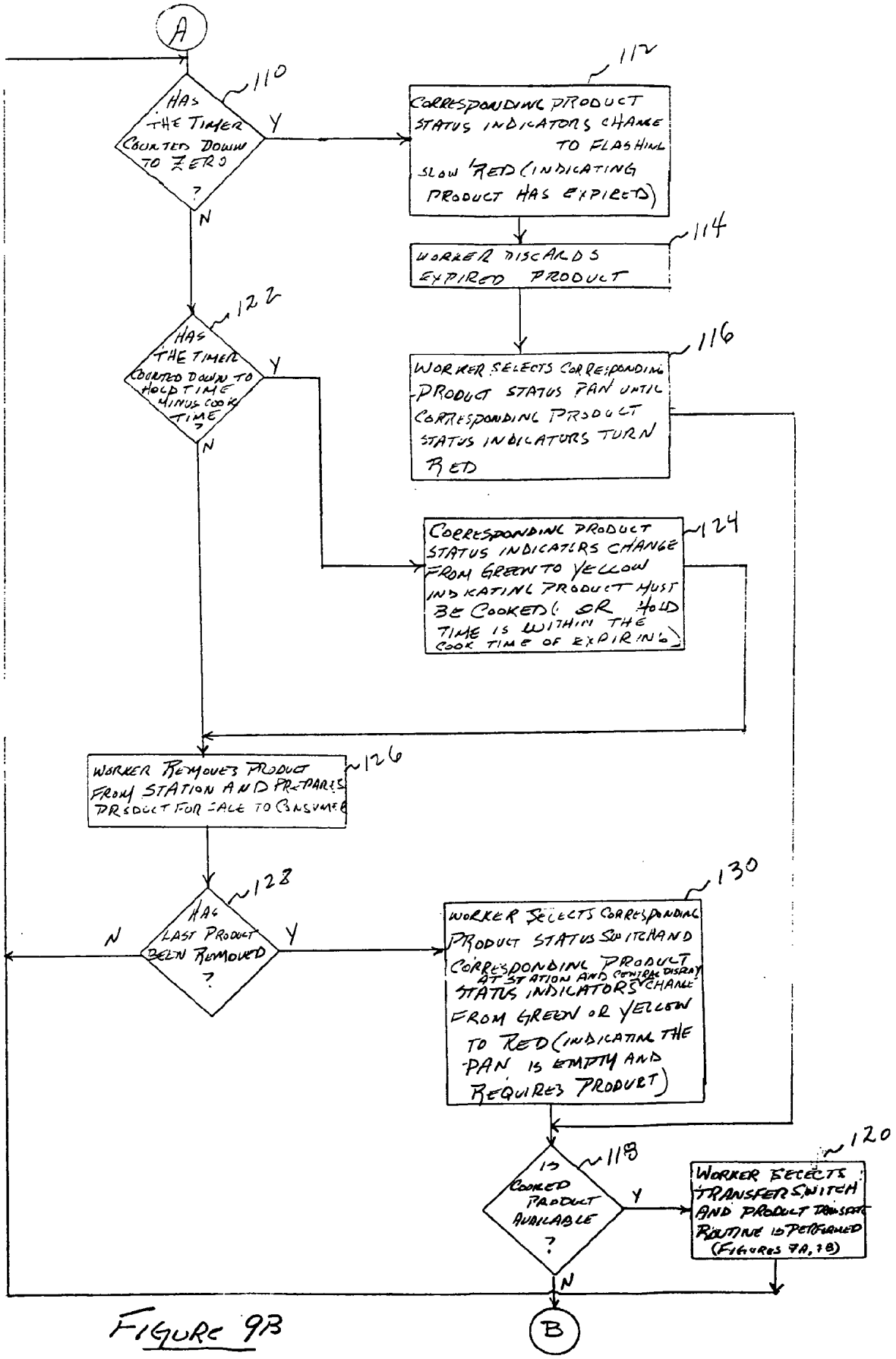

A
110
HAS THE TIMER COUNTED DOWN TO ZERO ?
Y
N
112
CORRESPONDING PRODUCT STATUS INDICATORS CHANGE TO FLASHING SLOW RED (INDICATING PRODUCT HAS EXPIRED)
114
WORKER DISCARDS EXPIRED PRODUCT
116
WORKER SELECTS CORRESPONDING PRODUCT STATUS PAN UNTIL CORRESPONDING PRODUCT STATUS INDICATORS TURN RED
122
HAS THE TIMER COUNTED DOWN TO HOLD TIME MINUS COOK TIME ?
Y
N
124
CORRESPONDING PRODUCT STATUS INDICATORS CHANGE FROM GREEN TO YELLOW INDICATING PRODUCT MUST BE COOKED (OR HOLD TIME IS WITHIN THE COOK TIME OF EXPIRING)
126
WORKER REMOVES PRODUCT FROM STATION AND PREPARES PRODUCT FOR SALE TO CONSUMER
128
HAS LAST PRODUCT BEEN REMOVED ?
N
Y
130
WORKER SELECTS CORRESPONDING PRODUCT STATUS SWITCH AND CORRESPONDING PRODUCT AT STATION AND CENTRAL DISPLAY STATUS INDICATORS CHANGE FROM GREEN OR YELLOW TO RED (INDICATING THE PAN IS EMPTY AND REQUIRES PRODUCT)
118
IS COOKED PRODUCT AVAILABLE ?
Y
N
120
WORKER SELECTS TRANSFER SWITCH AND PRODUCT TRANSFER ROUTINE IS PERFORMED (FIGURES 9A, 9B)
B

FIGURE 9B

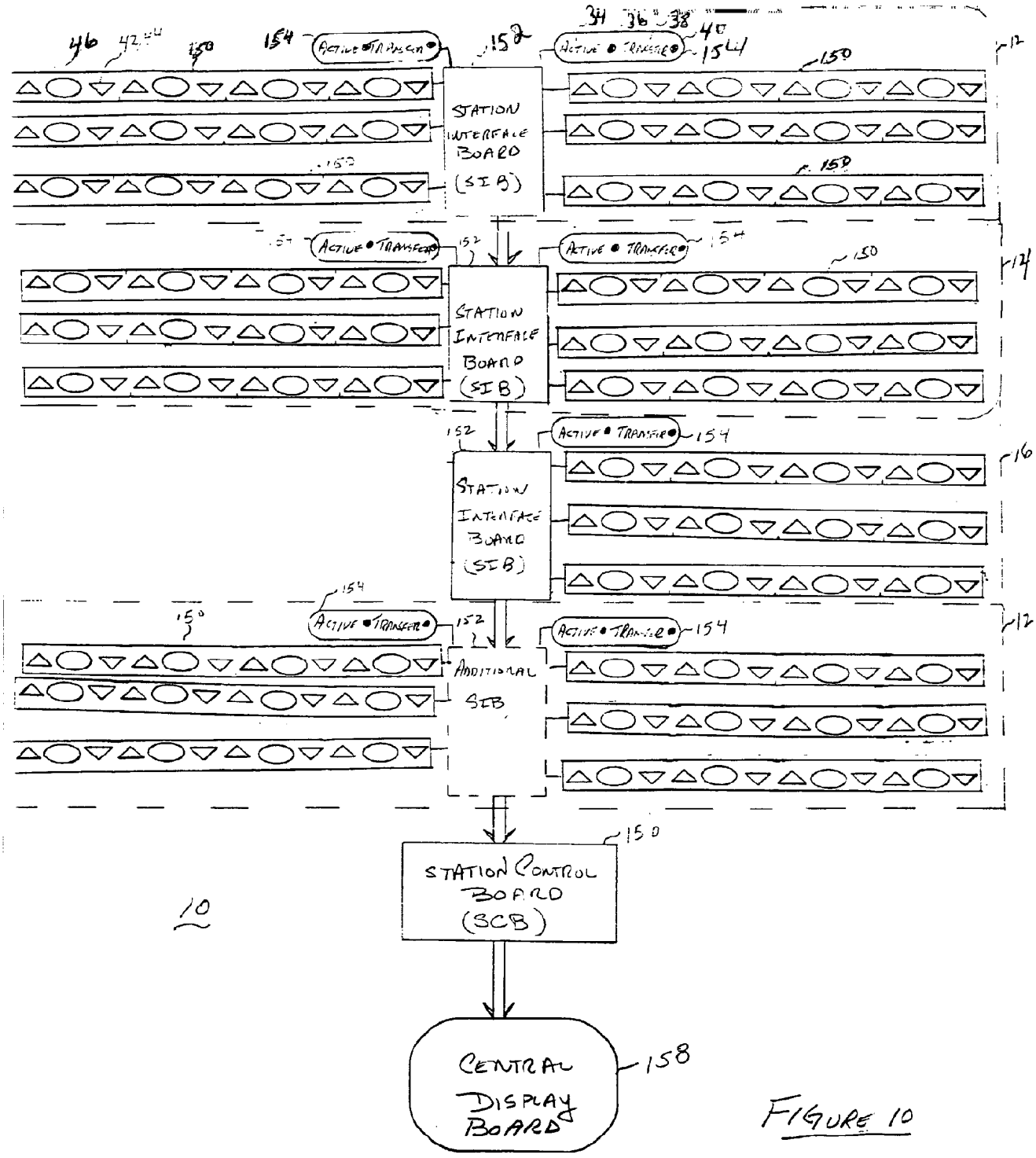

STATION INTERFACE BOARD (SIB)
STATION INTERFACE BOARD (SIB)
STATION INTERFACE BOARD (SIB)
ADDITIONAL SIB
STATION CONTROL BOARD (SCB)
CENTRAL DISPLAY BOARD
ACTIVE • TRANSFER •
10
12
14
16
150
152
154
158

FIGURE 10

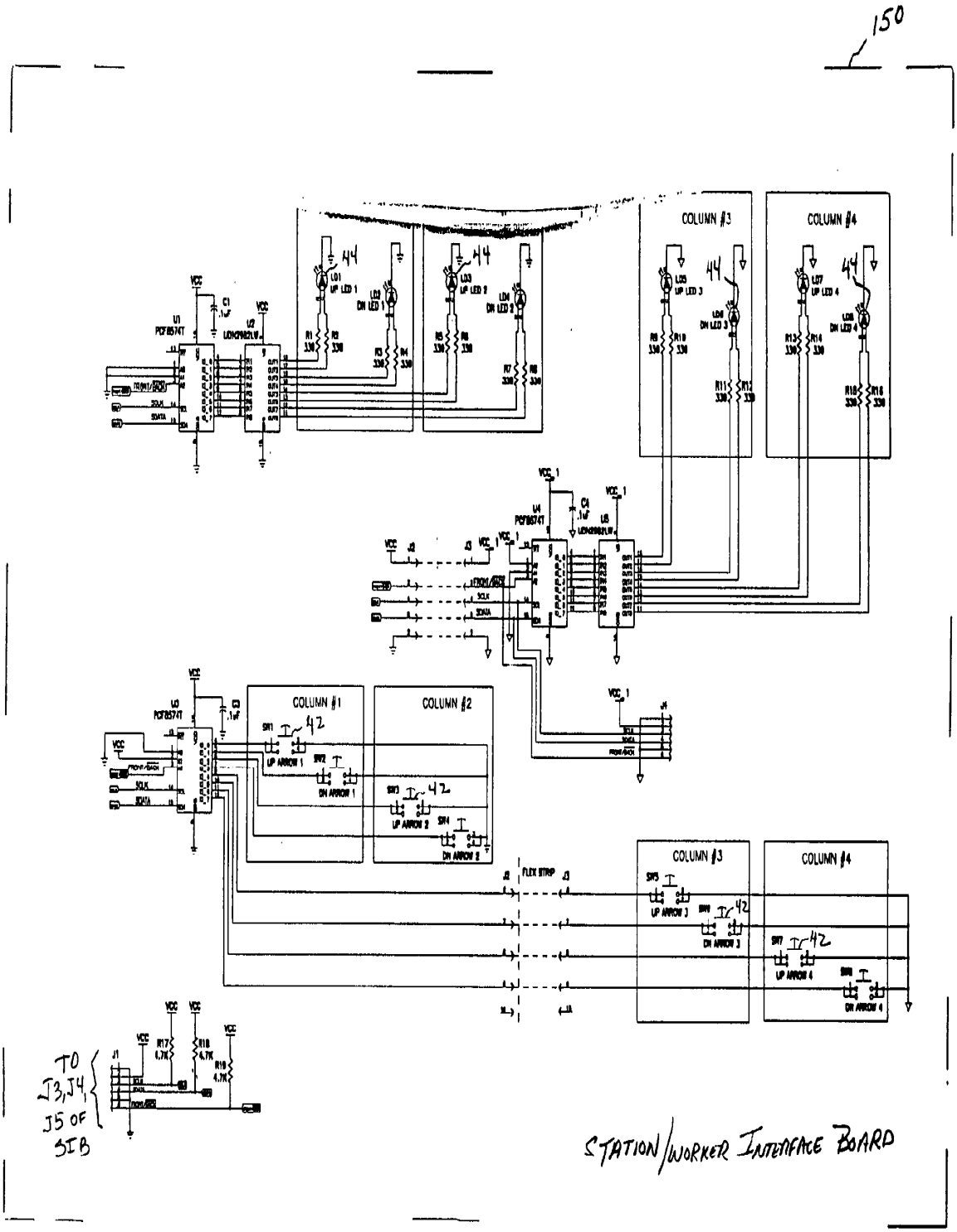
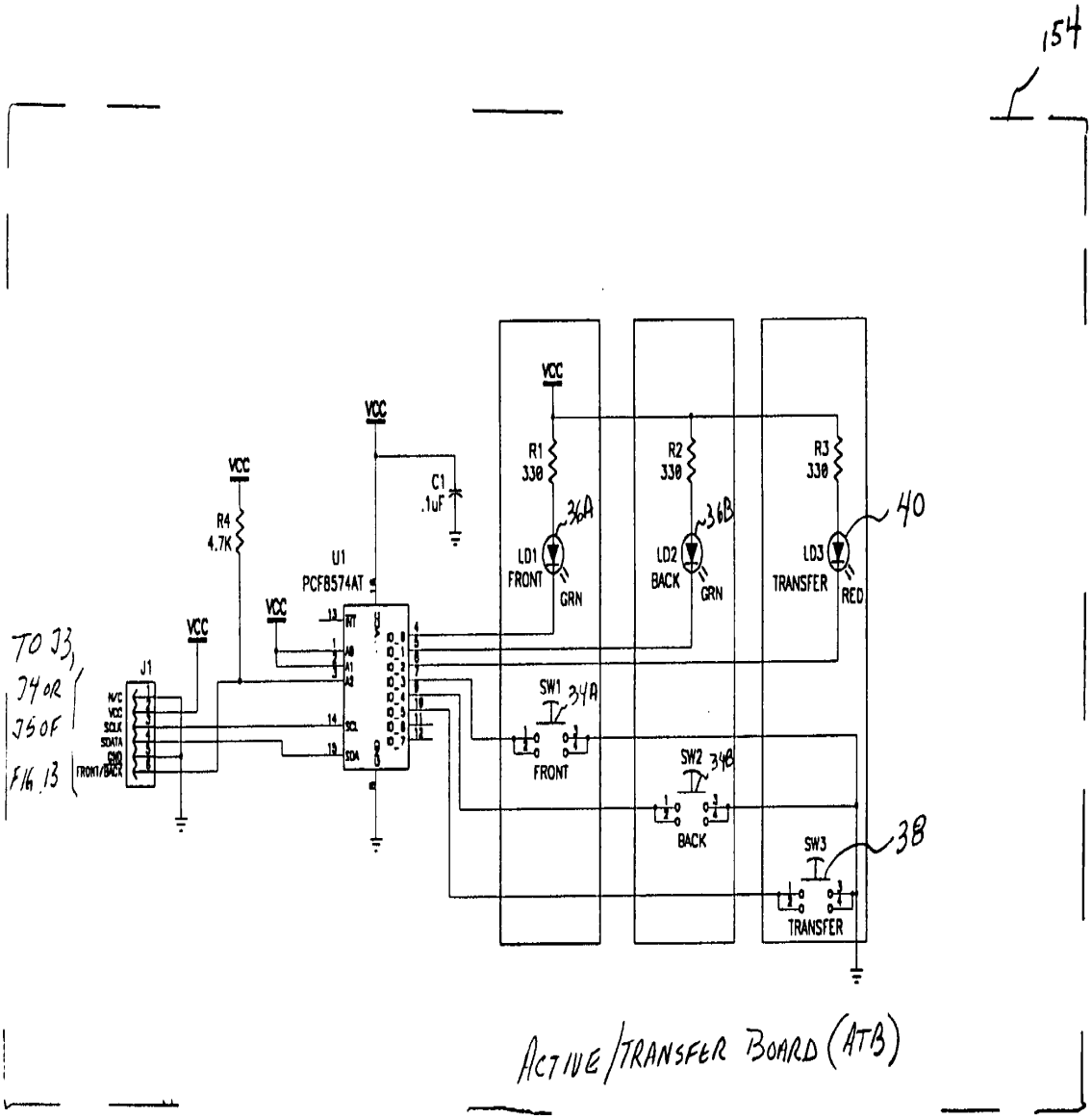

150
COLUMN #1
COLUMN #2
COLUMN #3
COLUMN #4
FLEX STRIP
TO J3, J4, J5 OF SIB
STATION/WORKER INTERFACE BOARD

FIGURE 11



ACTIVE/TRANSFER BOARD (ATB)

FIGURE 12

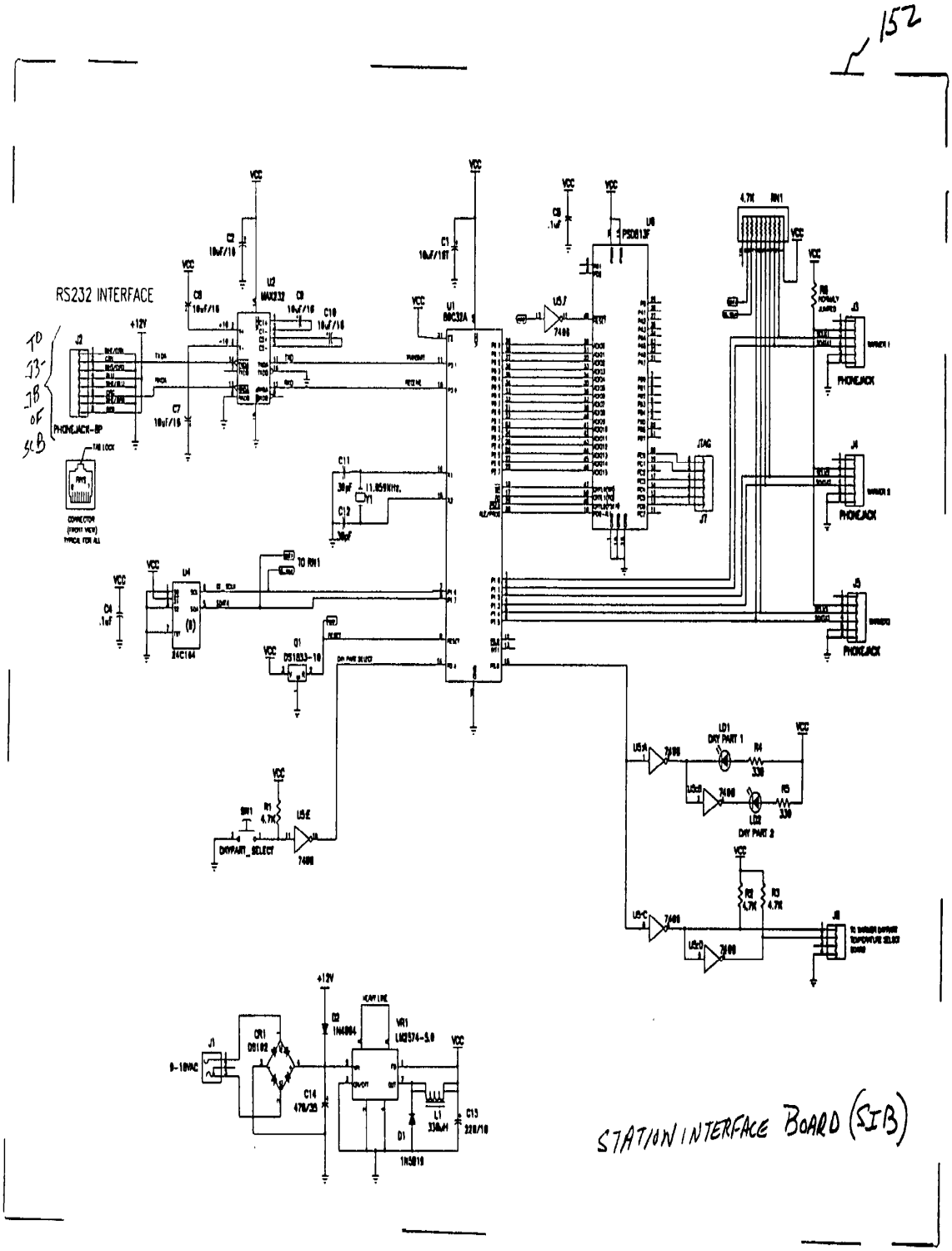

152
RS232 INTERFACE
PHONEJACK-8P
PHONEJACK
JTAG
DRYPART_SELECT
DRY PART 1
DRY PART 2
9-18VAC
+12V
VCC
STATION INTERFACE BOARD (SIB)

FIGURE 13

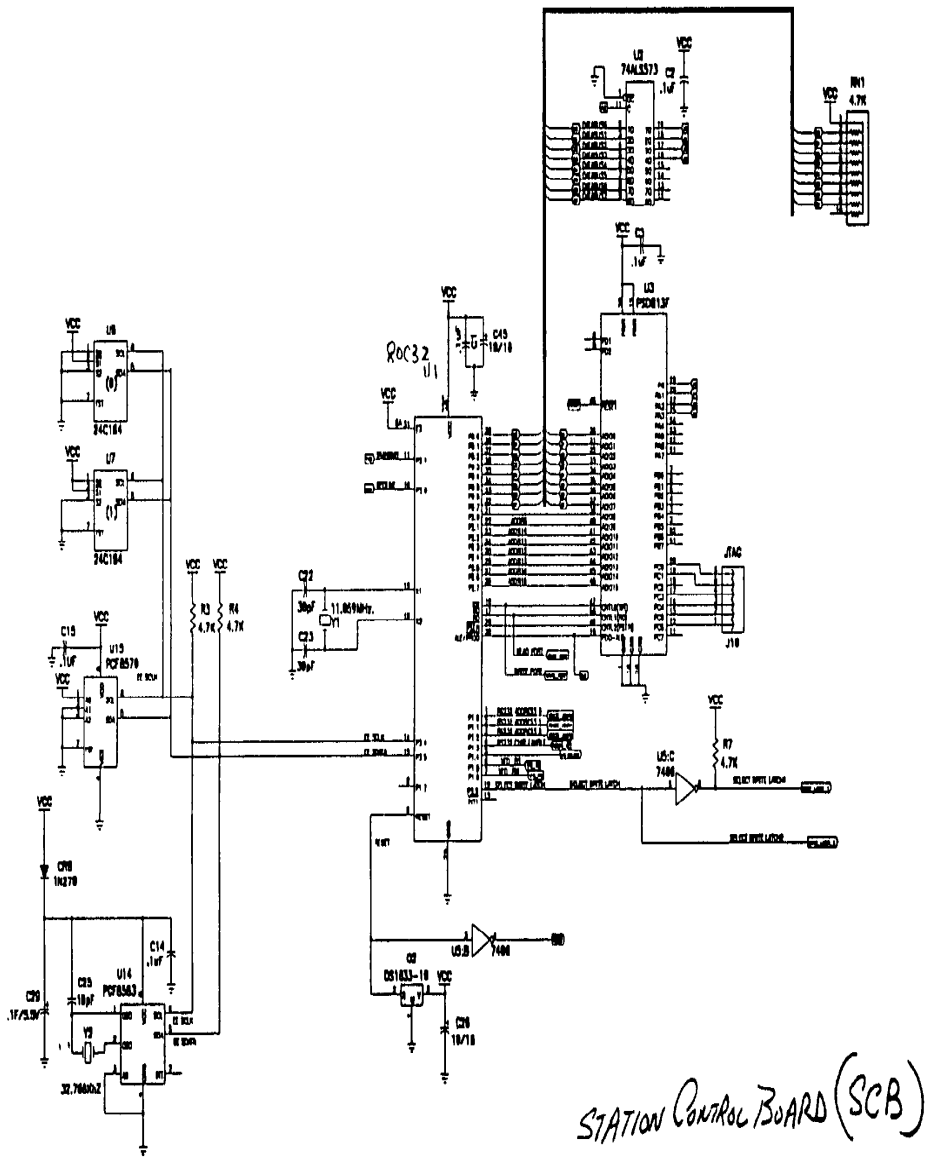


FIGURE 14A

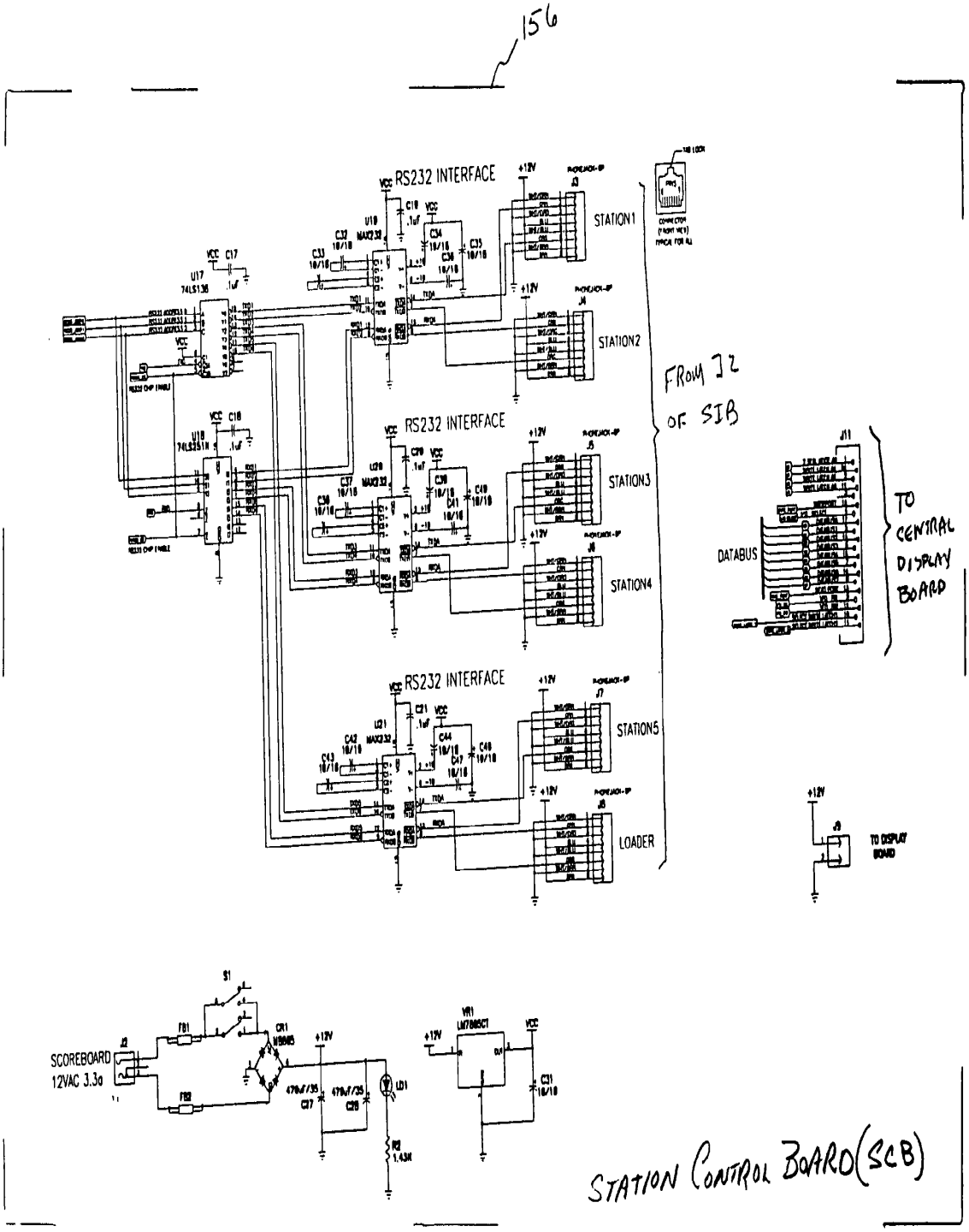
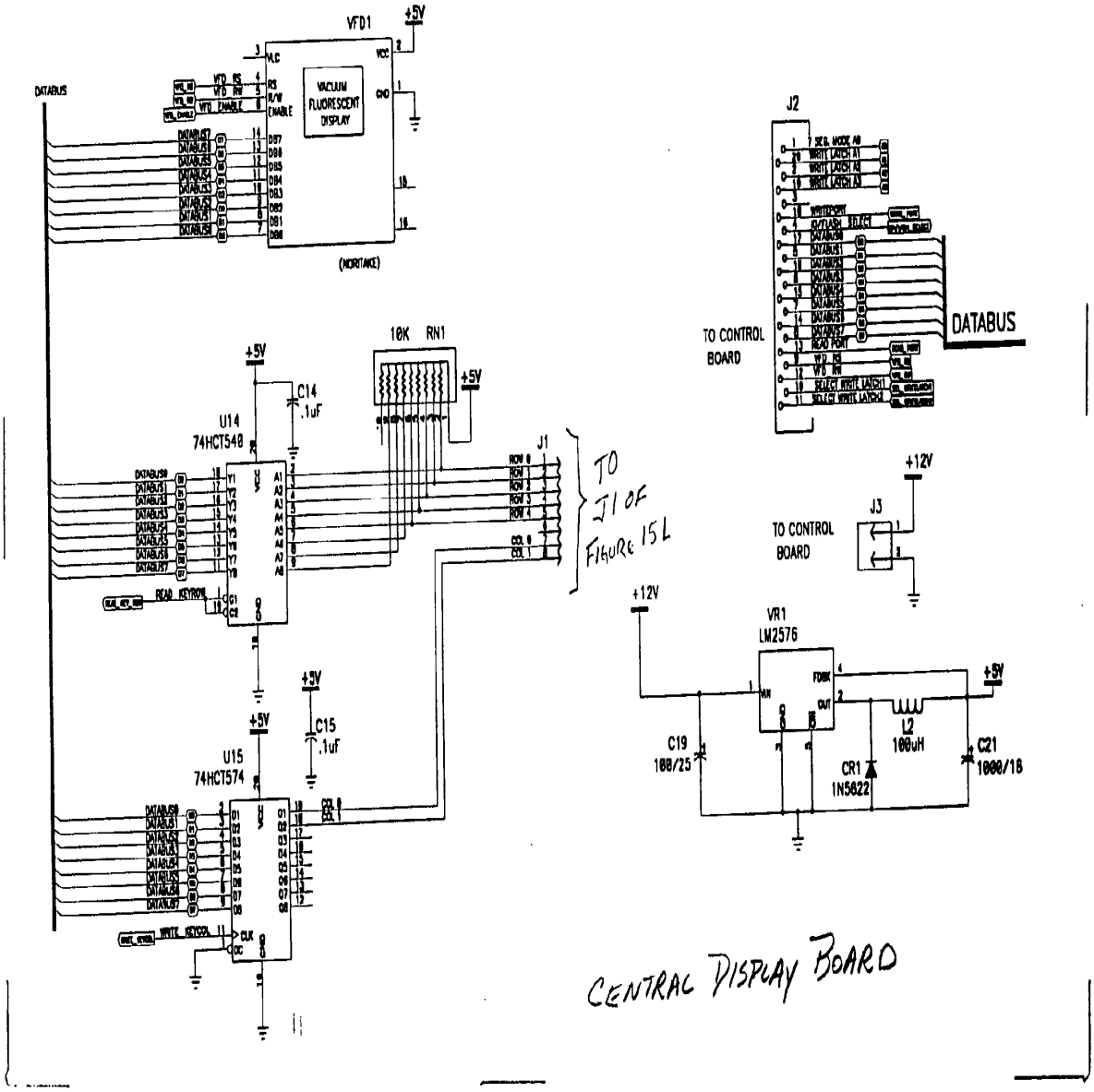

156
RS232 INTERFACE
STATION1
STATION2
RS232 INTERFACE
STATION3
STATION4
RS232 INTERFACE
STATION5
LOADER
FROM J2 OF SIB
DATABUS
TO CENTRAL DISPLAY BOARD
TO DISPLAY BOARD
SCOREBOARD 12VAC 3.3a
STATION CONTROL BOARD(SCB)

FIGURE 14B

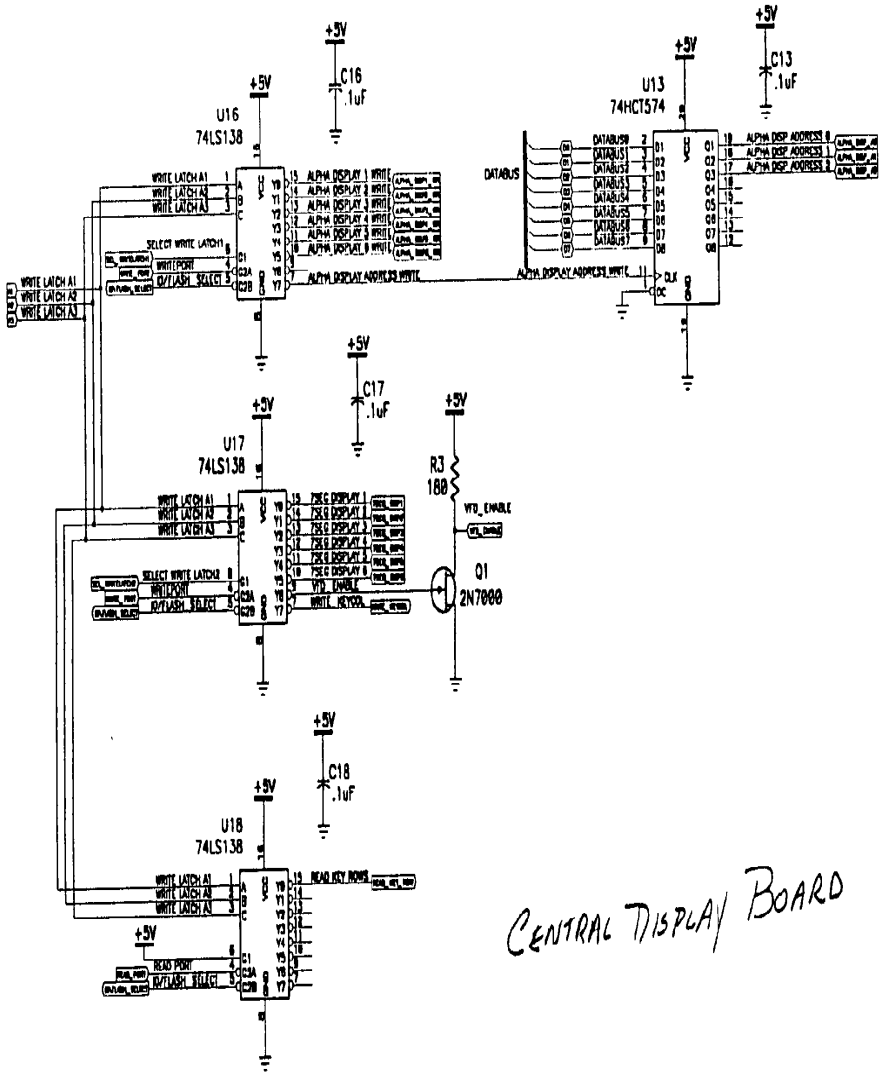
158



CENTRAL DISPLAY BOARD

FIGURE 15A

158



CENTRAL DISPLAY BOARD

FIGURE 15B

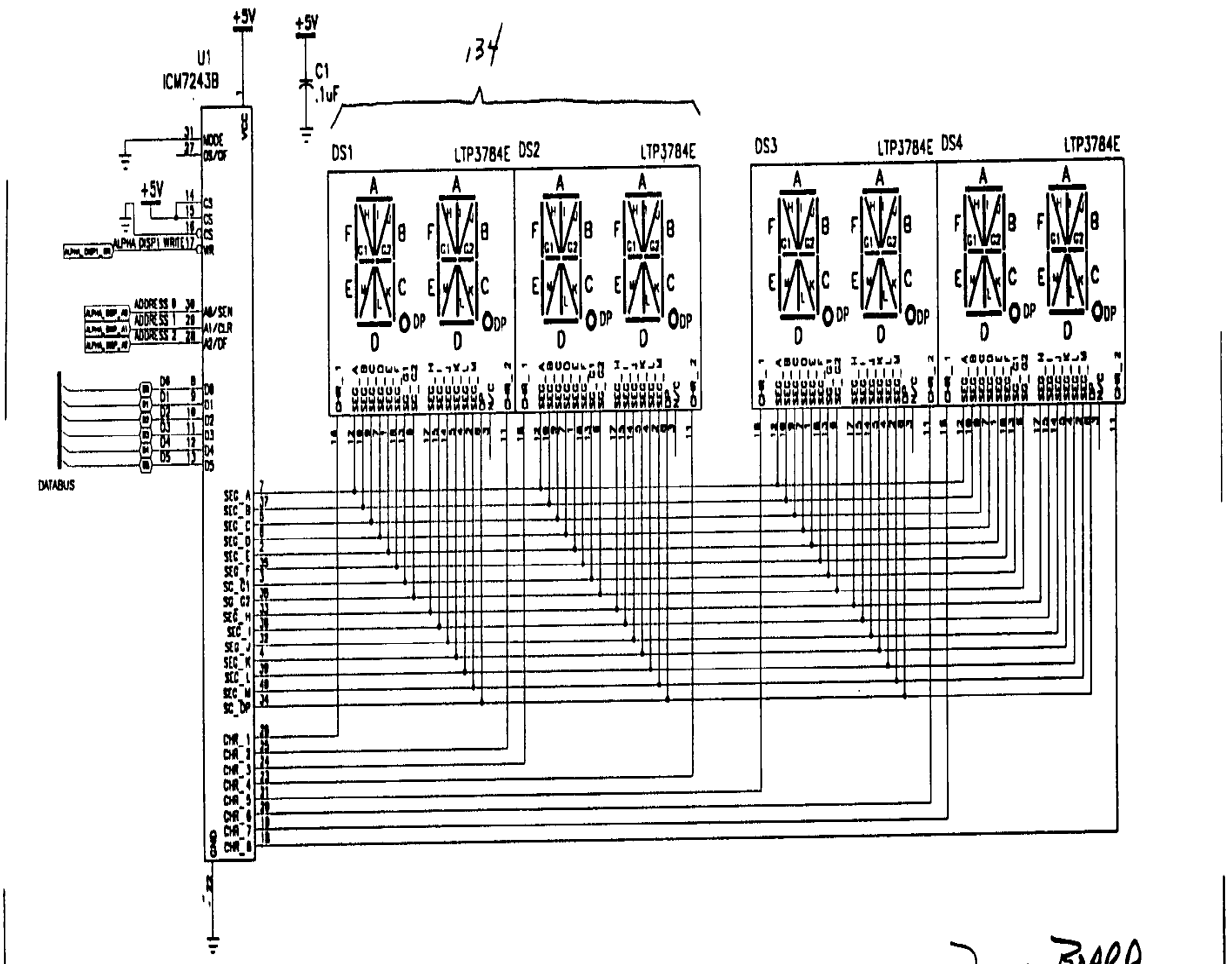

158
134
U1
ICM7243B
+5V
C1
.1uF
DS1
LTP3784E
DS2
LTP3784E
DS3
LTP3784E
DS4
LTP3784E
DATABUS
CENTRAL DISPLAY BOARD

FIGURE 15C

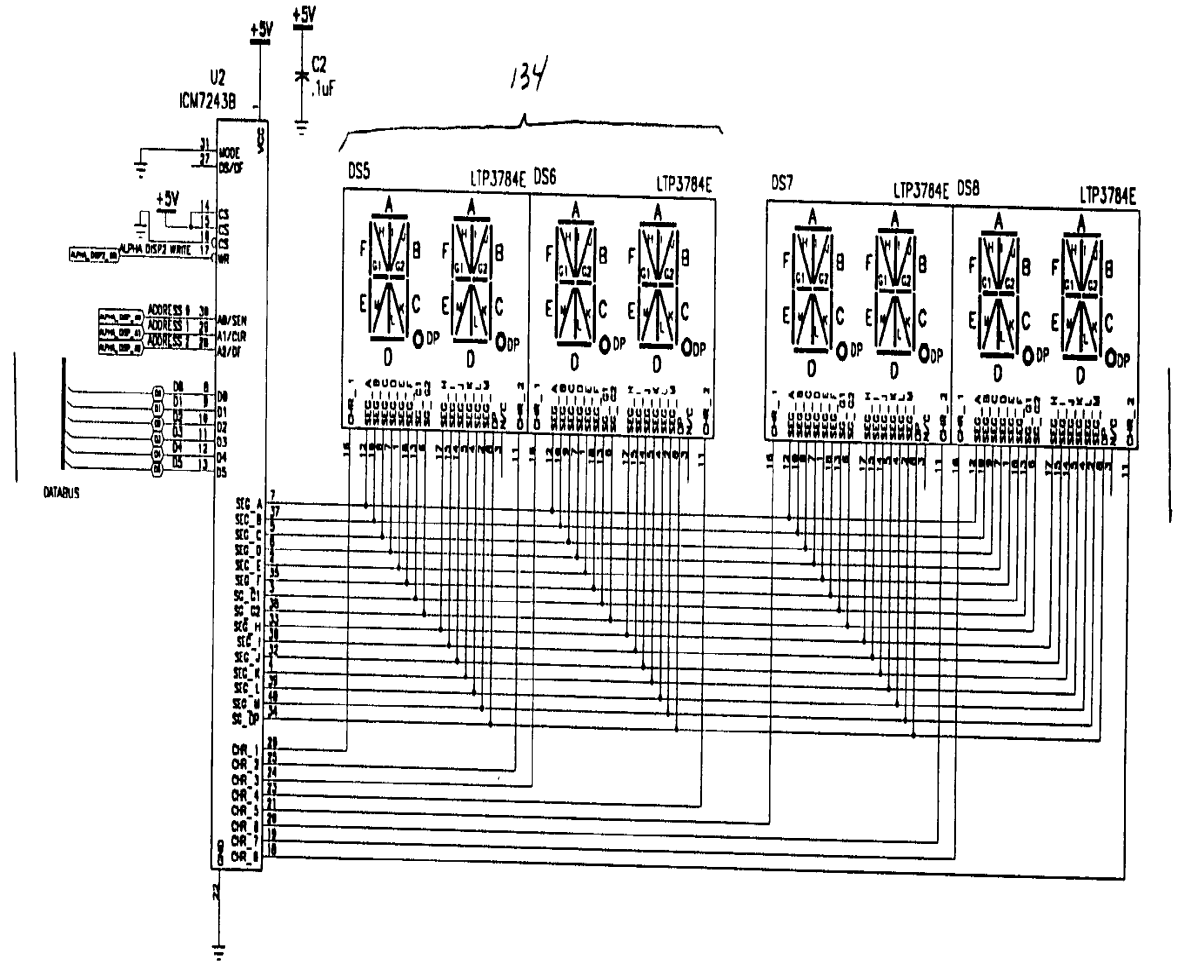

158
134
+5V
C2
.1uF
U2
ICM7243B
DS5
LTP3784E
DS6
LTP3784E
DS7
LTP3784E
DS8
LTP3784E
ALPHA DISP2 WRITE
DATABUS
CENTRAL DISPLAY BOARD

FIGURE 15D

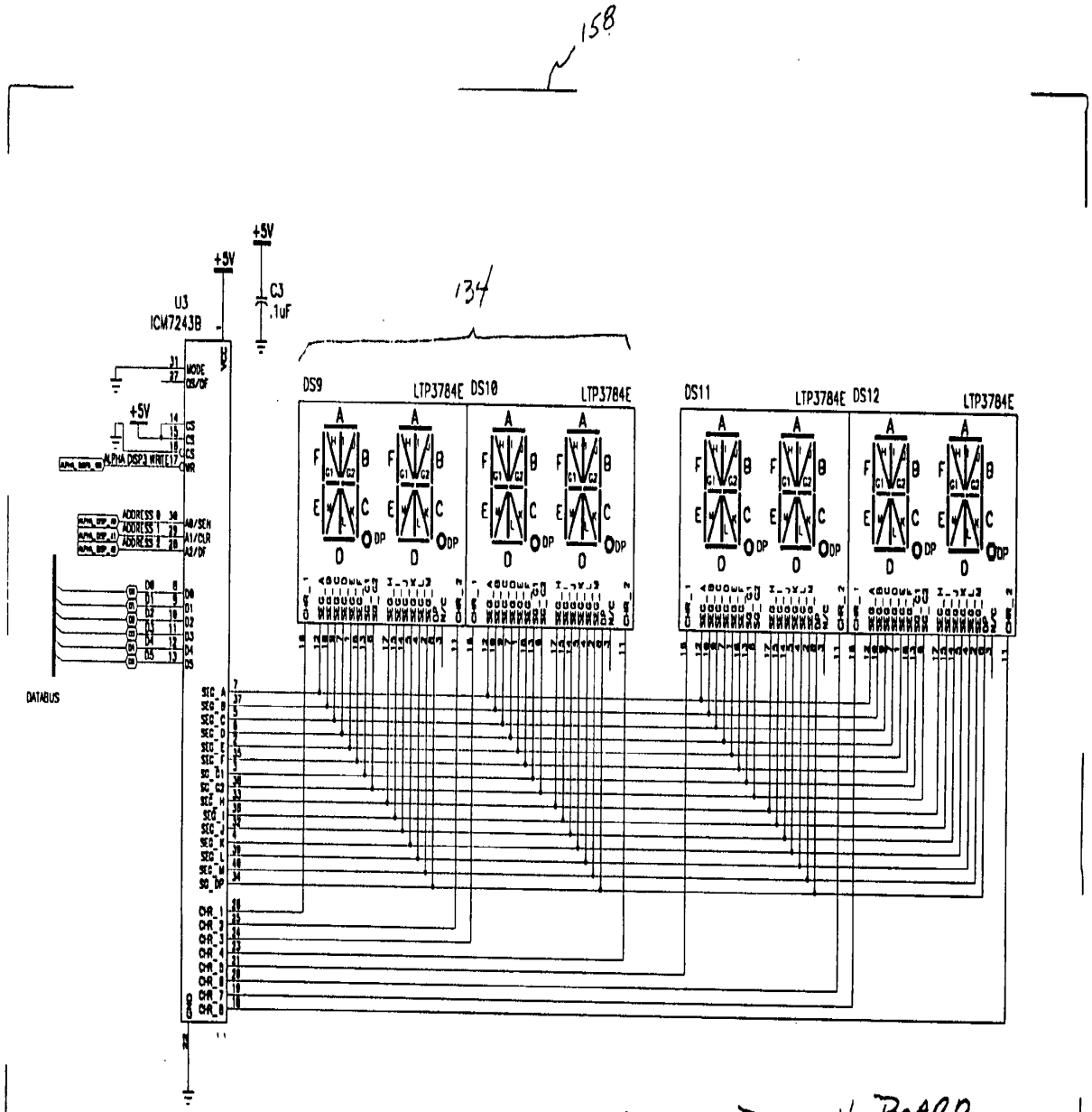

158
134
+5V
U3
ICM7243B
C3
.1uF
DS9
LTP3784E
DS10
LTP3784E
DS11
LTP3784E
DS12
LTP3784E
DATABUS
CENTRAL DISPLAY BOARD

FIGURE 15E

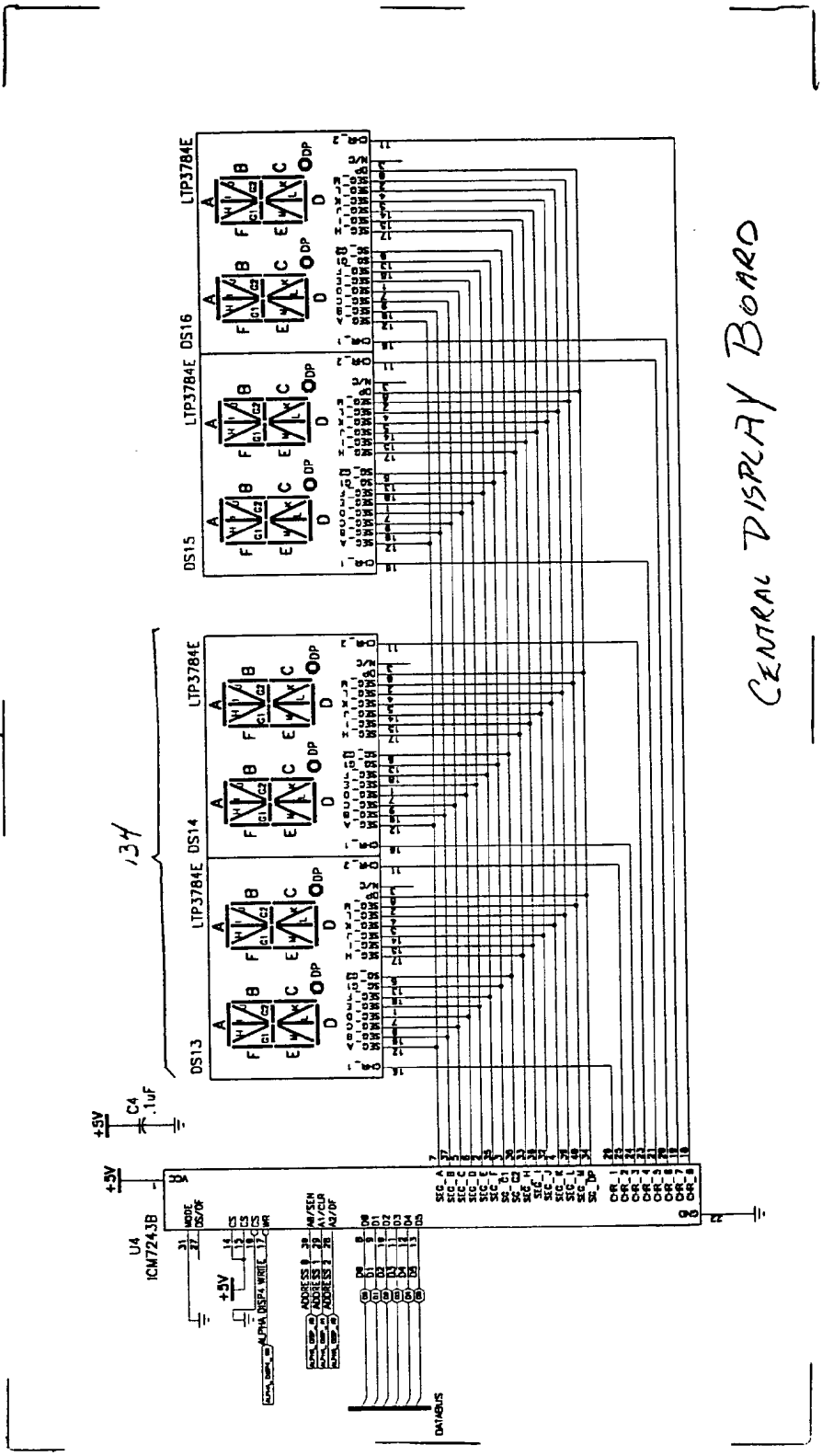

158
134
DS13
DS14
DS15
DS16
LTP3784E
+5V
C4
.1uF
U4
ICM7243B
MODE
DS/OF
ADDRESS 0
ADDRESS 1
ADDRESS 2
DATABUS
CENTRAL DISPLAY BOARD

FIGURE 15F

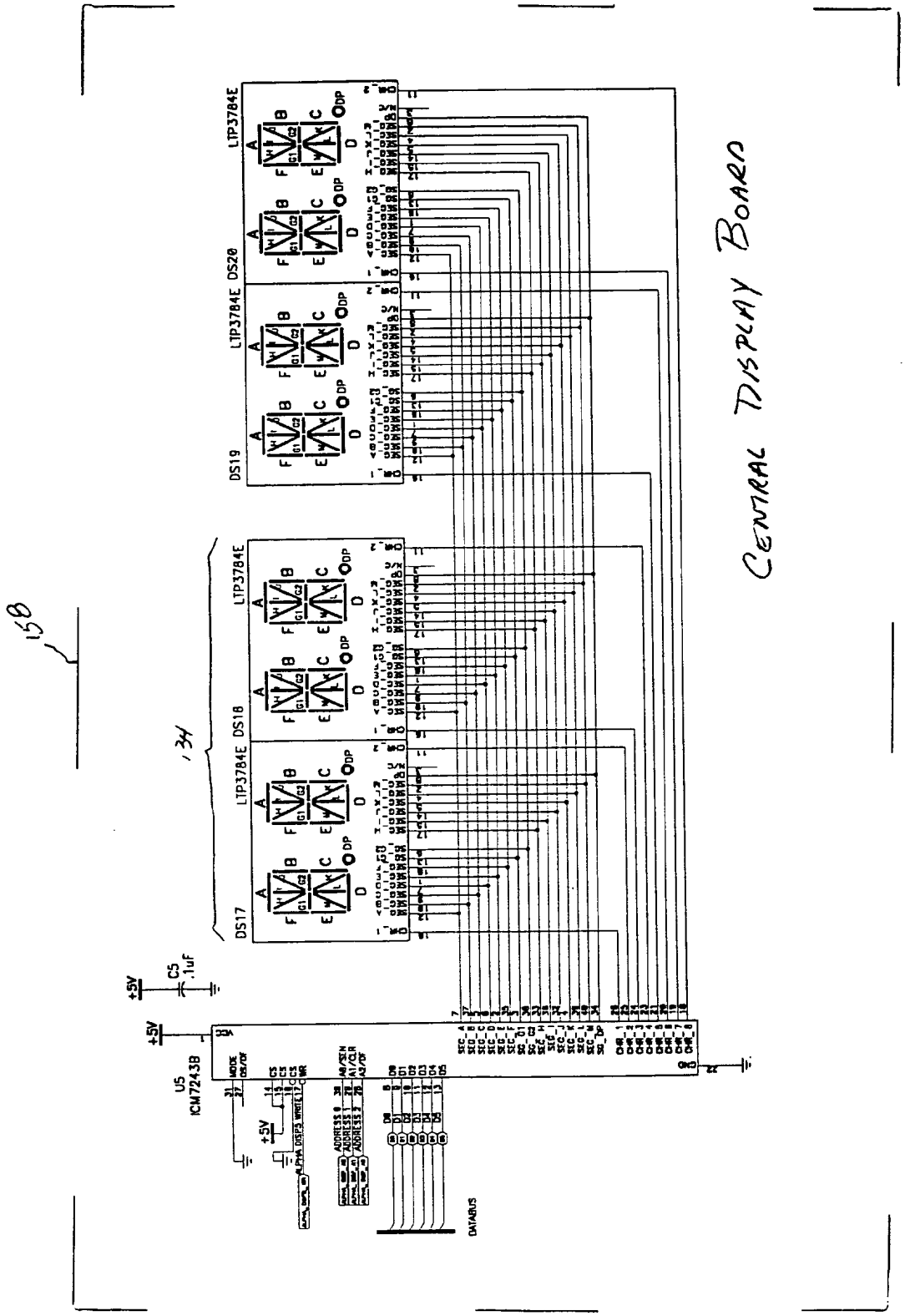

150
134
CENTRAL DISPLAY BOARD
DS17
DS18
DS19
DS20
LTP3784E
U5
ICM7243B
+5V
C5
.1uF
DATABUS

FIGURE 15G

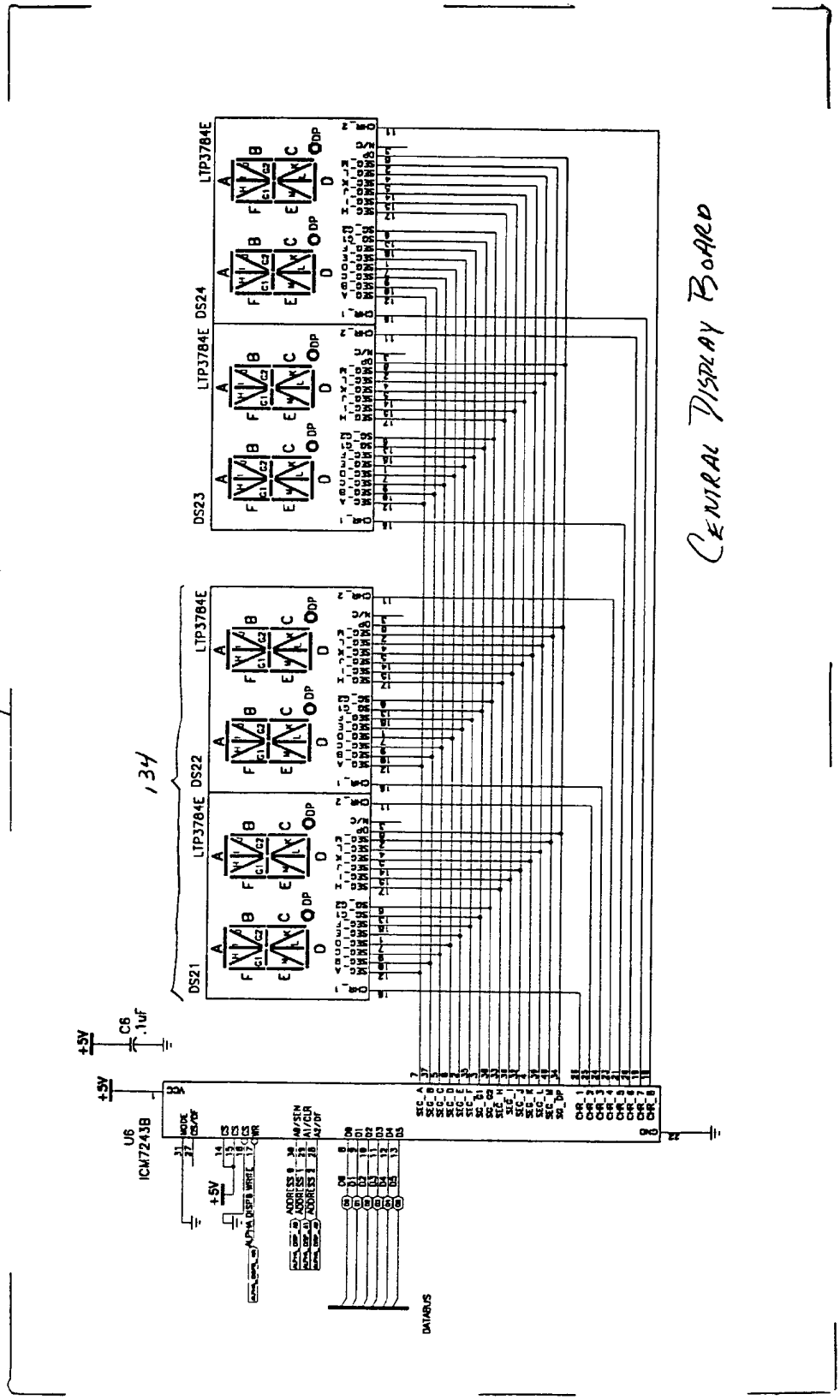

158
134
DS21
DS22
DS23
DS24
LTP3784E
U6
ICM7243B
+5V
C6
.1uF
DATABUS
CENTRAL DISPLAY BOARD

FIGURE 15H

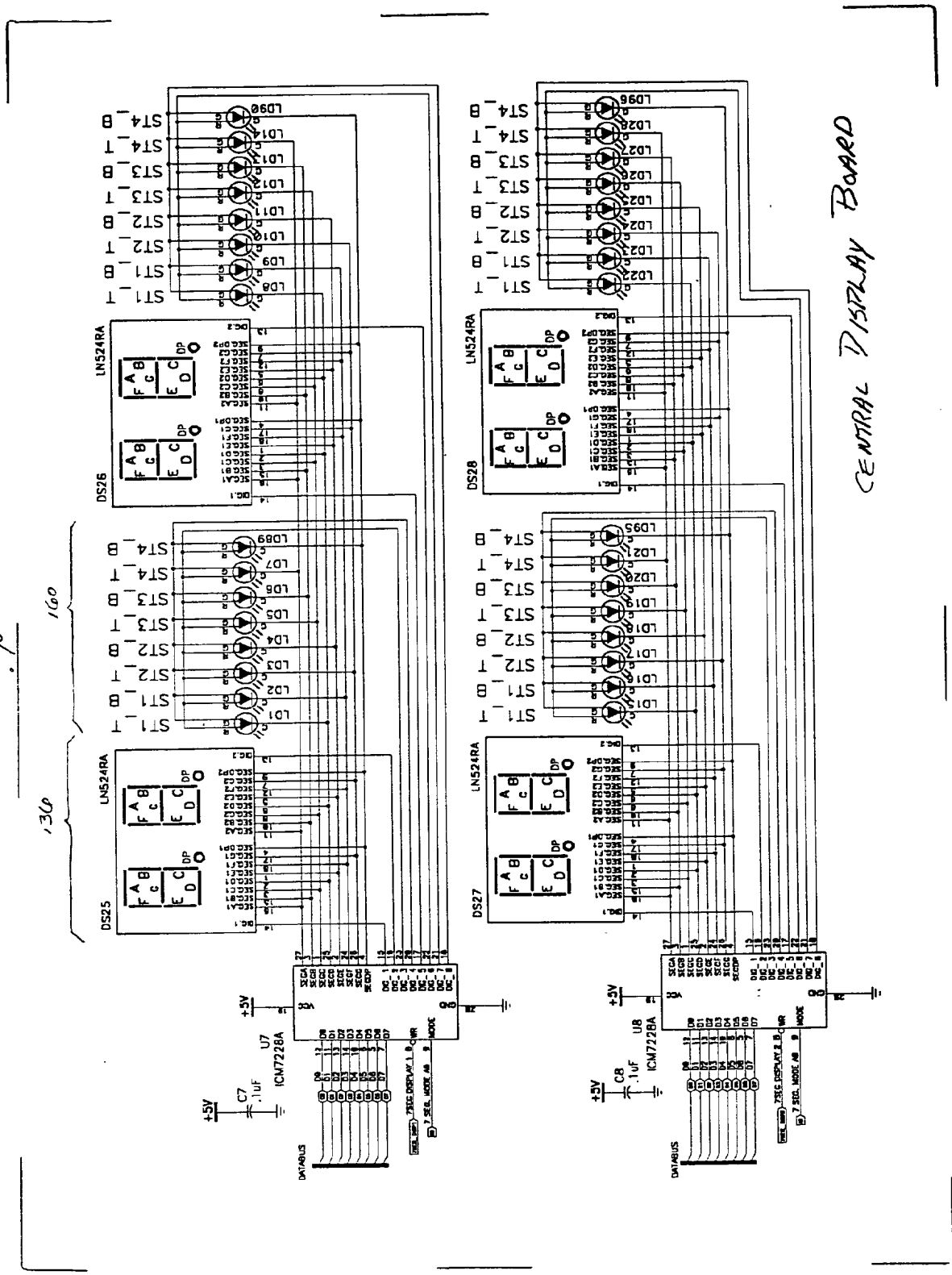

158
160
130
CENTRAL DISPLAY BOARD
DS25
DS26
DS27
DS28
LN524RA
U7
U8
ICM7228A
C7
C8
.1uF
+5V
DATABUS

FIGURE 15I

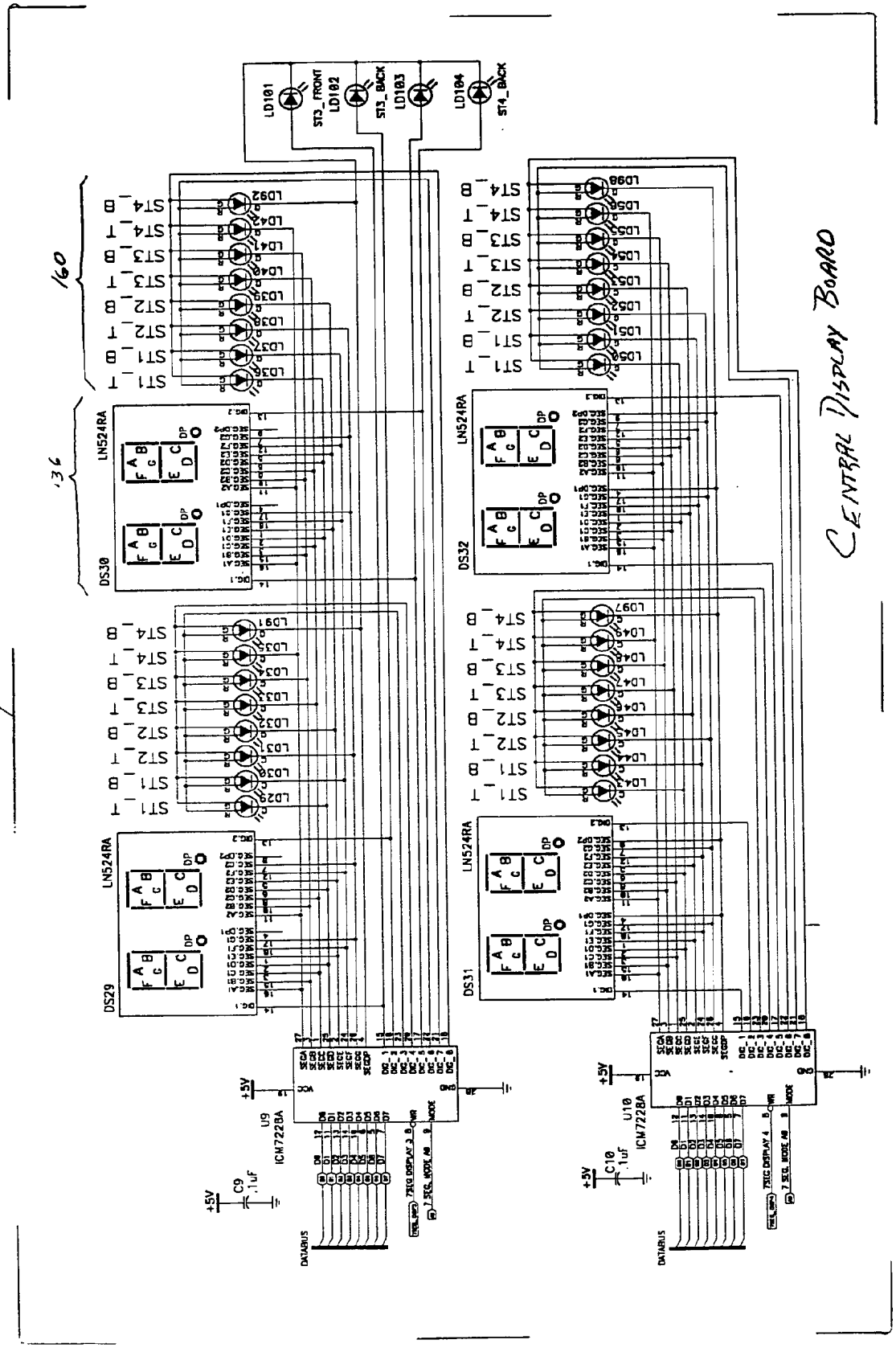

CENTRAL DISPLAY BOARD
LD101
ST3_FRONT
LD102
ST3_BACK
LD103
LD104
ST4_BACK
160
136
158
LN524RA
DS30
DS29
DS32
DS31
U9
ICM7228A
U10
C9
.1uF
C10
.1uF
+5V
DATABUS

FIGURE 15J

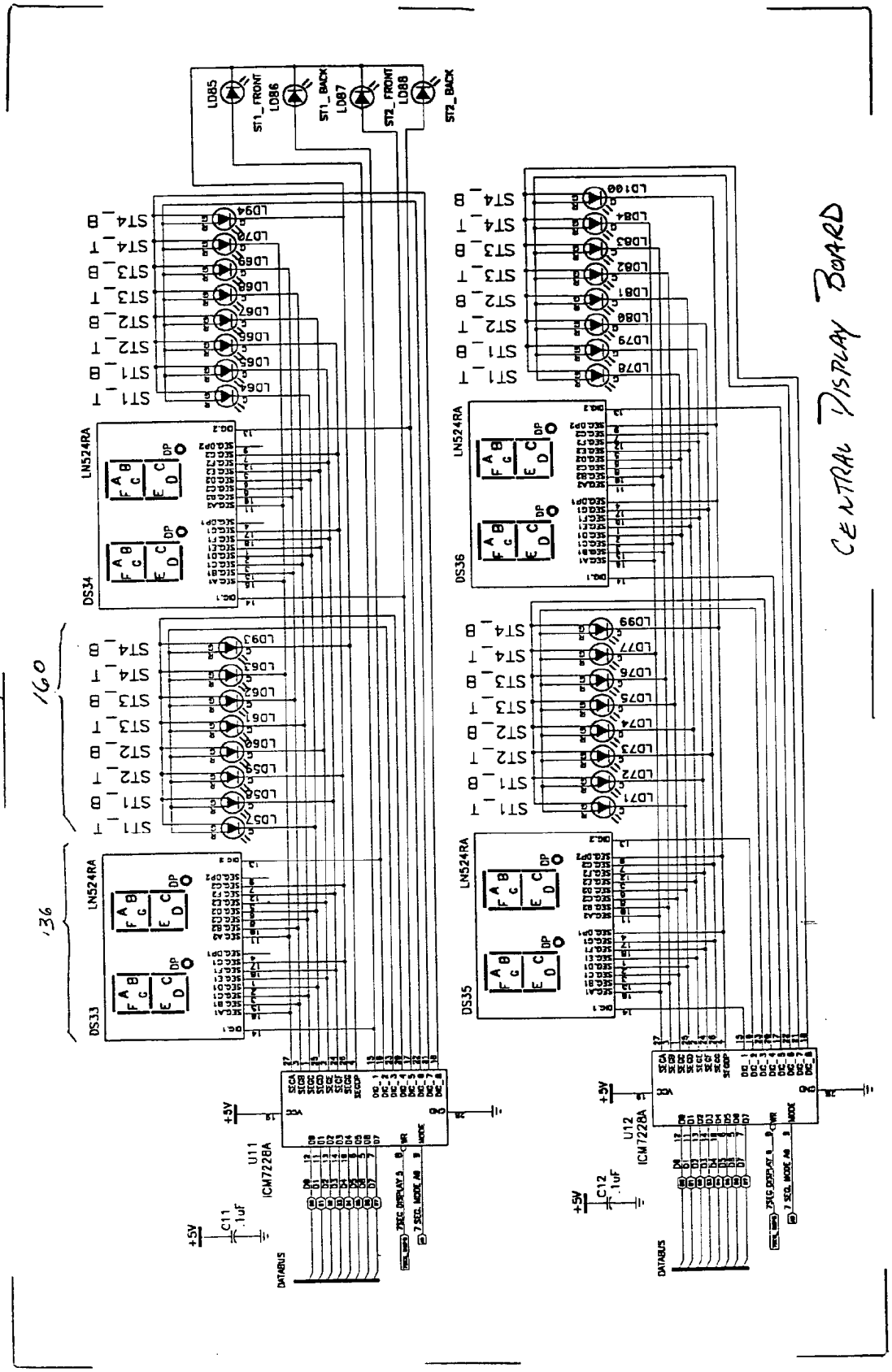

CENTRAL DISPLAY BOARD
158
160
136
LD85
ST1_FRONT
LD86
ST1_BACK
LD87
ST2_FRONT
LD88
ST2_BACK
DS33
DS34
DS35
DS36
LN524RA
U11
U12
ICM7228A
+5V
C11
C12
.1uF
DATABUS

FIGURE 15K

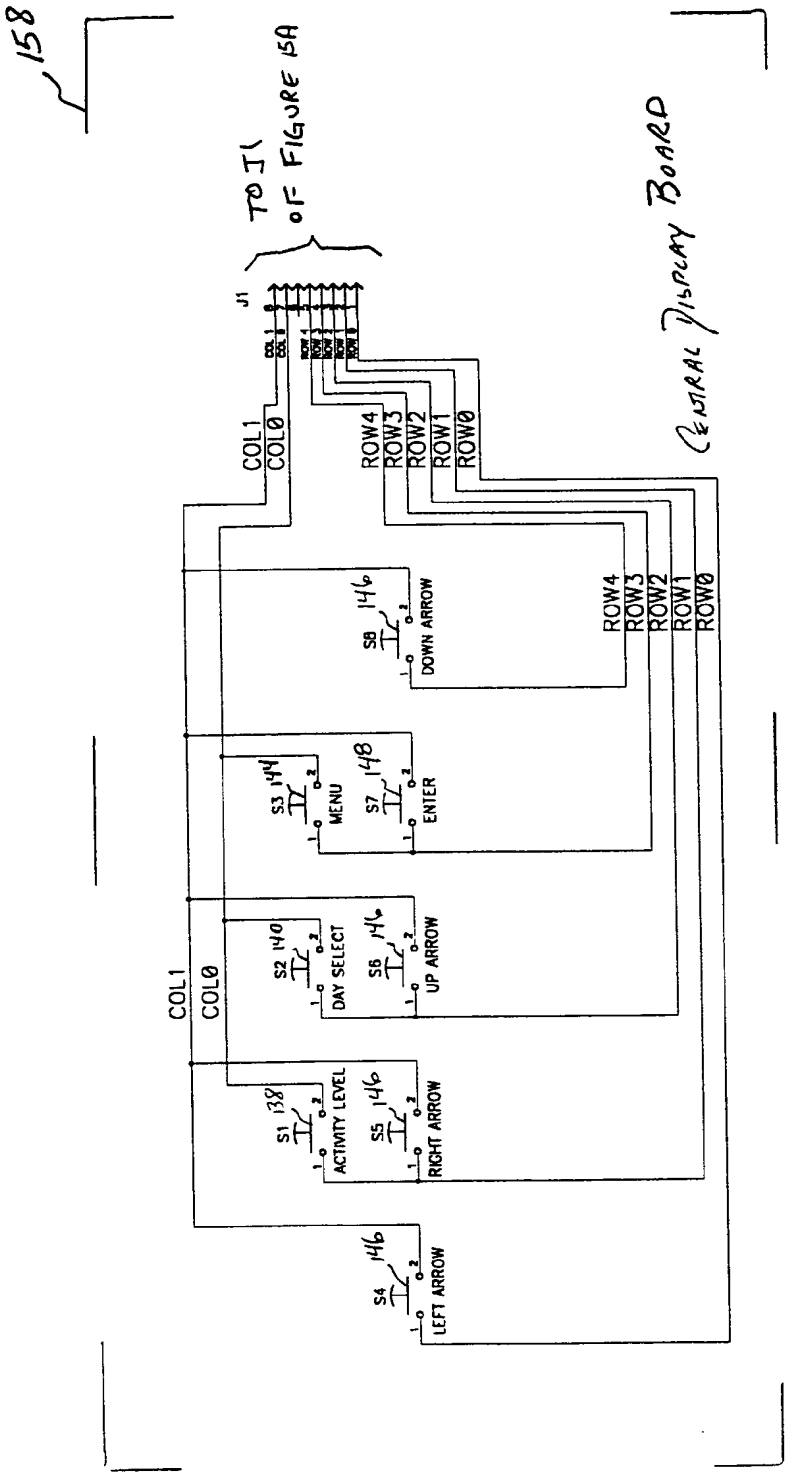

158
TO J1 OF FIGURE 5A
J1
COL1
COL0
ROW4
ROW3
ROW2
ROW1
ROW0
CENTRAL DISPLAY BOARD
S8 146
DOWN ARROW
S3 144
MENU
S7 148
ENTER
S2 140
DAY SELECT
S6 146
UP ARROW
S1 138
ACTIVITY LEVEL
S5 146
RIGHT ARROW
S4 146
LEFT ARROW

FIGURE 5L

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/28948

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 17/60
US CL : 705/22

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/1, 7, 14, 15, 16, 20, 21, 22, 24, 28, 29

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

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

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 6,052,667 A (WALKER et al.) 18 April 2000, the abstract, Figs. 1-20, and column 2 line 65 to column 13 line 59.	1-99
A,P	US 6,009,400 A (BLACKMAN) 28 December 1999, the entire document.	1-99
A	US 5,045,283 A (PATEL) 03 September 1991, the entire document.	1-99
A	US 4,737,463 A (BHATTACHARJEE et al.) 12 April 1988, the entire document.	1-99
A	US 5,667,303 A (ARENS et al.) 16 September 1997, the entire document.	1-99

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 12 JANUARY 2001	Date of mailing of the international search report 15 FEB 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer ERIC W. STAMBER James R. Matthews Telephone No. (703) 305-3900

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(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **SHEI, Steven, M.** [US/US]; 11334 Branstrator Road, Fort Wayne, IN 46809 (US).

(74) Agents: **CLAERBOUT, Andrew, N.** et al.; Senniger Powers, 1 Metropolitan Square, 16th Floor, St. Louis, 63102 (US).

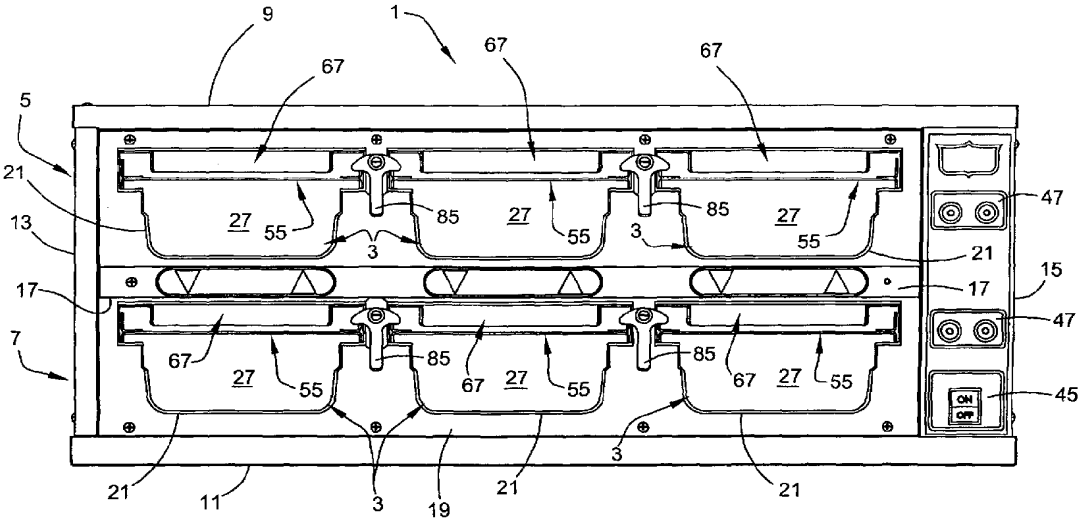
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FOOD WARMING APPARATUS AND METHOD



(57) Abstract: In general, one embodiment of the invention is directed to food holding apparatus for holding pre-cooked food at a selected holding temperature. The apparatus comprises a cabinet having at least one holding compartment therein, and pre-cooked food in the holding compartment, the food having been previously cooked in a cooking appliance. At least one radiant heat source is spaced above the food a distance less than 12 inches (30.5 cm) for delivering radiant heat to the food. A control mechanism varies the amount of radiant heat delivered by the heat source to the food to maintain the food at the selected holding temperature. A related method is also disclosed.

WO 2005/034633 A1

FOOD WARMING APPARATUS AND METHOD

Background of the Invention

[0001] This invention relates generally to food service equipment and more particularly to equipment for maintaining foods at temperatures suitable for serving food.

[0002] In one embodiment, this invention is especially (but not exclusively) directed to food service equipment that uses infrared (IR) heaters to maintain pre-cooked food at proper temperatures before serving. This type of equipment is referred to using such terms as holding oven, holding unit, and food warmer, and these terms are used interchangeably hereinafter. Such equipment is often used in, for example, the fast food service industry to heat food. However, such equipment has certain disadvantages. For example, short holding times (e.g., twenty minutes or less) and rapid product quality degradation often limit the effectiveness of this technology for holding applications. Additionally, different food products require different amounts of IR energy to be held in optimum condition. The quality of the food being held is affected in large part by the temperature and the air flow in the holding oven. As the food loses moisture due to evaporation, flavor is lost. This affects the texture and taste of the product. For example, chicken meat fibers will dry out and become tough, while the breading will become dry and greasy. French fries will develop a dry, rubbery texture as moisture is lost and the outer skin loses its crispness.

[0003] Conventional IR holding devices are not adjustable to control the amount of IR energy delivered to the food being heated. Rather, the heat source is on full power all of the time, and the food is placed relatively

far from the heat source to prevent overheating. As a result, the typical prior holding device requires a large amount of vertical space. This can present a problem in a situation where space is at a premium, as in a fast-food restaurant.

[0004] U.S. Patent Nos. 6,175,099, 6,262,394 and 6,541,739, assigned to Duke Manufacturing Co. of St. Louis, Mo. and incorporated herein by reference, are directed to a holding or cooking oven which is an improvement over prior designs and which has proven to be successful with various fried products. However, there is still a need for a technology that extends the holding time and quality of food products, especially fried products such as hash browns, French fries, rotisserie chicken, deep-fried chicken and shrimp.

Summary of the Invention

[0005] Among the several objects of this invention will be noted the provision of food service equipment, e.g., a food warmer, which is adapted for holding pre-cooked food longer without degradation of the quality of the product, including products having a crust which tends to become soggy or rubbery, such as fried potato products, fried chicken, and rotisserie chicken; the provision of such equipment which is more compact than conventional food warming equipment, thus requiring less space; the provision of such an oven which allows evaporative losses to be more closely controlled to enhance food quality; and a method of maintaining previously cooked food in an environment where the quality of the food is maintained at a high level for a longer period of time.

[0006] In general, one embodiment of the invention is directed to food holding apparatus for holding pre-cooked food at a selected holding temperature. The apparatus comprises a cabinet having at least one holding compartment therein, and pre-cooked food in the holding compartment, the food having been previously cooked in a cooking appliance. At least one radiant heat source is spaced above the food a distance less than 12 inches (30.5 cm) for delivering radiant heat to the food. A control mechanism varies the amount of radiant heat delivered by the heat source to the food to maintain the food at the selected holding temperature.

[0007] The present invention is also directed to a method of preserving cooked food. The method comprises the steps of cooking food in a cooking appliance to provide pre-cooked food, placing the pre-cooked food in a holding compartment of food warming apparatus for a duration of holding time, and heating the pre-cooked food in the holding compartment for at least a portion of said duration of holding time by delivering radiant heat to the food. The heating step comprises varying the amount of radiant heat delivered to the pre-cooked food to maintain the food at a selected holding temperature.

[0008] Other objects and features will be in part apparent and in part pointed out hereinafter.

Brief Description of the Drawings

[0009] Fig. 1 is a front elevation of an oven of the present invention equipped with heat sinks for receiving food-containing trays, auxiliary heat sources mounted above the heat sinks, and metallic covers for covering the trays (the trays being omitted from the view);

[0010] Fig. 2 is an enlarged sectional view of a portion of Fig. 1 but showing a tray positioned in a respective heat sink below its cover;

[0011] Fig. 3 is a perspective showing a heat sink, cover and auxiliary heat source;

[0012] Fig. 4 is a plan of a cover per se;

[0013] Fig. 5 is a front perspective view of another embodiment of an oven of the present invention equipped with compartments for receiving food-containing trays;

[0014] Fig. 6 is a sectional view of a portion of the oven of Fig. 5 showing trays positioned in respective compartments below heat sources;

[0015] Fig. 7 is a sectional view of a portion of the oven similar to Fig. 6 showing trays positioned in respective compartments below alternate heat sources;

[0016] Fig. 8 is a sectional view of a portion of the oven similar to Fig. 6 showing trays positioned in respective compartments below alternate heat sources;

[0017] Fig. 9 is a sectional view of a portion of the oven of Fig. 5 showing a ventilation system of the oven according to an embodiment of the invention;

[0018] Fig. 10 is a perspective view of one embodiment of a tray used with the oven of Fig. 5;

[0019] Fig. 11 is a schematic diagram of one embodiment of a control circuit of the oven of Fig. 5;

[0020] Fig. 12 is a diagram of a time vs. temperature curve illustrating one mode of operation of the oven of Fig. 5;

[0021] Fig. 13 is a time vs. heat source activation curve for the mode of operation depicted in Fig. 12;

[0022] Fig. 14 is a diagram of a time vs. temperature curve illustrating a different mode of operation of the oven of Fig. 5;

[0023] Fig. 15 is a time vs. heat source activation curve for the mode of operation depicted in Fig. 14;

[0024] Fig. 16 is a perspective of a different embodiment of a holding oven of this invention;

[0025] Fig. 17 is a front elevation of the holding oven of Fig. 16;

[0026] Fig. 18 is a section on line 18--18 of Fig. 17;

[0027] Fig. 19 is an enlarged portion of Fig. 17 with parts broken away to show the distance D1 between the food in the oven and a heat source of the oven;

[0028] Fig. 20 is a right-side elevation of the holding oven of Fig. 16;

[0029] Fig. 21 is a section on line 21--21 of Fig. 20;

[0030] Fig. 22A is a graph of a time v. holding temperature curve during an embodiment of a holding duration;

[0031] Fig. 22B is a graph of time v. radiant energy curve during the embodiment of Fig. 22A;

[0032] Fig. 23 is a schematic view of a holding oven of another embodiment;

[0033] Fig. 24 is a schematic view of a holding oven of still another embodiment; and

[0034] Fig. 25 is a schematic view of a holding oven of yet another embodiment.

[0035] Corresponding parts are designated by corresponding reference numbers throughout the drawings.

Detailed Description of the Preferred Embodiment

[0036] Fig. 1 illustrates one embodiment of a holding oven of the present invention, generally designated 1, comprising a cabinet having an interior 12 comprising a plurality of tiers for removably receiving a plurality of trays, each generally designated 3, the trays in each tier

being disposed side-by-side. As shown, the oven has two tiers, an upper tier 5 and a lower tier 7, each accommodating three trays. It is to be understood that the number of tiers and the number of trays in each tier may vary.

[0037] The holding oven 1 has a top 9, bottom 11, sides 13 and 15, and a shelf 17 extending from one side to the other generally midway of the top and bottom. The shelf 17 and top 9 define the upper tier 5; the bottom 11 and shelf 17 define the lower tier 7. The oven has a front panel 19 and a corresponding rear panel (not shown) each having openings such as indicated at 21 for sliding each tray 3 either into or out of its respective tier front or rear.

[0038] In one embodiment, each tray 3 is generally rectangular in plan, having a bottom 23, opposite side walls each designated 25, and end walls each designated 27. Each tray is disposed in its respective tier 5, 7 in the oven 1 in a heat sink generally designated 29 extending from front to rear in the respective tier, being slidably disposed in its heat sink for being slidably withdrawn from or entered in the heat sink either front or rear through the respective opening 21. Each heat sink 29, which is made of aluminum, for example, has a bottom 31 and side walls each designated 33 (Fig. 2). The side walls 33 have outwardly (laterally) extending flanges 35 and rims 37 extending up from the outer margins of the flanges. Each heat sink constitutes a tray-receiving member for holding a single tray. An electrical resistance heating element generally designated 39 having a bottom component 41 contacting the bottom of the heat sink and upwardly extending side components 43 contacting the sides of each heat sink is provided for heating the heat sink and the

tray 3 therein. Each heat sink 29 and associated heating element 39 constitutes the primary heating source for heating the respective tray 3 and its food content. At 45 is indicated an on-off electrical power control for all the heating elements 34. At 47, are indicated temperature controls for the heating elements 39 in the upper and lower tiers. The bottom component 41 of each heating element 39 in the upper tier 5 seats on shelf 17, the bottom component 41 of each heating element 39 in the lower tier 7 seats on the bottom 11 of the holding holding oven 1. The sides 43 of each heating element extend up to the flanges 35 of the respective heat sink 29. Reference may be made to U.S. Patent Nos. 6,175,099, 6,262,394 and 6,541,739, incorporated herein by reference, assigned to Duke Manufacturing Co. of St. Louis, Mo., for further details relating to the construction of the heat sink 29 and associated equipment.

[0039] Primary heating sources other than the heat sinks 29 and associated heating elements 39 can be used without departing from the scope of this invention.

[0040] In the preferred embodiment, each tray 3 has a rim 49 having an outwardly (laterally) directed upper part 51 with a downwardly extending angled lip 53 in sliding sealing engagement with the respective heat sink flange 35. The rim defines the open top 32 of the tray 3. A cover generally designated 55 is provided for the open top of each tray, each cover having a metallic portion 57 overlying the top of the respective tray. More specifically, the metallic portion 57 of each cover comprises a generally horizontal cross wall comprising a rectangular plate of anodized aluminum sheet, for example, having downturned flanges such as indicated at 59 at each side thereof and anodized metal angles 61 extending the

length thereof on each side margin. The lower edges of the downturned flanges 59 engage the top of the heat sink flanges 35. One or more of the covers 55 is/are spaced above the rims 49 of respective trays 3 at a distance no greater than one inch (25 mm), more preferably no greater than about 0.40 inch (10 mm), and still more preferably no greater than about 0.30 inch (7.6 mm). One or more openings such as indicated at 63 is/are provided in at least one of the covers 55 for venting moisture from each tray having such an opening or openings. Fig. 4 shows a cover having sixteen openings 63 arranged in a pattern such as illustrated. The number and pattern may vary widely; the area of the one opening in a cover having one opening and the combined area of the openings in a cover having more than one opening is preferably less than about 25% of the area of the open top of the tray 3 it is covering, more preferably less than about 5% and even more preferably less than 1% thereof. The combined areas of the openings and the specific pattern of openings in a cover will vary depending on the type and quantity of food in the tray being covered. Whatever the circumstances, the size and pattern of the opening(s) can be selected to closely control the amount of moisture vented from the tray and thus optimize the conditions for maintaining food quality over an extended period of time.

[0041] Each cover 55 is part of a system generally designated 65 for heating the food in the respective tray in addition to the primary heat source, e.g., the respective heat sink 29 and heating element 39. This auxiliary heating system 65 comprises a heat source 67 for heating the metallic portion 57 of the respective cover 55 whereby the metallic portion is adapted to emit radiant heat to the food in the respective tray for additional

warming of the food in the tray 3. Each heat source 67, which is located over the respective cover 55, comprises one electric heating element 69 or more disposed in a sheet metal housing 71 affixed to an interior surface of the oven or cabinet 1. In particular the heating element 69 is a commercial item, viz., a Chromalox electrical resistance heater element sold by Carlton Company of St. Louis, Missouri. The housing 71 comprises a shallow pan of sheet metal such as aluminum having a rectangular bottom 73, sides 75, ends such as indicated at 77 and flanges 79 extending out from the top of the sides.

[0042] In one embodiment, the heating element 69 lies on the bottom 73 of the pan extending lengthwise thereof. It is suitably connected in an electrical circuit such that it is adapted to heat the respective cover 55 by heating the bottom 73 of the pan 71 with attendant emission of heat from the bottom of the pan to the cover. Terminals of the heating element for connection thereof in the aforesaid circuit are indicated at 81 and 83. The pans 71 are affixed in the oven or cabinet with the bottom 73 of each pan 71 spaced above the respective cover 55 a distance less than 2.0 inches (5.1 cm) and more particularly less than about 1.0 inch (2.5 cm). In one embodiment, the power delivered by each heat source 67 to the respective cover 55 ranges from 100-500 watts, for example, and each heat source 67 is operable to heat each cover 55 to a temperature which preferably ranges from 200° to 500°F (93° to 204°C). Pivoted locks for locking the covers 55 in the oven 1 are indicated at 85.

[0043] Fig. 5 illustrates a second embodiment of a holding oven of this invention, generally designated 101, comprising a generally rectangular or box-shaped cabinet 102. The cabinet 102 has a top 109, a bottom 111,

opposite sides 113 and 115, a front panel 119 and a corresponding rear panel (not shown). The cabinet 102 defines an interior, generally designated 112, for removably receiving a plurality of trays, each generally designated 103. The holding oven 101 has vertical partitions 126 and horizontal partitions 127 within the cabinet 102 dividing the interior 112 thereof into a plurality of separate, thermally isolated holding compartments 128. It is to be understood that the number of vertical and horizontal partitions 126 and 127 (and thus the number of compartments 128) may vary. Preferably, the partitions 126 and 127 prevent the transfer of food flavors between the compartments 128.

[0044] The front panel 119 and rear panel contain openings, such as indicated at 121, in communication with each compartment 128. In one embodiment, the openings 121 in the front panel 119 have corresponding openings (not shown) formed in the rear panel such that each compartment 128 extends from front to rear of the oven 101 and is adapted for removably receiving one of the trays 103 from either the front or the back of the holding oven 101. The openings 121 are sized for sliding each tray 103 either into or out of the compartment 128.

[0045] Preferably, the compartments 128 and corresponding openings 121 are arranged in several tiers of compartments. As shown in Fig. 5, the holding oven has three horizontal tiers, an upper tier 132, a middle tier 134 and a lower tier 136. Each tier includes three compartments 128, with each compartment accommodating an individual tray 103. It is to be understood, however, that the number of tiers and the number of compartments in each tier may vary. In some embodiments, for example, it may be desirable to configure the holding oven 101 to have a

single tier having two, three, or more compartments 128. Preferably, the entire cabinet 102 is fabricated of sheet metal material and a least the top 109, the bottom 111 and the sides 113 and 115 are of a dual wall construction to insulate the interior 112.

[0046] The holding oven 101 includes a control mechanism, generally indicated at 140, for controlling operation of the oven 101. Preferably, the control mechanism 140 has an operator input device, which in one embodiment, comprises a keypad, indicated by reference 142, and a display, indicated by reference 144, to selectively allow the operator to interact with the control mechanism to control the environment, such as the temperature and/or air flow, in each compartment 128. The control mechanism may include a separate keypad for each compartment 128. Alternately, the operator input device can include dials, switches and the like known to those in the art. For example, rotatably mounted control dials mounted on the front panel 119 and movable in a push-and-turn fashion to any user-selected positions can permit operator input to the control mechanism 140. The control mechanism 140 may also include associated indicator lights (not shown) to inform an operator of the status of a particular compartment 128 or the food within the compartment, such as whether the temperature in the compartment is at a desired temperature or whether the food in the compartment is approaching or has exceeded the desired hold time. Further operation of the control mechanism 140 will be described below.

[0047] Referring to Figs. 6-8, each compartment 128 has tray supports comprising, in one embodiment, inwardly (laterally) extending flanges 144 extending from the vertical partitions 126 at opposite sides of the

compartment 128. The flanges 144 are vertically spaced for supporting a tray 103 at different elevations in the compartment 128. In one embodiment, the compartments 128 in the holding oven 101 have different widths and/or heights to accommodate trays of different sizes. It is contemplated that the tray supports can have other forms, such as grooves or slots in the vertical partitions 126.

[0048] Heat sources 146 positioned above respective compartments 128 are adapted to emit radiant heat into the compartments directed at the trays 103 to warm food contained therein. Each heat source 146 can function as the primary heating source for heating the respective tray 103 and cooking its food content or maintaining an already cooked food near a selected temperature. In the embodiment shown in Fig. 6, the heat source (designated 146A) is a quartz infrared heat source, but it will be understood that other heat sources may be used. For example, Fig. 7 illustrates ceramic infrared heat sources 146B and Fig. 8 illustrates resistance heating elements embedded in magnesium oxide 146C. Alternatively, halogen infrared heat sources or other sources may be used. The power delivered by each heat source 146 ranges from between about 20 and 2,000 watts, desirably between about 25 and 1500 watts, preferably between about 30 and 1000 watts, more preferably between about 35 and 750 watts and even more preferably between about 40 and 600 watts. In one embodiment, each heat source 146 delivers about 400 watts of power. Additional means for heating the holding oven 101 other than heat sources 146 can be used without departing from the scope of this invention. Reference may be made to the aforementioned U.S. Patent Nos. 6,175,099, 6,262,394 and 6,541,739, for further details relating to the construction

of certain types of equipment used for heating the trays 103 and food contained therein.

[0049] In one embodiment, a panel 150 is positioned between each heat source 146 and its respective compartment 128 to prevent the trays 103 and their contents from contacting the heat sources. In one embodiment, the panel 150 is a tempered glass cover that permits radiant energy produced by the heat source 146 to pass through into the compartment 128. In this embodiment, the panel is preferably made from transparent or semi-transparent glass. Alternately, the panel 150 can be a radiant metallic plate. In this latter embodiment, the heat source 146 is used to heat the panel 150, and the panel then radiates heat to warm the contents of the tray 103. A reflector 152 is positioned above the heat source 146 to radiate heat down toward the tray 103 below it.

[0050] Fig. 9 illustrates an embodiment of the holding oven 101 having a forced air mechanism, indicated generally at 154, for delivering recirculating air into the compartments 128. The mechanism 154 comprises lower air ducting 160, upper air ducting 162, and a fan system 156 that moves air through the lower and upper air ducting air ducting. In one mode of operation, the fan system 156 circulates air in one direction along a flow path through the lower air ducting 160, into the compartments 128 and then through the upper air ducting 162 and back to the fan system. The lower air ducting 160 conveys the forced air into the compartments 128 through openings 164 located in a floor 166 of the compartments 128 below the trays 103. Air flows up from the compartments 128 into the upper air ducting 162 through one or more openings 168 in the panels 150 above the trays 103. In a second mode of operation, the fan system 156 moves air in the opposite direction

through the upper air ducting 162, down into the compartments via openings 168, into the lower ducting 160 via openings 164, and then back to the fan system.

[0051] The number and pattern of openings 164, 168 in the panels 150 and floor 166 may vary widely depending on the type of heat source 146 used in each compartment 128 and the type of food in the compartment. The size and/or speed of the fan system 156 and/or the number, pattern and/or size of the openings 164, 168 associated with each compartment 128 can be varied to regulate the air flow around each tray 103 to provide optimum air flow for different food products. Additionally, the number, size and/or pattern of the opening(s) 164, 168 can be selected to closely control the amount of moisture vented from each compartment 128 and thus optimize the conditions for maintaining food quality over an extended period of time.

[0052] An upper duct heat source 170 and a lower duct heat source 172 are positioned in the respective air ducting 162,160 for heating air flowing along the selected flow path. The upper and lower duct heat sources 170, 172 heat the air that flows through the compartments so that, optionally, the food may also be warmed by convective heating. The duct heat sources 170, 172 are commercially available items, e.g., Chromalox electrical resistance heater element sold by Carlton Company of St. Louis, Missouri. The duct heat sources 170, 172 may be used when additional heat is needed in the compartments 128, such as when the initial temperature is low or a large quantity of food is placed in the compartments. In one embodiment, temperature sensors 174 (Fig. 9), such as conventional resistive thermal detector type sensors known to those skilled in the art, may be positioned in each of the compartments 128 or in the air ducting 162, 160. The

temperature sensors 174 provide feedback to the control mechanism 140, for example, to supply an indication of the temperature to the display 144, to control the operation of the fan system 156, or to provide indications to a warning system (not shown) that the temperature has exceeded a selected threshold. The forced air mechanism 154 can also provide recirculating air for forced cooling of the food stored in the compartment 128. Fig. 9 illustrates a holding oven with a single tier and a single forced air mechanism 154, but holding ovens 101 with multiple tiers can have separate fan systems with associated air ducting 160, 162 for each tier within the scope of the invention.

[0053] The air flow over the food in the tray 103 is controlled to enable an operator to control the amount of moisture that evaporates from the food. When the air flow direction is from the bottom to the top, i.e., from the lower air ducting 160 through the compartment 128 and into the upper air ducting 162, convection heat is applied to the food in the tray from below the tray, and infrared heat is applied from the heat sources 146 above the tray 103. By changing the direction of air flow so that air flows from top to bottom, the food can be cooked or held with a combination of convection heat and infrared heat directed from above the tray 103. Depending on the food in the tray, air flow can be maintained continuously from one direction, e.g., always from bottom to top, throughout the cook/hold cycle. Alternately, the direction of the air flow can be reversed during the cook/hold cycle so that air flow is alternately directed from the bottom and from the top of the food product. In one embodiment, the forced air mechanism 154 supplies air while the heat sources 146 are activated and is turned off when the heat sources are deactivated.

[0054] Referring now to Fig. 10, each tray 103 is generally rectangular in plan, having a bottom 180, opposite side walls each designated 182, end walls each designated 184, and an open top. As shown, each tray 103 has a rim 186 comprising a pair of laterally extending lips 190 adapted for sliding sealing engagement with the respective support flanges 144 in a compartment. One or more openings such as indicated at 194 is/are provided in at least one of the bottom 180 and/or the side walls 182 and end walls 184 for allowing air to circulate through the tray 103 to vent moisture from each tray. Fig. 10 shows a tray having sixteen openings 194 in the bottom 180 and each side wall 182 and 8 openings 194 in each end wall 184 arranged in a pattern such as illustrated. It is contemplated that the number, pattern and size of openings 194 may vary widely. For example, the openings 194 in the tray 103 may be circular, oval, square or other shape and each opening may have an area of between about 0.1 and about 1.0 square inch (between about 0.6 and about 6.4 square cm). It is desirable that the combined area of the openings 194 in the tray is less than about 50% of the area of the open top of the tray 103, preferably less than about 25% and more preferably less than about 10% thereof. Also, it is contemplated that different trays 103 within the oven 101 may have different patterns of openings 194. The combined areas of the openings 194 and/or the specific pattern of openings in the tray 103 will vary depending on the type and quantity of food in the tray 103. Whatever the circumstances, the size and pattern of the opening(s) 194 can be selected to closely control the amount of moisture evaporated from the tray 103 and thus optimize the conditions for maintaining food quality over an extended period of time.

[0055] The control mechanism 140 is used to selectively control the environment, such as the temperature and/or air flow, in each compartment 128 of the holding oven 101. As will be described more fully hereafter, the control mechanism 140 is operable to vary the amount of radiant heat as needed to maintain the food at a desired holding temperature to preserve the quality of the food for a longer period of time. As used herein, the term "selected holding temperature" means either a single substantially constant temperature (e.g., 180 °F (82 °C)) or a range of temperatures (e.g., 160-180°F (71-82 °C)). In one embodiment, the control mechanism comprises suitable timer and duty cycle controls to control the length of the duty cycle of each heat source 146, the term "duty cycle" meaning the ratio of heat source on-time to heat source on-time plus heat source off-time. The control mechanism 140 uses a suitable microprocessor and appropriate software to control relays 198 (Fig. 11) that activate the heat sources 146, 170 and 172 and fans 156.

[0056] Fig. 11 is a simplified schematic of a portion of one embodiment of an oven control circuit, generally indicated at 196, that is controlled by the control mechanism 140. The circuit 196 operates the heat sources 146 in the multiple compartments 128 of the holding oven and the heat sources 170, 172 in the upper and lower ducting 160, 162. In the embodiment shown, the control mechanism 140 regulates the heat sources in the holding oven 101 by energizing conventional relays 198. It is understood that the control mechanism 140 may independently operate the heat sources 146 in the compartments 128, such that the heat source 146 for one compartment may be actuated while the corresponding heat source for another compartment is at a different level of activation or

deactivated. Additionally, the control mechanism 140 may independently operate the upper and lower duct heat sources 170, 172 such that neither, one or both heat sources in a flow path may be operating, and such that, for example, the top heat source may be operated in one tier while the bottom heat source may be operated in another tier. Using a keypad 142 or other suitable operator input device, the control mechanism 140 can be programmed to control the heat sources 146, 170 and 172 to adjust various parameters, such as, for example, the ambient hold time, the heated hold time, the total hold time, the percentage heater on time, the time base of the duty cycle, the cook or rethermalization time, and/or the temperature, as more fully described below. As such, the control mechanism 140 controls operation of the heat sources 146 independent of one another so that the temperature in each compartment 128 may be independently controlled.

[0057] Typically, the holding oven 101 will operate in at least two modes. In a first "cool down and hold" mode, the initial temperature of the food placed in the holding oven is higher than the desired holding temperature of the food, as is typically the case when the food has just been cooked in a cooking appliance (e.g., cooking or baking oven, frier, etc.) and then is transferred to the holding oven. In this mode, the control mechanism 140 is operable to maintain the heat source in a respective compartment 128 deactivated (or at a low level of activation) while the pre-cooked food in the compartment 128 cools down to the selected holding temperature during a duration of non-heated holding time, and for then controlling the heat source 146 in the compartment 128 to maintain the food in the compartment 128 at or near the selected holding temperature for a duration of heated holding time. In a

second "heat up and hold" or "rethermalizing" mode, the initial temperature of the pre-cooked food placed in the oven is lower than the desired holding temperature of the food, as where the food has been cooked and then refrigerated before placement in the holding oven. In this mode, the control mechanism 140 is operable to activate the heat source in the compartment 128 to raise the temperature in the compartment 128 to the selected holding temperature during a duration of rethermalizing holding time, and for then controlling the heat source 146 in the at least one compartment 128 to maintain the food in the compartment 128 at the selected holding temperature for the duration of heated holding time. It will be understood that the oven 1 of Fig. 1 can be used in a similar manner without departing from the scope of the invention.

[0058] Figs. 12 and 13 illustrate an example of the operation of the holding oven 101 in the first (cool down and hold) mode. In particular, Fig. 12 illustrates a time vs. temperature curve for a complete duration of holding time D for one compartment 128 of the oven 101, and Fig. 13 illustrates a time vs. activation curve for the heat source 146 of that same compartment during the holding time duration D. The time vs. temperature curve of Fig. 12 plots the temperature of the food product as a function of time. One skilled in the art will understand that this curve can be different for each type of food product to be held in the oven 101.

[0059] In a cool down and hold situation, a food product is typically cooked as by frying, grilling, baking, etc., in a cooking appliance until a desired high internal temperature, usually between about 170 and 210 degrees Fahrenheit (°F)(between about 77 and 99 degrees Celsius (°C)), is achieved. After the food is cooked, the food

product is placed in a tray 103 and inserted into compartment 128 in the oven 101. Alternatively, the food can be placed in the oven without the use of a tray. Using the keypad 142 or other input device, the operator selects a desired holding temperature, indicated at T, which will be lower than the temperature Tc of the food initially placed in the compartment. The holding temperature T is the desired temperature for maintaining the pre-cooked food to preserve taste, appearance and/or other food quality. The operator also selects a duration of holding time D. The duration of holding time D is the total time the food is to be held in the oven 101 and maintained at a desired quality level. Alternatively, the control mechanism 140 can be programmed so that the operator need only select the type of food to be placed in the compartment and the control mechanism 140 automatically uses preselected settings for that type of food.

[0060] In general, when the holding oven is operating in the cool down and hold mode, it is desirable that food introduced into the oven be allowed to quickly cool down to the selected holding temperature, and that the food be held at this temperature thereafter. Thus, the duration of holding time D may comprise an ambient hold time, i.e., a period of non-heated cool-down time such as indicated at B in Fig. 12, during which time the food product is allowed to cool to the desired holding temperature T. Preferably, during the ambient hold time B, heat source 146 is either in a deactivated state or a state in which it is delivering a relatively low quantity of radiant heat to the food so that the food product may cool down more rapidly than if the heat source was at full power. The food product is allowed to cool for the ambient hold time B until it reaches the desired hold temperature T as illustrated at

point A. In one embodiment, forced air flow from the forced air mechanism 154 (Fig. 9) can be used to more rapidly decrease the temperature. After the internal temperature of the food decreases to the desired hold temperature T, the food is held near the desired hold temperature to preserve food quality for a period of heated hold time, indicated at C, comprising the remaining portion of the holding time duration D. During the heated holding time C, the heat source 146 may be operated in duty cycles to apply the appropriate amount of radiant heat to the food. Additionally, the control mechanism 140 controls the heat sources 170, 172 and the fan system 156 to maintain the internal food temperature at or near the desired hold temperature T during the heated hold time C.

[0061] Fig. 13 illustrates an embodiment in which the heat source 146 is successively activated and deactivated in a controlled sequence or duty cycle, indicated at G, to maintain the temperature in the compartment 128 near the selected holding temperature T. In this particular embodiment, each duty cycle G comprises a heating interval E during which time the heat source 146 is activated followed by a non-heating interval F during which time the heat source is deactivated. The time-base of the duty cycle G is the time required to complete one cycle of activation and deactivation of the heat source 146 as shown in Fig. 13. In one embodiment, the time-base of the duty cycle G and the percent on time of the heat source 146 (i.e., the duration of heating interval E divided by the time-base of the duty cycle G expressed as a percent) maintains the actual temperature within the compartment 128 within at least about 15 degrees of the desired temperature, preferably within at least about 10 degrees, more preferably within about 5 degrees, and even more

preferably within about 2 degrees of the desired temperature.

[0062] The operator is able to set various parameters using the keypad 142 or other input device of the control mechanism 140, such as the ambient hold time delay B, the heating interval E, the time-base of the duty cycle G, and/or total hold time D. These parameters can be selected by the operator or preset for the type of food product in the compartment 128 so that the operator need only select the proper food product. The control mechanism 140 in an oven 101 having more than one compartment 128 can control the duty cycle of the heat source 146 in each compartment to maintain the temperatures in the compartments at different levels.

[0063] Using the keypad 142 or other input device, an operator can also control the operation of the forced air mechanism 154 (Fig. 9) by activating the fan system 156 or selecting the direction of forced air flow. In one embodiment, forced air flow from the forced air mechanism 154 conveys convective heating air into the compartments 128 at locations below the trays 103 for flow in a generally upward direction toward the trays 103. Alternately, the ventilation system conveys heating air into the compartments 128 at locations above the trays 103 for flow in a generally downward direction toward the trays 103. The fan system 156 can be operated such that heating air is circulated through the compartments 128 in one direction and then the direction of air flow is reversed to circulate heating air through the compartments 128 in the opposite direction. Using the keypad 142 or other input device of the control mechanism 140, the operator is able to select the duration that the fan system 156 circulates air through the compartments 128. For example, in one

embodiment, the forced air mechanism 154 operates in a controlled sequence during the duty cycle G such that the fan system 156 is activated when the heat sources 146 are activated and is deactivated when the heat sources are deactivated. Alternately, the fan system 156 can be continuously activated for the duration of the total hold time D or can be activated so that the fan system is on a desired percentage of the duty cycle G independent of the heat sources. Preferably, the fan system 156 is activated a suitable percentage of the time to control the evaporation of moisture from the food in the compartment 128. The percentage of time the fan system 156 is activated desirably depends on the type and/or the amount of food placed in the compartment 128. The percentage of time the fan system 156 is activated and the direction of air flow can be selected by the operator or preset for the type of food product in the compartment 128 so that the operator need only select the proper food product. Additionally, the vertical position of at least one tray 103 in a respective compartment 128 may be varied.

[0064] Set forth below are exemplary oven settings for particular food products when the oven is operating in a cool down and hold mode.

[0065] Example 1 - Fried Chicken Nuggets

Ambient hold time delay (B)	=	10 minutes
Hold temperature (T)	=	180 °F (82 °C)
Time-base of duty cycle (G)	=	120 seconds
Percent on time (E)	=	50%
Total hold time (D)	=	60 minutes

[0066] Example 2 - Fried Apple Turnover

Ambient hold time delay (B)	=	25 minutes
Hold temperature (T)	=	200 °F (93 °C)
Time base of duty cycle (G)	=	120 seconds
Percent on time (E)	=	40%
Total hold time (D)	=	240 minutes

[0067] Figs. 14 and 15 illustrate an example of the operation of the oven 101 in the second (heat up and hold or rethermalizing) mode. In particular, Fig. 14 illustrates a time vs. temperature curve for a complete hold cycle D for one compartment 128 of the oven 101, and Fig. 15 illustrates a time vs. activation curve for the heat source 146 of that same compartment during the hold cycle D. The time vs. temperature curve of Fig. 14 plots the temperature of the food product as a function of time. One skilled in the art will understand that this curve can be different for each type of food product to be held in the oven 101.

[0068] In this mode, the oven 101 is used to raise the temperature of a food product to a selected temperature and hold the food product at the selected temperature. A tray 103 containing a food product at an initial temperature T_I is placed into the compartment 128. (Temperature T_I may vary from a frozen or refrigerated temperature to ambient or above.) Using the keypad 142 or other input device, the operator selects a desired holding temperature T (which will be higher than the initial food temperature T_I), and a duration of holding time D. Alternatively, the control mechanism 140 can be programmed so that the operator need only select the type of food to be placed in the compartment and the control mechanism 140 automatically uses preselected settings for that type of food. In either

case, the control mechanism is operable to activate the heat source 146 to raise the temperature of the food product for a duration of heat-up or rethermalization time, indicated at I, the food reaching the holding temperature T at time H. The heat source 146 is then activated and deactivated during the heated holding time C for successive duty cycles G to maintain the food in the compartment 128 at the selected holding temperature T for the duration the total hold time D. In one embodiment, the duration of the heated holding time C includes intervals of the duty cycle G when the heat source 146 is activated as indicated by E and intervals during which the heat source is deactivated as indicated by F as described above.

[0069] Set forth below are exemplary oven settings for particular food products when the oven is operating in a heat-up and hold mode.

[0070] Example 3 - Diced Frozen Chicken

Rethermalization time (I)	= 40 minutes
Hold temperature(T)	= 220 °F (104 °C)
Time-base of duty cycle (G)	= 180 seconds
Percent on time (E)	= 50%
Total hold time(D)	= 160 minutes

[0071] Example 4 - Refrigerated Beef BBQ

Rethermalization time (I)	= 30 minutes
Hold temperature(T)	= 210 °F (99 °C)
Time base of duty cycle (G)	= 180 seconds
Percent on time (E)	= 30%
Total hold time(D)	= 240 minutes

[0072] With the heating system of the present invention and the capability of controlling the evaporation of moisture from the trays 103, the holding time (D) for fast service cooked foods such as chicken and french fries is substantially increased, and good texture and taste are maintained. In this respect, controlling the rate of evaporation of moisture from chicken, for example, precludes drying out and toughening of the chicken fibers and precludes the breading from becoming dry and greasy. And with respect to french fries, for example, development of a dry, rubbery texture as moisture is lost and the outer skin loses crispness is precluded.

[0073] In the embodiments described above, the control mechanism 140 uses a duty-cycle system to control the amount of radiant heat delivered to the pre-cooked food by the heat sources. In this type of system, the percentage of heater on and off time is adjusted to vary the radiant energy as needed to maintain the food at the suitable holding temperature. It will be understood, however, that the control mechanism 140 can vary the amount of radiant energy delivered to the food in other ways. For example, the heat sources 146 may be variable-power heaters operable to deliver radiant heat at multiple discrete energy levels or at an infinite number of levels between full-power and zero power (as by varying the voltage to the heaters), and the control mechanism 140 may operate to increase and decrease the radiant heat delivered by the heaters in a controlled, pre-programmed manner to maintain a particular food at its ideal holding temperature.

[0074] The particular program used by the control mechanism 140 to control a heat source 146 for any given type of food may be determined empirically. Alternatively, the control mechanism 140 can include one or more sensors

and one or more appropriate feedback loops for each compartment or group of components of the holding oven. For example, in one embodiment, at least one sensor is used in each compartment to detect a characteristic indicative of the temperature of the food in the compartment, and the control mechanism is responsive to signals received from the at least one sensor to control the heat source 146 to vary the radiant heat delivered to the pre-cooked food to maintain it at a holding temperature appropriate for that food. The characteristic detected by the one or more sensors may be the temperature of the air in the compartment, or the temperature of a surface in the compartment, or the radiant IR energy emitted by the food in the compartment, or some other characteristic. Thus, the sensor may be a standard temperature sensor, or an IR emissions detector, or some other type of detector capable of detecting the aforesaid characteristic indicative of the temperature of the food in the compartment.

[0075] Figs. 16-21 show another embodiment of food warming apparatus of this invention, generally designated 201. The apparatus comprises a cabinet 203 having two horizontal tiers of compartments, two compartments per tier (each compartment being designated 207). It will be understood that the number of tiers can vary from one to any number more than one, and that the number of compartments 207 in each tier may vary from one to any number more than one. In the particular embodiment shown, each compartment is sized to receive a single tray T, but it will be understood that each compartment 207 may be sized to receive more than one tray, or that some compartments may be sized to receive one tray and other compartments more than one tray. In other embodiments (to

be discussed later), food is placed in one or more compartments 207 without the use of a tray.

[0076] The cabinet 203 has front and back panels 211, 213 with openings 215 aligned with the compartments 207 in the cabinet to allow food (either in or out of trays T) to be placed into the compartments and removed from the compartments from both ends of the compartments. The cabinet also has a bottom wall 221, side walls 223, a top wall 225, a vertical partition or divider 227 extending between the top and bottom walls of the cabinet to separate the two compartments 207 in each tier, and a horizontal partition or divider 231 extending between the side walls 223 to separate the compartments in the upper tier from the compartments in the lower tier. As a result, the interior of the cabinet is divided into a plurality of separate, thermally isolated holding compartments 207, and each compartment is completely enclosed on opposite sides, top and bottom so that food flavors are prevented (or at least inhibited) from transferring between compartments. Suitable thermal insulation (not shown) is provided adjacent the walls of each compartment 207.

[0077] As shown in Fig. 19, for example each compartment 207 has a heat source 235 for emitting radiant heat down on pre-cooked food in the compartment. As noted previously, this heat source 225 may comprise one or more IR heat lamps or the like, each mounted by a suitable fixture adjacent to the top wall of the compartment. A reflector 241 is provided in each compartment 207 over the best source 235 for reflecting radiant heat in a generally downward direction through a cover panel 245 of suitable material capable of transmitting the heat (e.g., glass). The food in the compartment 207 is positioned a distance D1 below the heat source 235, as shown in Fig. 19. Distance

D1 is desirably relatively small to reduce or minimize the size (e.g., vertical height) of the cabinet 203. In one embodiment, for example, distance D1 is less than 12 in. (30.5 cm); in another it is less than 11 in. (27.9 cm); in another it is less than 10 in. (25.4 cm); in another it is less than 9 in. (22.9 cm); in another it is less than 8 in. (20.3 cm); in another it is less than 7 in. (17.8 cm); in another it is less than 6 in. (15.2 cm); in another it is less than 5 in. (12.7 cm); in another it is less than 4 in. (10.2 cm); in another it is less than 3 in. (7.6 cm); in another it is less than 2 in. (5.1 cm); in another it is less than 1 in. (2.5 cm); and in another it less than 0.5 in. (1.3 cm). In other embodiments, distance D1 may be in the range of 0.25 in. to 10 in. (0.63 cm to 25.4 cm), or in the range of 0.25 in. to 8 in. (0.63 cm to 20.3 cm), or in the range of 0.25 in. to 6 in. (0.63 cm to 15.2 cm), or in the range of 0.25 to 4 in. (0.63 cm to 10.2 cm), or in the range of 0.25 to 3 in. (0.63 cm to 7.6 cm), or in the range of 0.25 in. to 2 in. (0.63 cm to 5.1 cm), or in the range of 0.25 in. to 1 in. (0.63 cm t0 2.5 cm). Where the pre-cooked food is placed in one or more trays, as shown in Fig. 19, each tray T is supported by supports 247 in a respective compartment 207 at an elevation where the bottom of the tray is spaced above the floor of the compartment a suitable distance D2. Distance D2 may be in the range of 0-12 in. (0-30.5 cm), and more preferably 0.5-1.0 in. (1.3-2.5 cm). Alternatively, the food may be placed on the floor of the compartment.

[0078] The heat sources 235 in the cabinet 203 are controlled by a suitable control mechanism 251, similar to the control mechanism 140 described above, which can be used to operate each heat source 235 independently of the other heat sources to deliver varying amounts of radiant

energy to the food in a respective compartment. In this manner, the amount of radiant energy delivered to the food in a compartment 207 can be closely controlled to maintain the food at an appropriate holding temperature for that particular food, as described above. Also, because the amount of radiant heat delivered to the food is varied as a function of time, the heat source 235 in each compartment 207 can be placed much closer to the food (e.g., distance D1 in Fig. 19, discussed above) which has the desirable advantage of reducing the size of the cabinet 203. This is in contrast to conventional IR holding units where the energy delivered by the heat source is not variable. Rather, the heat source is energized to deliver full power all of the time. As a result, the heat source must be positioned relatively far from the food (e.g., 12 in. (30.5 cm) or more).

[0079] In one embodiment, the control mechanism 251 is programmed for different types of food, so that after food has been placed in a particular compartment 207, an operator simply selects that type of food from a suitable menu on a display (not shown) on the cabinet. The control mechanism then automatically selects the appropriate heating protocol for the food selected, including one or more of the following: the ideal holding temperature for the food selected; the duration of holding time ("holding duration"); and the manner in which the heat source in each compartment is to be varied to maintain the food at the desired holding temperature (e.g., percent on time during each duty cycle, if duty cycles are used). For convenience, the control 251 also includes a timer which times out the holding duration, and a display 255 which shows the time remaining until the end of holding duration. The control mechanism 251 may also include a visual and/or

audible alarm for alerting an operator at a predetermined time before the end of the holding duration, so that steps can be taken to start cooking a fresh batch or batches of additional food. (At the end of a holding duration, any food remaining in the compartments 207 is typically disposed of and replaced by freshly cooked food.)

[0080] As noted previously, an important aspect of this invention is the ability of the control mechanism 251 to vary the amount of radiant heat delivered by the heat source in each compartment 207 to the pre-cooked food in the compartment. In general, or at least typically, it is desirable that pre-cooked food introduced into the compartment be allowed to cool down as quickly as possible to the desired holding temperature, and that the food be held relatively constant at the desired holding temperature using a minimum of power to the heat source 235. The graphs in Figs. 22A and 22B illustrate this concept. Fig. 22A graphs time v. temperature in one compartment 207. Pre-cooked food introduced into the compartment at time T_0 cools down to the desired holding temperature at time T_1. Thereafter, the food is substantially maintained at the holding temperature for the remainder of the holding duration D. Fig. 22B is a graph of time v. the radiant energy delivered by the heat source 235 to the food. In the particular embodiment shown in this graph, the heat source is operated at a first relatively low level (where the heater is either off or delivering radiant heat at low level of energy or power) during a first phase P1 from time T_0 to time T_1, so that little or no radiant energy is delivered to the food. As a result, the temperature of the food declines relatively rapidly toward ambient temperature. When the temperature of the food approaches (or reaches) the desired holding temperature, the control

mechanism 251 causes the heat source 235 in the compartment 207 to deliver radiant heat at a second higher level (e.g., 70% of maximum) to stop the decline in temperature of the food and hold it at about the desired holding temperature during a second phase P2 from time T_1 to time T_2. After the temperature of the food has equilibrated at the desired holding temperature, which will vary depending on the particular type of food, the control mechanism 251 causes the heat source 235 to reduce the amount of radiant heat delivered to the food to a third level (e.g., 30% maximum) sufficient to maintain the food at the desired holding temperature during a third phase P3 from time T2 until the end of the holding period at time T3.

[0081] It will be understood that the graphs shown in Figs. 22A and 22B can vary, and that the number of phases P1, P2, P3 discussed above can vary without departing from the scope of this invention.

[0082] Fig. 23 shows another embodiment of a holding oven of this invention, generally designated 301. The oven is similar to those described above except that the cabinet of the unit has only one compartment. In this embodiment, food is not placed in a tray, but rather on the bottom wall 307 or other supporting surface in the compartment, and the heat source 311 is closely spaced above the food to heat the food and maintain it at the desired holding temperature. The spacing D1 between the food and the IR heat source is relatively small (as discussed above) to reduce the overall height dimension of the oven 301. The heat source 311 is controlled by a control mechanism 140, 251 of the type described above.

[0083] Fig. 24 shows a holding oven, generally designated 401, which is similar to the oven shown in Fig. 23. In this embodiment, the single compartment 403 of the

oven is sized to hold multiple trays T. All other aspects of the oven, including the heat source and control mechanism, are the same.

[0084] Fig. 25 shows a holding oven, generally designated 501, which is similar to the oven shown in Fig. 24 except that the oven is divided into three compartments 503, each of which is capable of receiving food placed on the bottom wall or other supporting surface in the compartment. Partitions 507 between the compartments prevent or at least inhibit the transfer of food flavors between adjacent compartments. Each compartment 503 has its own heat source 511 which is spaced relatively closely to the bottom wall of the compartment to maintain the distance between the food and the heat source within the ranges (e.g., distance D1) described above. The heat sources 511 are controlled by a control mechanism similar to the control mechanism 140, 251 described above.

[0085] When introducing elements of the present invention or the preferred embodiment(s) thereof, the articles "a", "an", "the" and "said" are intended to mean that there are one or more of the elements. The terms "comprising", "including" and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

[0086] In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained. As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

WHAT IS CLAIMED IS:

1. Food holding apparatus for holding pre-cooked food at a selected holding temperature, said apparatus comprising:

a cabinet having at least one holding compartment therein;

pre-cooked food in the holding compartment, said food having been previously cooked in a cooking appliance;

at least one radiant heat source spaced above the food a distance less than 30.5 cm for delivering radiant heat to the food; and

a control mechanism for varying the amount of radiant heat delivered by the heat source to the food to maintain the food at said selected holding temperature.

2. Food warming apparatus as set forth in claim 1 wherein said distance is in the range of 0.63 cm to 25.4 cm.

3. Food warming apparatus as set forth in claim 1 further comprising partitions in the cabinet dividing the cabinet into a plurality of separate, thermally isolated holding compartments, at least one tray in each of said holding compartments holding pre-cooked food therein, at least one radiant heat source spaced above the pre-cooked food in said tray a distance less than 30.5 cm for delivering radiant heat to the food, and said control mechanism being adapted for controlling operation of the heat sources independent of one another whereby the temperature in each compartment may be independently controlled.

4. Food warming apparatus as set forth in claim 1 wherein said control mechanism is operable to vary the radiant heat delivered by said at least one heat source to the food through a duration of holding time, said duration comprising a first phase at which radiant heat is delivered to the food by the heat source at a first level to permit said pre-cooked food to cool down to said selected holding temperature, and a second phase at which radiant heat is delivered to the food by the heat source at a second level higher than said first level to hold the food at said selected holding temperature.

5. Food warming apparatus as set forth in claim 4 wherein said duration of holding time further comprises a third phase at which radiant heat is delivered to the food at a third level less than said second level to maintain said pre-cooked food at said holding temperature.

6. Food warming apparatus as set forth in claim 1 wherein said control mechanism comprises at least one sensor in the compartment for detecting a characteristic indicative of the temperature of the pre-cooked food in the compartment, the control mechanism being responsive to signals from said sensor to vary the amount of radiant heat delivered by the heat source to the food to maintain the food at said selected holding temperature.

7. Food warming apparatus as set forth in claim 6 wherein said sensor is a temperature sensor for detecting the temperature of a surface in the compartment.

8. Food warming apparatus as set forth in claim 6 wherein said sensor is operable to detect radiant energy emitted by said pre-cooked food.

9. Food warming apparatus as set forth in claim 1 wherein said control mechanism is programmed to operate said heating source according to a predetermined protocol to vary said radiant energy delivered to said food depending on the type of pre-cooked food placed in the compartment.

10. A method of preserving cooked food, comprising the steps of:

cooking food in a cooking appliance to provide pre-cooked food;

placing the pre-cooked food in a holding compartment of food warming apparatus for a duration of holding time; and

heating the pre-cooked food in the holding compartment for at least a portion of said duration of holding time by delivering radiant heat to the food;

said heating step comprising varying the amount of radiant heat delivered to the pre-cooked food to maintain the food at a selected holding temperature.

11. A method as set forth in claim 10 wherein said pre-cooked food placed in the compartment is at a temperature greater than ambient temperature, and said heating step comprises not delivering any substantial radiant heat to the pre-cooked food until the food has cooled to a temperature approaching said selected holding temperature.

12. A method as set forth in claim 10 wherein said pre-cooked food placed in the compartment is at a temperature below ambient temperature, and said heating step comprises delivering radiant heat to the pre-cooked

food until the food reaches said selected holding temperature.

13. A method as set forth in claim 10 further comprising sensing a characteristic indicative of the temperature of the pre-cooked food in the compartment, and varying the amount of radiant heat delivered to the food according to said sensed characteristic.

14. A method as set forth in claim 13 wherein said sensed characteristic is a temperature of a surface in said holding compartment.

15. A method as set forth in claim 13 wherein said sensed characteristic is an amount of radiant energy emitted by said pre-cooked food.

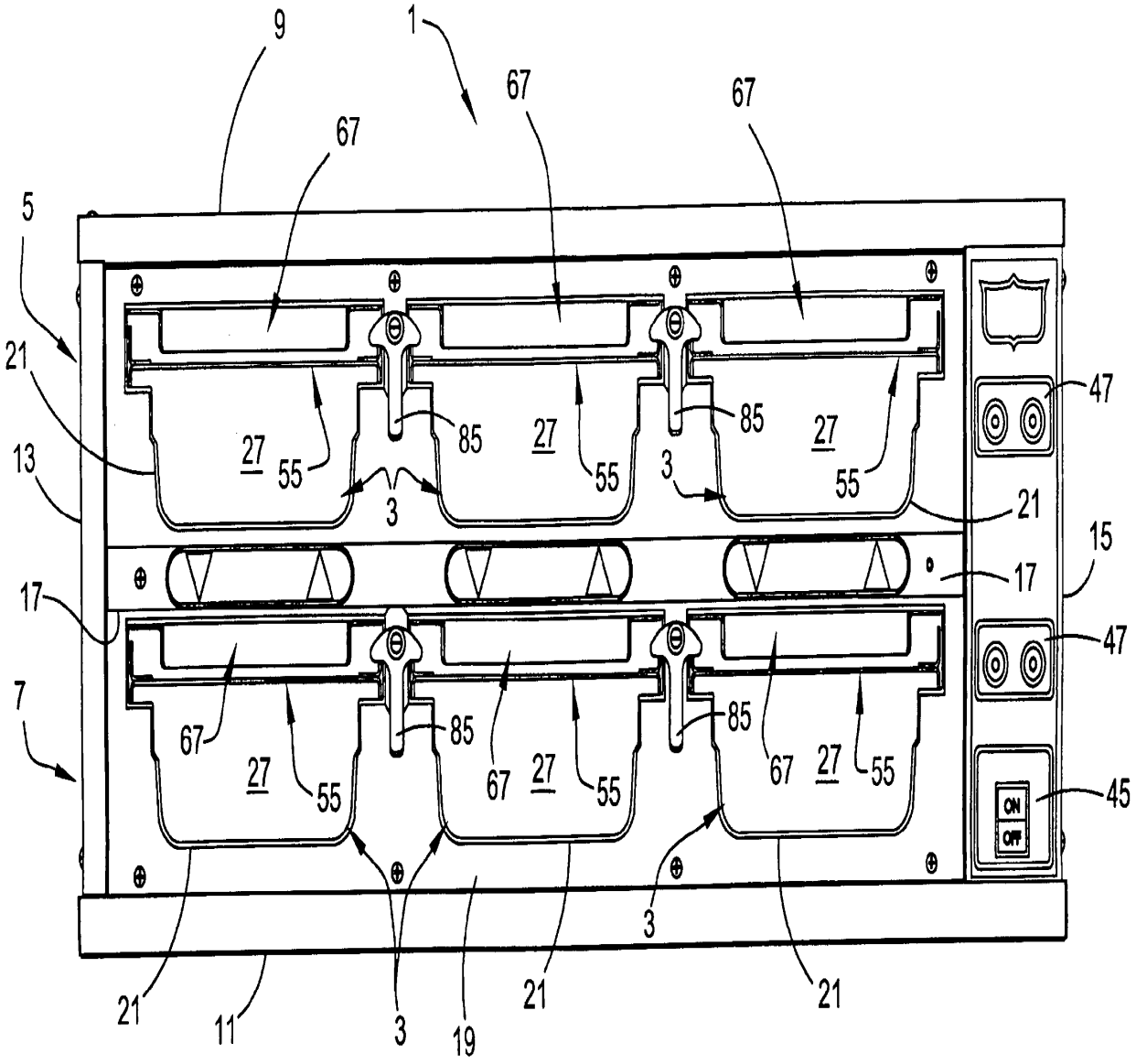
16. A method as set forth in claim 10 further comprising placing said pre-cooked food in said holding oven at a location within a distance of less then 30.5 cm from a source of overhead radiant heat.

17. A method as set forth in claim 10 further comprising placing said pre-cooked food in said holding oven at a location within a distance in the range of 0.63 cm to 25.4 cm from a source of overhead radiant heat.

18. A method as set forth in claim 10 wherein said amount of radiant heat is varied by activating and deactivating a source of radiant heat.

19. A method as set forth in claim 10 wherein said amount of radiant heat is varied by increasing and decreasing the level of radiant heat delivered by a source of radiant heat without deactivating the heat source.

FIG. 1


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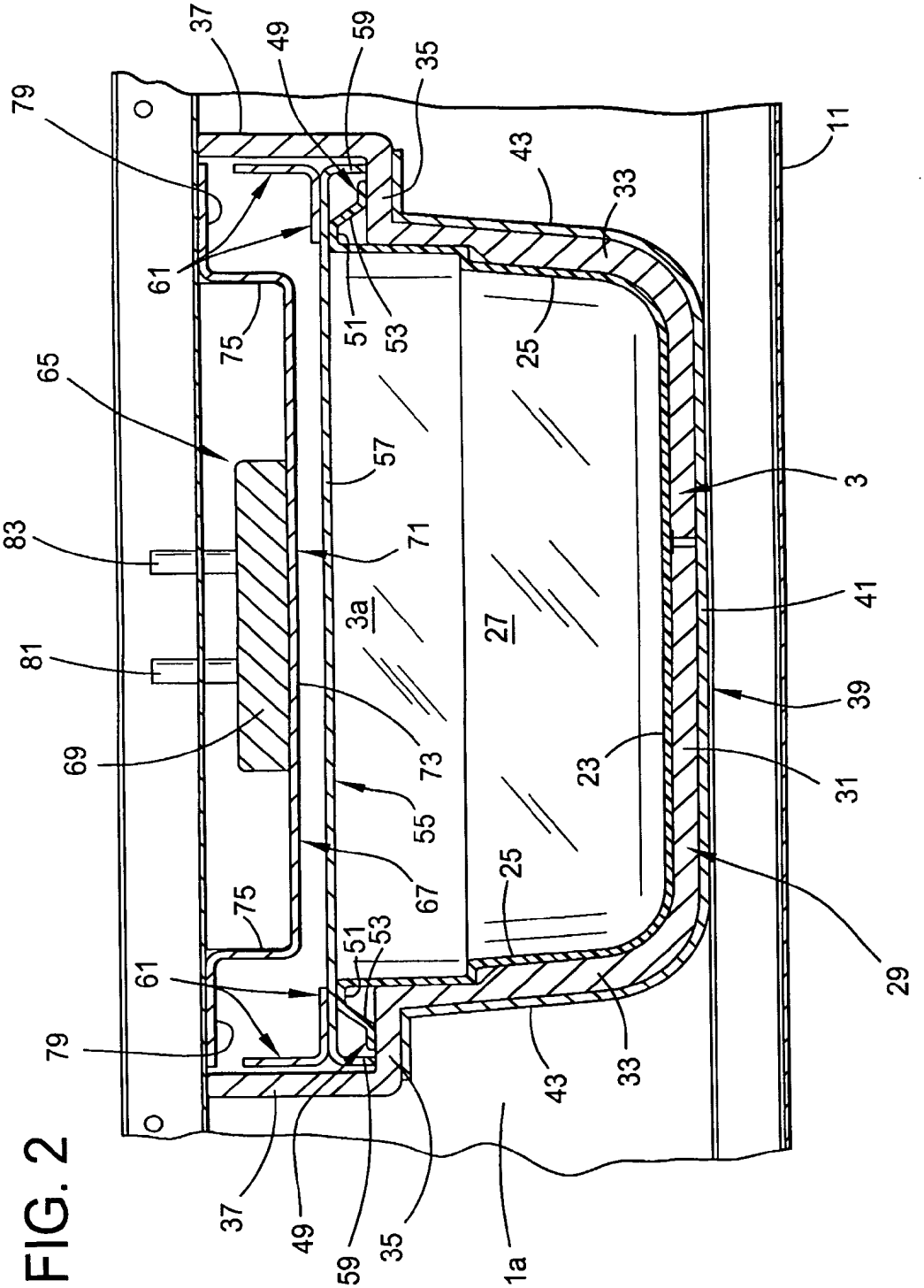

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FIG. 2

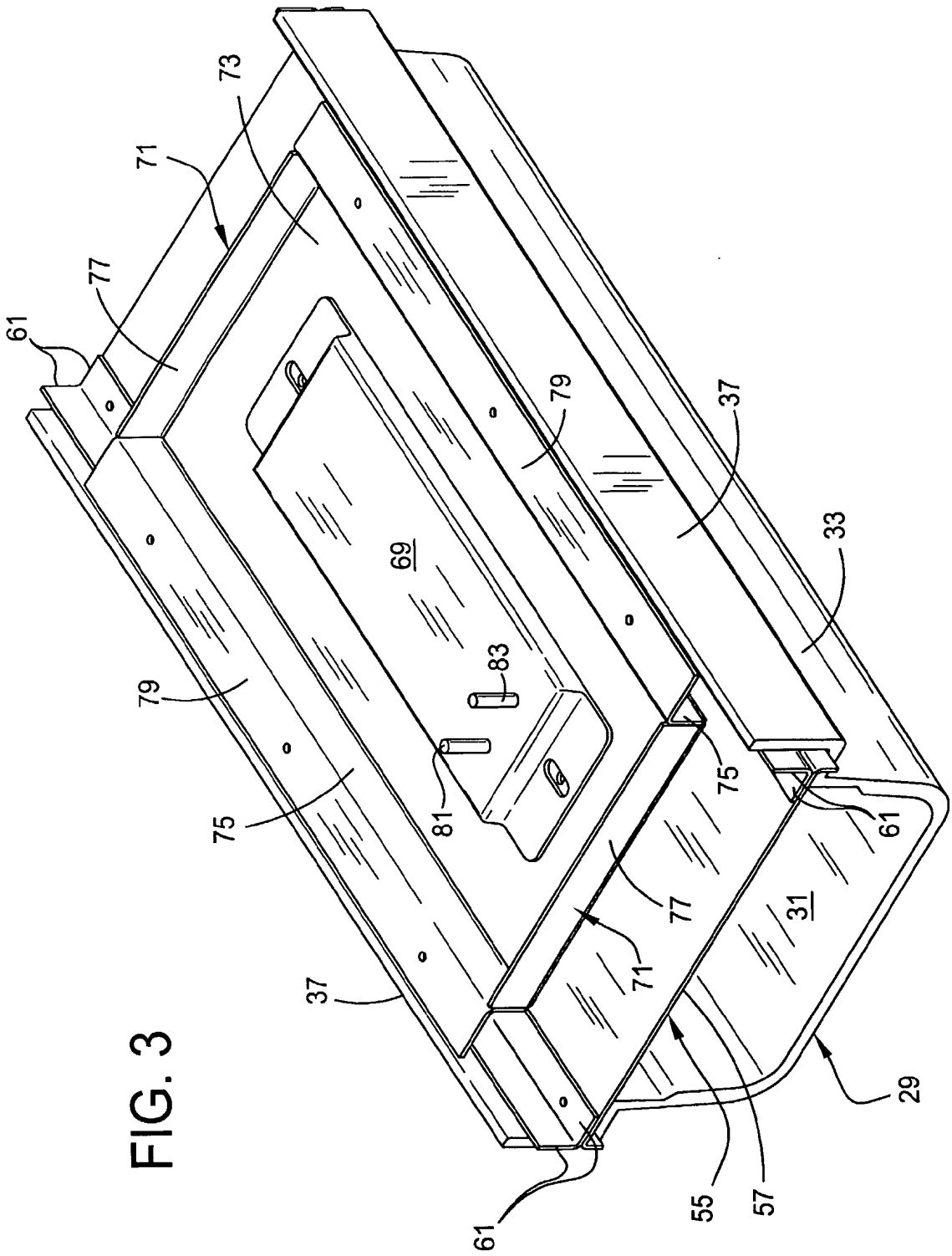


FIG. 3

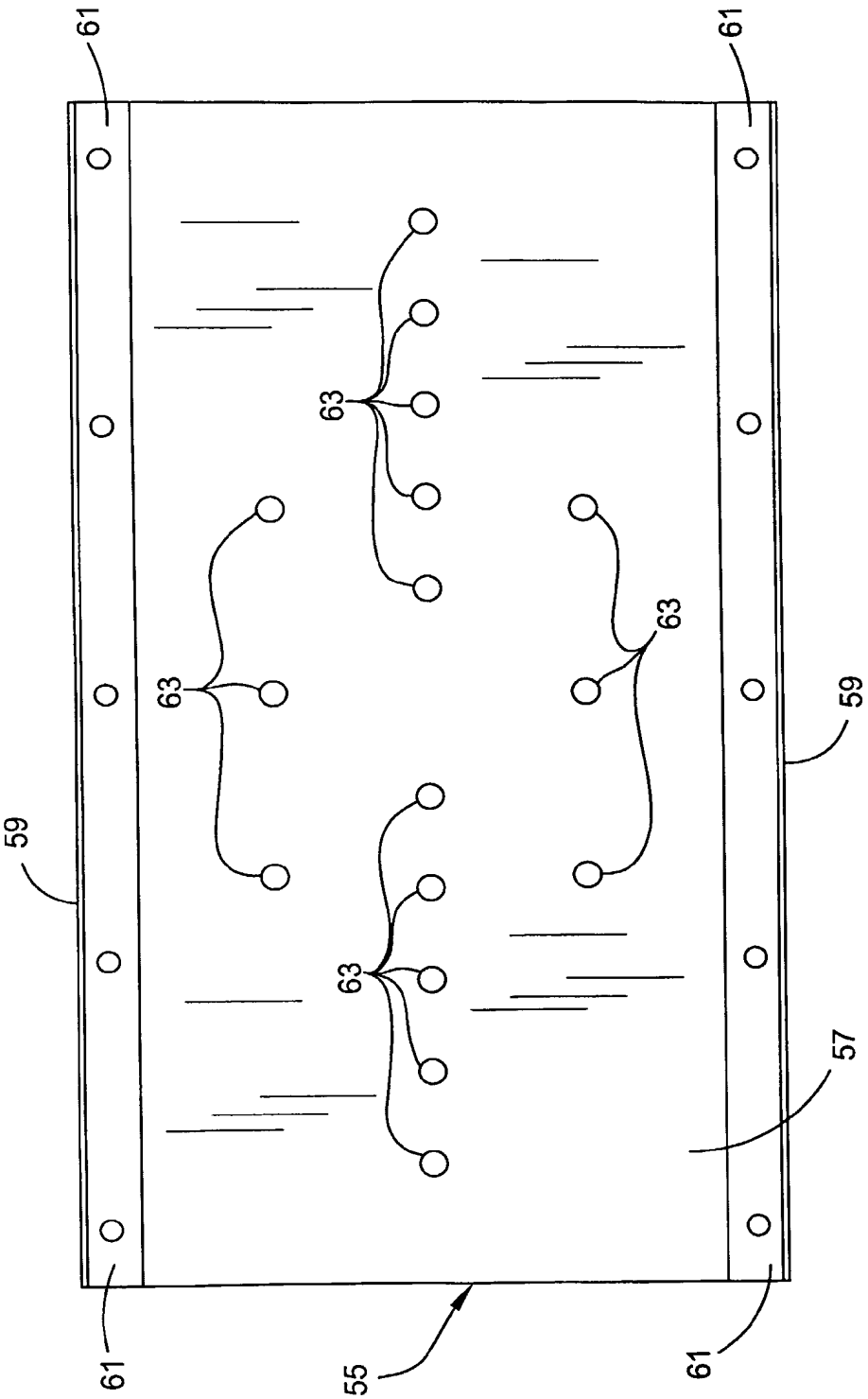


FIG. 4

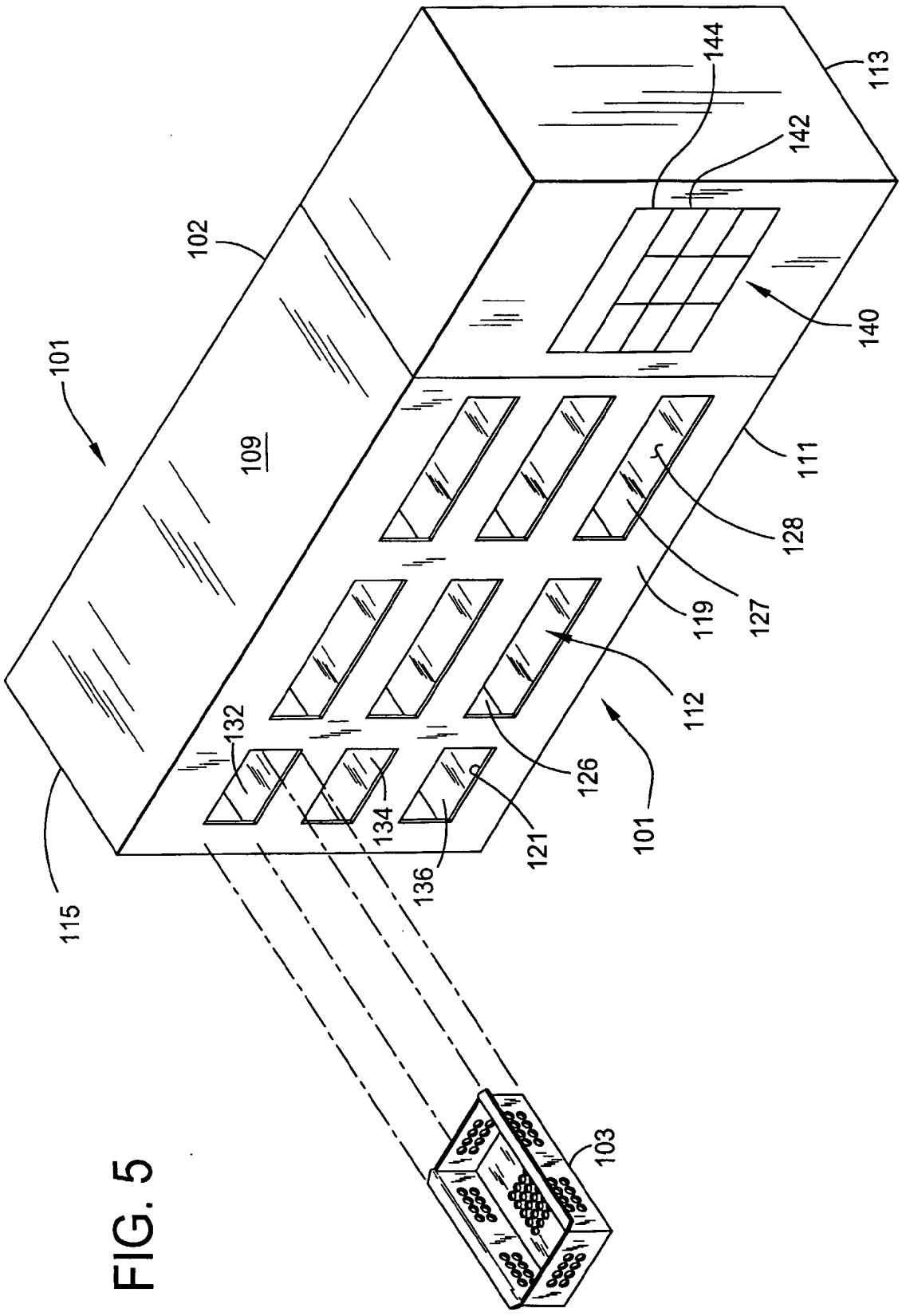

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FIG. 5

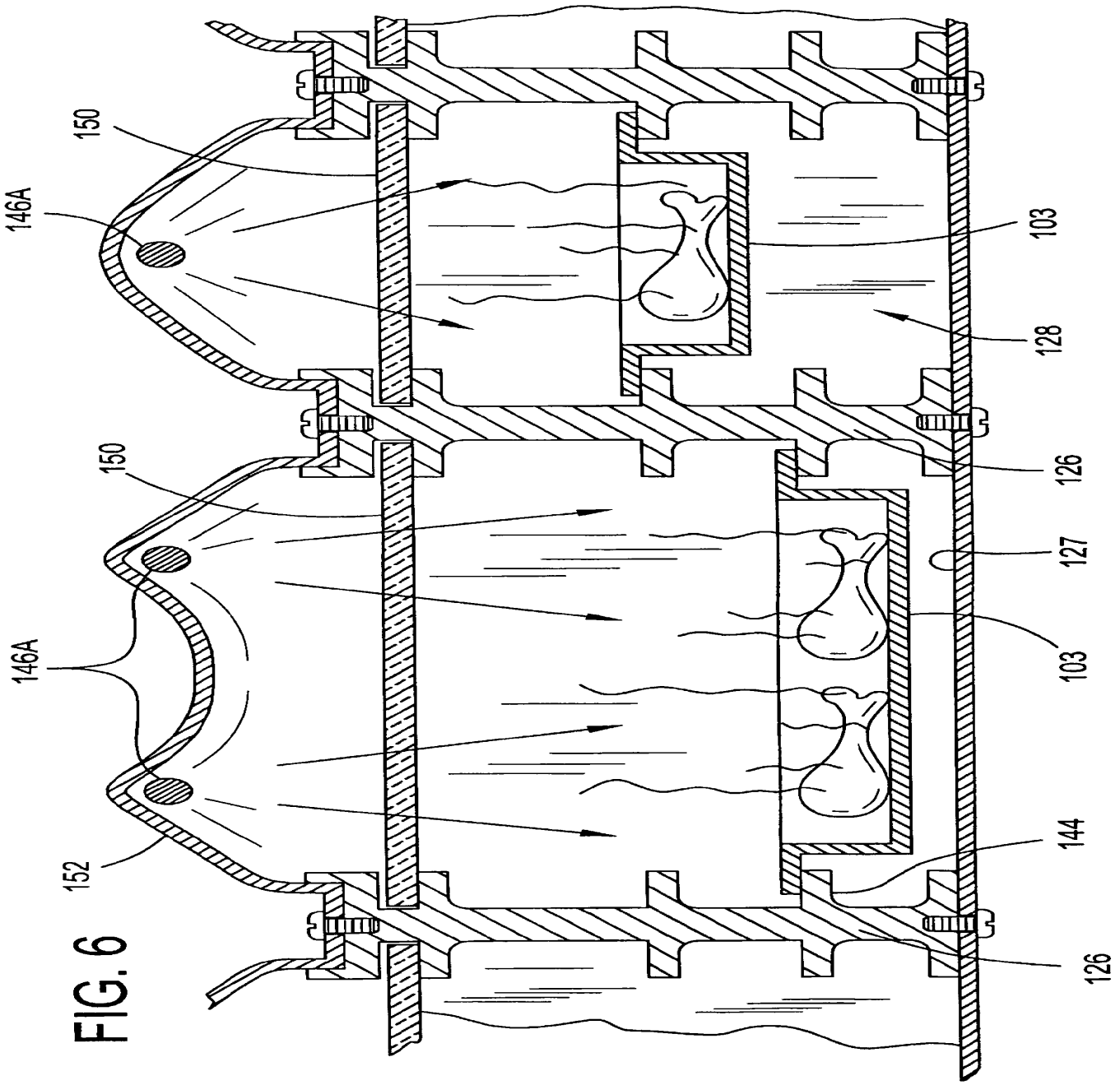


FIG. 6

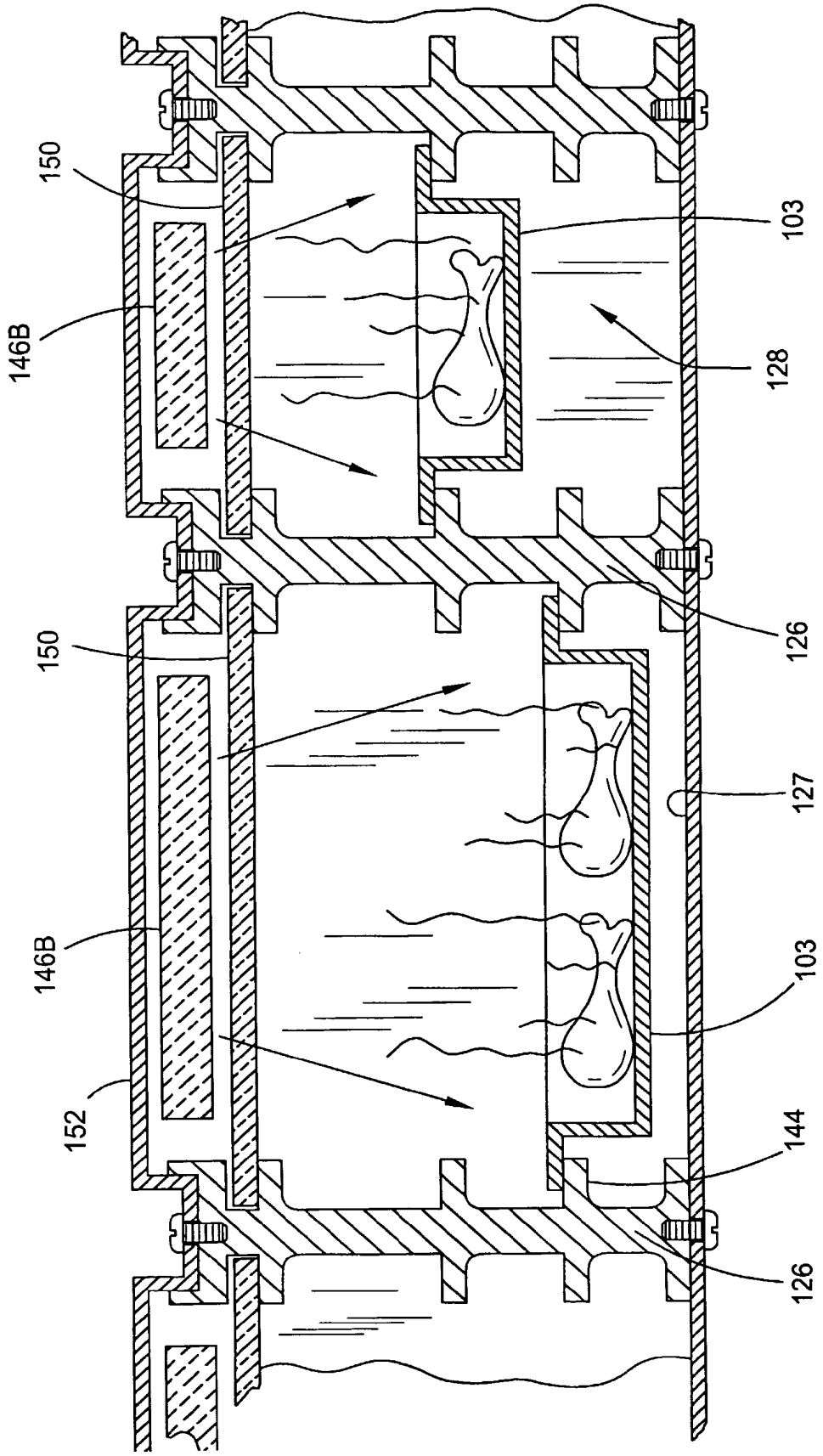


FIG. 7

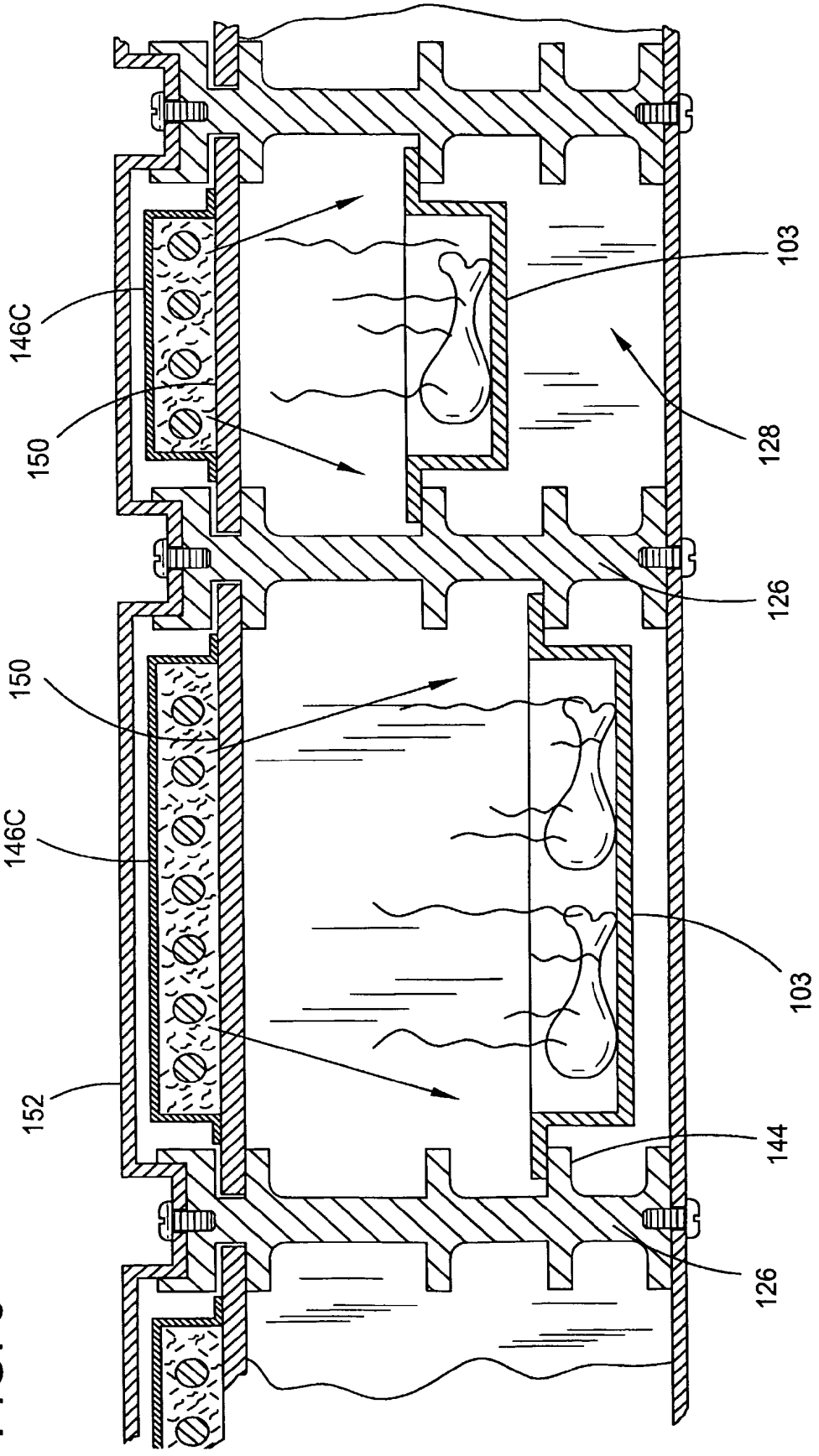
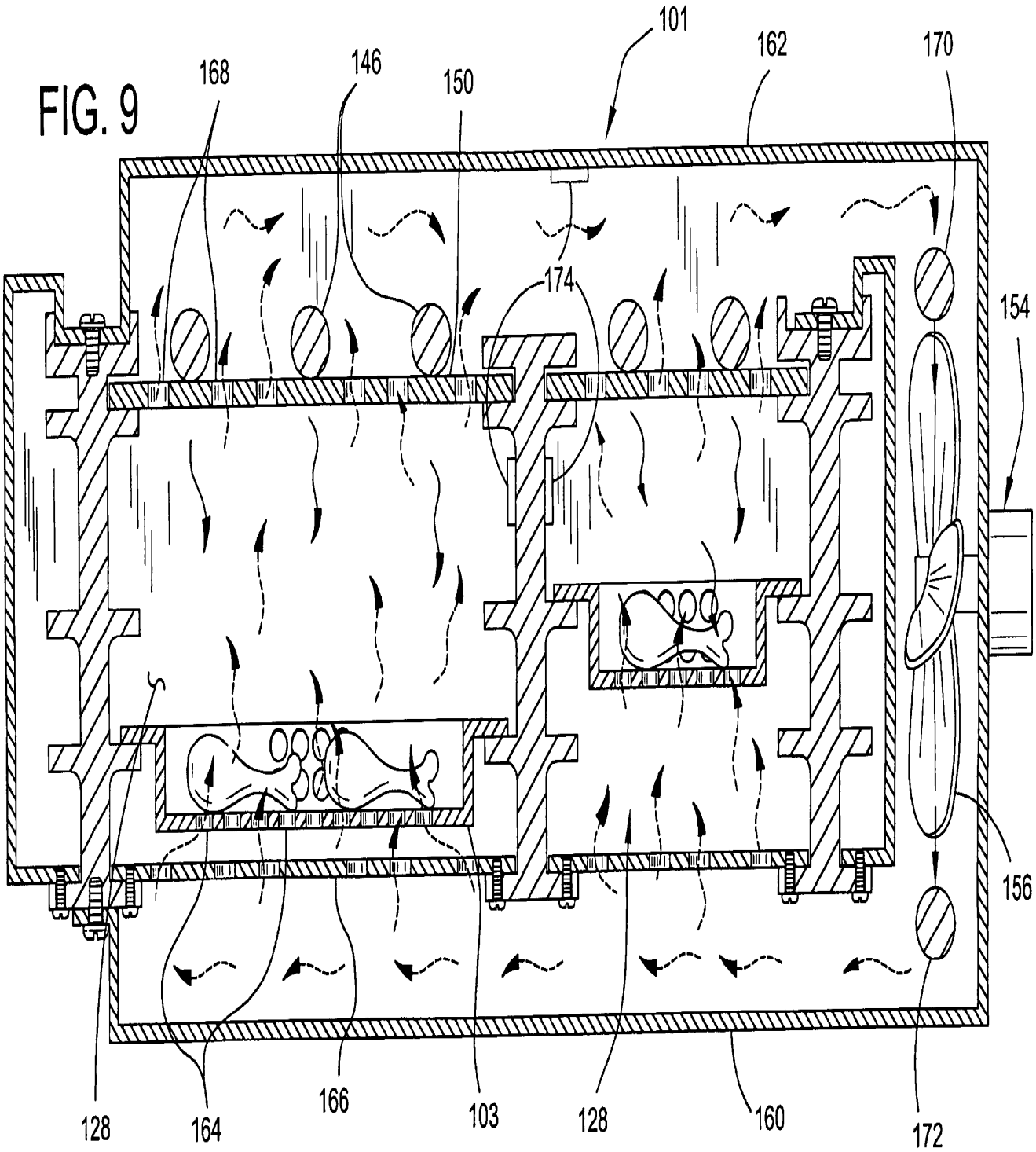


FIG. 8

FIG. 9



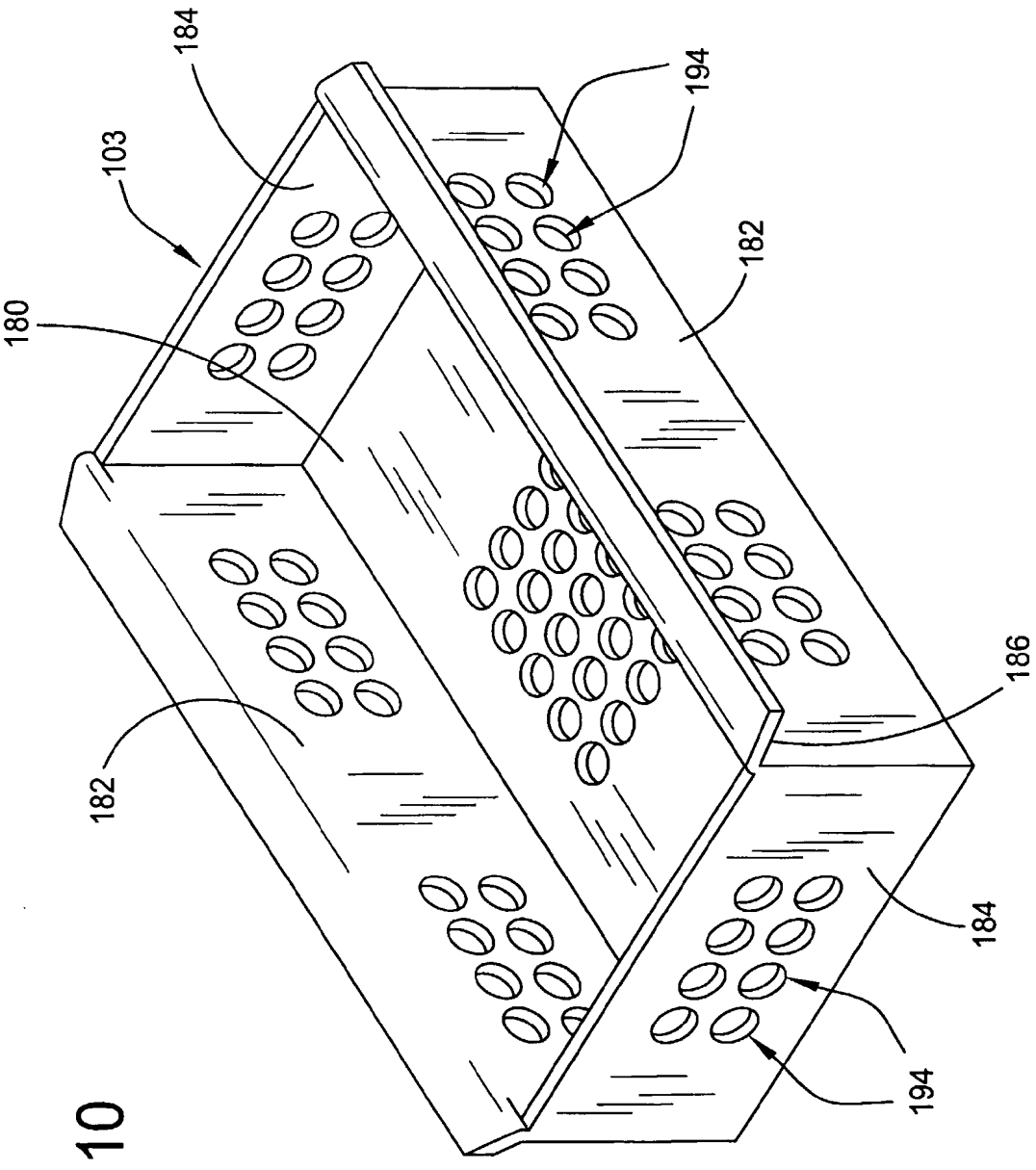


FIG. 10

FIG. 11

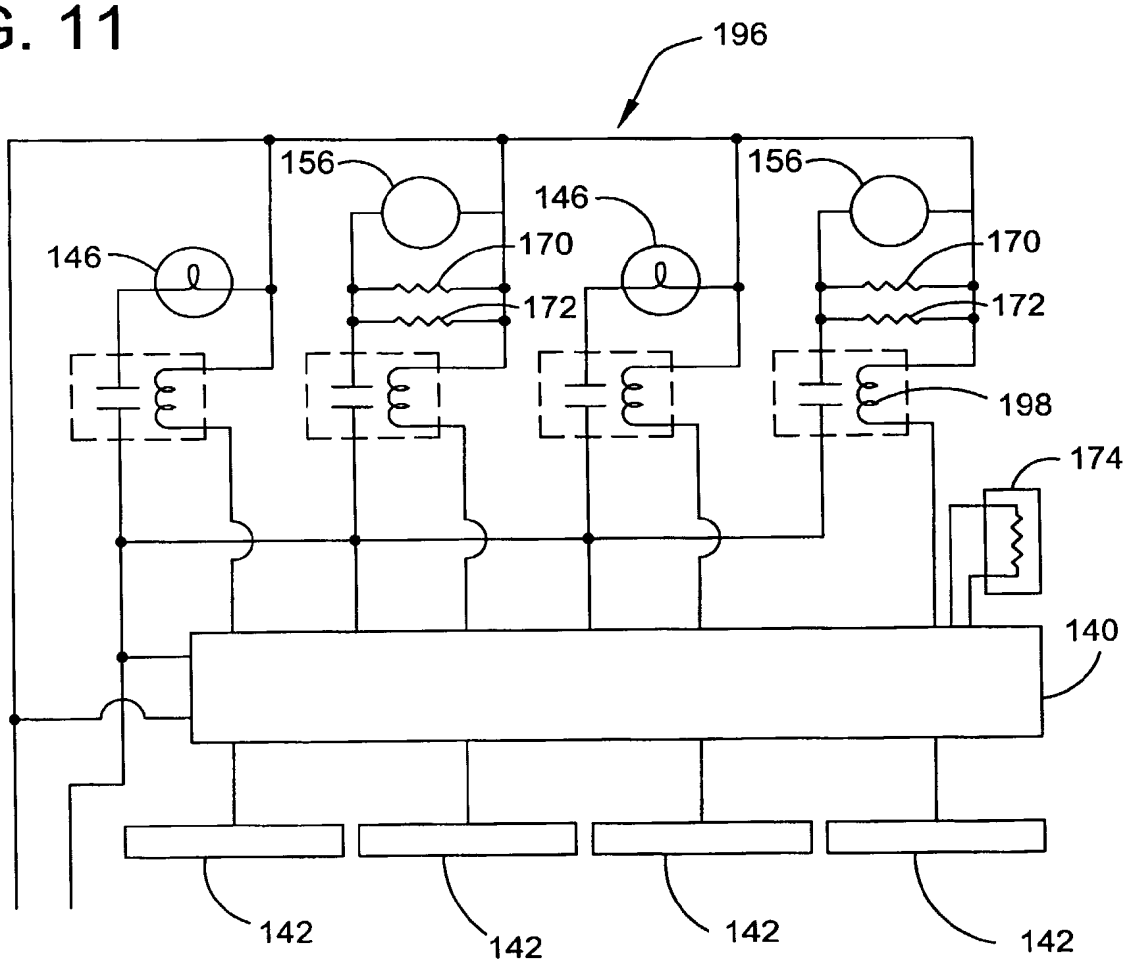


FIG. 12

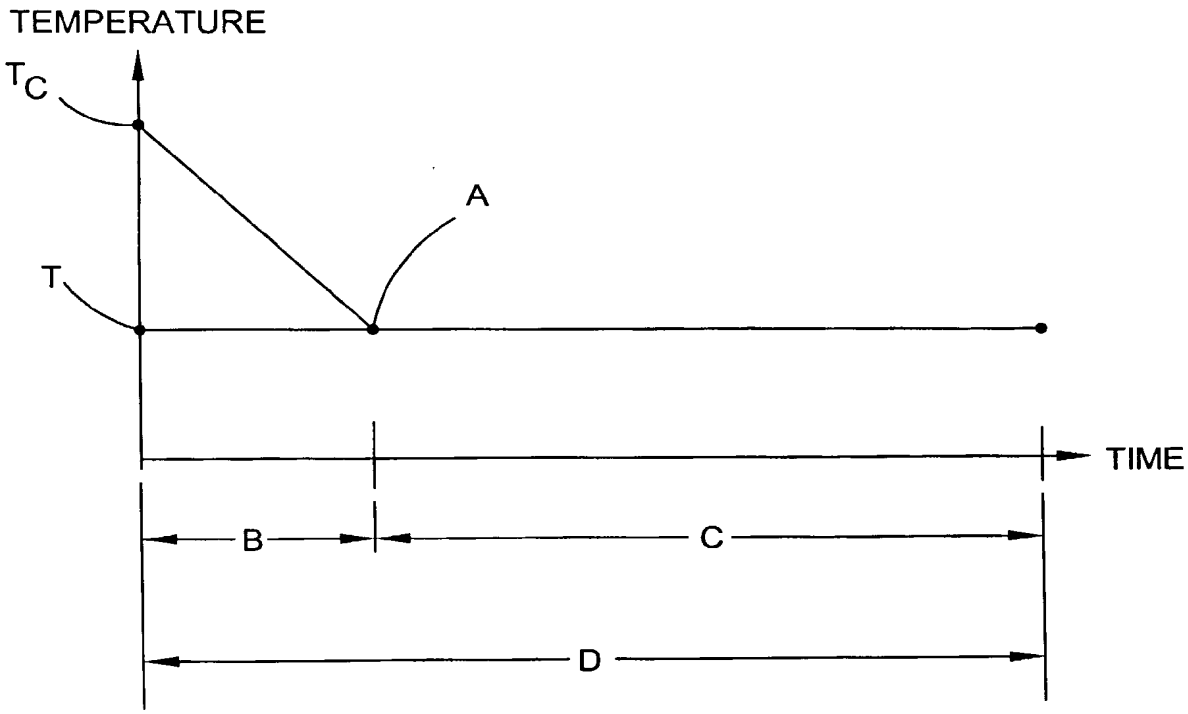


FIG. 13

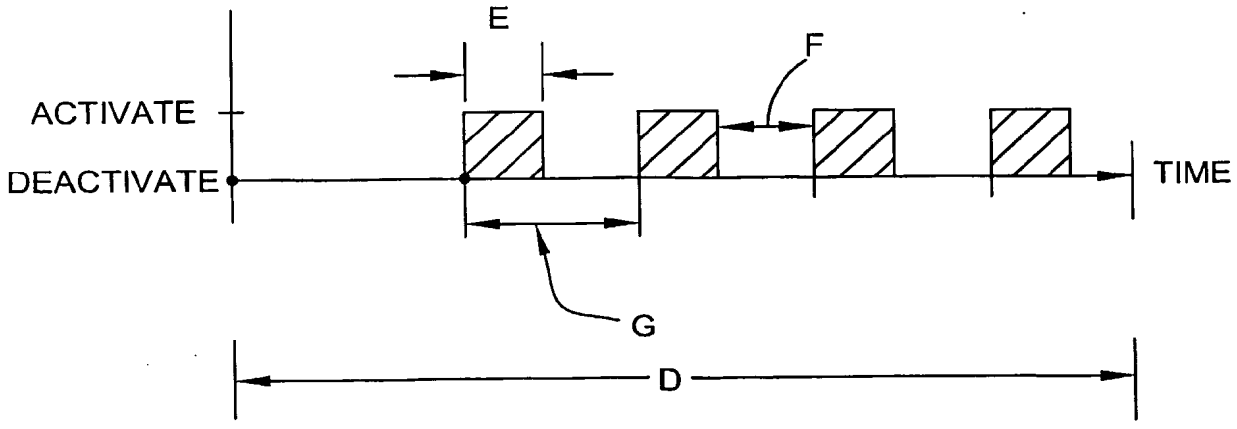


FIG. 14

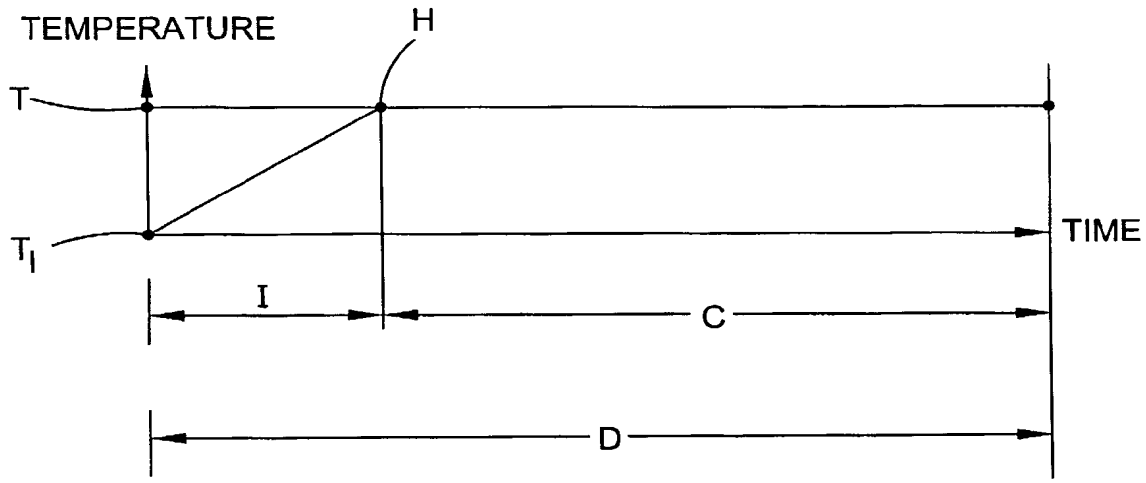
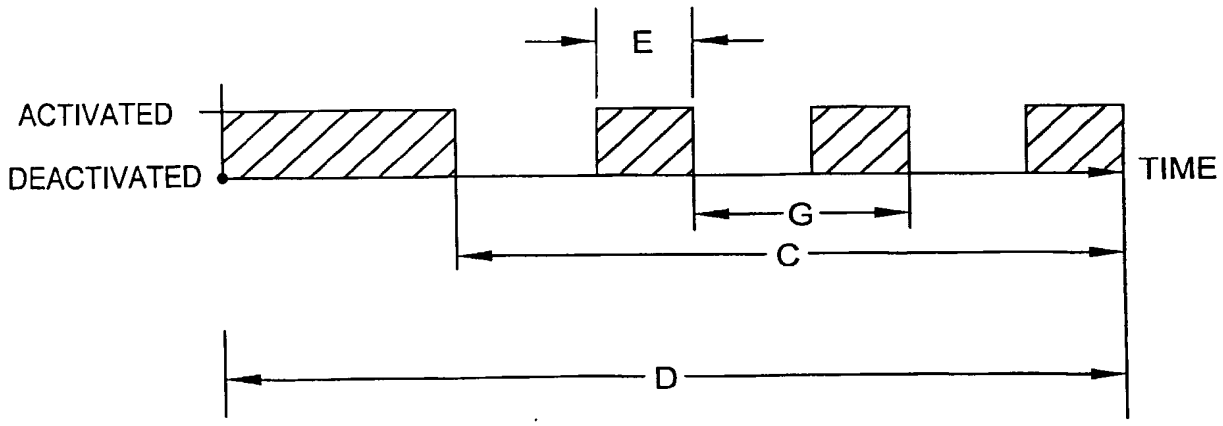

TEMPERATURE
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T_I
TIME
I
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FIG. 15


E
ACTIVATED
DEACTIVATED
TIME
G
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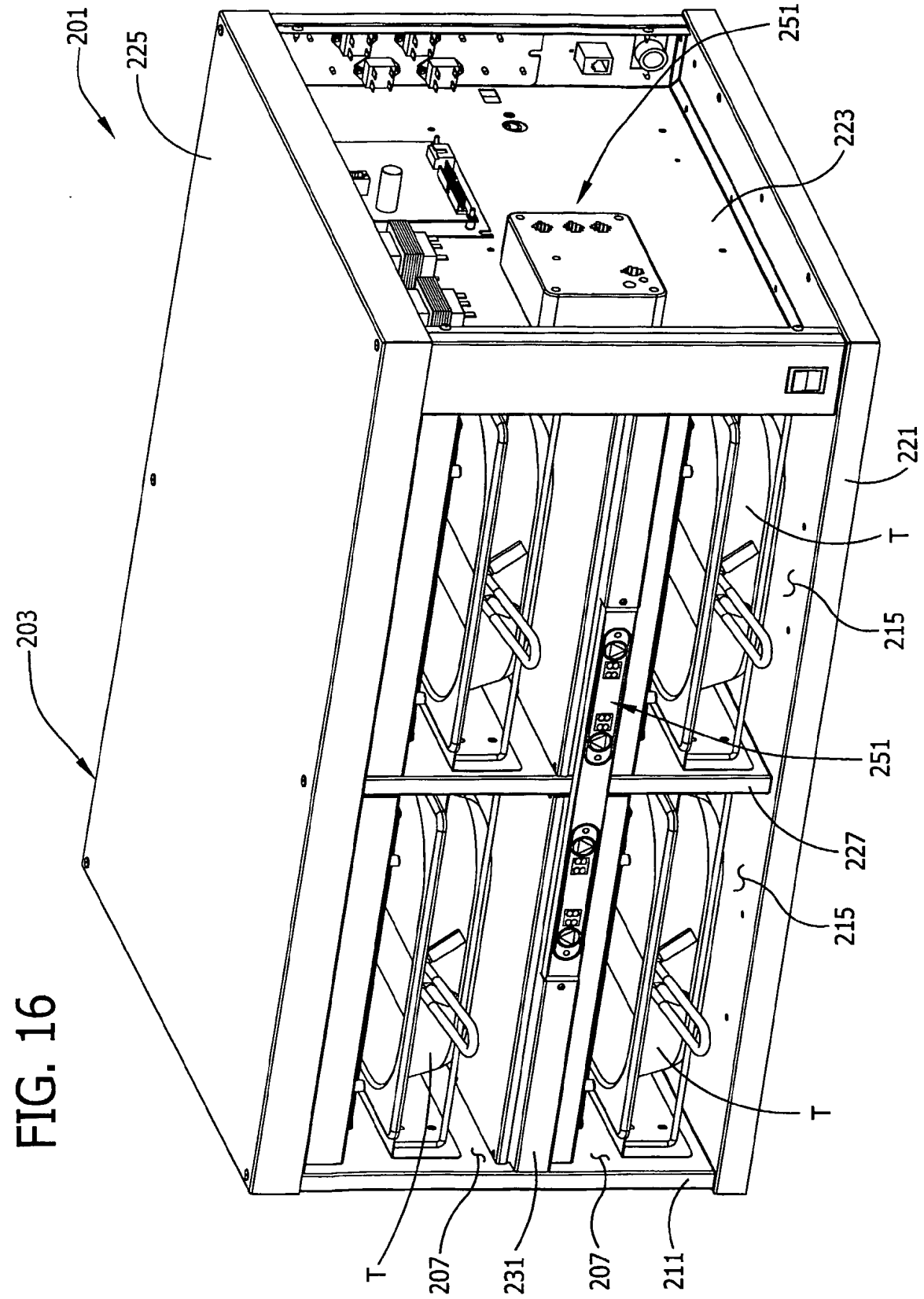


FIG. 16

FIG. 17

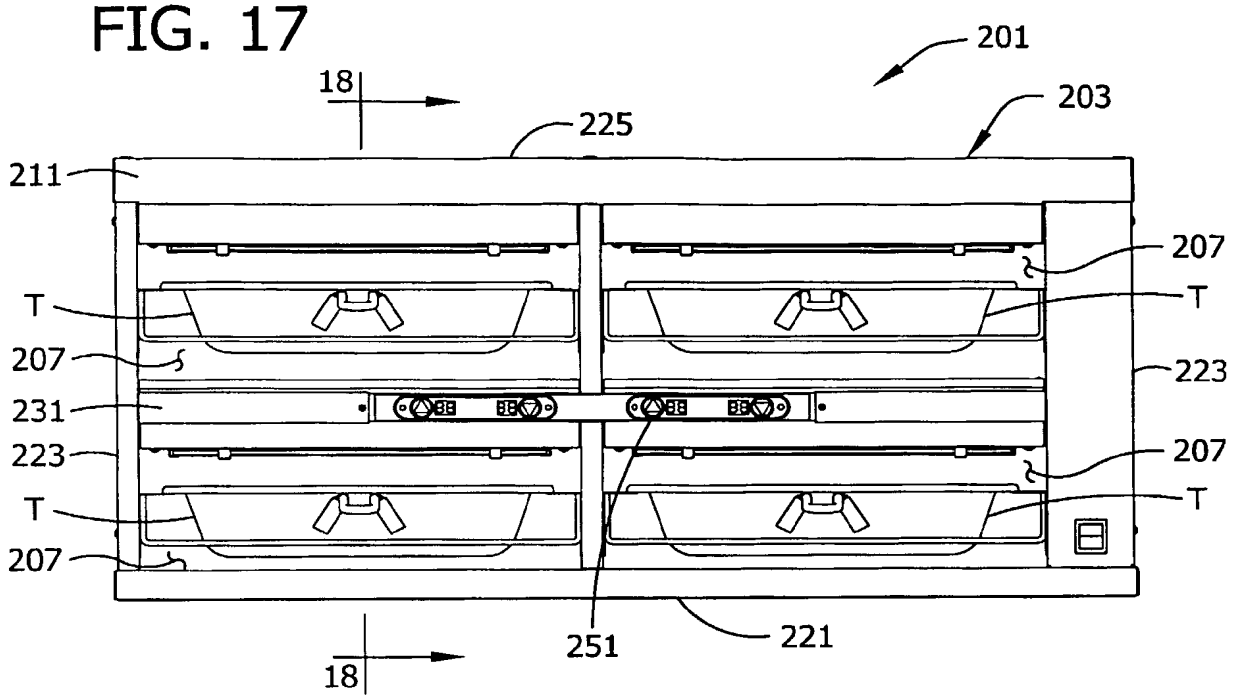
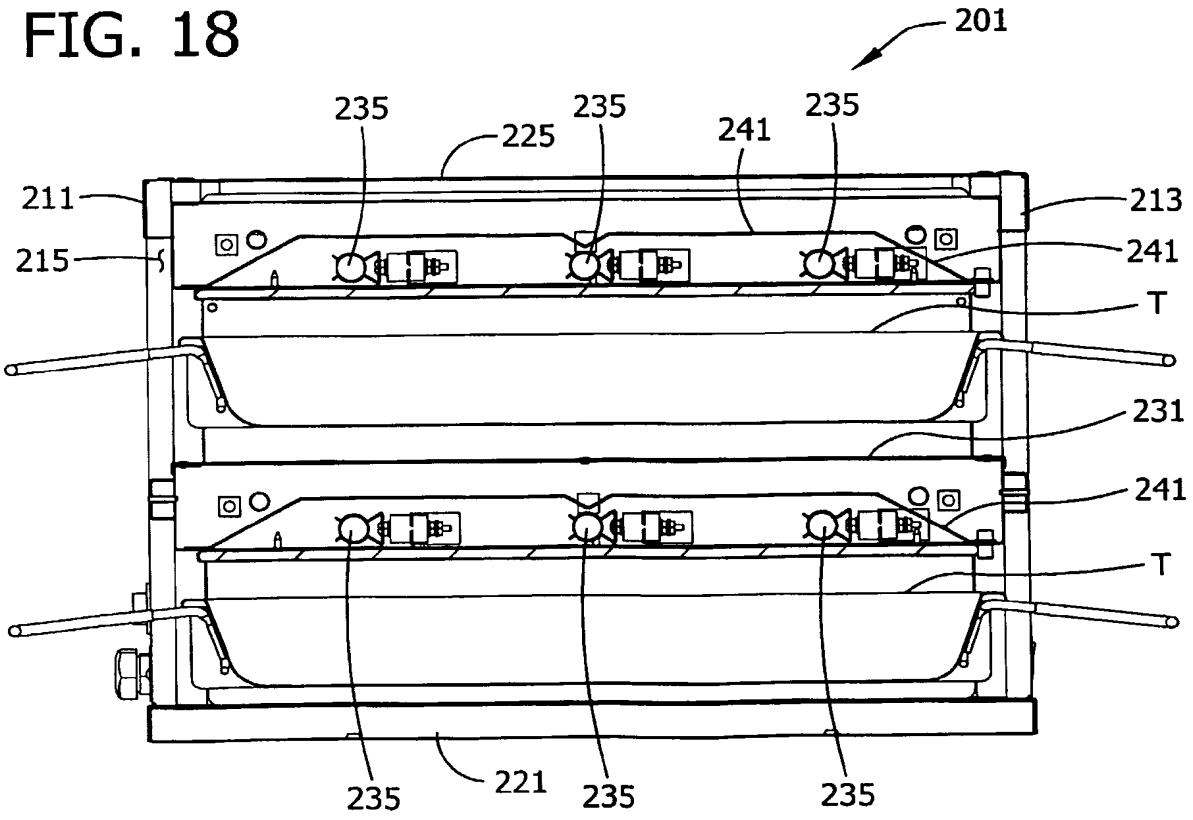

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FIG. 18


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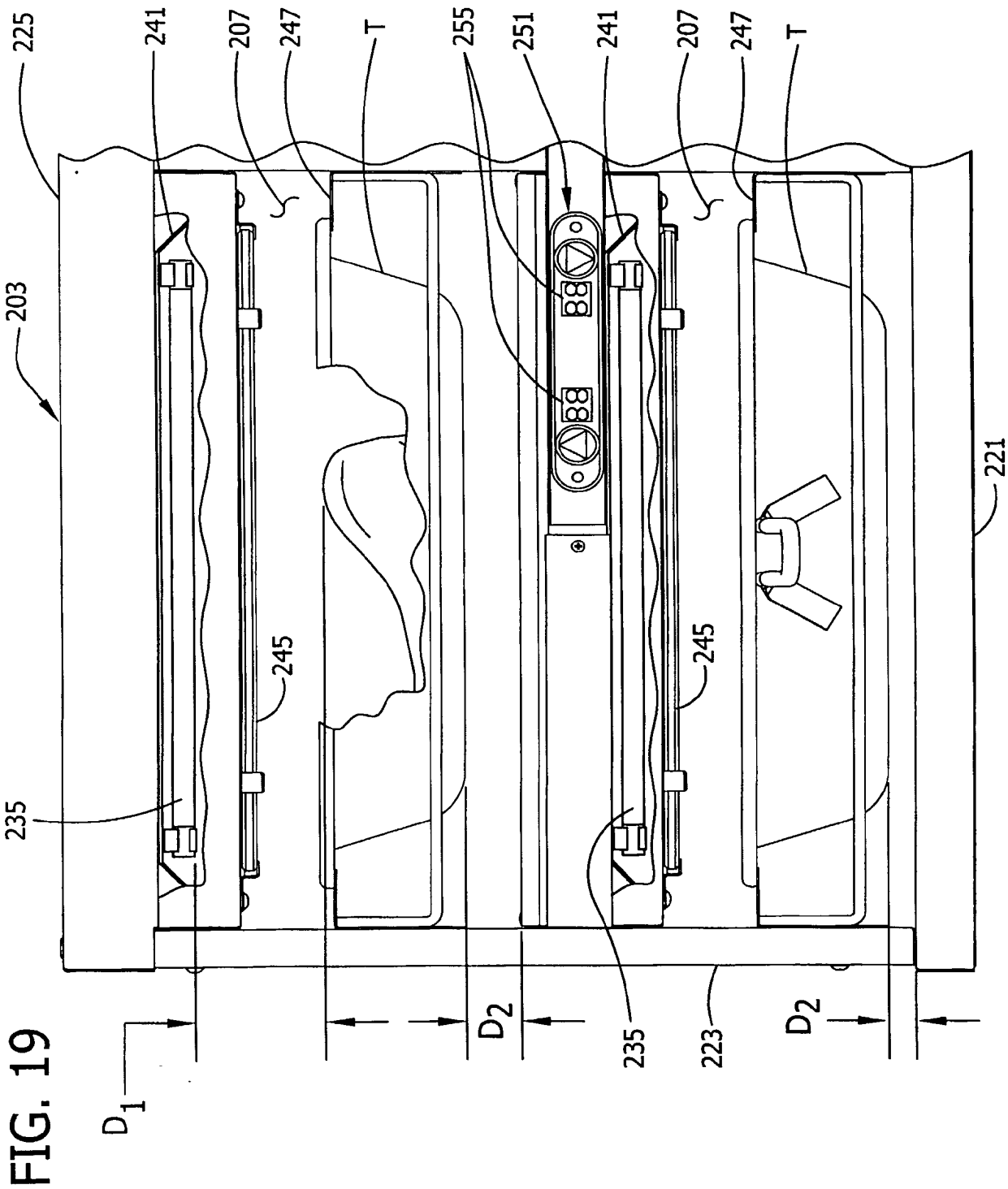

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FIG. 19

FIG. 20

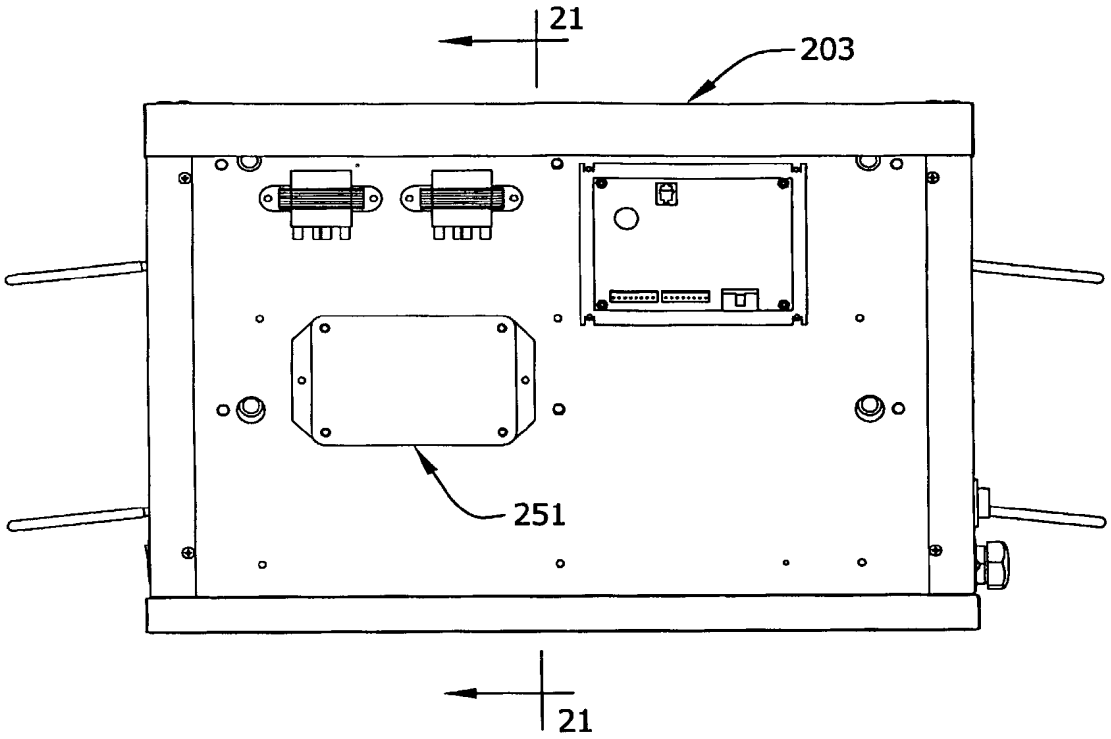

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FIG. 21

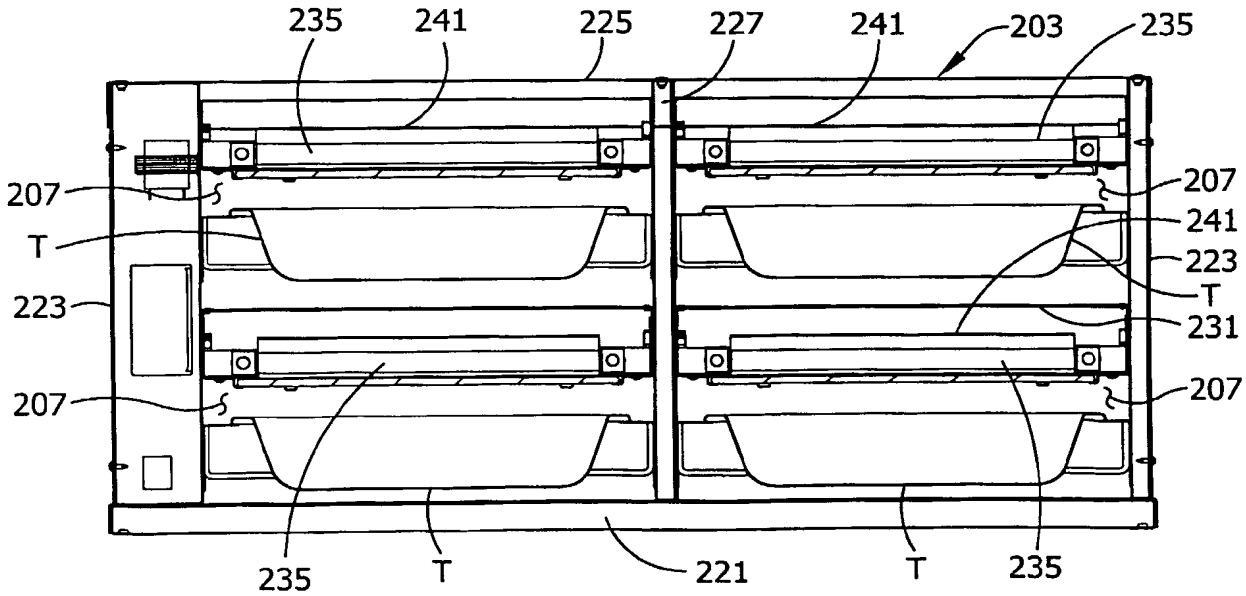

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FIG. 22A

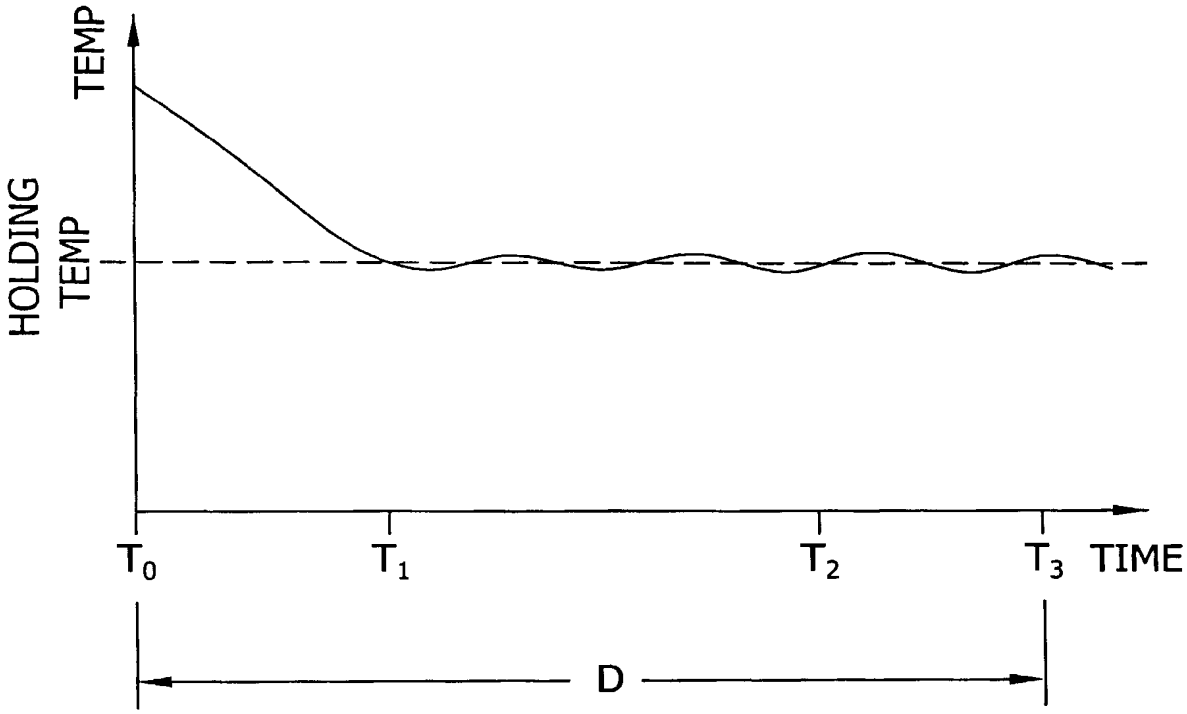


FIG. 22B

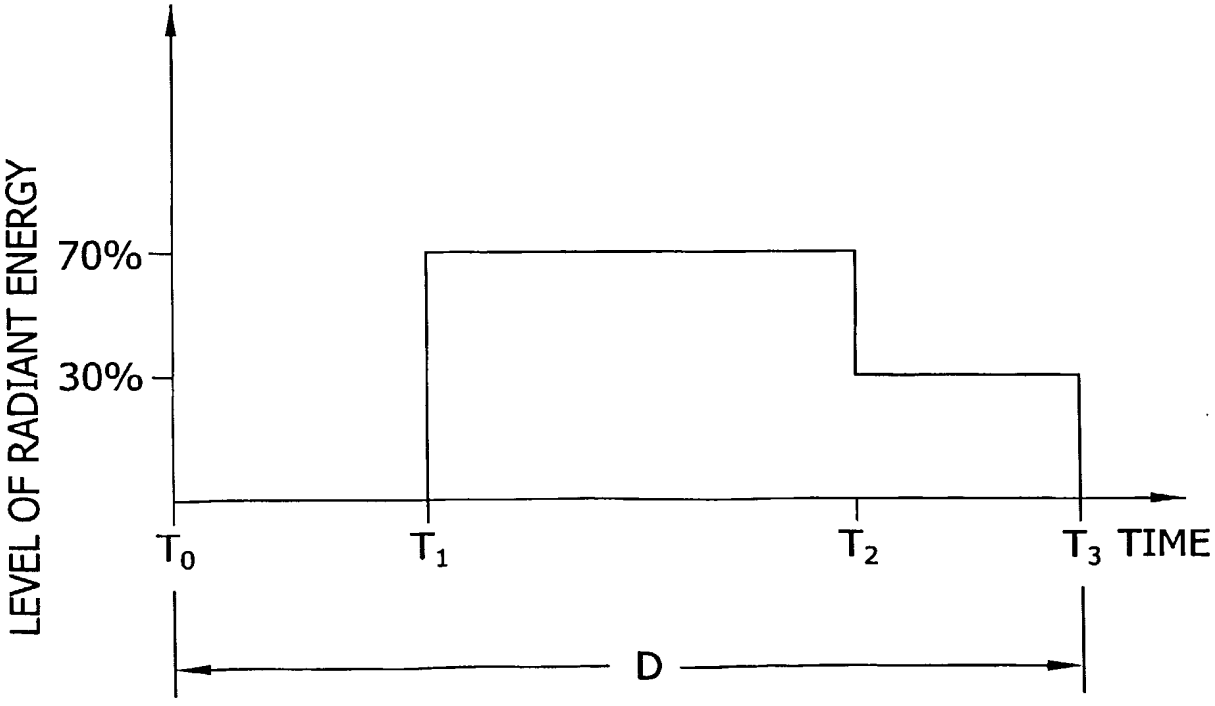


FIG. 23

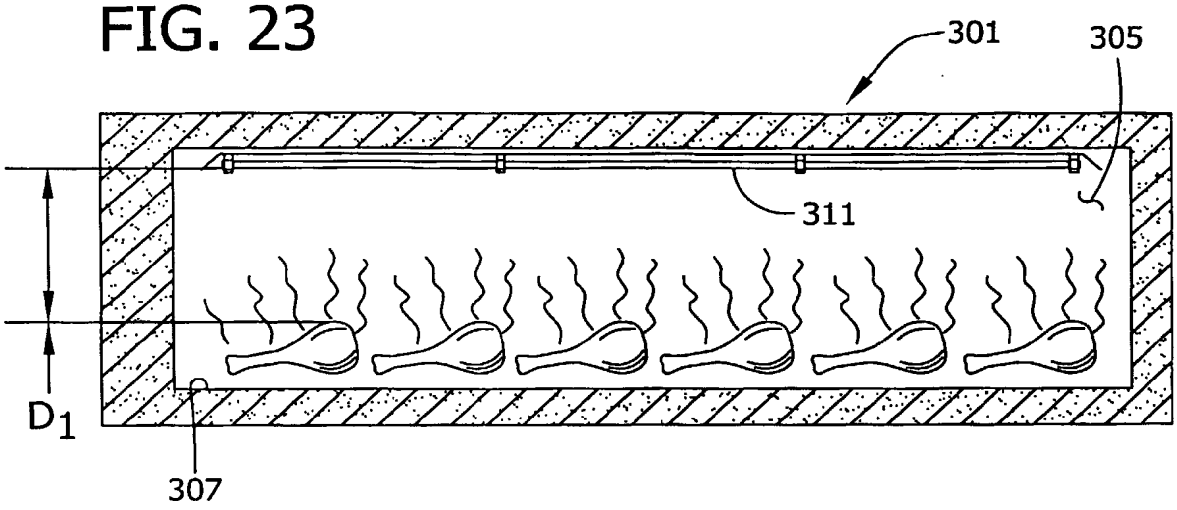


FIG. 24

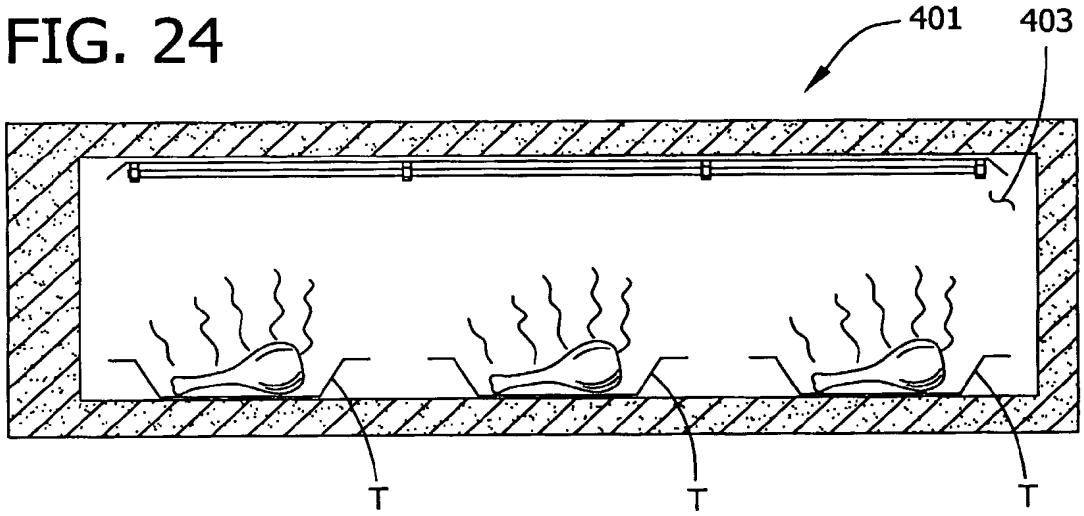
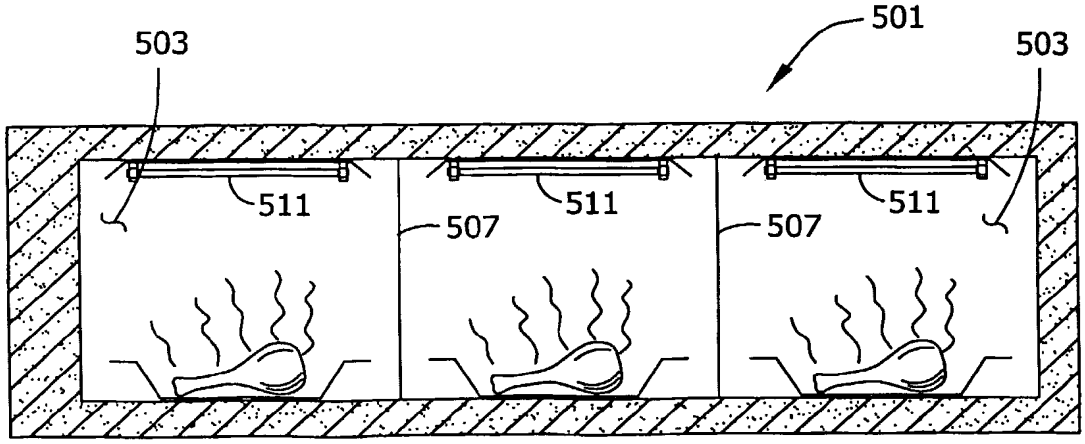


FIG. 25



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/32926

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : A21B 1/00, 1/22
US CL : 219/413
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 219/413

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2,860,225 A (STEEN) 11 November 1958 (11.11.1958), See entire document.	1-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

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

"E" earlier application or patent published on or after the international filing date

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
	10 JAN 2005
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Thor S. Campbell Telephone No. 571-272-4777

Sharon N. Greene for

Form PCT/ISA/210 (second sheet) (January 2004)

Electronic Patent Application Fee Transmittal

Application Number:	15134380
Filing Date:	20-Apr-2016
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Filer:	Michael Alexander Chinlund/Diane Arpino
Attorney Docket Number:	29178/50736

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	27995346
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Michael Alexander Chinlund/Diane Arpino
Filer Authorized By:	Michael Alexander Chinlund
Attorney Docket Number:	29178/50736
Receipt Date:	06-JAN-2017
Filing Date:	20-APR-2016
Time Stamp:	15:13:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$180
RAM confirmation Number	010917INTEFSW15150800
Deposit Account	132855
Authorized User	Diane Arpino

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Amendment_in_Response_to_Non-Final_Office_Action_Under_37 CFR1.PDF	243301 b710725b1610fc6826c4d11f0537f0c2ac97fefa	yes	14
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
	Claims		2	6	
	Applicant Arguments/Remarks Made in an Amendment		7	14	
Warnings:					
Information:					
2	Transmittal Letter	Information_Disclosure_Statement.PDF	18854 af0b40de2a5a85e7ebe6a7d1c8799f35be0d91ea	no	2
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	IDS_Citation_by_Applicant_164_References.PDF	116584 576fe78b50a9f1aa9d05a2231a3af95b9976ad4d	no	10
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Foreign Reference	JP10079088.PDF	977593 af40de27776ff55015cab2d8057e0295137fc3f8	no	11
Warnings:					
Information:					

5	Foreign Reference	JP11342061.PDF	469745 4221909c7c29e43fd0b7322319af68719d5be5fd	no	7
Warnings:					
Information:					
6	Foreign Reference	JP8000414.PDF	610408 a77ec78a61edebf0c00924f12610d855c1acb85e	no	9
Warnings:					
Information:					
7	Foreign Reference	WO0131533A1.PDF	5284191 03e6c78440da40c5804dcf9b1469bf7e3c38c4ce	no	149
Warnings:					
Information:					
8	Foreign Reference	WO2005034633A1.PDF	2172779 4ca34f843cab807ca1eb8f16fedacaf7d97f9793	no	59
Warnings:					
Information:					
9	Non Patent Literature	CarterHoffmann.PDF	851777 e55155edbd315670db507fa18439150fef4ba320	no	6
Warnings:					
Information:					
10	Non Patent Literature	14278549.PDF	1352749 556e6453185231c1d8b9693bb0f3a1b38eb47aed	no	28
Warnings:					
Information:					
11	Non Patent Literature	12782843_finalOA_12312012.PDF	1375884 9693380a24f77c84309abfd9be4f7a226fdc7e4b	no	32
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12	Non Patent Literature	13567821_finalOA_06062013.PDF	1274011 304dfdf9e7b12c6971a76cf23106215a8127317d	no	24
Warnings:					
Information:					
13	Non Patent Literature	FrymasterHCP.PDF	3560301 8c9a23ef46bbba2ca5d0cdda23abb208ea34a012	no	30
Warnings:					
Information:					
14	Non Patent Literature	12782843_nonfinalOA_06192013.PDF	1290367 7134c6c6ec5a4c7b540dd629402707cd4ab0574e	no	29
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15	Non Patent Literature	12782843_nonfinalOA_08212012.PDF	1230119 29c179dd923cad0640ab7c33f23c7837f2ebf767	no	36
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16	Non Patent Literature	13567821_nonfinalOA_02082013.PDF	1787784 12a3fb7a23a1704417049 27f154e4089ebfff10d	no	40
Warnings:					
Information:					
17	Non Patent Literature	PCHoldingBins.PDF	272706 6e88e0fcd1cb3ab32d513c41818c1ca10b0b8629	no	2
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18	Non Patent Literature	PCHoldingPanels.PDF	206574 e6d0b5bb02d2d5e2bac3819678e8243dabaf8e24	no	2
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Information:					

19	Non Patent Literature	Reider.PDF	166670 31df8d1a352e9dcb89e811ec148ceef6723707a5	no	1
Warnings:					
Information:					
20	Non Patent Literature	Thermodyne.PDF	1939002 5a5345da3d33937165e246b48db78a17cebc2676	no	2
Warnings:					
Information:					
21	Non Patent Literature	29450074.PDF	1065444 b4a9b4184161cfa03e898ba54e9d17d36ba6281c	no	47
Warnings:					
Information:					
22	Non Patent Literature	29494683.PDF	447440 1743ffa26a62b6a1b1445261ffebe84a0a5aa7d6	no	17
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Information:					
23	Fee Worksheet (SB06)	fee-info.pdf	30384 4c683fbba480fa77adea18bf517cfb209735df82	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	26744667		

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

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. 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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/134,380	Filing Date 04/20/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **01/06/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

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

LIE
TAMMY D. MCBETH BROWN

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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

4743 7590 10/06/2016

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

EXAMINER
PELHAM, JOSEPH MOORE

ART UNIT	PAPER NUMBER
3742	

NOTIFICATION DATE	DELIVERY MODE
10/06/2016	ELECTRONIC

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

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

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

mgbdocket@marshallip.com

Office Action Summary	Application No. 15/134,380	Applicant(s) KESTNER ET AL.	
	Examiner JOSEPH M. PELHAM	Art Unit 3742	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/20/16*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *4/20/16* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 103

Claims 1-7 and 9-16 are rejected under 35 U.S.C. 103 as being unpatentable over US Pat. 7905173 in view of US Pat 7385160.

Referring to Figures 1, 5 & 5A especially, *1:49-58* ("column:line"), *3:40-41, 5:30-65, 7:3-21, & 12:64 – 13:13*, '173 discloses a multi-zone food holding bin and method, including a food holding apartment with an uncovered "first opening" 22a (referring to the portion forming the gap between transparent curtain 24a and the bottom of the opening; see 5:43-63), a "continuous and planar surface [33a] forming a bottom of the food holding compartment," a "first food holding zone [132a] formed in the food holding compartment... having an independently controllable *first heating element*… at a top portion of the… compartment " (see 12:64 – 13:13) and "an independently controllable *second heating element* [132a']… at a bottom portion of the… compartment" (7:3-15), a "second food holding zone [132b] formed in the food holding compartment... having an independently controllable *third heating element*… at a top portion of the… compartment " (12:64 – 13:13) and "an independently controllable *fourth heating element* [132b']… at the bottom portion of the… compartment," ***wherein***, the first and second zones are adjacent one another "across the continuous planar surface" 33a, the first and second zones maintaining different set point temperatures, as recited in claims 1, 12 and 13.

As recited in claim 2, '173 discloses a "second food holding compartment... below the first… compartment," a "shelf [130] located between the first and second holding compartments… the second [132a'] and fourth [132b'] heating elements being disposed in the shelf [130] and in thermal communication with" the top side of the shelf, the second and fourth heating elements being independently controllable, and a controller 150, 152 independently controlling the second and fourth heating elements.

As recited in claim 3, '173 discloses the first and second food compartments to be open at the rear face of the bin (7:20-21).

As recited in claims 4, 5, 15, and 16, '173 discloses the first (top) heating element to be a radiant heating element, and the second (bottom) heating element to be a conductive heating element (see 12:64 – 13:5).

As recited in claims 6 and 14, '173 discloses the first heating element to generate more power than the second (7:6-10).

As recited in claim 9, '173 discloses a food holding tray 30a in the food holding compartment.

Claim 1 differs from '173 only in calling for the first and second zones to each comprise first and second food holding bays, each bay receiving a food holding tray.

'160 discloses, at Fig. 1B and 7:42 - 8:37, a single food heating zone comprising first and second food holding bays, each bay receiving a food holding tray 14.

It would have been obvious to enlarge the individual heating zones of '173 to accommodate two food holding trays, since '160 reveals the unsurprising fact that food

service establishments often need more than one tray of a particular food item. Hence if demand for a food item held a given temperature is high, a restaurant need not incur the expense of holding bins with more individually heated food holding bays than required by customer preferences.

Claims 7 and 10 differ substantively from ‘173 only in calling for a tray lid inserted in a shelf in a top portion of the food holding compartment.

‘160 discloses, at Fig. 1A and 11-12, a tray lid 16, used in an analogous food staging chamber with upper and lower heaters 38, 39, inserted in a shelf 46R in a top portion of a food holding compartment. Note that 46R is effectively a shelf, on which rear tray lip 66 rests (see 11:45 – 12:4). It would have been obvious to adapt the tray lids of ‘160 to the trays of ‘173 to preserve moisture in food items in which minimal moisture loss is preferred, such as meat portions for fast food sandwiches.

Regarding claim 11, while the discussion of ‘173 is no more specific than mentioning a “resistive” heating element (12:64 – 13:4), since nichrome wire is conventionally used in both applications, by reason of its economy and ease of assembly, it would have been obvious to utilize such a resistive heating wire.

Claim 8 is rejected under 35 U.S.C. 103 as being unpatentable over ‘173 in view of ‘160, as applied to claims 1-7 and 9-16 above, and further in view of US Pat. 7105779.

The claim differs from '173 in view of '160 only in calling for a latch rotatable with respect to the shelf between a locked and unlocked position.

'779 discloses, at Fig. 1 and 5:8-25, a latch 85 rotatable with respect to an equivalent shelf in a food staging chamber, between a locked and unlocked position. It would have been obvious to adapt the latch of '779 to the food staging device of '173 in view of '160, as an alternative manner of supporting and securing the tray lids in the compartment, while withdrawing the trays, requiring less complex structural support.

Applicant is strongly encouraged to review the prior art cited but not applied – particularly US Pat. 8,522,675 – if a response to this Office action is contemplated.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSEPH M. PELHAM whose telephone number is (571)272-4786. The examiner can normally be reached on M-F 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Angwin can be reached on 571-270-3735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOSEPH M PELHAM/
Primary Examiner, Art Unit 3742
10/1/16

Notice of References Cited	Application/Control No. 15/134,380	Applicant(s)/Patent Under Reexamination KESTNER ET AL.	
	Examiner JOSEPH M. PELHAM	Art Unit 3742	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5,783,803 A	07-1998	Robards, Jr.; Chester F.	A47J39/00	219/385
*	B	US-2001/0007322 A1	07-2001	Shei, Steven M.	A47J39/006	219/399
*	C	US-7,105,779 B2	09-2006	Shei; Steven M.	A21B1/22	219/394
*	D	US-7,328,654 B2	02-2008	Shei; Steven M.	A47J39/006	219/385
*	E	US-7,385,160 B2	06-2008	Jones; Douglas Scott	F24C15/16	126/333
*	F	US-2008/0302778 A1	12-2008	Veltrop; Loren J.	A47J39/006	219/385
*	G	US-2011/0030565 A1	02-2011	Shei; Steven Michael	A47J39/006	99/329P
*	H	US-7,905,173 B2	03-2011	Sus; Gerald A.	F24C15/166	219/214
*	I	US-8,096,231 B2	01-2012	Veltrop; Loren J.	A47J37/0623	219/385
*	J	US-2013/0175253 A1	07-2013	Shei; Steven M.	A21B1/245	219/400
*	K	US-8,522,675 B2	09-2013	Veltrop; Loren	A23L3/005	219/214
*	L	US-2014/0130684 A1	05-2014	Reese; Robert J.	A47J37/0629	99/483
	M	US-				

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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BIB DATA SHEET

CONFIRMATION NO. 1584

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/134,380	04/20/2016	219	3742	29178/50736

APPLICANTS

PRINCE CASTLE LLC, Carol Stream, IL;

INVENTORS

Kyle Thomas Kestner, Schaumburg, IL;
Christopher B. Lyons JR., LaGrange, IL;
Charles B. Hartfelder, Hanover Park, IL;
Zachary N. McCoy, South Elgin, IL;

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

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

05/05/2016

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /JOSEPH MOORE PELHAM/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		IL	6	16	2

ADDRESS

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357
UNITED STATES

TITLE

Multi-Zone Food Holding Bin

FILING FEE RECEIVED		
1740	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

BIB (Rev. 05/07).

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"7905173".pn. and (zone)	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/01 17:08
S1	20	shei-$.in. and 219/398-428.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/28 16:02
S2	20	219/398,394,428.ccls. and zone and (tray bay)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/29 15:54
S3	61	("20020094361" | "20020100756" | "20020102337" | "20020172742" | "20030080657" | "20030118706" | "20030188929" | "20040033297" | "20040208961" | "20050255208" | "20060045943" | "2122532" | "3136356" | "3331425" | "3542445" | "3942426" | "4095642" | "4109484" | "4165778" | "4180125" | "4186790" | "4254824" | "4296792" | "4312396" | "4313485" | "4384606" | "4388961" | "4392360" | "4607678" | "4784054" | "4801180" | "4822981" | "5127460" | "5172328" | "5724886" | "5783803" | "5852967" | "5900173" | "5931083" | "5947012" | "6119587" | "6175099" | "6209447" | "6262394" | "6358548" | "6412403" | "6541739" | "6607766" | "6637322" | "6658992" | "6658994" | "6783199" | "6878391" | "6884451").PN. OR ("7905173").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/29 16:01
S4	35	("20010007322" | "20030118706" | "20040020915" | "20040056761" | "20040069155" | "20050216349" | "4575164" | "4576425" | "4832422" | "5058764" | "5724886" | "5783803" | "5900173" | "5947012" | "6116154" | "6119587" | "6175099" | "6262394" | "6412403" | "6637322" | "6878391" | "6884451" | "7105779" | "D254308" | "D364530").PN. OR ("7385160").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/29 16:02
S5	8	(US-20140130684-$ or US-20130175253-$ or US-20110030565-$).did. or (US-8895902-$ or US-7328654-$ or US-7105779-$ or US-7905173-$ or US-7385160-$).did.	US-PGPUB; USPAT	OR	ON	2016/09/29 20:54
S6	1	("7385160").pn. and zone and (tray bay)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 13:41

S7	1	("7905173").pn. and zone and ("33"$1 "31"$1)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 14:53
S8	1	("7905173").pn. and zone and (back rear behind)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 15:03
S9	1	("7905173").pn. and zone and (upper lower)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 15:39
S10	0	("7905173").pn. and zone and (lid)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 15:44
S11	1	("7905173").pn. and zone and (cover)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 15:44
S12	0	("7905173").pn. and (wire coil)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 15:46
S13	2	("5842353" | "6403928").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 16:07
S14	1	("7385160").pn. and (heat$3 near7 (upper top lower bottom))	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 21:25
S15	1	("7385160" "7905173").pn. and (heat$3 with (coil wire cable resistor resistive))	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 21:56
S16	16	219/398,394,428.ccls. and ((tray bay) with (latch stop stay block))	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 22:21
S17	135	(312/236 219/214,385,386,398,394,428).ccls. and ((tray bay) with (latch stop stay block apice lock))	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 22:27
S18	119	S17 not S16	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 22:27
S19	15	(US-20140130684-$ or US-20130175253-$ or US-20110030565-$ or US-20010007322-$ or US-20080302778-$).did. or (US-8895902-$ or US-7328654-$ or US-7105779-$ or US-7905173-$ or US-7385160-$ or US-6262394-$ or US-8096231-$ or US-8404292-$ or US-8522675-$ or US-5783803-$).did.	US-PGPUB; USPAT	OR	ON	2016/09/30 22:59
S20	1	S19 and lock$3	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/30 23:00

S21	2	("8522675" "7905173" "7385160").pn. and ((heat$3 control$4) with (independent independently))	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/01 15:10
S22	2	("8522675" "7905173" "7385160").pn. and ((heat$3 control$4) and (independent independently))	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/01 15:14
S23	2	("8522675" "7905173" "7385160").pn. and ((heat heater heating control$4) and (independent independently))	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/01 15:16
S24	1	("8522675" "7905173" "7385160").pn. and ((tray) with (cover lid))	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/01 15:29
S25	1	"20010007322".pn. and (heater heating resistive resistor)	US-PGPUB; USPAT; USOCR	OR	ON	2016/10/01 15:40

EAST Search History (Interference)

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10/ 1/ 2016 5:53:28 PM
C:\ Users\ jpelham\ Documents\ EAST\ Workspaces\ 15.133220.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	Art Unit
	JOSEPH M PELHAM	3742

CPC- SEARCHED		
Symbol	Date	Examiner
See attached search history	9/30/16	JP

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
See attached search history	9/30/16	JP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15134380	KESTNER ET AL.
	Examiner	**Art Unit**
	JOSEPH M PELHAM	3742

✓	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	10/01/2016								
	1	✓								
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	11	✓								
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	13	✓								
	14	✓								
	15	✓								
	16	✓								

Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 Confirmation No.: 1584

Filed: April 20, 2016 Art Unit: 3781

For: Mutli-Zone Food Holding Bin Examiner: Not Yet Assigned

SUBMISSION OF DECLARATION

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

Dear Sir:

In connection with the above-identified application filed April 20, 2016, the Applicant submits herewith an executed Declaration. The $140.00 fee set forth in 37 CFR 1.16(f) was paid by credit card account on April 20, 2016. However, the Commissioner is hereby authorized to charge any deficiency or any additional fees which may be required under 37 CFR 1.16 to Deposit Account No. 13-2855, under Order No. 29178/50736.

Dated: September 8, 2016

Respectfully submitted,

Electronic signature: /Andrew M. Lawrence/
Andrew M. Lawrence
Registration No.: 46,130
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive
6300 Willis Tower
Chicago, Illinois 60606-6357
(312) 474-6300
Attorney for Applicant

Attorney Docket No.: 29178/50736 01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Mutli-Zone Food Holding Bin

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/134,380 filed on 04/20/2016 .

☐ As Amended on _____ (if applicable)

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment, if any, specifically referred to herein. I acknowledge the duty to disclose information that is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information that became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

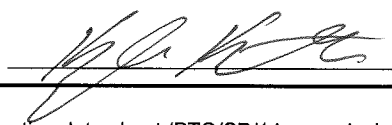
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WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Kyle Thomas Kestner Date (Optional): _____

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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LEGAL NAME OF INVENTOR

Inventor: Christopher B. Lyons, Jr. Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

Attorney Docket No.: 29178/50736 01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

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LEGAL NAME OF INVENTOR

Inventor: Charles B. Hartfelder Date (Optional): _____

Signature: Charles B. Hartfelder

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

Attorney Docket No.: 29178/50736 01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Mutli-Zone Food Holding Bin

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- [ ] The attached application, or
- [x] United States application or PCT international application number 15/134,380 filed on 04/20/2016 .
  - [ ] As Amended on _____ (if applicable)

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I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment, if any, specifically referred to herein. I acknowledge the duty to disclose information that is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information that became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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LEGAL NAME OF INVENTOR

Inventor: Zachary N. McCoy Date (Optional): _____

Signature: Zachary N McCoy

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

Electronic Acknowledgement Receipt

EFS ID:	26871065
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Andrew Michael Lawrence/Gina Scianni
Filer Authorized By:	Andrew Michael Lawrence
Attorney Docket Number:	29178/50736
Receipt Date:	08-SEP-2016
Filing Date:	20-APR-2016
Time Stamp:	16:24:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Submission_Of_Declaration.PDF	16065 8b5c43db24e8a8305c17e5cdcb86e508b8e4d1e1	no	1

Warnings:

Information:					
2	Oath or Declaration filed	Executed_Declaration_29178_50736.PDF	257528 a10ebb288371f083e298951aab86ac8019150196	no	4
Warnings:					
Information:					
			Total Files Size (in bytes):	273593	

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

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736	1584

4743 7590 06/07/2016

MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

EXAMINER	

ART UNIT	PAPER NUMBER
3781	

NOTIFICATION DATE	DELIVERY MODE
06/07/2016	ELECTRONIC

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

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

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

mgbdocket@marshallip.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
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Doc Code: TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.:15/134,380

1. THE REQUEST FILED April 20, 2016 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination
- A. ☒ for an original nonprovisional application (Track I).
- B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

- A. filing a **petition for extension of time** to extend the time period for filing a reply;
- B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
- C. filing a **request for continued examination**;
- D. filing a notice of appeal;
- E. filing a request for suspension of action;
- F. mailing of a notice of allowance;
- G. mailing of a final Office action;
- H. completion of examination as defined in 37 CFR 41.102; or
- I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to Vanitha Elgart at 571-272-7395.

/Vanitha Elgart/
Vanitha Elgart
[Signature]

Petitions Examiner, Office of Petitions
(Title)

Office of Petitions: Decision Count Sheet

Mailing Month

Application No. 15134380

15134380

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: ELGART, VANITHA

Count (1) - Palm Credit 15/134,380

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 643 - Track One request

643

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on:

Office of Petitions Internal Document - Ver. 5.0

Office of Petitions: Routing Sheet



Application No. 15/134,380

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

- [X] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/134,380	04/20/2016	3781	1740	29178/50736	16	2

CONFIRMATION NO. 1584

UPDATED FILING RECEIPT

4743
MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

OC000000083085098

Date Mailed: 05/23/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Kyle Thomas Kestner, Schaumburg, IL;
Christopher B. Lyons JR., LaGrange, IL;
Charles B. Hartfelder, Hanover Park, IL;
Zachary N. McCoy, South Elgin, IL;

Applicant(s)

PRINCE CASTLE LLC, Carol Stream, IL;

Power of Attorney: The patent practitioners associated with Customer Number 04743

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/05/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/134,380**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No
Title

Multi-Zone Food Holding Bin

Preliminary Class

220

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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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 AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736

CONFIRMATION NO. 1584

4743
MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

INFORMAL NOTICE

OC000000083085097

Date Mailed: 05/23/2016

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Kyle Thomas Kestner
  Christopher B. Lyons JR.
  Charles B. Hartfelder
  Zachary N. McCoy

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nbekele/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/134,380

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	16 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Docket No.: 29178/50736
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kyle Thomas Kestner et al.

Application No.: 15/134,380 Confirmation No.: 1584

Filed: April 20, 2016 Art Unit: 3781

For: Mutli-Zone Food Holding Bin Examiner: Not Yet Assigned

AMENDMENT AND RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

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

INTRODUCTORY COMMENTS

This paper is being filed in response to the Notice to File Corrected Application Papers mailed May 6, 2016. This response is timely filed.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please amend paragraph [0006] as follows:

[0006] FIG. [[4]] 4A is a partially cut-away top perspective view of an alternate embodiment of a multi-zone food holding bin[[;]], and FIG. 4B is a close up of a shelf portion of the multi-zone food holding bin from circle 4B in FIG. 4A;

Please amend paragraph [0009] as follows:

[0009] Turning now to FIGS. 1-3, a multi-zone food holding bin 10 includes two separate food holding compartments 50. Additional food holding compartments 50 may also be included as explained in further detail below. Each separate food holding compartment 50 includes two or more separate food holding zones, for example, as illustrated in FIGS. 1-3, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b may include two food holding bays. For example, the first food holding zone 57a may include a first food holding bay 51a and a second food holding bay 51b. The second food holding zone 57b may include a third food holding bay 51c and a fourth food holding bay 51d. Each food holding bay 51a, 51b, 51c, 51d is capable of receiving a single food holding tray 27 and/or a single lid 21, as illustrated in the third food holding bay 51c in FIG. 2. The food holding bays 51a, 51b, 51c, and 51d are illustrated as being separated from one another by a dashed line in FIGS. 1-3. The dashed lines are for illustration only. The food holding bays need not have their boundaries identified with any sort of line or other indicia in food holding compartment 50. Each food holding zone 57a, 57b can be configured to maintain a different food holding temperature, advantageously allowing the operator to hold different food products with different heating requirements in the same food holding

compartment 50, thereby permitting increased energy efficiencies to be realized and potentially reducing the space requirements for holding different foods. For example, a first food product can be held in the first food holding bay 51a of the first food holding zone 57a and a second food product, which may be the same as the first food product or different from the first food product as long as both food products have substantially the same temperature requirements, can be held in the second food holding bay 51b of the first food holding zone 57a. Both the first food holding bay 51a and the second food holding bay 51b are held at a first temperature by independently controllable upper and lower heating elements. A third food product can be held in the third food holding bay 51c of the second food holding zone 57b and a fourth food product, which may be the same as the third food product or different from the third food product as long as both food products have substantially the same temperature requirements, may be held in the fourth food holding bay 51d of the second food holding zone 57b. Both the third food holding bay 51c and the fourth food holding bay 51d are held at a second temperature by independently controllable upper and lower heating elements. Because the heating elements used to heat the second food holding zone 57b are different from those used to heat the first food holding zone 57a, he second temperature of the second food holding zone 57b is capable of being independently set to be different from the first temperature of the first food holding zone 57a. Suitable heating elements are illustrated with respect to the embodiment shown in FIGS. [[4]] 4A, 4B, and 5. This can be particularly useful for restaurants during lower demand times (as fewer food holding bins are needed to hold larger numbers of different food items than previously) and also for smaller restaurants and retail operations (as space constraints can be met more easily).

Please amend paragraph [0013] as follows:

[0013] In the embodiment illustrated in FIG. 1, the top or "A" compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and a first or upper-most shelf 52. Compartment "B" is defined by the two sidewalls 30 and 35, the first or upper-most shelf 52, and the chassis bottom panel 25. In bin embodiments having only one compartment 50, the single compartment is defined by opposing, left and right sidewalls 30 and 35, a chassis top panel 20 and a chassis bottom panel 25. For brevity, bin construction and operation is described with regard to a bin 10 having two compartments 50 in FIGS. 1-3. However, other embodiments may have more than two compartments 50 or less than two compartments 50. For example, the embodiments illustrated in FIGS. [[4-6]] 4A, 4B, 5, and 6 have four compartments 50. Again, other configurations are also possible.

Please amend paragraphs [0022]-[0025] as follows:

[0022] FIGS. [[4]] 4A, 4B, and 5 are perspective views of an alternate embodiment of a multi-zone food holding bin 10, the embodiment of FIGS. [[4]] 4A, 4B, and 5 including four separate food holding compartments 50. The embodiment of FIGS. [[4]] 4A, 4B, and 5 is substantially identical to the embodiment of FIGS. 1-3 with the exception that the embodiment of FIGS. [[4]] 4A, 4B, and 5 includes four food holding compartments 50 instead of two, each food holding compartment 50 including two food holding zones 57a, 57b, and each food holding zone 57a, 57b including a single food holding bay 51a, 51b, respectively. Thus, reference numbers identifying identical elements are the same in FIGS. 1-3 and in FIGS. [[4]] 4A, 4B, and 5. Moreover, elements not illustrated in one of the embodiments are understood to be present in the other embodiment. For example, the

embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5 includes cut-away views showing internal components that are not visible in FIGS. 1-3. Nevertheless, these internal components are understood to be present in the embodiment illustrated in FIGS. 1-3 as well.

[0023] Similar to the embodiment of FIGS. 1-3, each separate food holding compartment 50 in the food holding bin 10 of FIGS. [[4]] 4A, 4B, and 5 includes at least two separate food holding zones, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b is configured to maintain a different temperature. Of course, it is not necessary for the food holding zones 57a, 57b to be operated at different temperatures in practice.

[0024] The bin 10 illustrated in FIG. [[4]] 4A is sized, shaped and arranged to have four compartments 50, however, bins in accordance with the disclosure can have any number of compartments, including a single compartment.

[0025] In FIG. [[4]] 4A, the first or top compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and the first or upper-most shelf 52. The second compartment is defined by the two sidewalls 30 and 35, the shelf 52 for the first compartment and the second shelf 52. The third compartment is defined by the two sidewalls 30, 35, the second shelf 52 and the third shelf 52. The fourth compartment is defined by the two sidewalls 30 and 35, the third shelf and the chassis bottom 25.

Please amend paragraph [0027] as follows:

[0027] Each food holding bay 51a, 51b may include a dedicated display and/or control 93a, 93b, respectively. Each display and/or control 93a, 93b may display the temperature setpoint of a respective food holding bay 51a, 51b, and in the embodiment illustrated in FIGS. [[4]]

4A, 4B, and 5, the temperature of a respective food holding zone 57a, 57b. Moreover, each display and/or control 93a, 93b may control the respective heating elements that maintain the temperature setpoint of the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5, a single bezel 92 is used to provide the display and/or control elements for a single compartment 50. The displays and/or controls 93a, 93b can provide a graphical user interface to one or more controllers (not shown) for the bin 10.

Please amend paragraphs [0034] and [0035] as follows:

[0034] In the embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5, the first heating element 67 can be located above the second heating element 65 but in thermal communication with the planar bottom surface 53 such that when the temperature of the first heating element 67 rises, it provides heat energy into the planar bottom surface 53 in a region around the first heating element 67, and more specifically, within the first food holding zone 57a of the first or top food holding compartment 50. Thermally insulating the first heating element 67 from the planar upper surface 54 and thermally insulating the second heating element 65 from the planar bottom surface 53, enables the first heating element 67 to provide a first amount of heat energy into the planar bottom surface 53 (and thus into the first food holding zone 57a of the upper food holding compartment 50), while the second heating element 65 provides a second amount of heat energy into the planar upper surface 54 (and thus into the first food holding zone 57b of the lower food holding compartment 50). In this manner, each food holding zone 57a, 57b may be configured to have an independent and unique temperature profile from top to bottom of the food holding zone 57a, 57b. For example, one food holding

zone 57a, 57b may have a temperature profile that generally decreases from top to bottom (i.e., the top of the food holding zone 57a, 57b is hotter than the bottom of the food holding zone 57a, 57b).

[0035] In some embodiments, the second heating element 65 may comprise a radiant heating source that projects radiant heat through the planar upper surface 54 and into the first food holding zone 57a of the lower food holding compartment 50. In other words, in one embodiment, the first heating element 67 provides heat energy into the first food holding zone 57a of the upper food holding compartment 50 through conduction, while the second heating element 65 provides heat energy into the first food holding zone 57a of the lower food holding compartment through radiation. Similarly, a radiant heating element may be provided at a top interior surface of the first or top food holding compartment 50 beneath the chassis top panel 20. In this manner, the top and bottom of a food product placed into the first food holding zone 57a may absorb different amounts of heat energy, customized depending on the type of food product. Thus, the heat profile in the first food holding zone 57a may be customized vertically as well as differentiated from the heat profile in the second food holding zone 57b. As a result, a single food holding compartment 50 (e.g., the upper compartment in FIGS. [[4]] 4A and 5) may be customized to store different types of food products in the first food holding zone 57a and the second food holding zone 57b, each food holding zone 57a, 57b having a different temperature profile. As a result, the disclosed food holding bin 10 is flexible in that it can keep multiple different types of food products at their ideal holding temperatures in a single food holding compartment, thus increasing efficiency and adaptability to different food demands.

REMARKS

This paper is presented in response to the Notice to File Corrected Application Papers dated May 6, 2016, hereinafter "the Notice," in which the drawings submitted were found to be unacceptable.

The specification is amended to refer to FIGS. 4A and 4B, which were originally filed in the drawings. No new matter is added.

The applicant respectfully submits that the amendments to the specification address the requirements in the Notice. More specifically, the specification now contains a brief description of the drawings that refers to each and every drawing. Moreover, each of the originally filed drawings was labeled "FIG." with a consecutive Arabic numeral and in some cases an Arabic numeral with a capital letter in the English alphabet. As a result, the drawings as originally filed comply with 37 CFR 1.84 and 37 CFR 1.121(d). For this reason, the applicant respectfully submits that the items required in the Notice are satisfied.

The surcharge under 37 CFR 1.16(f) is submitted herewith for the late filing of an inventor's oath or declaration.

Conclusion

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 13-2855, under Order No. 29178/50736.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: May 11, 2016

Respectfully submitted,

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MULTI-ZONE FOOD HOLDING BIN

BACKGROUND

[0001] Often the success of a restaurant depends, at least in part, on how quickly customers can be served with ordered food items and also on the quality of the food items when served. If the rate of food preparation equals the rate at which the food is ordered and sold, a restaurant can theoretically have freshly-prepared foods ready to serve for customers as they arrive. Since it is not always possible to match food production with customer ordering rates, and since certain fast food restaurant customers expect to receive their ordered food items quickly, many fast food restaurants prepare various food items in advance and keep them ready for sale until a customer arrives and purchases a pre-cooked food item.

[0002] To facilitate the food holding process, holding bins or holding ovens are often used to keep the food warm. Known holding bins can allow a cooked food item to be inserted from one side and taken from the opposite side whereby food preparers add food to the holding bin on one side and food servers on the opposite side take food from the holding bin. Food holding bins in which the cooked food item is inserted and removed from the same side are also known. The food items in the holding bins are kept warm by heating elements. However, food holding time in known holding bins or ovens is somewhat limited, generally less than 15 or 20 minutes before the food item must be discarded. As a result, restaurants can only keep a limited amount of pre-cooked food items on hand and often a significant amount of the pre-cooked food items must be discarded before they are sold, resulting in additional costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] FIG. 1 is a perspective view of a multi-zone food holding bin;

[0004] FIG. 2 is a front elevational view of the multi-zone food holding bin of FIG. 1;

[0005] FIG. 3 is a rear elevational view of the multi-zone food holding bin of FIG. 1;

[0006] FIG. [[4]] 4A is a partially cut-away top perspective view of an alternate embodiment of a multi-zone food holding bin[[;]], and FIG. 4B is a close up of a shelf portion of the multi-zone food holding bin from circle 4B in FIG. 4A;

[0007] FIG. 5 is a partially cut-away bottom perspective view of the food holding bin of FIG. [[4]] 4A; and

[0008] FIG. 6 is a partially cutaway top perspective view of yet another alternate embodiment of a multi-zone food holding bin.

DETAILED DESCRIPTION

[0009] Turning now to FIGS. 1-3, a multi-zone food holding bin 10 includes two separate food holding compartments 50. Additional food holding compartments 50 may also be included as explained in further detail below. Each separate food holding compartment 50 includes two or more separate food holding zones, for example, as illustrated in FIGS. 1-3, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b may include two food holding bays. For example, the first food holding zone 57a may include a first food holding bay 51a and a second food holding bay 51b. The second food holding zone 57b may include a third food holding bay 51c and a fourth food holding bay 51d. Each food holding bay 51a, 51b, 51c, 51d is capable of receiving a single food holding tray 27 and/or a single lid 21, as illustrated in the third food holding bay 51c in FIG. 2. The food holding bays 51a, 51b, 51c, and 51d are illustrated as being separated from one another by a dashed line in FIGS. 1-3. The dashed lines are for illustration only. The food holding bays need not have their boundaries

identified with any sort of line or other indicia in food holding compartment 50. Each food holding zone 57a, 57b can be configured to maintain a different food holding temperature, advantageously allowing the operator to hold different food products with different heating requirements in the same food holding compartment 50, thereby permitting increased energy efficiencies to be realized and potentially reducing the space requirements for holding different foods. For example, a first food product can be held in the first food holding bay 51a of the first food holding zone 57a and a second food product, which may be the same as the first food product or different from the first food product as long as both food products have substantially the same temperature requirements, can be held in the second food holding bay 51b of the first food holding zone 57a. Both the first food holding bay 51a and the second food holding bay 51b are held at a first temperature by independently controllable upper and lower heating elements. A third food product can be held in the third food holding bay 51c of the second food holding zone 57b and a fourth food product, which may be the same as the third food product or different from the third food product as long as both food products have substantially the same temperature requirements, may be held in the fourth food holding bay 51d of the second food holding zone 57b. Both the third food holding bay 51c and the fourth food holding bay 51d are held at a second temperature by independently controllable upper and lower heating elements. Because the heating elements used to heat the second food holding zone 57b are different from those used to heat the first food holding zone 57a, he second temperature of the second food holding zone 57b is capable of being independently set to be different from the first temperature of the first food holding zone 57a. Suitable heating elements are illustrated with respect to the embodiment shown in FIGS. [[4]] 4A, 4B, and 5. This can be particularly useful for restaurants during lower demand times (as fewer food holding bins are needed to hold larger numbers of

different food items than previously) and also for smaller restaurants and retail operations (as space constraints can be met more easily).

[0010] In one embodiment of the bin 10, all of the compartments 50 are heated. In another embodiment, some compartments 50 may be refrigerated while other compartments 50 are heated. In yet another embodiment, one or more compartments 50 can be selectively heated or refrigerated.

[0011] The bin 10 includes a chassis 15. As illustrated, the chassis 15 includes a top panel 20, a bottom panel 25, a left-side panel 30, a right side panel 35, an open front face 40 and an open rear face 45. When the rear face 45 is open and uncovered, food items can be inserted by a first operator responsible for initial food preparation into one of the faces 40, 45 and passed through to and removed from the other of the faces 40, 45 by a second operator responsible for final food preparation, for example, a second operator responsible for packaging and customization of a food product for serving to the ultimate customer. In another embodiment, the rear face 45 may be "closed" and provided by a rear panel such that access into the bin 10 is only provided by the open front face 40. The panels may be insulated to reduce heat transfer between the interior of the bin 10 and the atmosphere surrounding the bin 10.

[0012] The bin 10 illustrated in FIG. 1 is sized, shaped and arranged to have two compartments 50, however, the bin 10 can have any number of compartments 50, including a single compartment 50. For clarity, the two compartments 50 depicted in FIGS. 1-3 are denominated using the letters A and B. The "A" compartment is the top or uppermost compartment 50 and the "B" compartment is the bottom or lower-most compartment 50.

[0013] In the embodiment illustrated in FIG. 1, the top or "A" compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and a first or upper-most shelf 52. Compartment "B" is defined by the two sidewalls 30 and 35, the first or upper-most shelf 52, and the chassis bottom panel 25. In bin embodiments having only one compartment 50, the single compartment is defined by opposing, left and right sidewalls 30 and 35, a chassis top panel 20 and a chassis bottom panel 25. For brevity, bin construction and operation is described with regard to a bin 10 having two compartments 50 in FIGS. 1-3. However, other embodiments may have more than two compartments 50 or less than two compartments 50. For example, the embodiments illustrated in FIGS. [[4-6]] 4A, 4B, 5, and 6 have four compartments 50. Again, other configurations are also possible.

[0014] The shelf 52, which partially defines the compartments 50, is planar or at least substantially planar and supported in the chassis 15 at opposing side ends by the two chassis side walls 30 and 35. The shelf 52 includes a planar and continuous top surface, which forms a planar and continuous bottom surface 53 of the upper compartment 50. The planar and continuous bottom surface 53 of the upper compartment 50 is configured to support food items (as used herein, the term "food item" includes but is not limited to containers or trays containing food products such as cooked protein patties, fried foods, and the like). In the illustrated embodiment, food items can be placed onto the planar and continuous bottom surface 53 and removed from the planar and continuous bottom surface 53 through the open front face 40 or through the open rear face 45. Because the bottom surface 53 is planar and continuous and substantially free of any dividing walls or other structure between the holding zones 57a, 57b, and more particularly between the food holding bays 51a, 51b, 51c, and 51d, cleaning of the bottom surface 53 can be easily accomplished.

[0015] A face plate or bezel 92 is generally attached to the front of the chassis 15. For example, the bezel can be attached to the sidewalls 30 and 35 of the chassis 15 so as to be disposed underneath a top surface of the shelf 52. In bin embodiments having only one compartment 50, the bezel 92 may be attached to either of the chassis top or bottom panels 20, 25 of the bin 10. In the illustrated embodiment of FIGS. 1-3, the bezel 92 is set forward from the shelf 52 by a space 55. The space 52 forms a slot in which one or more latches 23 translate and/or rotate from a locked/default position to an unlocked position so as to release lids held in lid holding ledges 31 as will be discussed further below.

[0016] The bezels 92 may include information displays and/or controls, which are collectively identified by reference numeral 93. Although the chassis 15 can include panels concealing the heat generating devices located within a shelf, the bezel 92 also can conceal heating elements, which are located within the shelf 52, such that a separate panel is not present.

[0017] Each food holding bay 51a, 51b, 51c, 51d may include a dedicated display and/or control 93a, 93b, 93c, 93d, respectively. While each dedicated display and/or control 93a, 93b, 93c, 93d may display and/or control the temperature within individual food holding bays 51a, 51b, 51c, 51d, the food holding bays within a particular food holding zone (51a and 51b within 57a; 51c and 51d within 57b) have the same temperature setting. The dedicated display and/or controls 93a, 93b, 93c, 93d, may also display additional information about the food item stored in the food holding bay 51a, 51b, 51c, 51d. For example, while the temperature in the first food holding bay 51a and the second food holding bay 51b is the same (because both food holding bays 51a, 51b are located within a single food holding zone 57a), the display and/or control 93a, 93b may indicate that the first food holding bay 51a has a first food item (such as sausage) while the second food holding bay 51b has a second food item (such as eggs). In the embodiment

illustrated in FIGS. 1-3, the display and control 93a, 93b, 93c, and 93d can display the particular food item, the temperature setpoint of a respective food holding bay 51a, 51b, 51c, 51d, along with other information about the food item stored in the food holding bay 51a, 51b, 51c, 51d, such as the food holding bay is ready to receive food items, the food items in the food holding bay should be discarded, the food items in the food holding bay are older and should be used first relative to the same food items contained in another food holding bay, the food items in the food holding bay are newer relative to the same food items contained in another food holding bay such that the food items contained in the other food holding bay should be used first, it is time to cook more food product. Moreover, the heating elements for each food holding zone 57a, 57b can be controlled by the displays and/or controls 93a, 93b, 93c, 93d to maintain the temperature setpoint of the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b, 93c, 93d may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b, 51c, 51d) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. 1-3, a single bezel 92 is used to provide the display and/or control elements for two vertically adjacent compartments 50, but of course discrete bezels can also be used. The displays and/or controls 93a, 93b, 93c, 93d thus can provide a user graphical interface to one or more controllers (not shown) for the bin. A temperature control interface panel 95 may also be provided to control the temperatures of the food holding zones 57a, 57b.

[0018] Each food holding bay 51a, 51b, 51c, 51d may be sized to receive an individual food holding tray 27 and lid 21 (see FIG. 2 where the tray 27 is illustrated in broken lines). In order to conveniently store the lid 21, each food holding bay 51a, 51b, 51c, 51d may also include a dedicated lid holding shelf 31 that is sized to receive and store the lid 21 when the lid 21 is desired for use in combination with a food holding tray 27, such as when protein patties are

contained within the tray 27. Generally, a top surface 27a of a food holding tray 27, when received in the lid holding shelf 31, is substantially flush with a top surface of the lid holding shelf 31 such that when the tray 27 is disposed in the food holding bay 51c, the tray 27 can be in contact with and engaged by the lid 21 in the lid holding shelf 31 so as to retain moisture within the tray 27-lid 21 assembly. In some embodiments, the lid holding shelf 31 may be provided by formed sheet metal. In other embodiments, the lid holding shelf 31 may be provided by a wire form. Other structures are also possible.

[0019] Adjacent to each lid holding shelf 31 is one or more latches 23 having an open center portion. In the embodiment illustrated in FIGS. 1-3, each food holding zone 57a, 57b includes a single dedicated latch 23 that selectively secures lids 21 in the food holding shelves 31 in each food holding bay 51a, 51b, 51c, 51d. In the illustrated embodiment, the latches 23 have a round or curved body 29 that is rotatable and/or translatable (because of the open center) about a retaining element such as a pin or screw (not shown). In other embodiments, the latches 23 may have straight or angled outer surfaces that form other shapes, such as a square, a pentagon, a hexagon, or any other polygonal shape. The latches 23 may be disposed adjacent an opening into the food holding compartment 50 above the lid holding shelf 31. In one example, the latches 23 may be captured on a cylindrical retaining element between the chassis 15 and a top of the food holding compartment 50 above the lid holding shelf 31. In other embodiments, one or more washers (not shown), such as metal, nylon, or plastic washers, may be disposed on the cylindrical retaining element to space the latches 23 apart from the bezel 92 and the shelf 52 to prevent metal galling and/or to reduce friction between the latches 23 and the bezel 92 or shelf 52 to ease actuation of the latches 23.

[0020] The round body 29 may be oriented substantially parallel to a front face of the chassis 15 or the bezel 92 in a locked or default position, as illustrated by reference numeral 23a, which prevents inadvertent removal of a lid 21 from the lid holding shelf 31 when a tray 27 is withdrawn. The latch 23 is in its default or locked position simply because of gravity, thus re-positioning the latch to an unlocked state advantageously requires simply overcoming the weight of the latch 23 by translational and/or rotational movement. The round body 29 may be rotated and/or translated upwards relative to the bezel 92 or lid holding shelf 31 from the locked or default position to an unlocked position, as illustrated by the dotted lines referencing latch 23 between food holding bay 51a and food holding bay 51b in FIG. 1; this rotational and/or translational movement of the latch 23 about the retaining element allows facile insertion or removal of a lid 21 to/from the lid holding shelf 31. The round body 29 may be mounted on a retaining element such as a pin or a screw (not shown), which retains the round body 29 and allows the round body 29 to translate along the open center portion and/or to at least partially rotate about the pin when the round body 29 translates. The lid holding shelf 31 also allows the food holding compartment 50 to have the planar and continuous bottom surface 52 by storing the lids 27a in an elevated position, with the lid holding shelf 31 being suspended above the continuous bottom surface 52, typically by fixedly attaching a base of the shelf to a top surface of the food holding compartment 50 at one or more positions. Such continuous planar and continuous bottom surfaces 52 are much easier to clean than compartmentalized or divided heating chambers. Furthermore, the round body 29 of the latch 23 and the translation/rotation movement of the latch allow easy removal of the lids 27 from the lid holding tray 31 with one hand while positioning the latch 23 to the unlocked position with another hand.

[0021] From a purely functional standpoint, a preferred latch 23 might simply include a locking portion that is able to prevent inadvertent displacement of the lid 21 when the tray 27 is purposefully removed. Thus, a number of different configurations and shapes can be used for the latch 23. The latch 23 illustrated here with the round body 29, on the other hand, has an alternative, ornamental arrangement for the round body 29 in which the edges of the round body 29 include an arc-shaped, curved surface. This illustrated arrangement may add to the cost of manufacture, so the illustrated latch does not provide all of the possible economic advantages that might be derived from the invention. On the other hand, this arrangement is believed to be aesthetically pleasing and is likely to be recognized and relied upon by purchasers to identify the source of the food holding bin.

[0022] FIGS. [[4]] 4A, 4B, and 5 are perspective views of an alternate embodiment of a multi-zone food holding bin 10, the embodiment of FIGS. [[4]] 4A, 4B, and 5 including four separate food holding compartments 50. The embodiment of FIGS. [[4]] 4A, 4B, and 5 is substantially identical to the embodiment of FIGS. 1-3 with the exception that the embodiment of FIGS. [[4]] 4A, 4B, and 5 includes four food holding compartments 50 instead of two, each food holding compartment 50 including two food holding zones 57a, 57b, and each food holding zone 57a, 57b including a single food holding bay 51a, 51b, respectively. Thus, reference numbers identifying identical elements are the same in FIGS. 1-3 and in FIGS. [[4]] 4A, 4B, and 5. Moreover, elements not illustrated in one of the embodiments are understood to be present in the other embodiment. For example, the embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5 includes cut-away views showing internal components that are not visible in FIGS. 1-3. Nevertheless, these internal components are understood to be present in the embodiment illustrated in FIGS. 1-3 as well.

[0023] Similar to the embodiment of FIGS. 1-3, each separate food holding compartment 50 in the food holding bin 10 of FIGS. [[4]] 4A, 4B, and 5 includes at least two separate food holding zones, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b is configured to maintain a different temperature. Of course, it is not necessary for the food holding zones 57a, 57b to be operated at different temperatures in practice.

[0024] The bin 10 illustrated in FIG. [[4]] 4A is sized, shaped and arranged to have four compartments 50, however, bins in accordance with the disclosure can have any number of compartments, including a single compartment.

[0025] In FIG. [[4]] 4A, the first or top compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and the first or upper-most shelf 52. The second compartment is defined by the two sidewalls 30 and 35, the shelf 52 for the first compartment and the second shelf 52. The third compartment is defined by the two sidewalls 30, 35, the second shelf 52 and the third shelf 52. The fourth compartment is defined by the two sidewalls 30 and 35, the third shelf and the chassis bottom 25.

[0026] The shelves 52, which partially define the compartments 50, are planar or at least substantially planar and supported in the chassis 15 at their opposing side ends by the two chassis side walls 30 and 35. Each shelf 52 forms a planar and continuous top surface, which defines a planar and continuous bottom surface 53 of the compartment 50. The planar and continuous bottom surface 53 of the compartment is configured to support food items (as mentioned above, the term “food item” includes but is not limited to containers or trays containing food products such as cooked protein patties, fried foods, and the like). Food items can be placed onto the

planar bottom surface 53 and removed from the planar bottom surface 53 through the open front face 40 or through the open rear face 45.

[0027] Each food holding bay 51a, 51b may include a dedicated display and/or control 93a, 93b, respectively. Each display and/or control 93a, 93b may display the temperature setpoint of a respective food holding bay 51a, 51b, and in the embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5, the temperature of a respective food holding zone 57a, 57b. Moreover, each display and/or control 93a, 93b may control the respective heating elements that maintain the temperature setpoint of the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5, a single bezel 92 is used to provide the display and/or control elements for a single compartment 50. The displays and/or controls 93a, 93b can provide a graphical user interface to one or more controllers (not shown) for the bin 10.

[0028] Bin 10 control and control of the food holding zone 51 temperature is effectuated in part by using one or more microcontrollers or microprocessors 97 in combination with temperature sensors 99. US 2011-0114624 A1 entitled "Food Holding Cabinet Power Supplies with Downloadable Software," the entirety of which is hereby incorporated by reference herein, discloses among other things, apparatuses and methods by which compartments of a food holding bin can be controlled using microprocessors having downloadable software. Compartment temperature control is preferably effectuated using a semiconductor temperature sensor, thermally coupled to each food holding zone 51 and electrically connected to a processor, such as those disclosed in US 2011-0114624 A1.

[0029] A semiconductor apparatus and method for measuring temperature of a plate or shelf in a food holding bin is disclosed in U.S. pat. No. 8,247,745, which is entitled "Temperature Sensor for a Food Holding Cabinet" the entirety of which is hereby incorporated by reference herein.

[0030] The shelf 52 includes a lower heating element 67 for the first food holding zone 57a in a first or top food holding compartment 50, and an upper heating element 65 for a second food holding zone 57b in a second or lower food holding compartment 50, directly below the first food holding compartment 50. While the first heating element 67 is illustrated as providing heat to the upper first food holding zone 57a (from below) and the second heating element 65 is illustrated as providing heat to the lower first food holding zone 57a (from above), heating elements that are not shown include at least a heating element that provides heat to the upper first food holding zone 57a from above and another heating element that provides heat to the lower first food holding zone 57a from below. Additionally, the second food holding zones 57b, which are adjacent to the first food holding zones 57a, are heated in the same way as the first food holding zones 57a, but with independent heating elements. The heating elements of the second food holding zones 57b are independently controllable from the heating elements of the first food holding zones 57a. Referring to the inset FIG. 4B, the shelf 52 includes an upper thermally conductive plate, which forms the continuous planar bottom surface 53 of the first (or upper) food holding compartment 50 and a lower thermally conductive plate, which forms a continuous planar upper surface 54 of the second (or lower) food holding compartment 50. The planar bottom surface 53 and the planar upper surface 54 are spaced apart from each other by a distance sufficient to accommodate the inclusion of at least two heating elements, which are illustrated in the figures as the separate first heating element 67 and the separate second heating element 65, respectively. Again, the temperature of each food holding zone is controlled by independently

controllable heating elements. Insulative materials may be provided between the first heating element 67 and the second heating element 65 to provide better thermal control over the food holding zones 57a, 57b. The first heating element 67 is a lower heating element for the upper food holding compartment 50 and the second heating element 65 is an upper heating element for the lower food holding compartment 50.

[0031] The continuous planar bottom surface 53 of the top food holding compartment 50 and the continuous planar upper surface 54 of the bottom food holding compartment are preferably made of aluminum, between about one-eighth and about one-quarter inch-thick. Alternate embodiments of the shelf 52 may use a thermally-conductive panel made of glass-ceramic or an ultra-low expansion glass for one or both of the lower surface 53 and the upper surface 54. Glass-ceramics and ultra-low expansion glass are considered herein to be "good" thermal conductors in that their conduction of heat energy is localized. Such materials also make excellent shelves for a heated, multi-zone food holding bin because they permit localized areas of a shelf to be heated to a first temperature, without having the entire shelf reach the same temperature.

[0032] The first heating element 67 is disposed between the planar bottom surface 53 and the planar upper surface 54 and the first heating element 67 is in thermal communication with the planar bottom surface 53. The first heating element 67 may be mechanically attached to the planar bottom surface 53 by a thermally-conductive adhesive, in one embodiment. The first heating element 67 may also be attached to the planar bottom surface 53 by brackets or clamps.

[0033] The second heating element 65 is disposed between the planar bottom surface 53 and the planar upper surface 54 and the second heating element 65 is in thermal communication with the planar upper surface 54. The second heating element 65 may be mechanically attached to the

planar upper surface 54 by a thermally-conductive adhesive, in one embodiment. The second heating element 65 may also be attached to the planar upper surface 54 by brackets or clamps.

[0034] In the embodiment illustrated in FIGS. [[4]] 4A, 4B, and 5, the first heating element 67 can be located above the second heating element 65 but in thermal communication with the planar bottom surface 53 such that when the temperature of the first heating element 67 rises, it provides heat energy into the planar bottom surface 53 in a region around the first heating element 67, and more specifically, within the first food holding zone 57a of the first or top food holding compartment 50. Thermally insulating the first heating element 67 from the planar upper surface 54 and thermally insulating the second heating element 65 from the planar bottom surface 53, enables the first heating element 67 to provide a first amount of heat energy into the planar bottom surface 53 (and thus into the first food holding zone 57a of the upper food holding compartment 50), while the second heating element 65 provides a second amount of heat energy into the planar upper surface 54 (and thus into the first food holding zone 57b of the lower food holding compartment 50). In this manner, each food holding zone 57a, 57b may be configured to have an independent and unique temperature profile from top to bottom of the food holding zone 57a, 57b. For example, one food holding zone 57a, 57b may have a temperature profile that generally decreases from top to bottom (i.e., the top of the food holding zone 57a, 57b is hotter than the bottom of the food holding zone 57a, 57b).

[0035] In some embodiments, the second heating element 65 may comprise a radiant heating source that projects radiant heat through the planar upper surface 54 and into the first food holding zone 57a of the lower food holding compartment 50. In other words, in one embodiment, the first heating element 67 provides heat energy into the first food holding zone 57a of the upper food holding compartment 50 through conduction, while the second heating element 65 provides

heat energy into the first food holding zone 57a of the lower food holding compartment through radiation. Similarly, a radiant heating element may be provided at a top interior surface of the first or top food holding compartment 50 beneath the chassis top panel 20. In this manner, the top and bottom of a food product placed into the first food holding zone 57a may absorb different amounts of heat energy, customized depending on the type of food product. Thus, the heat profile in the first food holding zone 57a may be customized vertically as well as differentiated from the heat profile in the second food holding zone 57b. As a result, a single food holding compartment 50 (e.g., the upper compartment in FIGS. [[4]] 4A and 5) may be customized to store different types of food products in the first food holding zone 57a and the second food holding zone 57b, each food holding zone 57a, 57b having a different temperature profile. As a result, the disclosed food holding bin 10 is flexible in that it can keep multiple different types of food products at their ideal holding temperatures in a single food holding compartment, thus increasing efficiency and adaptability to different food demands.

[0036] Because of this flexibility, it has been found that a food holding bin constructed in accordance with the disclosure can extend the palatability time of a food item by a factor of two or more.

[0037] An alternate embodiment, as illustrated in FIG. 6, may use the thermoelectric effect provided by one or more Peltier devices 80 to heat one or more of the compartments 50.

[0038] The thermoelectric effect is a direct conversion of a temperature difference into an electric voltage and vice versa. When a voltage is applied to a thermoelectric device, a temperature difference is created across the two sides of the device. The temperature difference created in response to an applied voltage is known as the Peltier effect. Devices that produce

temperature differences in response to an applied voltage are considered herein to be Peltier devices. A Peltier device 80 is therefore considered herein to be a heat source or heating element.

[0039] Peltier devices have a "cold" side and a "hot" side. The cold side absorbs heat whereas the hot side emits heat. Heat emitted from the hot side includes at least some of the heat absorbed from the cold side. A Peltier device 80 is therefore considered herein to be a solid-state heat pump or heat-sinking device.

[0040] FIG. 6 is a cutaway view of another embodiment of a point-of-use holding bin using Peltier devices to heat the food holding compartments 50. In one embodiment, one or more Peltier devices 80 are "sandwiched" between, and in thermal communication with the bottom planar surface 53 and the upper planar surface 54 described above. Electrical energy is provided to the Peltier devices 80 through wires 85, under the control of a controller.

[0041] “Sandwiching” the Peltier devices in a shelf 52 as shown in FIG. 6 provides a shelf 52 cold on one side and hot on the other. Such a shelf 52 structure thus enables a dual-mode food holding bin 10 having a “first” food holding compartment 50 that is warm and a vertically adjacent “second” food holding compartment 50 that is cold.

[0042] Temperature control of a thermoelectric, Peltier device 80 may be accomplished by controlling the electric energy provided to the device. Temperature control of one side of the Peltier device 80 can also be effectuated by controlling heat transferred into or out of the opposite side of the device, as described in US 2010-0307168 A1, entitled “Thermo Electric Cooler,” the disclosure of which is incorporated herein by reference in its entirety.

[0043] In another embodiment of a multi-zone food holding bin 10, multiple Peltier devices 80 are mounted between the bottom surface 53 and the upper surface 54 but have only their hot

sides thermally coupled to the bottom surface 53 and to the upper surface 54. Air is then moved through the inter-plate space to heat the cool sides of the Peltier devices therein.

[0044] Peltier devices as disclosed herein and similar heat transfer devices are thermally coupled to the shelf 52, preferably by way of mechanical attachment to at least one of the plates that form the lower planar surface 53 and the upper planar surface 54. Mechanical attachment and the resultant thermal coupling is preferably accomplished by a thermally-conductive adhesive, however, clamps that are attached to a plate by screws driven into a plate can also be used.

[0045] The shelves are mechanically coupled to the side panels 30 and 35. The side panels are also preferably made from thermally-conductive material such as aluminum. Thermally coupling a heat transfer device to one or more plates that comprise a shelf therefore also thermally couples the heat transfer device to the side walls and thus to the compartment. Heat transfer devices coupled to a shelf are therefore also thermally coupled to the corresponding compartment.

[0046] While the temperature of a Peltier device can be controlled by controlling the heat dissipated from the hot side and/or the heat absorbed into the cold side, bin embodiments disclosed herein preferably control compartment temperature using one or more semiconductor temperature sensors, thermally coupled to one or more of the thermally-conductive structures that comprise a compartment. Bin embodiments disclosed herein preferably use a semiconductor temperature sensor that is directly coupled and therefore thermally coupled to the heated surfaces 53 and/or 54 provided by the shelves 52.

[0047] Semiconductor temperature sensors used in preferred embodiments disclosed herein are disclosed in U.S. Pat. No. 8,247,745, which is entitled “Temperature Sensor for a Food

Holding Cabinet" the entirety of which is hereby incorporated by reference herein, especially the teachings of the structure and use of a semiconductor temperature sensor.

[0048] Thus, suitable heating elements for use in accordance with the disclosure include electrically-resistive heating elements, such as heated coils, radiant heating elements that provide heat energy via radiation, and devices and ancillary equipment that provide heat to a working fluid. As described above, Peltier devices may also be used as heating elements in accordance with the disclosure.

[0049] The foregoing description is for purposes of illustration only and not for purposes of limitation. The true scope of the invention is set forth by the appended claims.

What is claimed is:

1. A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment;

a first food holding zone formed in the food holding compartment, the first food holding zone having an independently controllable first heating element disposed at a top portion of the food holding compartment, and an independently controllable second heating element disposed at a bottom portion of the food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray; and

a second food holding zone formed in the food holding compartment, the second food holding zone having an independently controllable third heating element disposed at the top portion of the food holding compartment and an independently controllable fourth heating element disposed at the bottom portion of the food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to

maintain a first temperature and the second food holding zone is configured to maintain a second temperature, the first temperature and the second temperature capable of being different than one another.

2. The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4. The food holding bin of claim 1, wherein the first heating element is a radiant heating element.

5. The food holding bin of claim 1, wherein the second heating element is a conductive heating element.

6. The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. The food holding bin of claim 1, further comprising a food holding tray disposed in the first food holding compartment, and in the first food holding bay, and resting on the continuous and planar bottom surface.

10. The food holding bin of claim 9, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface;

independently setting a first temperature in the first food holding zone;

independently setting a second temperature in the second food holding zone,

wherein the first temperature is different from the second temperature.

13. The method of claim 12, wherein the first food holding zone includes an independently controlled first heating element located in a top portion of the food holding compartment and an

independently controlled second heating element located in a bottom portion of the food holding compartment.

14. The method of claim 13, further comprising providing more heat energy from the first heating element than from the second heating element.

15. The method of claim 13, further comprising providing radiant heat from the first heating element.

16. The method of claim 13, further comprising providing conduction heat from the second heating element.

Abstract

A multi-zone food holding bin has a continuous food supporting surface with multiple food holding zones. Each food holding zone is independently controllable so that different food temperatures may be maintained in adjacent food holding zones.

MULTI-ZONE FOOD HOLDING BIN

BACKGROUND

[0001] Often the success of a restaurant depends, at least in part, on how quickly customers can be served with ordered food items and also on the quality of the food items when served. If the rate of food preparation equals the rate at which the food is ordered and sold, a restaurant can theoretically have freshly-prepared foods ready to serve for customers as they arrive. Since it is not always possible to match food production with customer ordering rates, and since certain fast food restaurant customers expect to receive their ordered food items quickly, many fast food restaurants prepare various food items in advance and keep them ready for sale until a customer arrives and purchases a pre-cooked food item.

[0002] To facilitate the food holding process, holding bins or holding ovens are often used to keep the food warm. Known holding bins can allow a cooked food item to be inserted from one side and taken from the opposite side whereby food preparers add food to the holding bin on one side and food servers on the opposite side take food from the holding bin. Food holding bins in which the cooked food item is inserted and removed from the same side are also known. The food items in the holding bins are kept warm by heating elements. However, food holding time in known holding bins or ovens is somewhat limited, generally less than 15 or 20 minutes before the food item must be discarded. As a result, restaurants can only keep a limited amount of pre-cooked food items on hand and often a significant amount of the pre-cooked food items must be discarded before they are sold, resulting in additional costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] FIG. 1 is a perspective view of a multi-zone food holding bin;

[0004] FIG. 2 is a front elevational view of the multi-zone food holding bin of FIG. 1;

[0005] FIG. 3 is a rear elevational view of the multi-zone food holding bin of FIG. 1;

[0006] FIG. 4A is a partially cut-away top perspective view of an alternate embodiment of a multi-zone food holding bin, and FIG. 4B is a close up of a shelf portion of the multi-zone food holding bin from circle 4B in FIG. 4A;

[0007] FIG. 5 is a partially cut-away bottom perspective view of the food holding bin of FIG. 4A; and

[0008] FIG. 6 is a partially cutaway top perspective view of yet another alternate embodiment of a multi-zone food holding bin.

DETAILED DESCRIPTION

[0009] Turning now to FIGS. 1-3, a multi-zone food holding bin 10 includes two separate food holding compartments 50. Additional food holding compartments 50 may also be included as explained in further detail below. Each separate food holding compartment 50 includes two or more separate food holding zones, for example, as illustrated in FIGS. 1-3, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b may include two food holding bays. For example, the first food holding zone 57a may include a first food holding bay 51a and a second food holding bay 51b. The second food holding zone 57b may include a third food holding bay 51c and a fourth food holding bay 51d. Each food holding bay 51a, 51b, 51c, 51d is capable of receiving a single food holding tray 27 and/or a single lid 21, as illustrated in the third food holding bay 51c in FIG. 2. The food holding bays 51a, 51b, 51c, and 51d are illustrated as being separated from one another by a dashed line in FIGS. 1-3. The dashed lines are for illustration only. The food holding bays need not have their boundaries

identified with any sort of line or other indicia in food holding compartment 50. Each food holding zone 57a, 57b can be configured to maintain a different food holding temperature, advantageously allowing the operator to hold different food products with different heating requirements in the same food holding compartment 50, thereby permitting increased energy efficiencies to be realized and potentially reducing the space requirements for holding different foods. For example, a first food product can be held in the first food holding bay 51a of the first food holding zone 57a and a second food product, which may be the same as the first food product or different from the first food product as long as both food products have substantially the same temperature requirements, can be held in the second food holding bay 51b of the first food holding zone 57a. Both the first food holding bay 51a and the second food holding bay 51b are held at a first temperature by independently controllable upper and lower heating elements. A third food product can be held in the third food holding bay 51c of the second food holding zone 57b and a fourth food product, which may be the same as the third food product or different from the third food product as long as both food products have substantially the same temperature requirements, may be held in the fourth food holding bay 51d of the second food holding zone 57b. Both the third food holding bay 51c and the fourth food holding bay 51d are held at a second temperature by independently controllable upper and lower heating elements. Because the heating elements used to heat the second food holding zone 57b are different from those used to heat the first food holding zone 57a, he second temperature of the second food holding zone 57b is capable of being independently set to be different from the first temperature of the first food holding zone 57a. Suitable heating elements are illustrated with respect to the embodiment shown in FIGS. 4A, 4B, and 5. This can be particularly useful for restaurants during lower demand times (as fewer food holding bins are needed to hold larger numbers of

different food items than previously) and also for smaller restaurants and retail operations (as space constraints can be met more easily).

[0010] In one embodiment of the bin 10, all of the compartments 50 are heated. In another embodiment, some compartments 50 may be refrigerated while other compartments 50 are heated. In yet another embodiment, one or more compartments 50 can be selectively heated or refrigerated.

[0011] The bin 10 includes a chassis 15. As illustrated, the chassis 15 includes a top panel 20, a bottom panel 25, a left-side panel 30, a right side panel 35, an open front face 40 and an open rear face 45. When the rear face 45 is open and uncovered, food items can be inserted by a first operator responsible for initial food preparation into one of the faces 40, 45 and passed through to and removed from the other of the faces 40, 45 by a second operator responsible for final food preparation, for example, a second operator responsible for packaging and customization of a food product for serving to the ultimate customer. In another embodiment, the rear face 45 may be "closed" and provided by a rear panel such that access into the bin 10 is only provided by the open front face 40. The panels may be insulated to reduce heat transfer between the interior of the bin 10 and the atmosphere surrounding the bin 10.

[0012] The bin 10 illustrated in FIG. 1 is sized, shaped and arranged to have two compartments 50, however, the bin 10 can have any number of compartments 50, including a single compartment 50. For clarity, the two compartments 50 depicted in FIGS. 1-3 are denominated using the letters A and B. The "A" compartment is the top or uppermost compartment 50 and the "B" compartment is the bottom or lower-most compartment 50.

[0013] In the embodiment illustrated in FIG. 1, the top or "A" compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and a first or upper-most shelf 52.

Compartment "B" is defined by the two sidewalls 30 and 35, the first or upper-most shelf 52, and the chassis bottom panel 25. In bin embodiments having only one compartment 50, the single compartment is defined by opposing, left and right sidewalls 30 and 35, a chassis top panel 20 and a chassis bottom panel 25. For brevity, bin construction and operation is described with regard to a bin 10 having two compartments 50 in FIGS. 1-3. However, other embodiments may have more than two compartments 50 or less than two compartments 50. For example, the embodiments illustrated in FIGS. 4A, 4B, 5, and 6 have four compartments 50. Again, other configurations are also possible.

[0014] The shelf 52, which partially defines the compartments 50, is planar or at least substantially planar and supported in the chassis 15 at opposing side ends by the two chassis side walls 30 and 35. The shelf 52 includes a planar and continuous top surface, which forms a planar and continuous bottom surface 53 of the upper compartment 50. The planar and continuous bottom surface 53 of the upper compartment 50 is configured to support food items (as used herein, the term "food item" includes but is not limited to containers or trays containing food products such as cooked protein patties, fried foods, and the like). In the illustrated embodiment, food items can be placed onto the planar and continuous bottom surface 53 and removed from the planar and continuous bottom surface 53 through the open front face 40 or through the open rear face 45. Because the bottom surface 53 is planar and continuous and substantially free of any dividing walls or other structure between the holding zones 57a, 57b, and more particularly between the food holding bays 51a, 51b, 51c, and 51d, cleaning of the bottom surface 53 can be easily accomplished.

[0015] A face plate or bezel 92 is generally attached to the front of the chassis 15. For example, the bezel can be attached to the sidewalls 30 and 35 of the chassis 15 so as to be

disposed underneath a top surface of the shelf 52. In bin embodiments having only one compartment 50, the bezel 92 may be attached to either of the chassis top or bottom panels 20, 25 of the bin 10. In the illustrated embodiment of FIGS. 1-3, the bezel 92 is set forward from the shelf 52 by a space 55. The space 52 forms a slot in which one or more latches 23 translate and/or rotate from a locked/default position to an unlocked position so as to release lids held in lid holding ledges 31 as will be discussed further below.

[0016] The bezels 92 may include information displays and/or controls, which are collectively identified by reference numeral 93. Although the chassis 15 can include panels concealing the heat generating devices located within a shelf, the bezel 92 also can conceal heating elements, which are located within the shelf 52, such that a separate panel is not present.

[0017] Each food holding bay 51a, 51b, 51c, 51d may include a dedicated display and/or control 93a, 93b, 93c, 93d, respectively. While each dedicated display and/or control 93a, 93b, 93c, 93d may display and/or control the temperature within individual food holding bays 51a, 51b, 51c, 51d, the food holding bays within a particular food holding zone (51a and 51b within 57a; 51c and 51d within 57b) have the same temperature setting. The dedicated display and/or controls 93a, 93b, 93c, 93d, may also display additional information about the food item stored in the food holding bay 51a, 51b, 51c, 51d. For example, while the temperature in the first food holding bay 51a and the second food holding bay 51b is the same (because both food holding bays 51a, 51b are located within a single food holding zone 57a), the display and/or control 93a, 93b may indicate that the first food holding bay 51a has a first food item (such as sausage) while the second food holding bay 51b has a second food item (such as eggs). In the embodiment illustrated in FIGS. 1-3, the display and control 93a, 93b, 93c, and 93d can display the particular food item, the temperature setpoint of a respective food holding bay 51a, 51b, 51c, 51d, along

with other information about the food item stored in the food holding bay 51a, 51b, 51c, 51d, such as the food holding bay is ready to receive food items, the food items in the food holding bay should be discarded, the food items in the food holding bay are older and should be used first relative to the same food items contained in another food holding bay, the food items in the food holding bay are newer relative to the same food items contained in another food holding bay such that the food items contained in the other food holding bay should be used first, it is time to cook more food product. Moreover, the heating elements for each food holding zone 57a, 57b can be controlled by the displays and/or controls 93a, 93b, 93c, 93d to maintain the temperature setpoint of the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b, 93c, 93d may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b, 51c, 51d) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. 1-3, a single bezel 92 is used to provide the display and/or control elements for two vertically adjacent compartments 50, but of course discrete bezels can also be used. The displays and/or controls 93a, 93b, 93c, 93d thus can provide a user graphical interface to one or more controllers (not shown) for the bin. A temperature control interface panel 95 may also be provided to control the temperatures of the food holding zones 57a, 57b.

[0018] Each food holding bay 51a, 51b, 51c, 51d may be sized to receive an individual food holding tray 27 and lid 21 (see FIG. 2 where the tray 27 is illustrated in broken lines). In order to conveniently store the lid 21, each food holding bay 51a, 51b, 51c, 51d may also include a dedicated lid holding shelf 31 that is sized to receive and store the lid 21 when the lid 21 is desired for use in combination with a food holding tray 27, such as when protein patties are contained within the tray 27. Generally, a top surface 27a of a food holding tray 27, when received in the lid holding shelf 31, is substantially flush with a top surface of the lid holding

shelf 31 such that when the tray 27 is disposed in the food holding bay 51c, the tray 27 can be in contact with and engaged by the lid 21 in the lid holding shelf 31 so as to retain moisture within the tray 27-lid 21 assembly. In some embodiments, the lid holding shelf 31 may be provided by formed sheet metal. In other embodiments, the lid holding shelf 31 may be provided by a wire form. Other structures are also possible.

[0019] Adjacent to each lid holding shelf 31 is one or more latches 23 having an open center portion. In the embodiment illustrated in FIGS. 1-3, each food holding zone 57a, 57b includes a single dedicated latch 23 that selectively secures lids 21 in the food holding shelves 31 in each food holding bay 51a, 51b, 51c, 51d. In the illustrated embodiment, the latches 23 have a round or curved body 29 that is rotatable and/or translatable (because of the open center) about a retaining element such as a pin or screw (not shown). In other embodiments, the latches 23 may have straight or angled outer surfaces that form other shapes, such as a square, a pentagon, a hexagon, or any other polygonal shape. The latches 23 may be disposed adjacent an opening into the food holding compartment 50 above the lid holding shelf 31. In one example, the latches 23 may be captured on a cylindrical retaining element between the chassis 15 and a top of the food holding compartment 50 above the lid holding shelf 31. In other embodiments, one or more washers (not shown), such as metal, nylon, or plastic washers, may be disposed on the cylindrical retaining element to space the latches 23 apart from the bezel 92 and the shelf 52 to prevent metal galling and/or to reduce friction between the latches 23 and the bezel 92 or shelf 52 to ease actuation of the latches 23.

[0020] The round body 29 may be oriented substantially parallel to a front face of the chassis 15 or the bezel 92 in a locked or default position, as illustrated by reference numeral 23a, which prevents inadvertent removal of a lid 21 from the lid holding shelf 31 when a tray 27 is

withdrawn. The latch 23 is in its default or locked position simply because of gravity, thus re-positioning the latch to an unlocked state advantageously requires simply overcoming the weight of the latch 23 by translational and/or rotational movement. The round body 29 may be rotated and/or translated upwards relative to the bezel 92 or lid holding shelf 31 from the locked or default position to an unlocked position, as illustrated by the dotted lines referencing latch 23 between food holding bay 51a and food holding bay 51b in FIG. 1; this rotational and/or translational movement of the latch 23 about the retaining element allows facile insertion or removal of a lid 21 to/from the lid holding shelf 31. The round body 29 may be mounted on a retaining element such as a pin or a screw (not shown), which retains the round body 29 and allows the round body 29 to translate along the open center portion and/or to at least partially rotate about the pin when the round body 29 translates. The lid holding shelf 31 also allows the food holding compartment 50 to have the planar and continuous bottom surface 52 by storing the lids 27a in an elevated position, with the lid holding shelf 31 being suspended above the continuous bottom surface 52, typically by fixedly attaching a base of the shelf to a top surface of the food holding compartment 50 at one or more positions. Such continuous planar and continuous bottom surfaces 52 are much easier to clean than compartmentalized or divided heating chambers. Furthermore, the round body 29 of the latch 23 and the translation/rotation movement of the latch allow easy removal of the lids 27 from the lid holding tray 31 with one hand while positioning the latch 23 to the unlocked position with another hand.

[0021] From a purely functional standpoint, a preferred latch 23 might simply include a locking portion that is able to prevent inadvertent displacement of the lid 21 when the tray 27 is purposefully removed. Thus, a number of different configurations and shapes can be used for the latch 23. The latch 23 illustrated here with the round body 29, on the other hand, has an

alternative, ornamental arrangement for the round body 29 in which the edges of the round body 29 include an arc-shaped, curved surface. This illustrated arrangement may add to the cost of manufacture, so the illustrated latch does not provide all of the possible economic advantages that might be derived from the invention. On the other hand, this arrangement is believed to be aesthetically pleasing and is likely to be recognized and relied upon by purchasers to identify the source of the food holding bin.

[0022] FIGS. 4A, 4B, and 5 are perspective views of an alternate embodiment of a multi-zone food holding bin 10, the embodiment of FIGS. 4A, 4B, and 5 including four separate food holding compartments 50. The embodiment of FIGS. 4A, 4B, and 5 is substantially identical to the embodiment of FIGS. 1-3 with the exception that the embodiment of FIGS. 4A, 4B, and 5 includes four food holding compartments 50 instead of two, each food holding compartment 50 including two food holding zones 57a, 57b, and each food holding zone 57a, 57b including a single food holding bay 51a, 51b, respectively. Thus, reference numbers identifying identical elements are the same in FIGS. 1-3 and in FIGS. 4A, 4B, and 5. Moreover, elements not illustrated in one of the embodiments are understood to be present in the other embodiment. For example, the embodiment illustrated in FIGS. 4A, 4B, and 5 includes cut-away views showing internal components that are not visible in FIGS. 1-3. Nevertheless, these internal components are understood to be present in the embodiment illustrated in FIGS. 1-3 as well.

[0023] Similar to the embodiment of FIGS. 1-3, each separate food holding compartment 50 in the food holding bin 10 of FIGS. 4A, 4B, and 5 includes at least two separate food holding zones, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b is configured to maintain a different temperature. Of course, it is not necessary for the food holding zones 57a, 57b to be operated at different temperatures in practice.

[0024] The bin 10 illustrated in FIG. 4A is sized, shaped and arranged to have four compartments 50, however, bins in accordance with the disclosure can have any number of compartments, including a single compartment.

[0025] In FIG. 4A, the first or top compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and the first or upper-most shelf 52. The second compartment is defined by the two sidewalls 30 and 35, the shelf 52 for the first compartment and the second shelf 52. The third compartment is defined by the two sidewalls 30, 35, the second shelf 52 and the third shelf 52. The fourth compartment is defined by the two sidewalls 30 and 35, the third shelf and the chassis bottom 25.

[0026] The shelves 52, which partially define the compartments 50, are planar or at least substantially planar and supported in the chassis 15 at their opposing side ends by the two chassis side walls 30 and 35. Each shelf 52 forms a planar and continuous top surface, which defines a planar and continuous bottom surface 53 of the compartment 50. The planar and continuous bottom surface 53 of the compartment is configured to support food items (as mentioned above, the term "food item" includes but is not limited to containers or trays containing food products such as cooked protein patties, fried foods, and the like). Food items can be placed onto the planar bottom surface 53 and removed from the planar bottom surface 53 through the open front face 40 or through the open rear face 45.

[0027] Each food holding bay 51a, 51b may include a dedicated display and/or control 93a, 93b, respectively. Each display and/or control 93a, 93b may display the temperature setpoint of a respective food holding bay 51a, 51b, and in the embodiment illustrated in FIGS. 4A, 4B, and 5, the temperature of a respective food holding zone 57a, 57b. Moreover, each display and/or control 93a, 93b may control the respective heating elements that maintain the temperature

setpoint of the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. 4A, 4B, and 5, a single bezel 92 is used to provide the display and/or control elements for a single compartment 50. The displays and/or controls 93a, 93b can provide a graphical user interface to one or more controllers (not shown) for the bin 10.

[0028] Bin 10 control and control of the food holding zone 51 temperature is effectuated in part by using one or more microcontrollers or microprocessors 97 in combination with temperature sensors 99. US 2011-0114624 A1 entitled "Food Holding Cabinet Power Supplies with Downloadable Software," the entirety of which is hereby incorporated by reference herein, discloses among other things, apparatuses and methods by which compartments of a food holding bin can be controlled using microprocessors having downloadable software. Compartment temperature control is preferably effectuated using a semiconductor temperature sensor, thermally coupled to each food holding zone 51 and electrically connected to a processor, such as those disclosed in US 2011-0114624 A1.

[0029] A semiconductor apparatus and method for measuring temperature of a plate or shelf in a food holding bin is disclosed in U.S. pat. No. 8,247,745, which is entitled "Temperature Sensor for a Food Holding Cabinet" the entirety of which is hereby incorporated by reference herein.

[0030] The shelf 52 includes a lower heating element 67 for the first food holding zone 57a in a first or top food holding compartment 50, and an upper heating element 65 for a second food holding zone 57b in a second or lower food holding compartment 50, directly below the first food holding compartment 50. While the first heating element 67 is illustrated as providing heat to the upper first food holding zone 57a (from below) and the second heating element 65 is

illustrated as providing heat to the lower first food holding zone 57a (from above), heating elements that are not shown include at least a heating element that provides heat to the upper first food holding zone 57a from above and another heating element that provides heat to the lower first food holding zone 57a from below. Additionally, the second food holding zones 57b, which are adjacent to the first food holding zones 57a, are heated in the same way as the first food holding zones 57a, but with independent heating elements. The heating elements of the second food holding zones 57b are independently controllable from the heating elements of the first food holding zones 57a. Referring to the inset FIG. 4B, the shelf 52 includes an upper thermally conductive plate, which forms the continuous planar bottom surface 53 of the first (or upper) food holding compartment 50 and a lower thermally conductive plate, which forms a continuous planar upper surface 54 of the second (or lower) food holding compartment 50. The planar bottom surface 53 and the planar upper surface 54 are spaced apart from each other by a distance sufficient to accommodate the inclusion of at least two heating elements, which are illustrated in the figures as the separate first heating element 67 and the separate second heating element 65, respectively. Again, the temperature of each food holding zone is controlled by independently controllable heating elements. Insulative materials may be provided between the first heating element 67 and the second heating element 65 to provide better thermal control over the food holding zones 57a, 57b. The first heating element 67 is a lower heating element for the upper food holding compartment 50 and the second heating element 65 is an upper heating element for the lower food holding compartment 50.

[0031] The continuous planar bottom surface 53 of the top food holding compartment 50 and the continuous planar upper surface 54 of the bottom food holding compartment are preferably made of aluminum, between about one-eighth and about one-quarter inch-thick. Alternate

embodiments of the shelf 52 may use a thermally-conductive panel made of glass-ceramic or an ultra-low expansion glass for one or both of the lower surface 53 and the upper surface 54. Glass-ceramics and ultra-low expansion glass are considered herein to be "good" thermal conductors in that their conduction of heat energy is localized. Such materials also make excellent shelves for a heated, multi-zone food holding bin because they permit localized areas of a shelf to be heated to a first temperature, without having the entire shelf reach the same temperature.

[0032] The first heating element 67 is disposed between the planar bottom surface 53 and the planar upper surface 54 and the first heating element 67 is in thermal communication with the planar bottom surface 53. The first heating element 67 may be mechanically attached to the planar bottom surface 53 by a thermally-conductive adhesive, in one embodiment. The first heating element 67 may also be attached to the planar bottom surface 53 by brackets or clamps.

[0033] The second heating element 65 is disposed between the planar bottom surface 53 and the planar upper surface 54 and the second heating element 65 is in thermal communication with the planar upper surface 54. The second heating element 65 may be mechanically attached to the planar upper surface 54 by a thermally-conductive adhesive, in one embodiment. The second heating element 65 may also be attached to the planar upper surface 54 by brackets or clamps.

[0034] In the embodiment illustrated in FIGS. 4A, 4B, and 5, the first heating element 67 can be located above the second heating element 65 but in thermal communication with the planar bottom surface 53 such that when the temperature of the first heating element 67 rises, it provides heat energy into the planar bottom surface 53 in a region around the first heating element 67, and more specifically, within the first food holding zone 57a of the first or top food holding compartment 50. Thermally insulating the first heating element 67 from the planar upper

surface 54 and thermally insulating the second heating element 65 from the planar bottom surface 53, enables the first heating element 67 to provide a first amount of heat energy into the planar bottom surface 53 (and thus into the first food holding zone 57a of the upper food holding compartment 50), while the second heating element 65 provides a second amount of heat energy into the planar upper surface 54 (and thus into the first food holding zone 57b of the lower food holding compartment 50). In this manner, each food holding zone 57a, 57b may be configured to have an independent and unique temperature profile from top to bottom of the food holding zone 57a, 57b. For example, one food holding zone 57a, 57b may have a temperature profile that generally decreases from top to bottom (i.e., the top of the food holding zone 57a, 57b is hotter than the bottom of the food holding zone 57a, 57b).

[0035] In some embodiments, the second heating element 65 may comprise a radiant heating source that projects radiant heat through the planar upper surface 54 and into the first food holding zone 57a of the lower food holding compartment 50. In other words, in one embodiment, the first heating element 67 provides heat energy into the first food holding zone 57a of the upper food holding compartment 50 through conduction, while the second heating element 65 provides heat energy into the first food holding zone 57a of the lower food holding compartment through radiation. Similarly, a radiant heating element may be provided at a top interior surface of the first or top food holding compartment 50 beneath the chassis top panel 20. In this manner, the top and bottom of a food product placed into the first food holding zone 57a may absorb different amounts of heat energy, customized depending on the type of food product. Thus, the heat profile in the first food holding zone 57a may be customized vertically as well as differentiated from the heat profile in the second food holding zone 57b. As a result, a single food holding compartment 50 (e.g., the upper compartment in FIGS. 4A and 5) may be

customized to store different types of food products in the first food holding zone 57a and the second food holding zone 57b, each food holding zone 57a, 57b having a different temperature profile. As a result, the disclosed food holding bin 10 is flexible in that it can keep multiple different types of food products at their ideal holding temperatures in a single food holding compartment, thus increasing efficiency and adaptability to different food demands.

[0036] Because of this flexibility, it has been found that a food holding bin constructed in accordance with the disclosure can extend the palatability time of a food item by a factor of two or more.

[0037] An alternate embodiment, as illustrated in FIG. 6, may use the thermoelectric effect provided by one or more Peltier devices 80 to heat one or more of the compartments 50.

[0038] The thermoelectric effect is a direct conversion of a temperature difference into an electric voltage and vice versa. When a voltage is applied to a thermoelectric device, a temperature difference is created across the two sides of the device. The temperature difference created in response to an applied voltage is known as the Peltier effect. Devices that produce temperature differences in response to an applied voltage are considered herein to be Peltier devices. A Peltier device 80 is therefore considered herein to be a heat source or heating element.

[0039] Peltier devices have a "cold" side and a "hot" side. The cold side absorbs heat whereas the hot side emits heat. Heat emitted from the hot side includes at least some of the heat absorbed from the cold side. A Peltier device 80 is therefore considered herein to be a solid-state heat pump or heat-sinking device.

[0040] FIG. 6 is a cutaway view of another embodiment of a point-of-use holding bin using Peltier devices to heat the food holding compartments 50. In one embodiment, one or more

Peltier devices 80 are "sandwiched" between, and in thermal communication with the bottom planar surface 53 and the upper planar surface 54 described above. Electrical energy is provided to the Peltier devices 80 through wires 85, under the control of a controller.

[0041] "Sandwiching" the Peltier devices in a shelf 52 as shown in FIG. 6 provides a shelf 52 cold on one side and hot on the other. Such a shelf 52 structure thus enables a dual-mode food holding bin 10 having a "first" food holding compartment 50 that is warm and a vertically adjacent "second" food holding compartment 50 that is cold.

[0042] Temperature control of a thermoelectric, Peltier device 80 may be accomplished by controlling the electric energy provided to the device. Temperature control of one side of the Peltier device 80 can also be effectuated by controlling heat transferred into or out of the opposite side of the device, as described in US 2010-0307168 A1, entitled "Thermo Electric Cooler," the disclosure of which is incorporated herein by reference in its entirety.

[0043] In another embodiment of a multi-zone food holding bin 10, multiple Peltier devices 80 are mounted between the bottom surface 53 and the upper surface 54 but have only their hot sides thermally coupled to the bottom surface 53 and to the upper surface 54. Air is then moved through the inter-plate space to heat the cool sides of the Peltier devices therein.

[0044] Peltier devices as disclosed herein and similar heat transfer devices are thermally coupled to the shelf 52, preferably by way of mechanical attachment to at least one of the plates that form the lower planar surface 53 and the upper planar surface 54. Mechanical attachment and the resultant thermal coupling is preferably accomplished by a thermally-conductive adhesive, however, clamps that are attached to a plate by screws driven into a plate can also be used.

[0045] The shelves are mechanically coupled to the side panels 30 and 35. The side panels are also preferably made from thermally-conductive material such as aluminum. Thermally coupling a heat transfer device to one or more plates that comprise a shelf therefore also thermally couples the heat transfer device to the side walls and thus to the compartment. Heat transfer devices coupled to a shelf are therefore also thermally coupled to the corresponding compartment.

[0046] While the temperature of a Peltier device can be controlled by controlling the heat dissipated from the hot side and/or the heat absorbed into the cold side, bin embodiments disclosed herein preferably control compartment temperature using one or more semiconductor temperature sensors, thermally coupled to one or more of the thermally-conductive structures that comprise a compartment. Bin embodiments disclosed herein preferably use a semiconductor temperature sensor that is directly coupled and therefore thermally coupled to the heated surfaces 53 and/or 54 provided by the shelves 52.

[0047] Semiconductor temperature sensors used in preferred embodiments disclosed herein are disclosed in U.S. Pat. No. 8,247,745, which is entitled "Temperature Sensor for a Food Holding Cabinet" the entirety of which is hereby incorporated by reference herein, especially the teachings of the structure and use of a semiconductor temperature sensor.

[0048] Thus, suitable heating elements for use in accordance with the disclosure include electrically-resistive heating elements, such as heated coils, radiant heating elements that provide heat energy via radiation, and devices and ancillary equipment that provide heat to a working fluid. As described above, Peltier devices may also be used as heating elements in accordance with the disclosure.

[0049] The foregoing description is for purposes of illustration only and not for purposes of limitation. The true scope of the invention is set forth by the appended claims.

What is claimed is:

1. A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment;

a first food holding zone formed in the food holding compartment, the first food holding zone having an independently controllable first heating element disposed at a top portion of the food holding compartment, and an independently controllable second heating element disposed at a bottom portion of the food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray; and

a second food holding zone formed in the food holding compartment, the second food holding zone having an independently controllable third heating element disposed at the top portion of the food holding compartment and an independently controllable fourth heating element disposed at the bottom portion of the food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to

maintain a first temperature and the second food holding zone is configured to maintain a second temperature, the first temperature and the second temperature capable of being different than one another.

2. The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4. The food holding bin of claim 1, wherein the first heating element is a radiant heating element.

5. The food holding bin of claim 1, wherein the second heating element is a conductive heating element.

6. The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. The food holding bin of claim 1, further comprising a food holding tray disposed in the first food holding compartment, and in the first food holding bay, and resting on the continuous and planar bottom surface.

10. The food holding bin of claim 9, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface;

independently setting a first temperature in the first food holding zone;

independently setting a second temperature in the second food holding zone,

wherein the first temperature is different from the second temperature.

13. The method of claim 12, wherein the first food holding zone includes an independently controlled first heating element located in a top portion of the food holding compartment and an

independently controlled second heating element located in a bottom portion of the food holding compartment.

14. The method of claim 13, further comprising providing more heat energy from the first heating element than from the second heating element.

15. The method of claim 13, further comprising providing radiant heat from the first heating element.

16. The method of claim 13, further comprising providing conduction heat from the second heating element.

Abstract

A multi-zone food holding bin has a continuous food supporting surface with multiple food holding zones. Each food holding zone is independently controllable so that different food temperatures may be maintained in adjacent food holding zones.

Electronic Patent Application Fee Transmittal

Application Number:	15134380
Filing Date:	20-Apr-2016
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Filer:	Michael Alexander Chinlund/Diane Arpino
Attorney Docket Number:	29178/50736

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late Filing Fee for Oath or Declaration	1051	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**140**

Electronic Acknowledgement Receipt

EFS ID:	25744567
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Michael Alexander Chinlund/Diane Arpino
Filer Authorized By:	Michael Alexander Chinlund
Attorney Docket Number:	29178/50736
Receipt Date:	11-MAY-2016
Filing Date:	20-APR-2016
Time Stamp:	12:17:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$140
RAM confirmation Number	10301
Deposit Account	132855
Authorized User	CHINLUND, MICHAEL A.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		MAC_Response_to_Notice_of_File_Corrected_Application_Papers.PDF	34833 56efc5a0b6d6efe7ffe2e711fae8f19b0b46a4e1	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Response to Pre-Exam Formalities Notice	1	1
	Specification	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	9

Warnings:					
Information:					
2	Specification	substitute_specification_marked-up_version_5_10_16.PDF	69837 3470b420c1fdce7a0e3d045f5633ddec1a9c4bca	no	25
Warnings:					
Information:					
3	Specification	substitute_specification_clean_version_5_10_16.PDF	68052 963bae743486522ac6dc3a914f63c7cbdc289ce2	no	24
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30175 5ce7259efecd665a343f6ae8aa1372c546ed5664	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	202897		

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

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/134,380	04/20/2016	3781	1600	29178/50736	16	2

CONFIRMATION NO. 1584

4743
MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
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CHICAGO, IL 60606-6357

FILING RECEIPT

OC000000082704626

Date Mailed: 05/06/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

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Christopher B. Lyons JR., LaGrange, IL;
Charles B. Hartfelder, Hanover Park, IL;
Zachary N. McCoy, South Elgin, IL;

Applicant(s)

PRINCE CASTLE LLC, Carol Stream, IL;

Power of Attorney: The patent practitioners associated with Customer Number 04743

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/05/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/134,380**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No

Title

Multi-Zone Food Holding Bin

Preliminary Class

220

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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 AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/134,380

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	16 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/134,380	04/20/2016	Kyle Thomas Kestner	29178/50736

CONFIRMATION NO. 1584

4743
MARSHALL, GERSTEIN & BORUN LLP
233 SOUTH WACKER DRIVE
6300 WILLIS TOWER
CHICAGO, IL 60606-6357

FORMALITIES LETTER

OC000000082704627

Date Mailed: 05/06/2016

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The application contains drawings and the specification contains a brief description of the drawings. However, the specification does not contain a brief description of the several views of the drawings as required by 37 CFR 1.74 and 37 CFR 1.77(b)(7) and/or a drawing(s) has not been labeled in accordance with 37 CFR 1.84(u)(1). If each figure is not labeled "Fig." with a consecutive Arabic numeral (1, 2, etc.) or an Arabic numeral and capital letter in the English alphabet (A, B, etc.), then the drawing(s) must be relabeled in accordance with 37 CFR 1.84(u)(1). In addition, if the brief description of the several views of the drawings does not refer to the figure(s) as properly labeled, then the specification must be amended to correspond to the figure(s) as properly labeled and a substitute specification in compliance with 37 CFR 1.52, 1.121(b)(3), and 1.125, is required.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. No entity status discount is in effect. If applicant is qualified for small entity status, a written assertion of small entity status must be submitted to establish small entity status. (See 37 CFR 1.27). If applicant is qualified

for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **140** surcharge.
- $(**0**) previous unapplied payment amount.
- $ **140** TOTAL FEE BALANCE DUE.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Kyle Thomas Kestner
  Christopher B. Lyons JR.
  Charles B. Hartfelder
  Zachary N. McCoy

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

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/sgorems/

PTO/AIA/15 (03-13)
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	29178/50736
First Named Inventor	Kyle Thomas Kestner
Title	Multi-Zone Food Holding Bin
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [ ] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [X] **Specification** [*Total Pages* 24]
   Both the claims and abstract must start on a new page.
   (See MPEP § 608.01(a) for information on the preferred arrangement)
5. [X] **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 6]
6. **Inventor's Oath or Declaration** [*Total Pages*]
   (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))
   a. [ ] Newly executed (original or copy)
   b. [ ] A copy from a prior application (37 CFR 1.63(d))
7. [X] **Application Data Sheet** ** See note below.*
   See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   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

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ACCOMPANYING APPLICATION PAPERS

10. [ ] **Assignment Papers**
    (cover sheet & document(s))
    Name of Assignee
11. [ ] **37 CFR 3.73(c) Statement** (*when there is an assignee*) [X] **Power of Attorney**
12. [ ] **English Translation Document** (*if applicable*)
13. [ ] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
14. [ ] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. [ ] **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. [X] **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [ ] **Other:**

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[X] The address associated with Customer Number: 04743 **OR** [ ] Correspondence address below

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Signature	/Michael A. Chinlund/	Date	2016-04-20
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3837822

Application Data Sheet

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Correspondence Information

Correspondence Customer Number::	04743

Application Information

Application Type::	Regular
Subject Matter::	Utility
CD-ROM or CD-R?::	None
Sequence submission?::	None
Computer Readable Form (CRF)?::	No
Title::	Multi-Zone Food Holding Bin
Attorney Docket Number::	29178/50736
Request for Early Publication?::	No
Request for Non-Publication?::	No
Total Drawing Sheets::	6
Small Entity?::	No

Petition included?::	No
Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2::	No

Representative Information

Representative Customer Number::	04743

Domestic Priority Information

Foreign Priority Information

Applicant Information

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Applicant Type::	Assignee
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Assignee Information Including Non-Applicant Assignee Information

Authorization or Opt-Out of Authorization to Permit Access

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Signature:

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This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Michael A. Chinlund/	Date (YYYY-MM-DD)	2016-04-20
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MULTI-ZONE FOOD HOLDING BIN

BACKGROUND

[0001] Often the success of a restaurant depends, at least in part, on how quickly customers can be served with ordered food items and also on the quality of the food items when served. If the rate of food preparation equals the rate at which the food is ordered and sold, a restaurant can theoretically have freshly-prepared foods ready to serve for customers as they arrive. Since it is not always possible to match food production with customer ordering rates, and since certain fast food restaurant customers expect to receive their ordered food items quickly, many fast food restaurants prepare various food items in advance and keep them ready for sale until a customer arrives and purchases a pre-cooked food item.

[0002] To facilitate the food holding process, holding bins or holding ovens are often used to keep the food warm. Known holding bins can allow a cooked food item to be inserted from one side and taken from the opposite side whereby food preparers add food to the holding bin on one side and food servers on the opposite side take food from the holding bin. Food holding bins in which the cooked food item is inserted and removed from the same side are also known. The food items in the holding bins are kept warm by heating elements. However, food holding time in known holding bins or ovens is somewhat limited, generally less than 15 or 20 minutes before the food item must be discarded. As a result, restaurants can only keep a limited amount of pre-cooked food items on hand and often a significant amount of the pre-cooked food items must be discarded before they are sold, resulting in additional costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] FIG. 1 is a perspective view of a multi-zone food holding bin;

[0004] FIG. 2 is a front elevational view of the multi-zone food holding bin of FIG. 1;

[0005] FIG. 3 is a rear elevational view of the multi-zone food holding bin of FIG. 1;

[0006] FIG. 4 is a partially cut-away top perspective view of an alternate embodiment of a multi-zone food holding bin;

[0007] FIG. 5 is a partially cut-away bottom perspective view of the food holding bin of FIG. 4; and

[0008] FIG. 6 is a partially cutaway top perspective view of yet another alternate embodiment of a multi-zone food holding bin.

DETAILED DESCRIPTION

[0009] Turning now to FIGS. 1-3, a multi-zone food holding bin 10 includes two separate food holding compartments 50. Additional food holding compartments 50 may also be included as explained in further detail below. Each separate food holding compartment 50 includes two or more separate food holding zones, for example, as illustrated in FIGS. 1-3, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b may include two food holding bays. For example, the first food holding zone 57a may include a first food holding bay 51a and a second food holding bay 51b. The second food holding zone 57b may include a third food holding bay 51c and a fourth food holding bay 51d. Each food holding bay 51a, 51b, 51c, 51d is capable of receiving a single food holding tray 27 and/or a single lid 21, as illustrated in the third food holding bay 51c in FIG. 2. The food holding bays 51a, 51b, 51c, and 51d are illustrated as being separated from one another by a dashed line in FIGS. 1-3. The dashed lines are for illustration only. The food holding bays need not have their boundaries identified with any sort of line or other indicia in food holding compartment 50. Each food

holding zone 57a, 57b can be configured to maintain a different food holding temperature, advantageously allowing the operator to hold different food products with different heating requirements in the same food holding compartment 50, thereby permitting increased energy efficiencies to be realized and potentially reducing the space requirements for holding different foods. For example, a first food product can be held in the first food holding bay 51a of the first food holding zone 57a and a second food product, which may be the same as the first food product or different from the first food product as long as both food products have substantially the same temperature requirements, can be held in the second food holding bay 51b of the first food holding zone 57a. Both the first food holding bay 51a and the second food holding bay 51b are held at a first temperature by independently controllable upper and lower heating elements. A third food product can be held in the third food holding bay 51c of the second food holding zone 57b and a fourth food product, which may be the same as the third food product or different from the third food product as long as both food products have substantially the same temperature requirements, may be held in the fourth food holding bay 51d of the second food holding zone 57b. Both the third food holding bay 51c and the fourth food holding bay 51d are held at a second temperature by independently controllable upper and lower heating elements. Because the heating elements used to heat the second food holding zone 57b are different from those used to heat the first food holding zone 57a, he second temperature of the second food holding zone 57b is capable of being independently set to be different from the first temperature of the first food holding zone 57a. Suitable heating elements are illustrated with respect to the embodiment shown in FIGS. 4 and 5. This can be particularly useful for restaurants during lower demand times (as fewer food holding bins are needed to hold larger numbers of different

food items than previously) and also for smaller restaurants and retail operations (as space constraints can be met more easily).

[0010] In one embodiment of the bin 10, all of the compartments 50 are heated. In another embodiment, some compartments 50 may be refrigerated while other compartments 50 are heated. In yet another embodiment, one or more compartments 50 can be selectively heated or refrigerated.

[0011] The bin 10 includes a chassis 15. As illustrated, the chassis 15 includes a top panel 20, a bottom panel 25, a left-side panel 30, a right side panel 35, an open front face 40 and an open rear face 45. When the rear face 45 is open and uncovered, food items can be inserted by a first operator responsible for initial food preparation into one of the faces 40, 45 and passed through to and removed from the other of the faces 40, 45 by a second operator responsible for final food preparation, for example, a second operator responsible for packaging and customization of a food product for serving to the ultimate customer. In another embodiment, the rear face 45 may be "closed" and provided by a rear panel such that access into the bin 10 is only provided by the open front face 40. The panels may be insulated to reduce heat transfer between the interior of the bin 10 and the atmosphere surrounding the bin 10.

[0012] The bin 10 illustrated in FIG. 1 is sized, shaped and arranged to have two compartments 50, however, the bin 10 can have any number of compartments 50, including a single compartment 50. For clarity, the two compartments 50 depicted in FIGS. 1-3 are denominated using the letters A and B. The "A" compartment is the top or uppermost compartment 50 and the "B" compartment is the bottom or lower-most compartment 50.

[0013] In the embodiment illustrated in FIG. 1, the top or "A" compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and a first or upper-most shelf 52.

Compartment "B" is defined by the two sidewalls 30 and 35, the first or upper-most shelf 52, and the chassis bottom panel 25. In bin embodiments having only one compartment 50, the single compartment is defined by opposing, left and right sidewalls 30 and 35, a chassis top panel 20 and a chassis bottom panel 25. For brevity, bin construction and operation is described with regard to a bin 10 having two compartments 50 in FIGS. 1-3. However, other embodiments may have more than two compartments 50 or less than two compartments 50. For example, the embodiments illustrated in FIGS. 4-6 have four compartments 50. Again, other configurations are also possible.

[0014] The shelf 52, which partially defines the compartments 50, is planar or at least substantially planar and supported in the chassis 15 at opposing side ends by the two chassis side walls 30 and 35. The shelf 52 includes a planar and continuous top surface, which forms a planar and continuous bottom surface 53 of the upper compartment 50. The planar and continuous bottom surface 53 of the upper compartment 50 is configured to support food items (as used herein, the term "food item" includes but is not limited to containers or trays containing food products such as cooked protein patties, fried foods, and the like). In the illustrated embodiment, food items can be placed onto the planar and continuous bottom surface 53 and removed from the planar and continuous bottom surface 53 through the open front face 40 or through the open rear face 45. Because the bottom surface 53 is planar and continuous and substantially free of any dividing walls or other structure between the holding zones 57a, 57b, and more particularly between the food holding bays 51a, 51b, 51c, and 51d, cleaning of the bottom surface 53 can be easily accomplished.

[0015] A face plate or bezel 92 is generally attached to the front of the chassis 15. For example, the bezel can be attached to the sidewalls 30 and 35 of the chassis 15 so as to be

disposed underneath a top surface of the shelf 52. In bin embodiments having only one compartment 50, the bezel 92 may be attached to either of the chassis top or bottom panels 20, 25 of the bin 10. In the illustrated embodiment of FIGS. 1-3, the bezel 92 is set forward from the shelf 52 by a space 55. The space 52 forms a slot in which one or more latches 23 translate and/or rotate from a locked/default position to an unlocked position so as to release lids held in lid holding ledges 31 as will be discussed further below.

[0016] The bezels 92 may include information displays and/or controls, which are collectively identified by reference numeral 93. Although the chassis 15 can include panels concealing the heat generating devices located within a shelf, the bezel 92 also can conceal heating elements, which are located within the shelf 52, such that a separate panel is not present.

[0017] Each food holding bay 51a, 51b, 51c, 51d may include a dedicated display and/or control 93a, 93b, 93c, 93d, respectively. While each dedicated display and/or control 93a, 93b, 93c, 93d may display and/or control the temperature within individual food holding bays 51a, 51b, 51c, 51d, the food holding bays within a particular food holding zone (51a and 51b within 57a; 51c and 51d within 57b) have the same temperature setting. The dedicated display and/or controls 93a, 93b, 93c, 93d, may also display additional information about the food item stored in the food holding bay 51a, 51b, 51c, 51d. For example, while the temperature in the first food holding bay 51a and the second food holding bay 51b is the same (because both food holding bays 51a, 51b are located within a single food holding zone 57a), the display and/or control 93a, 93b may indicate that the first food holding bay 51a has a first food item (such as sausage) while the second food holding bay 51b has a second food item (such as eggs). In the embodiment illustrated in FIGS. 1-3, the display and control 93a, 93b, 93c, and 93d can display the particular food item, the temperature setpoint of a respective food holding bay 51a, 51b, 51c, 51d, along

with other information about the food item stored in the food holding bay 51a, 51b, 51c, 51d, such as the food holding bay is ready to receive food items, the food items in the food holding bay should be discarded, the food items in the food holding bay are older and should be used first relative to the same food items contained in another food holding bay, the food items in the food holding bay are newer relative to the same food items contained in another food holding bay such that the food items contained in the other food holding bay should be used first, it is time to cook more food product. Moreover, the heating elements for each food holding zone 57a, 57b can be controlled by the displays and/or controls 93a, 93b, 93c, 93d to maintain the temperature setpoint of the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b, 93c, 93d may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b, 51c, 51d) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. 1-3, a single bezel 92 is used to provide the display and/or control elements for two vertically adjacent compartments 50, but of course discrete bezels can also be used. The displays and/or controls 93a, 93b, 93c, 93d thus can provide a user graphical interface to one or more controllers (not shown) for the bin. A temperature control interface panel 95 may also be provided to control the temperatures of the food holding zones 57a, 57b.

[0018] Each food holding bay 51a, 51b, 51c, 51d may be sized to receive an individual food holding tray 27 and lid 21 (see FIG. 2 where the tray 27 is illustrated in broken lines). In order to conveniently store the lid 21, each food holding bay 51a, 51b, 51c, 51d may also include a dedicated lid holding shelf 31 that is sized to receive and store the lid 21 when the lid 21 is desired for use in combination with a food holding tray 27, such as when protein patties are contained within the tray 27. Generally, a top surface 27a of a food holding tray 27, when received in the lid holding shelf 31, is substantially flush with a top surface of the lid holding

shelf 31 such that when the tray 27 is disposed in the food holding bay 51c, the tray 27 can be in contact with and engaged by the lid 21 in the lid holding shelf 31 so as to retain moisture within the tray 27-lid 21 assembly. In some embodiments, the lid holding shelf 31 may be provided by formed sheet metal. In other embodiments, the lid holding shelf 31 may be provided by a wire form. Other structures are also possible.

[0019] Adjacent to each lid holding shelf 31 is one or more latches 23 having an open center portion. In the embodiment illustrated in FIGS. 1-3, each food holding zone 57a, 57b includes a single dedicated latch 23 that selectively secures lids 21 in the food holding shelves 31 in each food holding bay 51a, 51b, 51c, 51d. In the illustrated embodiment, the latches 23 have a round or curved body 29 that is rotatable and/or translatable (because of the open center) about a retaining element such as a pin or screw (not shown). In other embodiments, the latches 23 may have straight or angled outer surfaces that form other shapes, such as a square, a pentagon, a hexagon, or any other polygonal shape. The latches 23 may be disposed adjacent an opening into the food holding compartment 50 above the lid holding shelf 31. In one example, the latches 23 may be captured on a cylindrical retaining element between the chassis 15 and a top of the food holding compartment 50 above the lid holding shelf 31. In other embodiments, one or more washers (not shown), such as metal, nylon, or plastic washers, may be disposed on the cylindrical retaining element to space the latches 23 apart from the bezel 92 and the shelf 52 to prevent metal galling and/or to reduce friction between the latches 23 and the bezel 92 or shelf 52 to ease actuation of the latches 23.

[0020] The round body 29 may be oriented substantially parallel to a front face of the chassis 15 or the bezel 92 in a locked or default position, as illustrated by reference numeral 23a, which prevents inadvertent removal of a lid 21 from the lid holding shelf 31 when a tray 27 is

withdrawn. The latch 23 is in its default or locked position simply because of gravity, thus re-positioning the latch to an unlocked state advantageously requires simply overcoming the weight of the latch 23 by translational and/or rotational movement. The round body 29 may be rotated and/or translated upwards relative to the bezel 92 or lid holding shelf 31 from the locked or default position to an unlocked position, as illustrated by the dotted lines referencing latch 23 between food holding bay 51a and food holding bay 51b in FIG. 1; this rotational and/or translational movement of the latch 23 about the retaining element allows facile insertion or removal of a lid 21 to/from the lid holding shelf 31. The round body 29 may be mounted on a retaining element such as a pin or a screw (not shown), which retains the round body 29 and allows the round body 29 to translate along the open center portion and/or to at least partially rotate about the pin when the round body 29 translates. The lid holding shelf 31 also allows the food holding compartment 50 to have the planar and continuous bottom surface 52 by storing the lids 27a in an elevated position, with the lid holding shelf 31 being suspended above the continuous bottom surface 52, typically by fixedly attaching a base of the shelf to a top surface of the food holding compartment 50 at one or more positions. Such continuous planar and continuous bottom surfaces 52 are much easier to clean than compartmentalized or divided heating chambers. Furthermore, the round body 29 of the latch 23 and the translation/rotation movement of the latch allow easy removal of the lids 27 from the lid holding tray 31 with one hand while positioning the latch 23 to the unlocked position with another hand.

[0021] From a purely functional standpoint, a preferred latch 23 might simply include a locking portion that is able to prevent inadvertent displacement of the lid 21 when the tray 27 is purposefully removed. Thus, a number of different configurations and shapes can be used for the latch 23. The latch 23 illustrated here with the round body 29, on the other hand, has an

alternative, ornamental arrangement for the round body 29 in which the edges of the round body 29 include an arc-shaped, curved surface. This illustrated arrangement may add to the cost of manufacture, so the illustrated latch does not provide all of the possible economic advantages that might be derived from the invention. On the other hand, this arrangement is believed to be aesthetically pleasing and is likely to be recognized and relied upon by purchasers to identify the source of the food holding bin.

[0022] FIGS. 4 and 5 are perspective views of an alternate embodiment of a multi-zone food holding bin 10, the embodiment of FIGS. 4 and 5 including four separate food holding compartments 50. The embodiment of FIGS. 4 and 5 is substantially identical to the embodiment of FIGS. 1-3 with the exception that the embodiment of FIGS. 4 and 5 includes four food holding compartments 50 instead of two, each food holding compartment 50 including two food holding zones 57a, 57b, and each food holding zone 57a, 57b including a single food holding bay 51a, 51b, respectively. Thus, reference numbers identifying identical elements are the same in FIGS. 1-3 and in FIGS. 4 and 5. Moreover, elements not illustrated in one of the embodiments are understood to be present in the other embodiment. For example, the embodiment illustrated in FIGS. 4 and 5 includes cut-away views showing internal components that are not visible in FIGS. 1-3. Nevertheless, these internal components are understood to be present in the embodiment illustrated in FIGS. 1-3 as well.

[0023] Similar to the embodiment of FIGS. 1-3, each separate food holding compartment 50 in the food holding bin 10 of FIGS. 4 and 5 includes at least two separate food holding zones, a first food holding zone 57a and a second food holding zone 57b. Each food holding zone 57a, 57b is configured to maintain a different temperature. Of course, it is not necessary for the food holding zones 57a, 57b to be operated at different temperatures in practice.

[0024] The bin 10 illustrated in FIG. 4 is sized, shaped and arranged to have four compartments 50, however, bins in accordance with the disclosure can have any number of compartments, including a single compartment.

[0025] In FIG. 4, the first or top compartment is defined by the left and right sidewalls 30 and 35, the chassis top panel 20 and the first or upper-most shelf 52. The second compartment is defined by the two sidewalls 30 and 35, the shelf 52 for the first compartment and the second shelf 52. The third compartment is defined by the two sidewalls 30, 35, the second shelf 52 and the third shelf 52. The fourth compartment is defined by the two sidewalls 30 and 35, the third shelf and the chassis bottom 25.

[0026] The shelves 52, which partially define the compartments 50, are planar or at least substantially planar and supported in the chassis 15 at their opposing side ends by the two chassis side walls 30 and 35. Each shelf 52 forms a planar and continuous top surface, which defines a planar and continuous bottom surface 53 of the compartment 50. The planar and continuous bottom surface 53 of the compartment is configured to support food items (as mentioned above, the term "food item" includes but is not limited to containers or trays containing food products such as cooked protein patties, fried foods, and the like). Food items can be placed onto the planar bottom surface 53 and removed from the planar bottom surface 53 through the open front face 40 or through the open rear face 45.

[0027] Each food holding bay 51a, 51b may include a dedicated display and/or control 93a, 93b, respectively. Each display and/or control 93a, 93b may display the temperature setpoint of a respective food holding bay 51a, 51b, and in the embodiment illustrated in FIGS. 4 and 5, the temperature of a respective food holding zone 57a, 57b. Moreover, each display and/or control 93a, 93b may control the respective heating elements that maintain the temperature setpoint of

the respective food holding zones 57a, 57b. The displays and/or controls 93a, 93b may be grouped together (i.e., arranged horizontally beneath the respective food holding bay 51a, 51b) in the bezel 92 for a corresponding compartment 50. In the embodiment illustrated in FIGS. 4-5, a single bezel 92 is used to provide the display and/or control elements for a single compartment 50. The displays and/or controls 93a, 93b can provide a graphical user interface to one or more controllers (not shown) for the bin 10.

[0028] Bin 10 control and control of the food holding zone 51 temperature is effectuated in part by using one or more microcontrollers or microprocessors 97 in combination with temperature sensors 99. US 2011-0114624 A1 entitled "Food Holding Cabinet Power Supplies with Downloadable Software," the entirety of which is hereby incorporated by reference herein, discloses among other things, apparatuses and methods by which compartments of a food holding bin can be controlled using microprocessors having downloadable software. Compartment temperature control is preferably effectuated using a semiconductor temperature sensor, thermally coupled to each food holding zone 51 and electrically connected to a processor, such as those disclosed in US 2011-0114624 A1.

[0029] A semiconductor apparatus and method for measuring temperature of a plate or shelf in a food holding bin is disclosed in U.S. pat. No. 8,247,745, which is entitled "Temperature Sensor for a Food Holding Cabinet" the entirety of which is hereby incorporated by reference herein.

[0030] The shelf 52 includes a lower heating element 67 for the first food holding zone 57a in a first or top food holding compartment 50, and an upper heating element 65 for a second food holding zone 57b in a second or lower food holding compartment 50, directly below the first food holding compartment 50. While the first heating element 67 is illustrated as providing heat to the upper first food holding zone 57a (from below) and the second heating element 65 is

illustrated as providing heat to the lower first food holding zone 57a (from above), heating elements that are not shown include at least a heating element that provides heat to the upper first food holding zone 57a from above and another heating element that provides heat to the lower first food holding zone 57a from below. Additionally, the second food holding zones 57b, which are adjacent to the first food holding zones 57a, are heated in the same way as the first food holding zones 57a, but with independent heating elements. The heating elements of the second food holding zones 57b are independently controllable from the heating elements of the first food holding zones 57a. Referring to the inset FIG. 4B, the shelf 52 includes an upper thermally conductive plate, which forms the continuous planar bottom surface 53 of the first (or upper) food holding compartment 50 and a lower thermally conductive plate, which forms a continuous planar upper surface 54 of the second (or lower) food holding compartment 50. The planar bottom surface 53 and the planar upper surface 54 are spaced apart from each other by a distance sufficient to accommodate the inclusion of at least two heating elements, which are illustrated in the figures as the separate first heating element 67 and the separate second heating element 65, respectively. Again, the temperature of each food holding zone is controlled by independently controllable heating elements. Insulative materials may be provided between the first heating element 67 and the second heating element 65 to provide better thermal control over the food holding zones 57a, 57b. The first heating element 67 is a lower heating element for the upper food holding compartment 50 and the second heating element 65 is an upper heating element for the lower food holding compartment 50.

[0031] The continuous planar bottom surface 53 of the top food holding compartment 50 and the continuous planar upper surface 54 of the bottom food holding compartment are preferably made of aluminum, between about one-eighth and about one-quarter inch-thick. Alternate

embodiments of the shelf 52 may use a thermally-conductive panel made of glass-ceramic or an ultra-low expansion glass for one or both of the lower surface 53 and the upper surface 54. Glass-ceramics and ultra-low expansion glass are considered herein to be "good" thermal conductors in that their conduction of heat energy is localized. Such materials also make excellent shelves for a heated, multi-zone food holding bin because they permit localized areas of a shelf to be heated to a first temperature, without having the entire shelf reach the same temperature.

[0032] The first heating element 67 is disposed between the planar bottom surface 53 and the planar upper surface 54 and the first heating element 67 is in thermal communication with the planar bottom surface 53. The first heating element 67 may be mechanically attached to the planar bottom surface 53 by a thermally-conductive adhesive, in one embodiment. The first heating element 67 may also be attached to the planar bottom surface 53 by brackets or clamps.

[0033] The second heating element 65 is disposed between the planar bottom surface 53 and the planar upper surface 54 and the second heating element 65 is in thermal communication with the planar upper surface 54. The second heating element 65 may be mechanically attached to the planar upper surface 54 by a thermally-conductive adhesive, in one embodiment. The second heating element 65 may also be attached to the planar upper surface 54 by brackets or clamps.

[0034] In the embodiment illustrated in FIGS. 4 and 5, the first heating element 67 can be located above the second heating element 65 but in thermal communication with the planar bottom surface 53 such that when the temperature of the first heating element 67 rises, it provides heat energy into the planar bottom surface 53 in a region around the first heating element 67, and more specifically, within the first food holding zone 57a of the first or top food holding compartment 50. Thermally insulating the first heating element 67 from the planar upper

surface 54 and thermally insulating the second heating element 65 from the planar bottom surface 53, enables the first heating element 67 to provide a first amount of heat energy into the planar bottom surface 53 (and thus into the first food holding zone 57a of the upper food holding compartment 50), while the second heating element 65 provides a second amount of heat energy into the planar upper surface 54 (and thus into the first food holding zone 57b of the lower food holding compartment 50). In this manner, each food holding zone 57a, 57b may be configured to have an independent and unique temperature profile from top to bottom of the food holding zone 57a, 57b. For example, one food holding zone 57a, 57b may have a temperature profile that generally decreases from top to bottom (i.e., the top of the food holding zone 57a, 57b is hotter than the bottom of the food holding zone 57a, 57b).

[0035] In some embodiments, the second heating element 65 may comprise a radiant heating source that projects radiant heat through the planar upper surface 54 and into the first food holding zone 57a of the lower food holding compartment 50. In other words, in one embodiment, the first heating element 67 provides heat energy into the first food holding zone 57a of the upper food holding compartment 50 through conduction, while the second heating element 65 provides heat energy into the first food holding zone 57a of the lower food holding compartment through radiation. Similarly, a radiant heating element may be provided at a top interior surface of the first or top food holding compartment 50 beneath the chassis top panel 20. In this manner, the top and bottom of a food product placed into the first food holding zone 57a may absorb different amounts of heat energy, customized depending on the type of food product. Thus, the heat profile in the first food holding zone 57a may be customized vertically as well as differentiated from the heat profile in the second food holding zone 57b. As a result, a single food holding compartment 50 (e.g., the upper compartment in FIGS. 4 and 5) may be customized

to store different types of food products in the first food holding zone 57a and the second food holding zone 57b, each food holding zone 57a, 57b having a different temperature profile. As a result, the disclosed food holding bin 10 is flexible in that it can keep multiple different types of food products at their ideal holding temperatures in a single food holding compartment, thus increasing efficiency and adaptability to different food demands.

[0036] Because of this flexibility, it has been found that a food holding bin constructed in accordance with the disclosure can extend the palatability time of a food item by a factor of two or more.

[0037] An alternate embodiment, as illustrated in FIG. 6, may use the thermoelectric effect provided by one or more Peltier devices 80 to heat one or more of the compartments 50.

[0038] The thermoelectric effect is a direct conversion of a temperature difference into an electric voltage and vice versa. When a voltage is applied to a thermoelectric device, a temperature difference is created across the two sides of the device. The temperature difference created in response to an applied voltage is known as the Peltier effect. Devices that produce temperature differences in response to an applied voltage are considered herein to be Peltier devices. A Peltier device 80 is therefore considered herein to be a heat source or heating element.

[0039] Peltier devices have a "cold" side and a "hot" side. The cold side absorbs heat whereas the hot side emits heat. Heat emitted from the hot side includes at least some of the heat absorbed from the cold side. A Peltier device 80 is therefore considered herein to be a solid-state heat pump or heat-sinking device.

[0040] FIG. 6 is a cutaway view of another embodiment of a point-of-use holding bin using Peltier devices to heat the food holding compartments 50. In one embodiment, one or more

Peltier devices 80 are "sandwiched" between, and in thermal communication with the bottom planar surface 53 and the upper planar surface 54 described above. Electrical energy is provided to the Peltier devices 80 through wires 85, under the control of a controller.

[0041] "Sandwiching" the Peltier devices in a shelf 52 as shown in FIG. 6 provides a shelf 52 cold on one side and hot on the other. Such a shelf 52 structure thus enables a dual-mode food holding bin 10 having a "first" food holding compartment 50 that is warm and a vertically adjacent "second" food holding compartment 50 that is cold.

[0042] Temperature control of a thermoelectric, Peltier device 80 may be accomplished by controlling the electric energy provided to the device. Temperature control of one side of the Peltier device 80 can also be effectuated by controlling heat transferred into or out of the opposite side of the device, as described in US 2010-0307168 A1, entitled "Thermo Electric Cooler," the disclosure of which is incorporated herein by reference in its entirety.

[0043] In another embodiment of a multi-zone food holding bin 10, multiple Peltier devices 80 are mounted between the bottom surface 53 and the upper surface 54 but have only their hot sides thermally coupled to the bottom surface 53 and to the upper surface 54. Air is then moved through the inter-plate space to heat the cool sides of the Peltier devices therein.

[0044] Peltier devices as disclosed herein and similar heat transfer devices are thermally coupled to the shelf 52, preferably by way of mechanical attachment to at least one of the plates that form the lower planar surface 53 and the upper planar surface 54. Mechanical attachment and the resultant thermal coupling is preferably accomplished by a thermally-conductive adhesive, however, clamps that are attached to a plate by screws driven into a plate can also be used.

[0045] The shelves are mechanically coupled to the side panels 30 and 35. The side panels are also preferably made from thermally-conductive material such as aluminum. Thermally coupling a heat transfer device to one or more plates that comprise a shelf therefore also thermally couples the heat transfer device to the side walls and thus to the compartment. Heat transfer devices coupled to a shelf are therefore also thermally coupled to the corresponding compartment.

[0046] While the temperature of a Peltier device can be controlled by controlling the heat dissipated from the hot side and/or the heat absorbed into the cold side, bin embodiments disclosed herein preferably control compartment temperature using one or more semiconductor temperature sensors, thermally coupled to one or more of the thermally-conductive structures that comprise a compartment. Bin embodiments disclosed herein preferably use a semiconductor temperature sensor that is directly coupled and therefore thermally coupled to the heated surfaces 53 and/or 54 provided by the shelves 52.

[0047] Semiconductor temperature sensors used in preferred embodiments disclosed herein are disclosed in U.S. Pat. No. 8,247,745, which is entitled "Temperature Sensor for a Food Holding Cabinet" the entirety of which is hereby incorporated by reference herein, especially the teachings of the structure and use of a semiconductor temperature sensor.

[0048] Thus, suitable heating elements for use in accordance with the disclosure include electrically-resistive heating elements, such as heated coils, radiant heating elements that provide heat energy via radiation, and devices and ancillary equipment that provide heat to a working fluid. As described above, Peltier devices may also be used as heating elements in accordance with the disclosure.

[0049] The foregoing description is for purposes of illustration only and not for purposes of limitation. The true scope of the invention is set forth by the appended claims.

What is claimed is:

1. A multi-zone food holding bin comprising:

a chassis having a front face and an opposing rear face;

a first food holding compartment within the chassis, the food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment;

a continuous and planar surface forming a bottom of the food holding compartment;

a first food holding zone formed in the food holding compartment, the first food holding zone having an independently controllable first heating element disposed at a top portion of the food holding compartment, and an independently controllable second heating element disposed at a bottom portion of the food holding compartment, the first food holding zone including a first food holding bay and a second food holding bay, each of the first and second food holding bays being configured to receive a food holding tray; and

a second food holding zone formed in the food holding compartment, the second food holding zone having an independently controllable third heating element disposed at the top portion of the food holding compartment and an independently controllable fourth heating element disposed at the bottom portion of the food holding compartment, the second food holding zone including a third food holding bay and a fourth food holding bay, each of the third and fourth food holding bays being configured to receive a food holding tray,

wherein the first food holding zone and the second food holding zone are adjacent one another across the continuous planar surface and the first food holding zone is configured to

maintain a first temperature and the second food holding zone is configured to maintain a second temperature, the first temperature and the second temperature capable of being different than one another.

2. The food holding bin of claim 1, further comprising:

a second food holding compartment disposed below the first food holding compartment within the chassis, the second food holding compartment having at least a first opening, the first opening being open, uncovered and located at the front face of the chassis, the first opening being configured to allow food items to be placed into and removed from the food holding compartment; and

a shelf located between the first and second food holding compartments, the shelf comprising a first side and a second side, the first side facing into the first food holding compartment, the second side facing into the second food holding compartment, the second and fourth heating elements being disposed in the shelf and in thermal communication with the first side, the second and fourth heating elements being capable of providing different amounts of heat energy into the first and second food holding zones of the first food holding compartment; and

a controller operatively coupled to the second heating element and to the fourth heating element, the controller being configured to independently operate the second heating element and the fourth heating element.

3. The food holding bin of claim 1, wherein the first and second food holding compartments each have a second opening, uncovered and located at the rear face of the chassis.

4. The food holding bin of claim 1, wherein the first heating element is a radiant heating element.

5. The food holding bin of claim 1, wherein the second heating element is a conductive heating element.

6. The food holding bin of claim 1, wherein the first heating element is adapted to output more heat energy than the second heating element.

7. The food handling bin of claim 1, the first and second food holding bays being further configured to receive a lid, the bin further comprising a lid located in a top portion of the first food holding compartment, the lid capable of being inserted into a first shelf in the first food holding bay above the continuous and planar bottom surface or into a second shelf in the second food holding bay above the continuous and planar bottom surface.

8. The food holding bin of claim 7, further comprising a latch located in the first food holding zone, the latch having a body including an open center portion, the latch being rotatable or translatable relative to the chassis between a locked position and an unlocked position, the latch blocking access to the first shelf and the second shelf in the locked position and allowing access to the first shelf and the second shelf in the unlocked position.

9. The food holding bin of claim 1, further comprising a food holding tray disposed in the first food holding compartment, and in the first food holding bay, and resting on the continuous and planar bottom surface.

10. The food holding bin of claim 9, further comprising a lid on the food holding tray disposed in the first food holding compartment.

11. The food holding bin of claim 1, wherein at least one of the first heating element and the second heating element is an electrically resistive heating wire.

12. A method of maintaining different temperatures in a food holding compartment of a food holding bin, the method comprising:

providing a food holding compartment with a first food holding zone and a second food holding zone adjacent to one another, each of the first food holding zone and the second food holding zone including at least two food holding bays, the first and second food holding zones sharing an uninterrupted continuous planar bottom surface;

independently setting a first temperature in the first food holding zone;

independently setting a second temperature in the second food holding zone,

wherein the first temperature is different from the second temperature.

13. The method of claim 12, wherein the first food holding zone includes an independently controlled first heating element located in a top portion of the food holding compartment and an

independently controlled second heating element located in a bottom portion of the food holding compartment.

14. The method of claim 13, further comprising providing more heat energy from the first heating element than from the second heating element.

15. The method of claim 13, further comprising providing radiant heat from the first heating element.

16. The method of claim 13, further comprising providing conduction heat from the second heating element.

Abstract

A multi-zone food holding bin has a continuous food supporting surface with multiple food holding zones. Each food holding zone is independently controllable so that different food temperatures may be maintained in adjacent food holding zones.

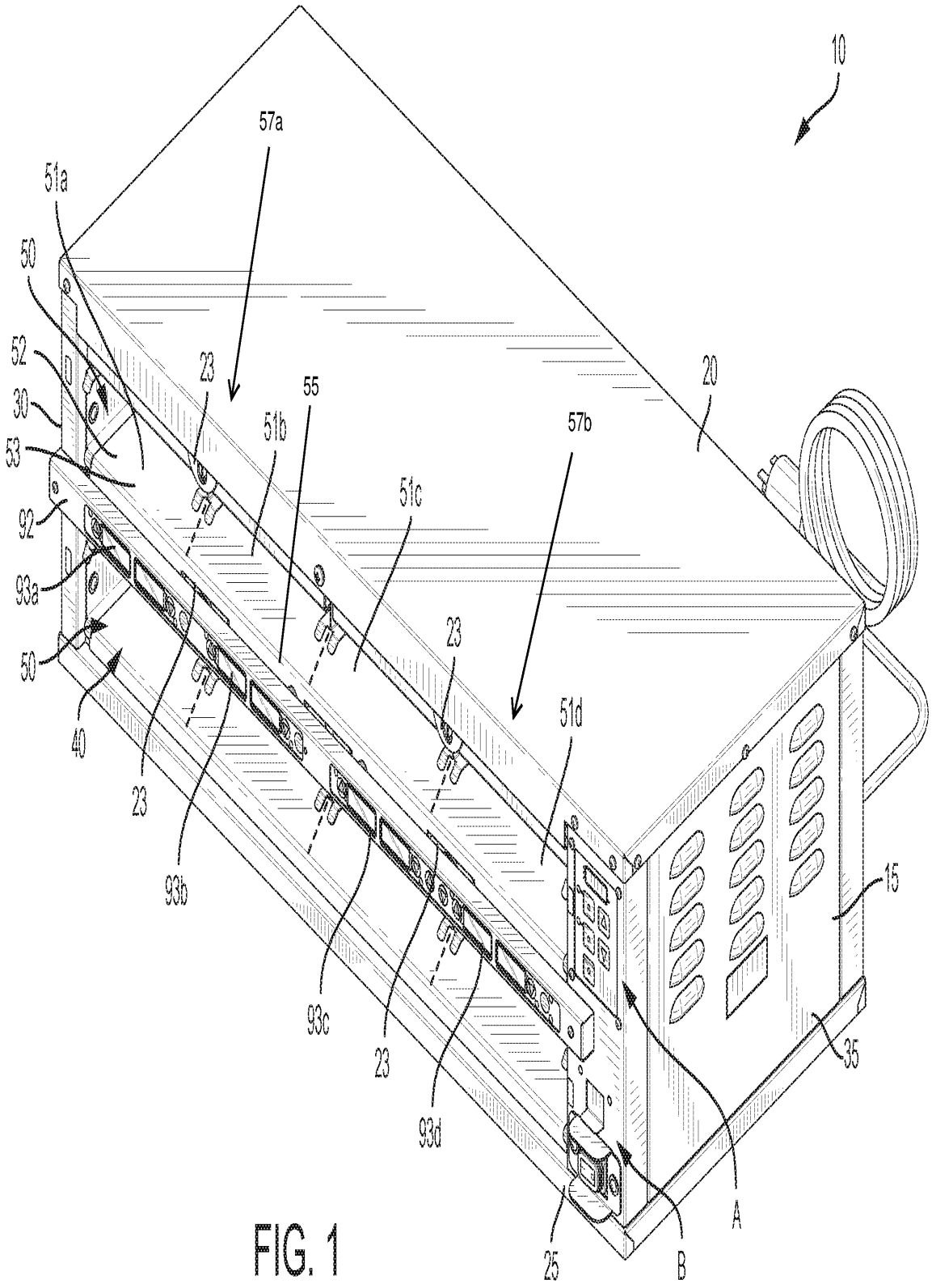

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57a
51a
50
52
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92
93a
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93b
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55
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51c
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51d
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93d
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B
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FIG. 1

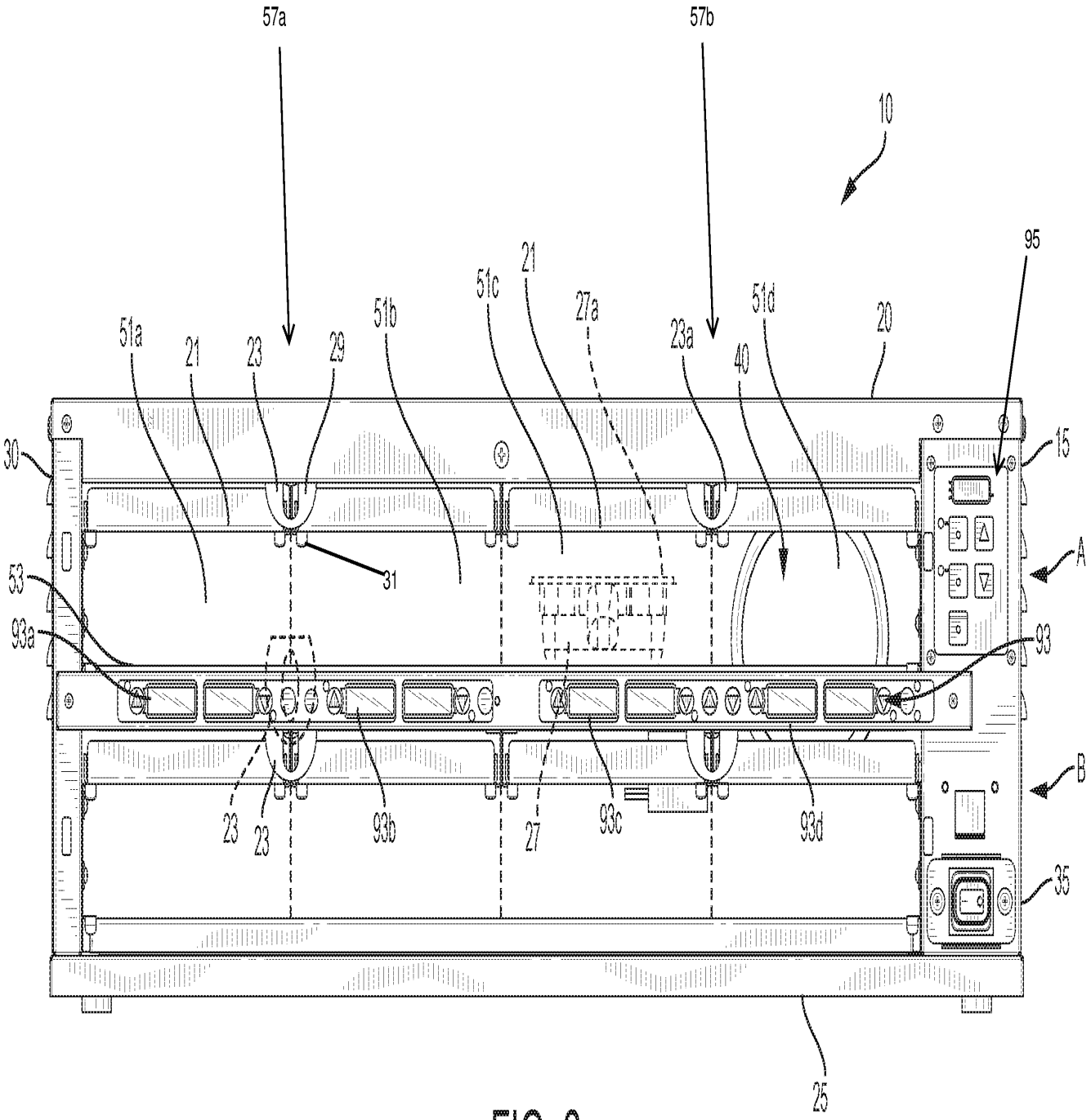

57a
57b
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95
51a
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29
51b
51c
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27a
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40
51d
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FIG. 2

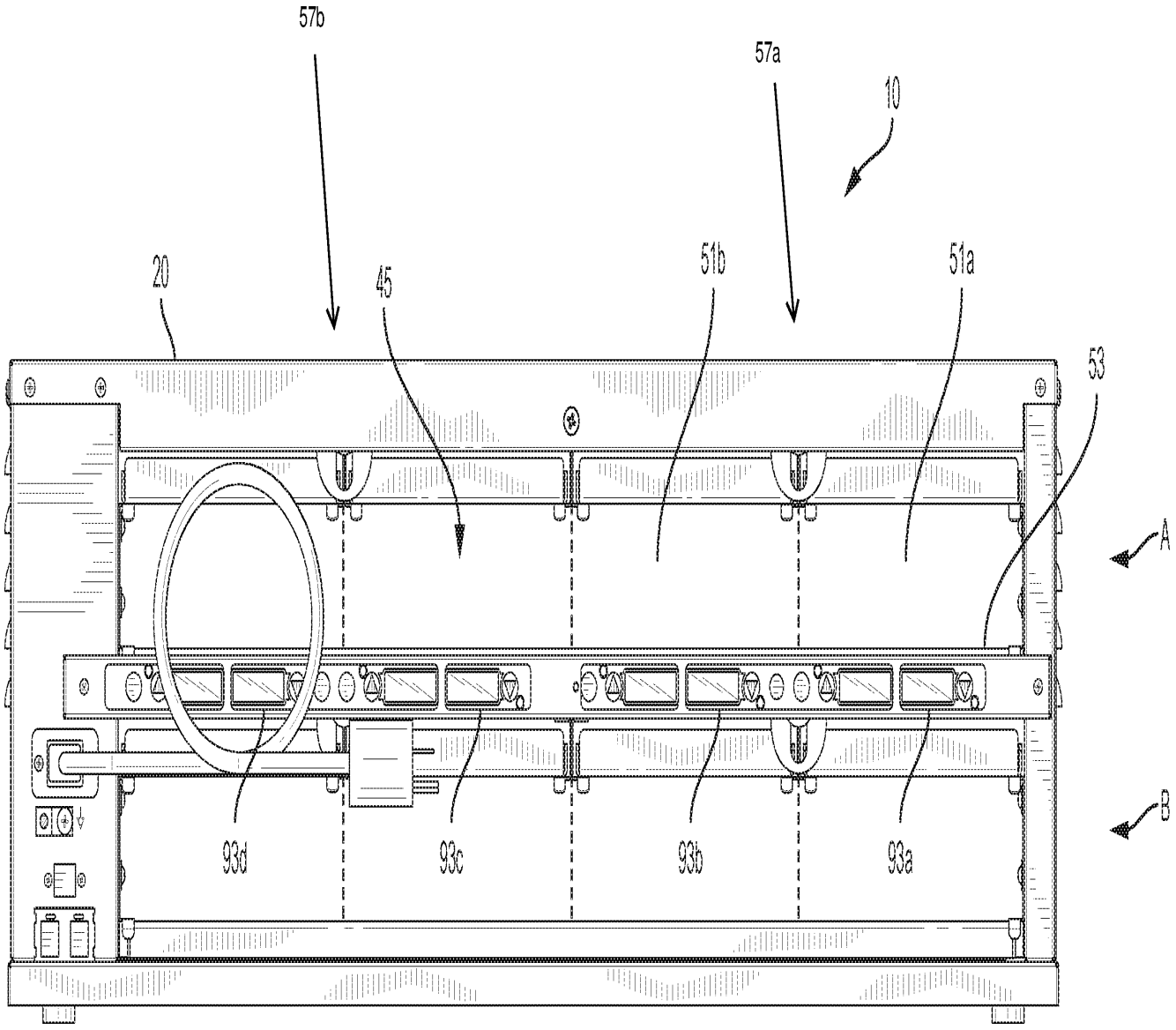


FIG. 3

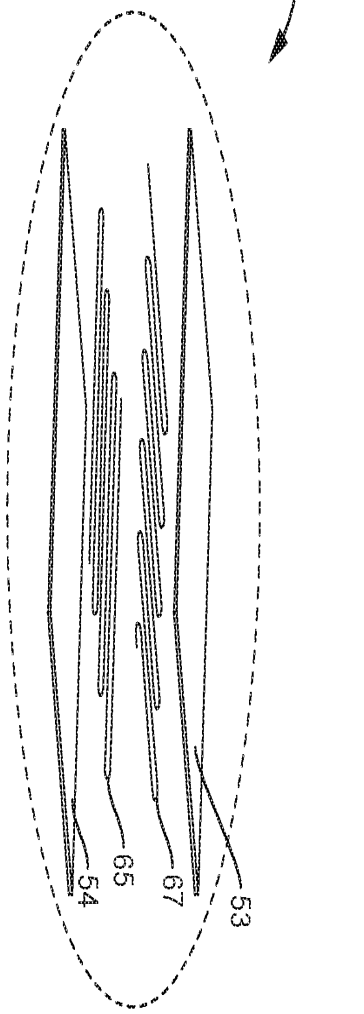

57a
53
54
65
67

FIG. 4B

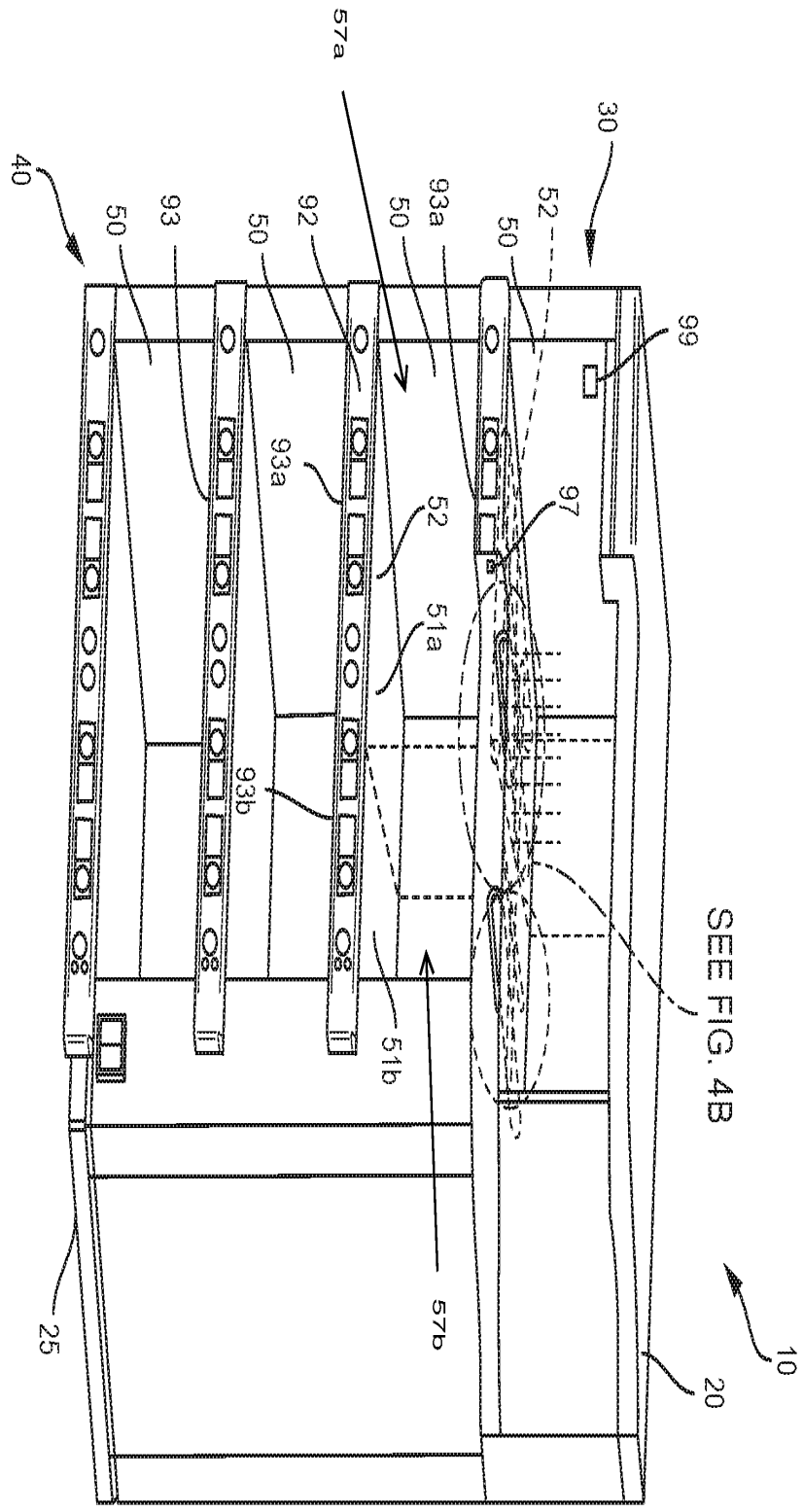

57a
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52
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93a
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92
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93
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97
93a
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51a
93b
51b
57b
SEE FIG. 4B
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20
25

FIG. 4A

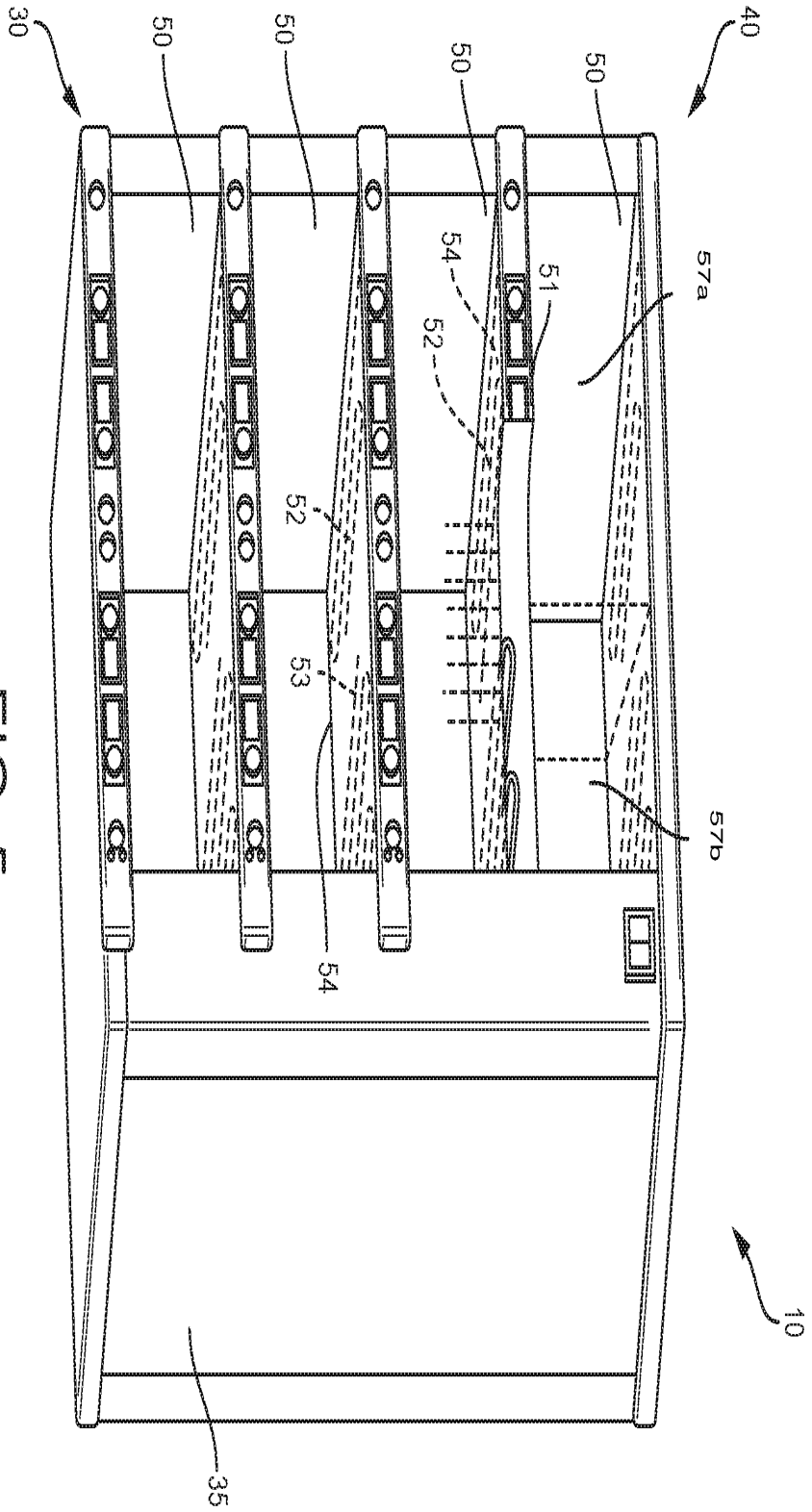


FIG. 5

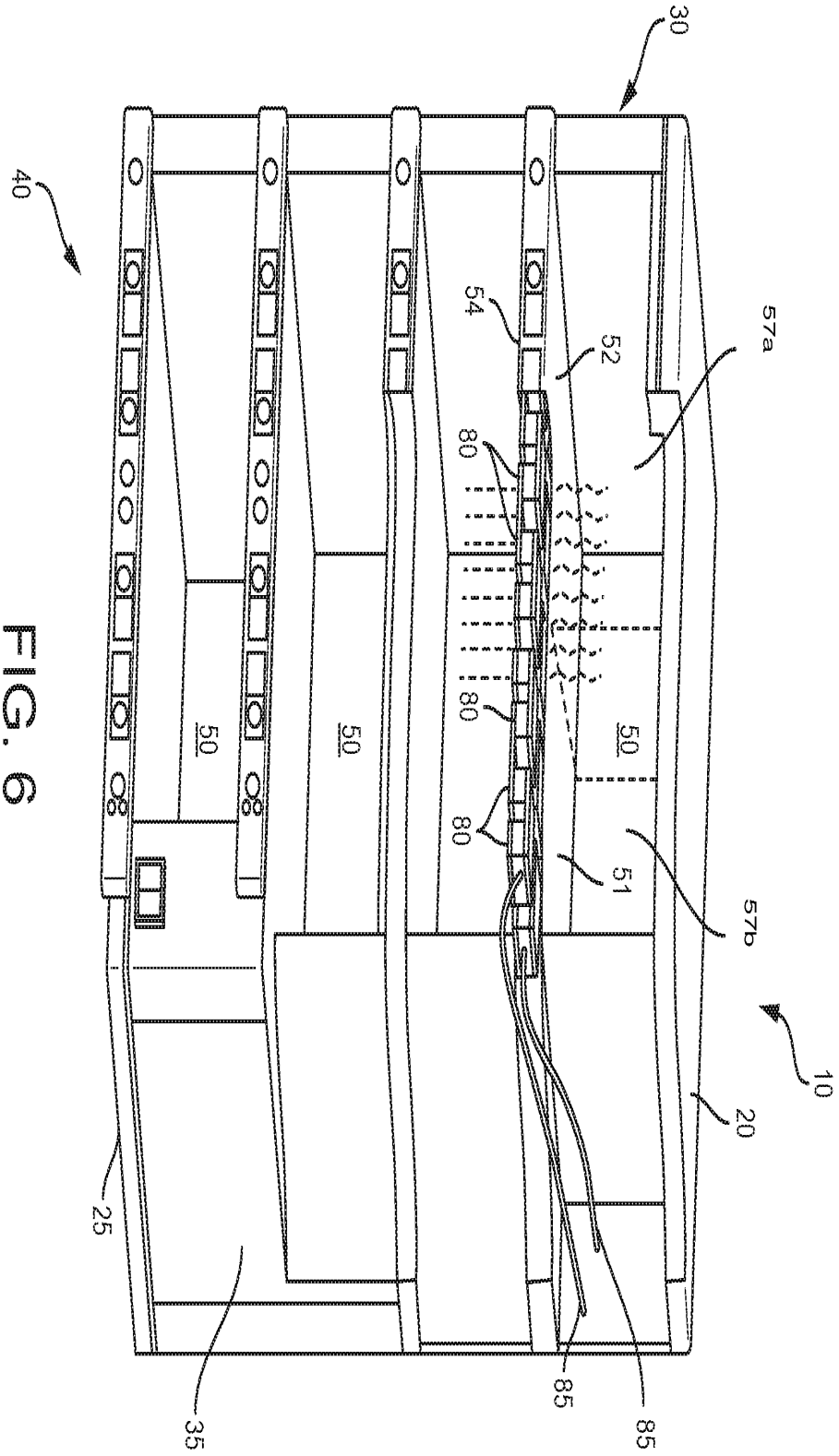


FIG. 6

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Kyle Thomas Kestner	Nonprovisional Application Number (if known):	Not Yet Assigned
Title of Invention:	Multi-Zone Food Holding Bin		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.
2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.
3. The applicable box is checked below:

I. [x] **Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)**

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

X. The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 13-2855.

II. [x] **Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)**

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature	/Michael A. Chinlund/	Date	April 20, 2016
Name (Print/Typed)	Michael A. Chinlund	Practitioner Registration Number	55,064

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

[ ] *Total of 1 forms are submitted.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Kyle Thomas Kestner
Title	Multi-Zone Food Holding Bin
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	29178/50736

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael A. Chinlund/	Date (Optional)	2016-04-20
Name	Michael A. Chinlund	Registration Number	55,064
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of 1 forms are submitted.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
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

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 04743

OR

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

[ ] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

PRINCE CASTLE LLC

[ ] Inventor or Joint Inventor (title not required below)

[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[X] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Loren Veltrop		
Title	Vice President		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of 1 forms are submitted.

PTO/SB/35 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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NONPUBLICATION REQUEST UNDER 35 U.S.C. 122(b)(2)(B)(i)	First Named Inventor	Kyle Thomas Kestner
	Title	Multi-Zone Food Holding Bin
	Attorney Docket Number	29178/50736

I hereby certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

I hereby request that the attached application not be published under 35 U.S.C. 122(b).

/Michael A. Chinlund/	April 20, 2016
Signature	Date
Michael A. Chinlund	55,064
Typed or printed name	Registration Number, if applicable
(312) 474-6300	
Telephone Number	

This request must be signed in compliance with 37 CFR 1.33(b) and submitted with the application **upon filing.**

Applicant may rescind this nonpublication request at any time. If applicant rescinds a request that an application not be published under 35 U.S.C. 122(b), the application will be scheduled for publication at eighteen months from the earliest claimed filing date for which a benefit is claimed.

If applicant subsequently files an application directed to the invention disclosed in the attached application in another country, or under a multilateral international agreement, that requires publication of applications eighteen months after filing, the applicant **must** notify the United States Patent and Trademark Office of such filing within forty-five (45) days after the date of the filing of such foreign or international application. **Failure to do so will result in abandonment of this application (35 U.S.C. 122(b)(2)(B)(iii)).**

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Filer:	Michael Alexander Chinlund/Tammi Bowden
Attorney Docket Number:	29178/50736

Filed as Large Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Request for Prioritized Examination	1817	1	4000	4000
Pages:				
Claims:				
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**5740**

Electronic Acknowledgement Receipt

EFS ID:	25552905
Application Number:	15134380
International Application Number:	
Confirmation Number:	1584
Title of Invention:	Multi-Zone Food Holding Bin
First Named Inventor/Applicant Name:	Kyle Thomas Kestner
Customer Number:	4743
Filer:	Michael Alexander Chinlund/Tammi Bowden
Filer Authorized By:	Michael Alexander Chinlund
Attorney Docket Number:	29178/50736
Receipt Date:	20-APR-2016
Filing Date:	
Time Stamp:	23:49:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$5740
RAM confirmation Number	9889
Deposit Account	132855
Authorized User	CHINLUND, MICHAEL A.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	Certification_and_Request_for_Prioritized_Exam_Track_1_29178_50736.PDF	32547 0fcf6ecb93f088f642d7d55ce4fbe27d0ae22d44	no	1
Warnings:					
Information:					
2	Transmittal of New Application	Transmittal_Utility_Patent_Application_29178_50736.PDF	32574 720512ba1d911be46804eb631f8ad50452f48069	no	1
Warnings:					
Information:					
3	Application Data Sheet	Appplication_Data_Sheet_ADS_29178_50736.PDF	29212 1a2ad137d5bf0522df1897d79db055ef677b6e47	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
4		Application_as_Filed_29178_50736.pdf	66978 64f69e13214b08d0f331b77f55450e2a36c38d53	yes	24

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	18
Claims	19	23
Abstract	24	24

Warnings:					
Information:					
5	Drawings-only black and white line drawings	29178_50736_Drawings_Revised_as_filed.PDF	695927 348c32c10ef85ba7ecffbe3af571acbdb9198aef	no	6
Warnings:					
Information:					

6	Power of Attorney	Power_of_Attorney_Transmittal_29178_50736.PDF	690386 e6585b4f8aec39dd970f7a7f6e3da51fc2dac5d0	no	2
Warnings:					
Information:					
7	Nonpublication request from applicant	Nonpublication_Request_29178_50736.PDF	17053 a6b4116f6a153911c20fdb63bd8b73e01a6f2002	no	1
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	38782 7c56cc102bb7bf70c64a82b220e374d6328d5220	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1603459	

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

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.