Electronic Acknowledgement Receipt

EFS ID:	7980822
Application Number:	12832943
International Application Number:	
Confirmation Number:	5435
Title of Invention:	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL
First Named Inventor/Applicant Name:	Paul F. Rembach
Customer Number:	29637
Filer:	Wendy Buskop/Sarah Gernhart
Filer Authorized By:	Wendy Buskop
Attorney Docket Number:	1875.004
Receipt Date:	08-JUL-2010
Filing Date:	
Time Stamp:	21:43:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$462
RAM confirmation Number	7904
Deposit Account	501313
Authorized User	
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 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	1875-004_ADSFORM.pdf	1031552 7b99757a29e4d8fe8bcbeaf50809e590616bb2d3	no	5
Warnings:					
Information:					
2	Oath or Declaration filed	1875-004_DECLARATIONOATH.pdf	367204 9c5430c4c164e638d799e9e98ae4bfbc4e57aeb1	no	5
Warnings:					
Information:					
3	Nonpublication request from applicant.	1875-004_NONPUBREQUEST.pdf	234998 715bc4248c1acd6d2d54f4b24739825e855317d7	no	2
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Filed (SB/08)	1875-004_IDSFORM.pdf	612050 34b1182407d6793c98d5bbe68afdbfd91d77bc1a	no	4
Warnings:					
Information:					
5		1875-004_PA_APPLICATION.pdf	292144 01e9eefa5676dc4cebd155037b8c08c30839f304	yes	22

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	18
Claims	19	21
Abstract	22	22

Warnings:					
Information:					
6	Drawings-only black and white line drawings	1875-004_DRAWINGS.pdf	434070 6e91263af0a14295159b29d8912e426b3c9433d6	no	8
Warnings:					

Information:					
7	Fee Worksheet (PTO-875)	fee-info.pdf	33347 669ef8de18a053028e5137eabe5c1eb902284062	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	3005365	

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.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL
First Named Inventor/Applicant Name:	Paul F. Rembach
Filer:	Wendy Buskop/Sarah Gernhart
Attorney Docket Number:	1875.004

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	462

Approved for use through 09/30/2010 OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1875.004
	Application Number	
Title of Invention	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul	F.	Rembach	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Houston	State/Province	TX	Country of Residence	US

Citizenship under 37 CFR 1.41(b) US

Mailing Address of Applicant:

Address 1	11503 Dakar Drive
Address 2	

City	Houston	State/Province	TX
Postal Code	77065	Country	US

Applicant 2

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Greg		Castleman	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Kemah	State/Province	TX	Country of Residence	US

Citizenship under 37 CFR 1.41(b) US

Mailing Address of Applicant:

Address 1	11503 Dakar Drive
Address 2	

City	Houston	State/Province	TX
Postal Code	77065	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

PTO/SB/14 (11-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1875.004
	Application Number	
Title of Invention	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL	

Customer Number	29637		
Email Address	sarah.gernhart@buskoplaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL		
Attorney Docket Number	1875.004	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☒	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	29637		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	12313732	2008-11-24
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12313732	non provisional of	61004397	2007-11-25

PTO/SB/14 (11-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1875.004
	Application Number	
Title of Invention	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL	

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country[i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			○ Yes ◉ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1

If the Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information:

Address 1			
Address 2			
City		**State/Province**	
Country[i]		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the **Add** button.

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/WBUSKOP/			Date (YYYY-MM-DD)	2010-07-08
First Name	Wendy	Last Name	Buskop	Registration Number	32202

PTO/SB/14 (11-06)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	1875.004
	Application Number	
Title of Invention	COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL	

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc Code: Oath
Document Description: Oath or declaration filed

PTO/SB/01 (04-09)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☒ Declaration Submitted With Initial Filing OR ☐ Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required)

Attorney Docket Number	1875.004
First Named Inventor	PAUL F. REMBACH et al.
COMPLETE IF KNOWN	
Application Number	
Filing Date	
Art Unit	
Examiner Name	

I hereby declare that: (1) Each inventor's residence, mailing address, and citizenship are as stated below next to their name; and (2) I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention titled:

COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL

(Title of the Invention)

the application of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) _____ as United States Application Number or PCT International Application Number _____ and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

Authorization To Permit Access To Application by Participating Offices

☒ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

PTO/SB/01 (04-09)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION — Utility or Design Patent Application

Claim of Foreign Priority Benefits

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application number(s) are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

PTO/SB/01 (04-09)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☒ The address associated with Customer Number: 29637	OR ☐ Correspondence address below

Name		
Address		
City	State	Zip
Country	Telephone	Email

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. Petitioner/applicant is advised that documents which form the record of a patent application (such as the PTO/SB/01) are placed into the Privacy Act system of records DEPARTMENT OF COMMERCE, COMMERCE-PAT-7, System name: *Patent Application Files*. Documents not retained in an application file (such as the PTO-2038) are placed into the Privacy Act system of COMMERCE/PAT-TM-10, System name: *Deposit Accounts and Electronic Funds Transfer Profiles*.

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

NAME OF SOLE OR FIRST INVENTOR:	☐ A petition has been filed for this unsigned inventor
Given Name (first and middle [if any]) Paul F.	Family Name or Surname Rembach
Inventor's Signature	Date July 6, 2010

Residence: City	State	Country	Citizenship
Houston	TX	US	US

Mailing Address 11503 Dakar Drive			
City	State	Zip	Country
Houston	TX	77065	US

☒ Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto

PTO/SB/02A (07-07)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet

Name of Additional Joint Inventor, if any:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))	Family Name or Surname		
Greg	Castleman		
Inventor's Signature: Greg Castleman			Date 7/6/10
Kemah (Residence: City)	TX (State)	US (Country)	US (Citizenship)
11503 Dakar Drive (Mailing Address)			
Houston (City)	TX (State)	77065 (Zip)	US (Country)

Name of Additional Joint Inventor, if any:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))	Family Name or Surname		
Inventor's Signature			Date
Residence: City	State	Country	Citizenship
Mailing Address			
City	State	Zip	Country

Name of Additional Joint Inventor, if any:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle (if any))	Family Name or Surname		
Inventor's Signature			Date
Residence: City	State	Country	Citizenship
Mailing Address			
City	State	Zip	Country

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.

PTO/SB/35 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE

NONPUBLICATION REQUEST UNDER 35 U.S.C. 122(b)(2)(B)(i)

First Named Inventor	Paul F. Rembach et al.
Title	COMPUER READABLE MEDIUM FOR OPERA
Attorney Docket Number	1875.004

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).

/WBUSKOP/	July 08, 2010
Signature	Date
Wendy Buskop	32,202
Typed or printed name	Registration Number, if applicable
713-275-3400	
Telephone Number	

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Application Number	
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First Named Inventor	Paul F. Rembach et al.
Art Unit	
Examiner Name	
Attorney Docket Number	1874.004

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6132267		2000-10-17	Campbell, James Stewart	
	2	6000353		1999-12-14	De Leu, Douglas F.	
	3	5131875		1992-07-21	Lee, Warren D.	

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	1	20080064273	A1	2008-03-13	Mizokawa, Takashi	
	2	20040242088	A1	2004-12-02	McCann, John	

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	Filing Date	
	First Named Inventor	Paul F. Rembach et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	1874.004

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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/WBUSKOP/	Date (YYYY-MM-DD)	2010-07-08
Name/Print	Wendy Buskop	Registration Number	32202

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APPLICATION FOR PATENT

INVENTORS:

PAUL F. REMBACH

GREG CASTLEMAN

TITLE:

COMPUTER READABLE MEDIUM FOR OPERATING A VESSEL

ATTORNEY DOCKET NO.: 1875.004

SPECIFICATION

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-in-Part of Co-pending US Patent Application Serial No. 12/313,732, filed on November 24, 2008, which claims the benefit of the filing date of US Provisional Patent Application Serial No. 61/004,397, filed November 25, 2007. The disclosures of these applications are incorporated herein by reference.

FIELD

[0002] The present embodiments relate to a computer readable medium that has a computer instructions stored thereon for operating a vessel.

BACKGROUND

[0003] A need exists for a computer readable medium that has a computer instructions stored thereon that can allow operation of the vessel utilizing both AC power supplies, such as generators, and DC power supplies such as battery banks.

[0004] A further need exists for a computer readable medium that has a computer instructions stored thereon that can determine the most efficient power source to power the vessel and automatically draw power from the most efficient power source.

[0005] In addition, a need exits for a computer readable medium that has a computer instructions stored thereon that operates a vessel in a manner that reduces carbon emissions and the cost of operating the vessel by reducing fuel consumption.

[0006] Furthermore, a need exits for a computer readable medium that has a computer instructions stored thereon that enables additional power sources to be used to operate

the vessel in the event that contaminated fuel is taken aboard is needed.

[0007] The present embodiments meet these needs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The detailed description will be better understood in conjunction with the accompanying drawings as follows:

[0009] Figure 1 depicts a schematic of an illustrative power system having a power management system according to one or more embodiments.

[00010] Figure 2 depicts a schematic of the illustrative power management system of Figure 1.

[00011] Figure 3 depicts a schematic of a control and monitor system for a battery bank according to one or more embodiments.

[00012] Figure 4 depicts an illustrative embodiment of a master data storage according to one or more embodiments.

[00013] Figure 5 depicts an illustrative embodiment of a data storage device in communication with a slave processor according to one or more embodiments.

[00014] Figure 6 depicts a vessel having an illustrative power system disposed thereon according to one or more embodiments.

[00015] Figure 7 depicts the vessel of Figure 6 when the illustrative power system is in a stealth mode according to one or more embodiments.

[00016] Figure 8 depicts the vessel of Figure 6 when the illustrative power system is in a hybrid mode combining both AC power and DC power according to one or more embodiments.

[00017] Figure 9 depicts the vessel of Figure 6 when the power system is in a docked mode according to one or more embodiments.

[00018] Figure 10 depicts the vessel of Figure 6 when the power system is in a maintenance mode according to one or more embodiments.

[00019] The present embodiments are detailed below with reference to the listed Figures.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[00020] Before explaining the present computer readable medium in detail, it is to be understood that the computer readable medium is not limited to the particular embodiments and that it can be practiced or carried out in various ways.

[00021] The present embodiments generally relate to a computer readable medium having computer instructions stored thereon for operating a vessel.

[00022] Operating the vessel can include managing certain aspects of the vessel. The aspects of the vessel can be the power system, propulsion system, and vessel service loads. The computer instructions can allow for automated management of a portion or all of the components of the vessel. The computer instructions can be used in conjunction with manual operation of one or more components of the vessel.

[00023] Illustrative embodiments of the computer readable medium can have computer instructions stored thereon for operating a vessel. The computer instructions can include computer instructions for monitoring a DC source. The computer readable medium can also have computer instructions for determining the most efficient power source to power a vessel, and computer instructions for controlling an AC power source to allow transfer of power solely from the DC power source to power the vessel, transfer of power solely from the AC power source to power the vessel; or transfer of power from both the AC power source and the DC power source to power the vessel.

[00024] The computer readable medium can also have computer instructions to determine when the DC power source is at a predetermined level, computer instructions for controlling auxiliary devices of the vessel, and computer instructions for monitoring the amount of power needed for all loads.

[00025] The computer readable medium can also have computer instructions for comparing the power needed for all loads against each individual power source and computer instructions for comparing the result to the state of charge of the battery system and comparing load curves of the AC power source to a mathematical model of the power management efficiency system.

[00026] The comprising computer instructions for varying the out put of the AC power source and varying the output voltage of the stored energy battery system when the required load of the AC power source is less than 50 percent of the maximum rating

[00027] The computer readable medium can also include computer instructions for synchronizing the AC power source with an additional AC power source and computer instructions for harvesting energy from electrical rotating sources.

[00028] One or more embodiments of the computer readable medium can having computer instructions stored thereon that allows or aids in the performance of one or method of operating a vessel.

[00029] An illustrative method can include determining the most efficient power source from a plurality of power sources for operating the vessel. The plurality of power sources can include one or more battery banks and one or more AC power sources.

[00030] Determining the most efficient power source from a plurality of power sources for operating the vessel can include monitoring the amount of power needed for all loads. The loads can include auxiliary equipment, such as winches, pumps, thrusters, hotel loads, and navigation equipment.

[00031] Determining the most efficient power source from a plurality of power sources can

also include comparing the state of charge of the battery banks and comparing load curves of the AC power sources to the required load to optimize the carbon fuel intake of the engine. For example, if one or more engines of one of the AC power sources online are operating at more than 5 percent outside of its optimized load curve, the engine speed and generator voltage can be adjusted to bring the engine into an optimized operational state. The optimized load curve is supplied by the engine manufacture based on carbon emission levels and fuel efficiency.

[00032] The battery banks can include one or more cells, and the AC power sources can include shore power, one or more generators, or combinations thereof.

[00033] In one or more embodiments, the battery cells within the battery banks can be maintained within a preset limit of one another. The preset limit can be when the state of charge of cells is within from about 3 percent to about 5 percent of one another. The balancing of the battery cells can include monitoring the voltage of each individual cell and transporting energy from the highest charged cell to the lowest charged cell to equalize all cells. The energy can be transported by selectively opening or closing one or more electrical pathways.

[00034] The most efficient power source can be determined by comparing the actual load against the state of charge of the battery banks and the available power that can be supplied from the AC power sources.

[00035] The method can also include drawing power from the most efficient power source to operate the vessel. The drawing of power from the most efficient power source can be controlled by a power management system, such as illustrated below. In one or more embodiments, the power management system can control the voltage output from one or more AC power sources to provide the most efficient power source.

[00036] For example, the AC power output can be increased to prevent current flow from the battery banks, decreased such that power is drawn solely from one or more battery banks, or balanced with the available power in the battery bank such that the power is drawn from one or more AC power sources and one or more battery banks.

[00037] The method can also include harvesting energy from electrical rotating sources. The electrical rotating sources can include winches, pumps, thrusters, or combinations thereof. The harvested energy can be transferred back to the battery banks, used to power the vessel, or both. For example, if a thruster is slowed down or stopped, water introduces a negative torque onto the propeller that can be converted into electrical energy and provided back into the system. One or more inverters in communication with the battery bank can allow for bi-directional flow of the harvested energy. The power management system can monitor the direction of the electrical energy.

[00038] The method can include monitoring the battery bank. For example, the power management system can be in communication with one or more sensors that are acquiring data related to one or more battery banks. The sensors can include temperature sensors, such as resistive thermo devices; voltage sensors, such as volt meters; current sensors, such as amp meters; or other sensors.

[00039] Monitoring the battery bank can include communicating sensors with each cell; acquiring output voltage for all the cells and the voltage output of each cell, and acquiring current of the battery bank output; and the temperature of each cell. The state of charge of the individual cells and the battery bank can be determined using a manufacturer provided table that can be integrated with the power management system.

[00040] The method can also include charging the battery bank when the charge of the battery bank drops below a preset limit. The preset limit can be a state of charge of 10 percent, 20 percent, 30 percent, 40 percent, 50 percent, 60 percent, or 80 percent. The preset limit can be determined by the type of battery used and the manufacture specification. The battery banks can be charged by the harvested energy, one or more AC power sources, one or more external power source, or a combination thereof. The battery banks can be placed in a charge state when the AC powers sources are at an output greater than the stored potential power in the battery banks. For example, when the battery banks reaches a preset limit, for example 50 percent charge, the AC output is increased thereby preventing energy draw from the battery bank and

providing a portion of the AC power to the battery bank.

[00041] In one or more embodiments, the vessel can be operated by solely using the battery bank. This is an advantage because it eliminates noise associated with the operation of the vessel, reduces carbon emissions, and reduces costs associated with fuel consumption.

[00042] In one or more embodiments, the method can also include automatically switching to the AC power supply when the battery bank reaches the predetermined state of charge. Accordingly, the one or more AC power supplies can be used to operate the vessel when the battery bank reaches the predetermined state of charge and one or more battery banks can be recharged.

[00043] In one or more embodiments of the method, the vessel can be operated using power from two AC power sources, and the AC power sources can be automatically synchronized with one another. The AC power sources can be synchronized with one another using the power management system. For example, the power management system can include computer instructions for controlling the engine speed for each of the AC power sources and controlling the voltage output of each of the generators, and computer instruction for ensuring synchronization of the sinusoidal output of each generator.

[00044] As the vessel is operated with one or more AC power sources, the state of charge of one or more battery banks can be managed. Accordingly the state of charge of the battery banks can be concurrently managed as the vessel is powered by one or more of the AC power sources.

[00045] In one or more embodiments of the method, the AC power source can be operated to provide a constant voltage. For example, the AC power source can be a generator system. The generator system can include an engine and a generator. Accordingly, the engine can be operated at a constant rotational speed, and the generator can provide a constant voltage. Accordingly, a constant power load can be maintained on the engine by controlling the rotational speed of the engine and the voltage from the generator.

This can be used to allow for servicing and maintenance of the battery banks.

[00046] In one or more embodiments, the engine can be operated at a varying rotational speed and the generator can provide a variable voltage output.

[00047] The embodiments of the method disclosed herein can be performed using a system. An illustrative system can include a plurality of power sources, wherein at least one of the power sources provides AC power and at least another of the power sources provides DC power. The power sources can be in communication with a load.

[00048] The system can also include a power management system in communication with the load and power sources. The power management system can include a processor. The processor can be a microprocessor or any other type of processor.

[00049] A data storage can be in communication with the processor. The data storage can be or include a hard drive, a virtual hard drive, a flash drive, or other computer readable medium.

[00050] The data storage can have a plurality of computer instructions stored thereon for performing one or more embodiments of the method described herein and as further explained below.

[00051] The power management system can control or instruct a control system. The control system can be an analog or digital control system. The control system can include hardware for operating or controlling the loads of the vessel, the power output of the AC power source, and the battery banks.

[00052] The power management system can also include an operator interface to limit the total amount of power that can be utilized over a period of time. The operator interface can limit the amount of power that can be utilized over a period of time based on the power source reserves.

[00053] Turning now to the Figures, Figure 1 depicts a schematic of an illustrative power system having a power management system according to one or more embodiments.

The system 100 for operating a vessel can include a plurality of power sources for operating the vessel. The plurality of power sources can include one or more DC power sources (two DC powers sources are depicted as battery banks 110 and 115). The plurality of power sources can also include one or more AC power sources (two AC power sources are depicted as generator systems 120 and 122). The system 100 can also include a power management system 150.

[00054] The first battery bank 110 can include one or more cells (four are shown 111, 112, 113, and 114). The cells 111, 112, 113, 114 can be connected in parallel or series. The cells 111, 112, 113, 114 can be in communication with a first control and monitor system 170.

[00055] The second battery bank 115 can include one or more cells (four are shown 116, 117, 118, and 119). The cells 116, 117, 118, 119 can be connected in parallel or series. The cells 116, 117, 118, 119 can be in communication with a second control and monitor system 172.

[00056] The control and monitor systems 170 and 172 can be in communication with the power management system 150. An illustrative control and monitor system is described in more detail below.

[00057] The first generator system 120 can include a first engine 123, such as a diesel or natural gas engine. The first engine 123 can have a first throttle 124 in communication with the power management system 150. The first generator system 120 can also include a first electrical generator 125 that is driven by the first engine 123.

[00058] The second generator system 122 can include a second engine 127. The second engine 127 can have a second throttle 129 in communication with the power management system 150. The second generator system 126 can also include a second electrical generator 128 that is driven by the second engine 127.

[00059] The first electrical generator 125 can be in communication with the first battery bank

110 by a first AC to DC inverter 176. The second electrical generator 127 can be in communication with the second battery bank 115 by a second AC to DC inverter 178. The AC to DC inverters 176 and 178 can be passive or active. The AC to DC inverter can be any commercially available AC to DC inverter.

[00060] The power management system 150 can be in communication with the control and monitor systems 170 and 172 and the generator systems 120 and 126. The power management system 150 is described in more detail in Figure 2.

[00061] Turning now to Figures 1 and 2. Figure 2 depicts a schematic of the illustrative power management system 150 according to one or more embodiments. The power management system 150 can include a processor 210, a data storage 220, and a plurality of computer instructions 230.

[00062] The processor 210 can be a processor or a microprocessor. For example, the processor 210 can be a personal computer, an Intel processor, a PLC, or the like. The processor 210 can be in communication with the data storage 220.

[00063] The data storage 220 can be a hard drive, a virtual hard drive, a flash drive, or other computer readable medium.

[00064] The plurality of computer instructions can be stored on the data storage 220. The plurality of computer instructions can include computer instructions for monitoring the battery bank 232, computer instructions for determining the most efficient power source to power the vessel 234, computer instructions to determine when one or more of the battery banks are at a predetermined state of charge 238, computer instructions for controlling one or more AC power source 241, computer instructions for controlling auxiliary devices of the vessel 242, and computer instructions for transferring harvested energy from one or more electrical rotating source to the battery bank, auxiliary devices of the vessel, loads of the vessel, or combinations thereof 244, computer instructions for comparing the power needed for all loads against each individual power source 245, computer instructions for monitoring the amount of power needed for all loads 246, and computer instructions to transfer a

portion of the power from one or more AC power source to one or more of the battery banks to increase the state of charge for one or more of the battery banks 247.

[00065] The computer instructions for monitoring the battery bank 232 can determine the state of charge of the battery banks using data from the control and monitor systems 170 and 172.

[00066] Computer instructions for determining the most efficient power source to power the vessel 234 can obtain information regarding the determined state of the battery banks. Accordingly, the computer instructions for determining the most efficient power source to power the vessel 234 can determine the state of the AC power sources; determine the state of the actual loads needed to power the vessel.

[00067] Consequently, the information determined by the computer instructions for determining the most efficient power source to power the vessel 234 can be used to increase the efficiency of the power system by instructing the processor to increase the AC power output, decreasing the AC power output, or balancing the AC power output with the battery bank power output. For example, if the computer instructions for determining the most efficient power source to power the vessel 234 determines that the most efficient power source is the battery banks 110 and 115, the computer instructions for determining the most efficient power source to power the vessel 234 can instruct the processor to adjust the generator systems 120 and 126, such that the vessel is only powered by the battery banks 110 and 115.

[00068] The computer instructions to determine when one or more of the battery banks are at a predetermined state of charge 238 can receive the determined state of charge from computer instructions for monitoring the battery bank 232 and compare the determined state of charge to a predetermined state of charge, which is provided by the manufacturer of the cells, and communicate this information to the computer instructions for determining the most efficient power source to power the vessel 234. Then the computer instructions for determining the most efficient power source to power the vessel 234 can tell the processor 210 to prevent transfer of energy from the

battery banks 110 and 115 and to provide power from one or more of the generator systems 120 and 126 to charge the battery banks 110 and 115 if the determined state of charge is less the predetermined state of charge. Alternatively, if the determined state of charge is greater than the predetermined state of charge the computer instructions for determining the most efficient power source 234 can decrease the generator systems 120 and 126 power output to allow more power to be drawn from the battery banks 110 and 115.

[00069] The computer instructions to transfer a portion of the power from one or more AC power source to one or more of the battery banks to increase the state of charge for one or more of the battery banks 247 can cooperate with the computer instructions to determine when one or more of the battery banks are at a predetermined state of charge 238 and the computer instructions for monitoring the battery bank 232 to selectively instruct the processor 210 to form one or more electrical communication paths between the one or more of the battery banks 110 and 115 and one or more of the generator systems 120 and 126.

[00070] The computer instructions for controlling auxiliary devices of the vessel 242 can instruct the processor to initiate the operation of one or more pumps, one or more winches, or other auxiliary devices needed for critical operations on the vessel.

[00071] The computer instructions for transferring harvested energy from one or more electrical rotating source to the battery bank, auxiliary devices of the vessel, loads of the vessel, or combinations thereof 244 can determine the allowable amount of harvested energy that can be transferred back into the system and processor 210 can selectively open one or more current paths to allow the harvested energy to be transferred back into the system.

[00072] The computer instructions for comparing the power needed for all loads against each individual power source 245 can cooperate with the computer instructions for monitoring the amount of power needed for all loads 246 to sum or calculate all the power requirements of the vessel. The computer instructions for monitoring the

amount of power needed for all loads 246 can instruct the processor to receive signals form one or more monitoring systems in communication with various components of the vessel to determine the required load. For example, the vessel can have one or more monitoring systems for monitoring service loads, and auxiliary device loads to determine the total load required.

[00073] Figure 3 depicts a schematic of a control and monitor system for a battery bank according to one or more embodiments.

[00074] The control and monitor system 300 can include a master battery monitoring processor 314. The master battery monitoring processor 314 can be a microprocessor, an Intel processor, PLC, or the like.

[00075] The master battery monitoring processor 314 can be in communication with a master data storage 316. The master data storage 316 is described in more detail in Figure 4.

[00076] The master battery monitoring processor 314 can be in communication with a voltage sensor 311. Other sensors can also be in direct communication with the master battery monitoring processor 314. The voltage sensor 311 can measure the power output of a battery bank 310.

[00077] The battery bank 310 can have one or more cells (four are shown 330, 332, 334, and 336). The cells can be any power cell such a lithium ion cells, acid based cells, or other commercially available cells.

[00078] The master battery monitoring processor 314 can be in communication with a plurality of slave processors 320, 322, 324, and 326. The first slave processor 320 can be in communication with a first cell 330. The second slave processor 322 can be in communication with a second cell 332. The third slave processor 324 can be in communication with a third cell 334. The fourth slave processor 326 can be in communication with a fourth cell 336.

[00079] The control and monitor system 300 can also include a plurality of sets of sensors

340, 342, 344, and 346. Each set of sensors 340, 342, 344, and 346 can be or include a voltage sensor, a temperature sensor, a current sensor, and other relevant sensors.

[00080] The first set of sensors 340 can be in communication with the first cell 330 and the first slave processor 320. The second set of sensors 342 can be in communication with the second cell 332 and the second slave processor 322. The third set of sensors 344 can be in communication with the third cell 334 and the third slave processor 324. The fourth set of sensors 346 can be in communication with the fourth cell 336 and the fourth slave processor 326.

[00081] The slave processors 320, 322, 324, and 326 can acquire data from the associated set of sensors 340, 342, 344, and 346. The slave processors 320, 322, 324, and 326 can provide the acquired data to the master battery monitoring processor 314. The master battery monitoring processor 314 can communicate the acquired data to the power management system.

[00082] The slave processors 320, 322, 324, and 326 can be in independent communication with a plurality of data storage devices 380. For clarity only one data storage device is depicted; however, similar data storage devices can be in communication with the other slave processors 320, 322, 324, and 326. The data storage device 380 is described in more detail in Figure 5.

[00083] Figure 4 depicts an illustrative embodiment of a master data storage according to one or more embodiments. The master data storage 316 can have computer instructions 370 for balancing the cells 330, 332, 334, and 336. For example, the computer instructions 370 can maintaining each cell 330, 332, 334, and 336 within a preset limit of one another by instructing the master battery monitoring processor 314 to selectively open and close electrical communication paths between the cells 330, 332, 334, and 336 to allow for transfer of energy from higher charged cells to lower charged cells. The master data storage 316 can also include computer instructions 370 for sounding an alert if one or more of the cells 330, 332, 334, and 336 are out of balance.

[00084] Figure 5 depicts an illustrative embodiment of a data storage device in communication with a slave processor according to one or more embodiments. The data storage device 380 can include computer instructions for acquiring data from the plurality of sensors 390 and computer instruction 392 for determining the voltage of the associated cell.

[00085] Figure 6 depicts a vessel having an illustrative power system disposed thereon according to one or more embodiments.

[00086] The power system can be disposed on a vessel 400. The vessel 400 can be a barge, tug boat, tanker, or other vessel. The power system can be similar to any one described herein. Accordingly, the power system can include a power management system 420, one or more AC power sources 430, and one or more DC power sources 440.

[00087] The power management system 420 can have a processor 422 in communication with one or more controllers for operating the vessel or critical elements of the vessel. For example, the processor 422 can be in communication with a first controller 423 for controlling the AC power source 430, a control and monitor system 442 for monitoring the DC power source 440. The power system can also include one or more auxiliary controllers for controlling one or more auxiliary devices, such as auxiliary device 498.

[00088] The AC power source 430 can be connected to a DC bus 490 by an AC to DC converter 492. The AC to DC can also be referred to as an AC to DC inverter. The AC to DC converter 492 can be any commercially available AC to DC converter.

[00089] The DC power source can be connected to the DC bus 490. The DC bus 490 can also be connected to a DC to AC inverter 493. The DC to AC inverter 493 can be bi-directionally connected to the DC bus 490. The DC bus 490 can be a commercially available DC bus and can have internal control systems.

[00090] In one or more embodiments the DC to AC inverter 495 can be connected or in

communication with one or more auxiliary devices 498. The DC to AC inverter 495 can transfer harvested energy from the auxiliary device 498, such as an azimuth thruster, to the load or the DC power source 440. For example, the processor 422 can tell the DC to AC inverter 493 how much harvested energy can be transferred into the system, and the DC to AC inverter 493 can be selectively operated to allow energy harvested from the electrical rotating source of the auxiliary device 498 or other auxiliary devices to be transferred back to the DC power source 440, the load 497, or both. Illustrative DC to AC inverters can include those available from Siemens, such as Sinamics inverters; or other commercially available DC to AC inverter. The DC to AC 493 inverter can be bi-directionally connected to the connection auxiliary device 498, the load 497, and the DC bus 490.

[00091] The power system 410 can have a connection 460 for connecting to one or more external power sources (one external power source is depicted as shore power 499). The connection 460 can be in communication with the DC to AC inverter 493.

[00092] The processor 422 can be in communication with the first controller 423, the DC to AC inverter, the auxiliary device 498, and other components of the vessel 400.

[00093] Figure 7 depicts the vessel of Figure 4 when the illustrative power system is in a stealth mode according to one or more embodiments.

[00094] The power management system 420 can tell the first controller 423 to shut down the AC power source 430. Accordingly, the DC power source 440 can provide electricity to the loads required to operate the vessel 400.

[00095] Figure 8 depicts the vessel of Figure 4 when the illustrative power system is in a hybrid mode combining both AC power and DC power according to one or more embodiments.

[00096] The power management system 420 can adjust the first controller 423 to adjust the power output of the AC power source 430. Accordingly, the AC power source 430 can be accelerated to increase the power output therefrom, allowing the AC power

source 430 to provide power for the entire load required to operate the vessel 400. Furthermore, some of the power outputted from the AC power source 430 can be used to charge the DC power source 440.

[00097] In addition, energy harvested from the auxiliary device 498 can be used to power some of the load or to charge the DC power source 440.

[00098] In addition, in this mode the processor 422 can selectively instruct the first controller 423 to manipulate the AC power source 430 such that the power output from the AC power source is balanced with the DC power source 440 to allow for both the AC power source and the DC power source 440 to power the critical components of the vessel.

[00099] Figure 9 depicts the vessel of Figure 1 when the power system is in a docked mode according to one or more embodiments.

[000100] The AC power source 430 and the DC power source 440 can be prevented from outputting power, and shore power 499 can be communicated with the connection 460 to provide power to all the loads required to operate the vessel and to charge the DC power supply 440.

[000101] Figure 10 depicts the vessel of Figure 1 when the power system is in a maintenance mode according to one or more embodiments. In this mode the AC power source 430 can be excited preventing current from discharging from the DC power source 440, and the AC power source 430 can power all the loads required to operate the vessel. In one or more embodiments, a circuit breaker (not shown) can be used to remove the DC power supply 440 from the power system.

[000102] While these embodiments have been described with emphasis on the embodiments, it should be understood that within the scope of the appended claims, the embodiments might be practiced other than as specifically described herein.

CLAIMS

What is claimed is:

1. A computer readable medium having computer instructions stored thereon for operating a vessel, wherein the computer instructions comprise:

   a. computer instructions for monitoring a DC source;

   b. computer instructions for determining the most efficient power source to power a vessel;

   c. computer instructions for controlling an AC power source to allow transfer of power solely from the DC power source to power the vessel, transfer of power solely from the AC power source to power the vessel; or transfer of power from both the AC power source and the DC power source to power the vessel;

   d. computer instructions to determine when the DC power source is at a predetermined level; and

   e. computer instructions for controlling auxiliary devices of the vessel.

2. The computer readable medium of claim 1, further comprising computer instructions for synchronizing the AC power source with an additional AC power source.

3. The computer readable medium of claim 1, further comprising computer instructions for harvesting energy from electrical rotating sources.

4. The computer readable medium of claim 1, further comprising computer instructions for monitoring the amount of power needed for all loads.

5. The computer readable medium of claim 4, further comprising instructions for comparing the power needed for all loads against each individual power source

6. A computer readable medium having computer instructions stored thereon for operating a vessel, wherein the computer instructions comprise:

a. computer instructions for monitoring a DC source;

b. computer instructions for determining the most efficient power source to power a vessel;

c. computer instructions for controlling an AC power source to allow transfer of power solely from the DC power source to power the vessel, transfer of power solely from the AC power source to power the vessel; or transfer of power from both the AC power source and the DC power source to power the vessel;

d. computer instructions to determine when the DC power source is at a predetermined level;

e. computer instructions for controlling auxiliary devices of the vessel;

f. computer instructions for monitoring the amount of power needed for all loads; and

g. computer instructions for comparing the power needed for all loads against each individual power source.

7. The computer readable medium of claim 6, further comprising computer instructions for synchronizing the AC power source with an additional AC power source.

8. The computer readable medium of claim 6, further comprising computer instructions for harvesting energy from electrical rotating sources.

9. A computer readable medium having computer instructions stored thereon for operating a vessel, wherein the computer instructions comprise:

a. computer instructions for monitoring a DC power source;

b. computer instructions for determining the most efficient power source from a plurality of power source comprising the DC power source and an AC power source to power a vessel; and

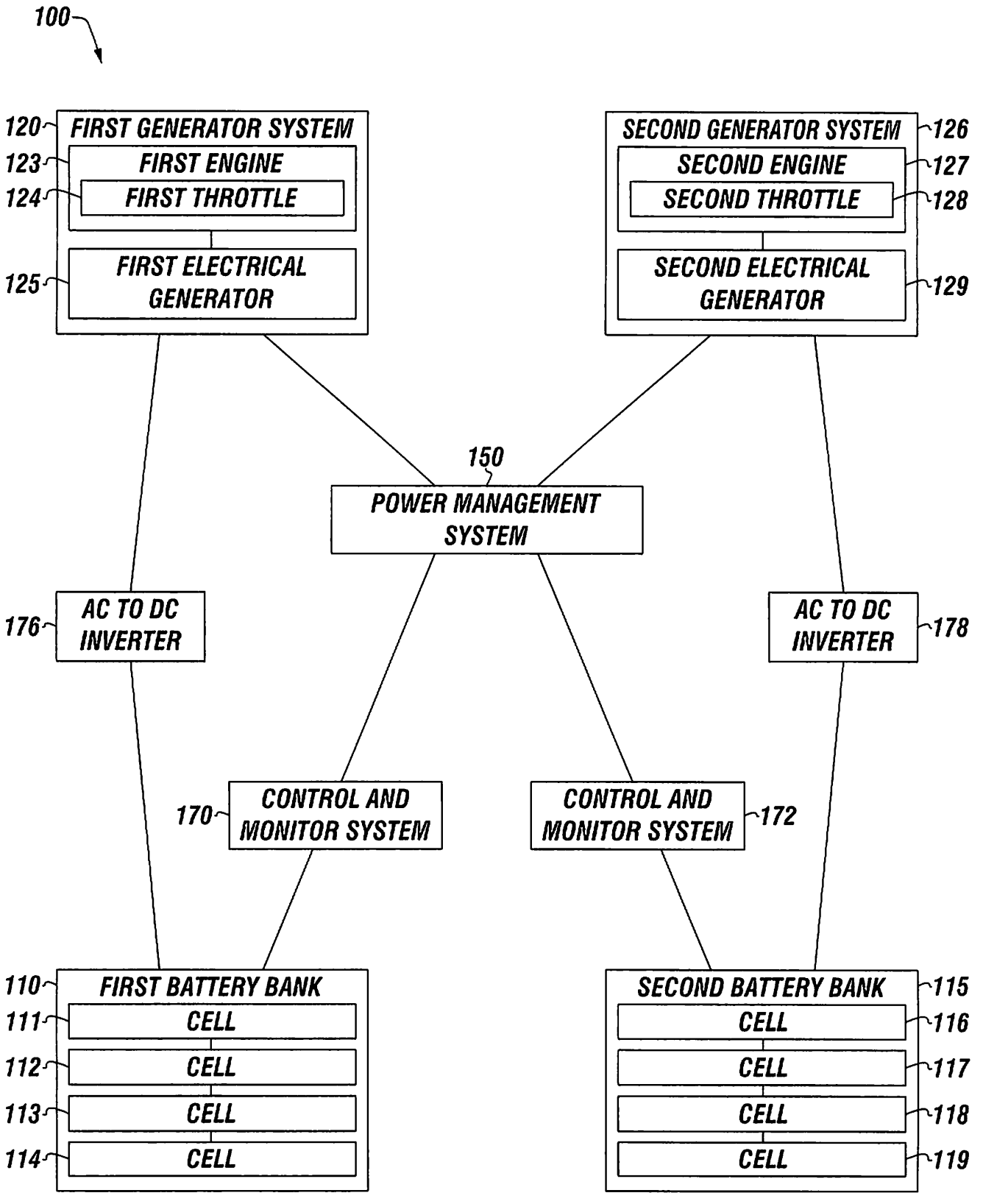
c. computer instructions for controlling the AC power source to allow transfer of power solely from the DC power source to power the vessel, transfer of power solely from the AC power source to power the vessel; or transfer of power from both the AC power source and the DC power source to power the vessel.

10. The computer readable medium of claim 9, further comprising computer instructions for synchronizing the AC power source with an additional AC power source.

11. The computer readable medium of claim 9, further comprising computer instructions for harvesting energy from electrical rotating sources.

ABSTRACT OF DISCLOSURE

One or more embodiments of a computer readable medium having computer instructions stored thereon for operating a vessel are provided. The computer readable medium can include computer instructions for monitoring a DC source; computer instructions for determining the most efficient power source to power a vessel; computer instructions for controlling an AC power source to allow transfer of power solely from the DC power source to power the vessel, transfer of power solely from the AC power source to power the vessel; or transfer of power from both the AC power source and the DC power source to power the vessel; computer instructions to determine when the DC power source is at a predetermined level; and computer instructions for controlling auxiliary devices of the vessel.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120
FIRST GENERATOR SYSTEM
123
FIRST ENGINE
124
FIRST THROTTLE
125
FIRST ELECTRICAL GENERATOR
126
SECOND GENERATOR SYSTEM
127
SECOND ENGINE
128
SECOND THROTTLE
129
SECOND ELECTRICAL GENERATOR
150
POWER MANAGEMENT SYSTEM
176
AC TO DC INVERTER
178
AC TO DC INVERTER
170
CONTROL AND MONITOR SYSTEM
172
CONTROL AND MONITOR SYSTEM
110
FIRST BATTERY BANK
111
CELL
112
CELL
113
CELL
114
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115
SECOND BATTERY BANK
116
CELL
117
CELL
118
CELL
119
CELL

FIGURE 1

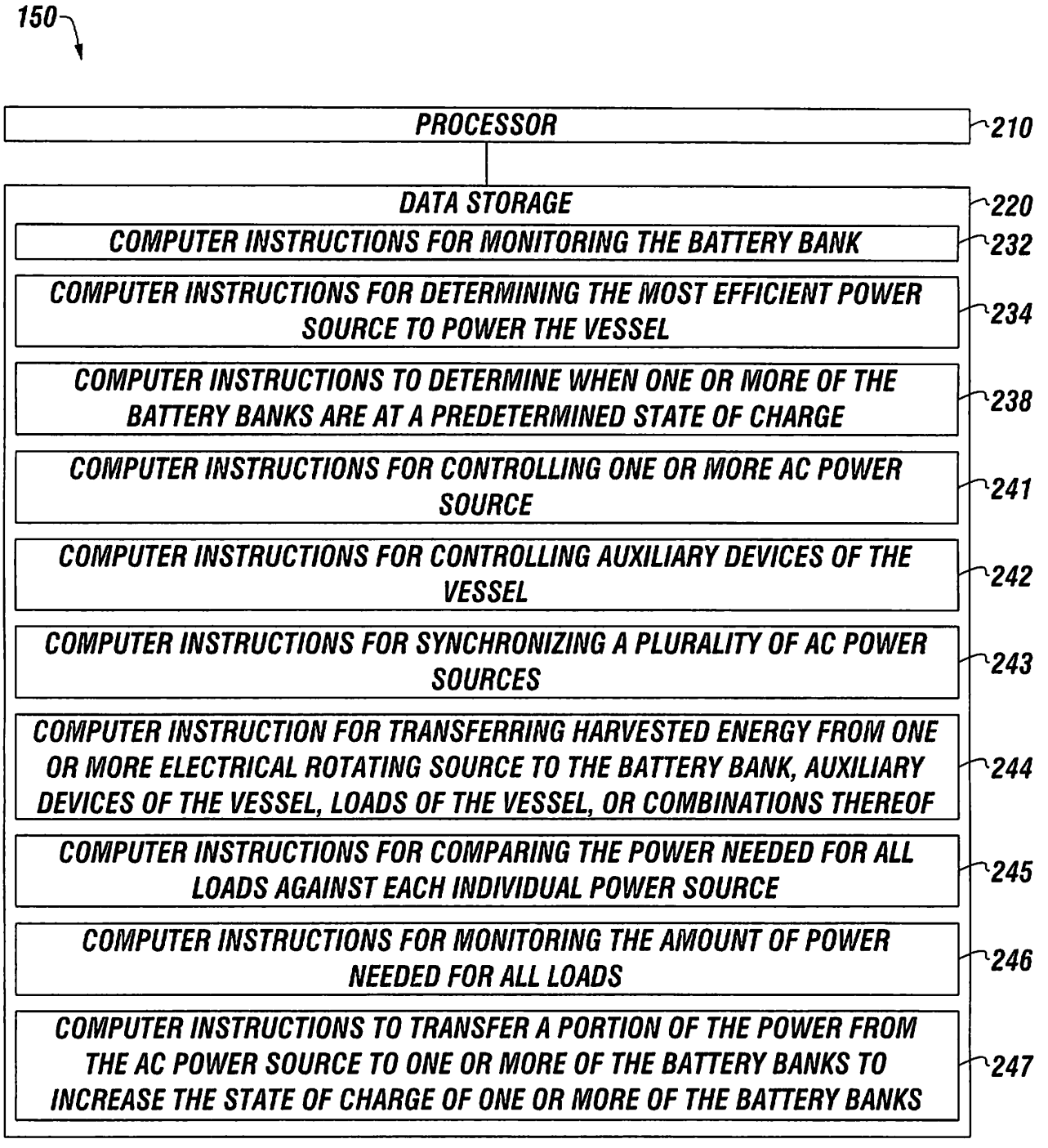

150
PROCESSOR
210
DATA STORAGE
220
COMPUTER INSTRUCTIONS FOR MONITORING THE BATTERY BANK
232
COMPUTER INSTRUCTIONS FOR DETERMINING THE MOST EFFICIENT POWER SOURCE TO POWER THE VESSEL
234
COMPUTER INSTRUCTIONS TO DETERMINE WHEN ONE OR MORE OF THE BATTERY BANKS ARE AT A PREDETERMINED STATE OF CHARGE
238
COMPUTER INSTRUCTIONS FOR CONTROLLING ONE OR MORE AC POWER SOURCE
241
COMPUTER INSTRUCTIONS FOR CONTROLLING AUXILIARY DEVICES OF THE VESSEL
242
COMPUTER INSTRUCTIONS FOR SYNCHRONIZING A PLURALITY OF AC POWER SOURCES
243
COMPUTER INSTRUCTION FOR TRANSFERRING HARVESTED ENERGY FROM ONE OR MORE ELECTRICAL ROTATING SOURCE TO THE BATTERY BANK, AUXILIARY DEVICES OF THE VESSEL, LOADS OF THE VESSEL, OR COMBINATIONS THEREOF
244
COMPUTER INSTRUCTIONS FOR COMPARING THE POWER NEEDED FOR ALL LOADS AGAINST EACH INDIVIDUAL POWER SOURCE
245
COMPUTER INSTRUCTIONS FOR MONITORING THE AMOUNT OF POWER NEEDED FOR ALL LOADS
246
COMPUTER INSTRUCTIONS TO TRANSFER A PORTION OF THE POWER FROM THE AC POWER SOURCE TO ONE OR MORE OF THE BATTERY BANKS TO INCREASE THE STATE OF CHARGE OF ONE OR MORE OF THE BATTERY BANKS
247

FIGURE 2

FIGURE 3

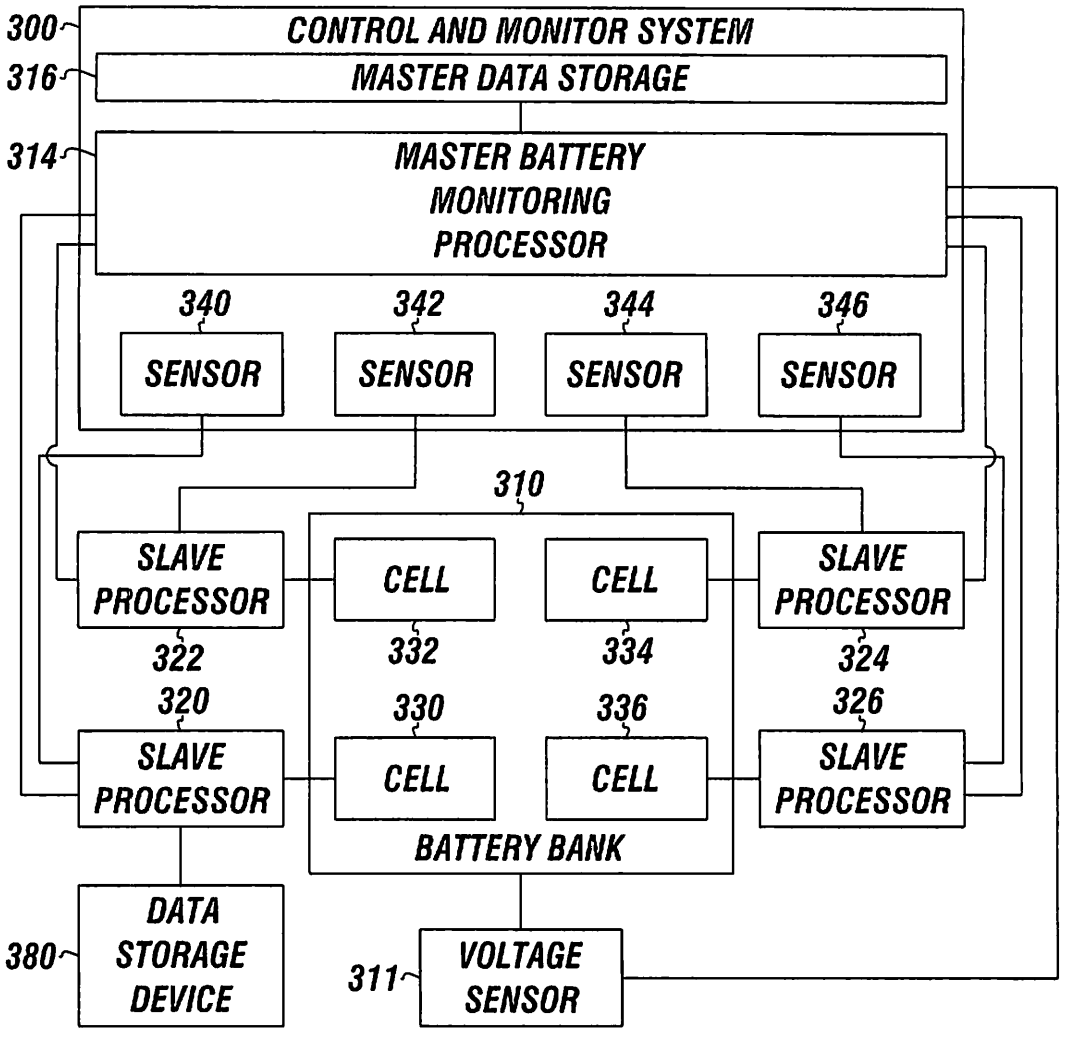


FIGURE 4

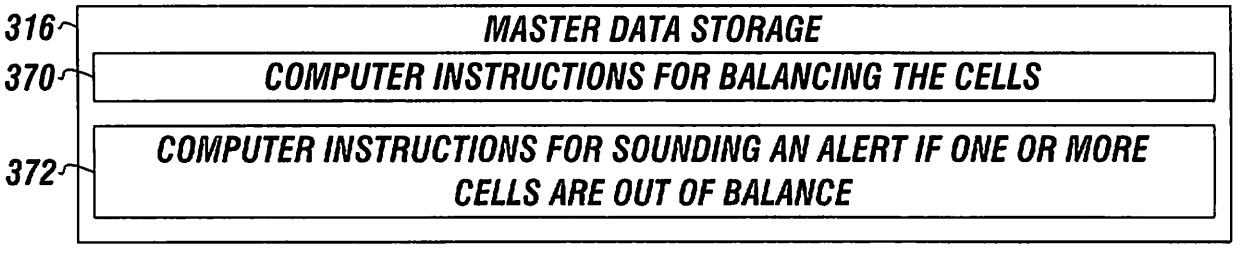
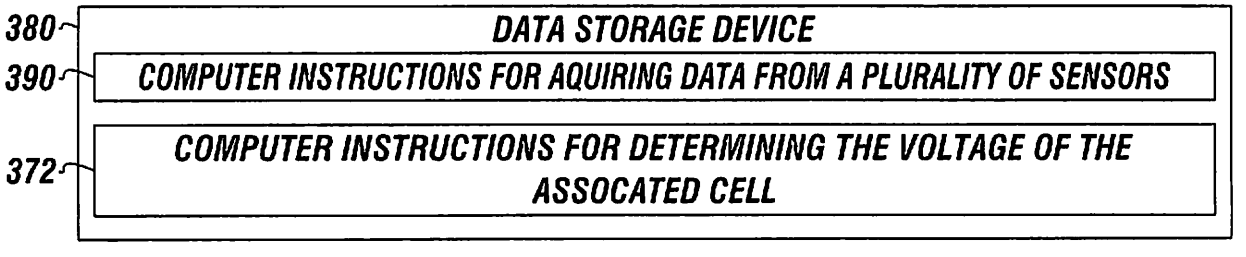
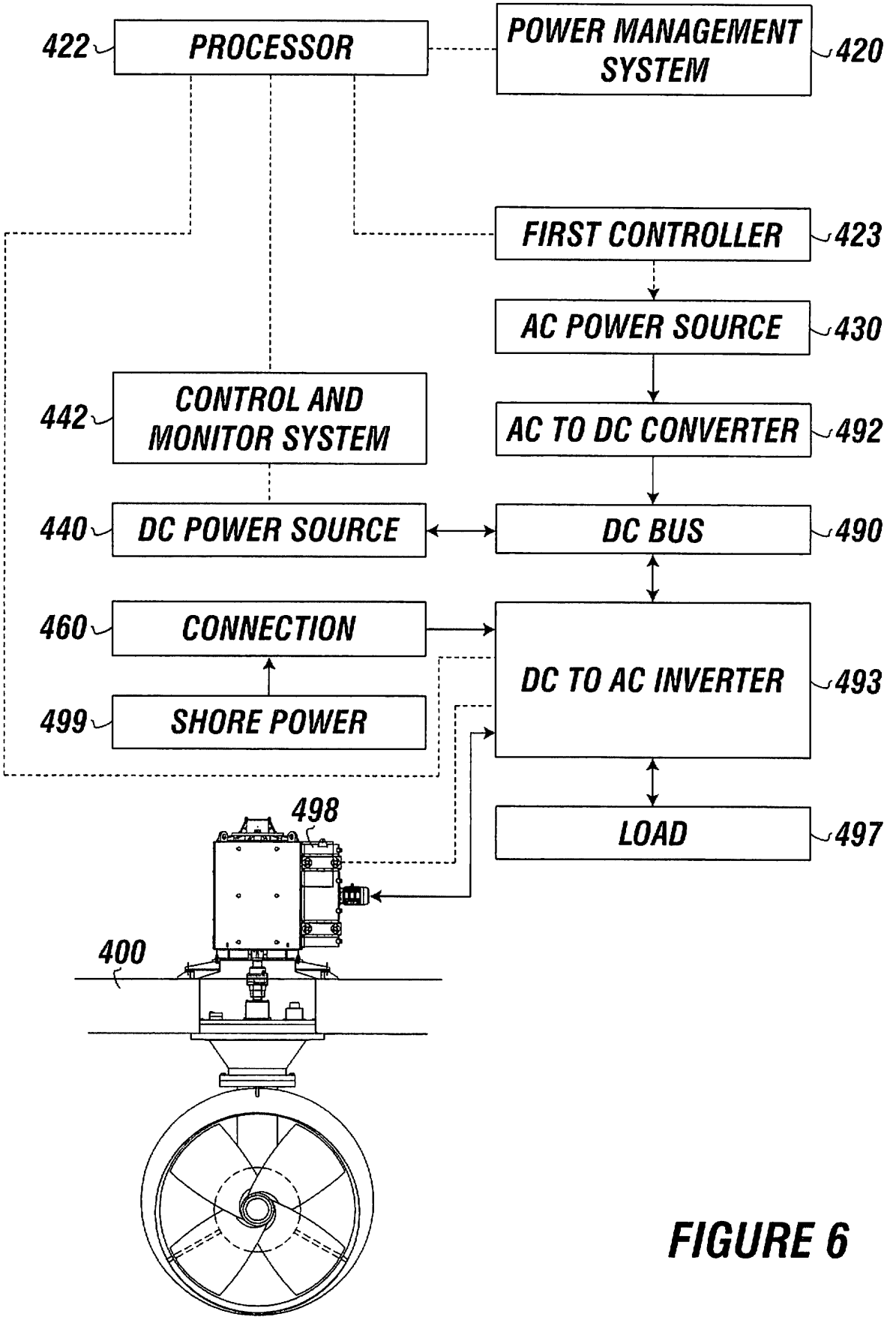


FIGURE 5

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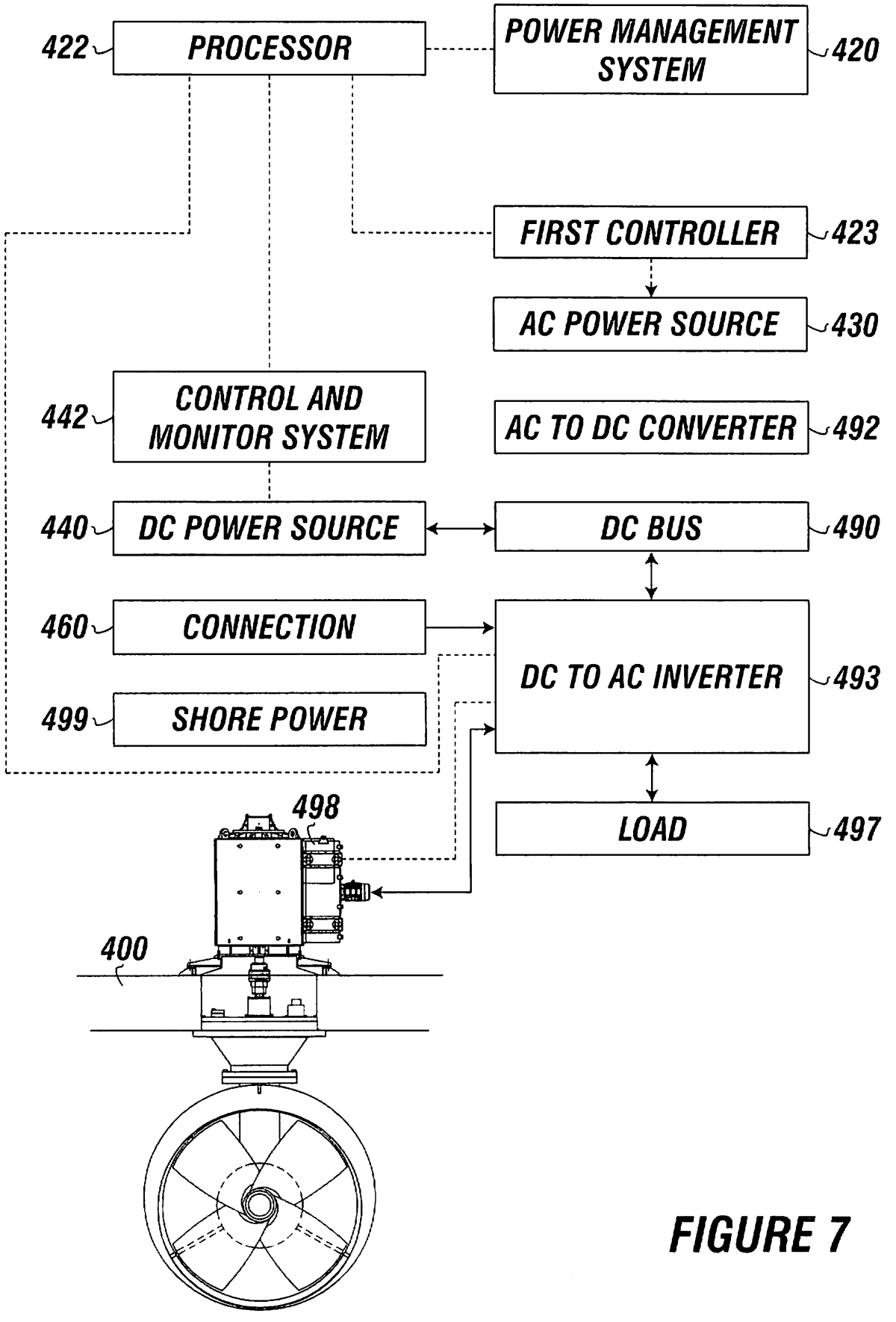
PROCESSOR
POWER MANAGEMENT SYSTEM
420
FIRST CONTROLLER
423
AC POWER SOURCE
430
442
CONTROL AND MONITOR SYSTEM
AC TO DC CONVERTER
492
440
DC POWER SOURCE
DC BUS
490
460
CONNECTION
DC TO AC INVERTER
493
499
SHORE POWER
498
LOAD
497
400

FIGURE 6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499
SHORE POWER
LOAD
497
498
400

FIGURE 7

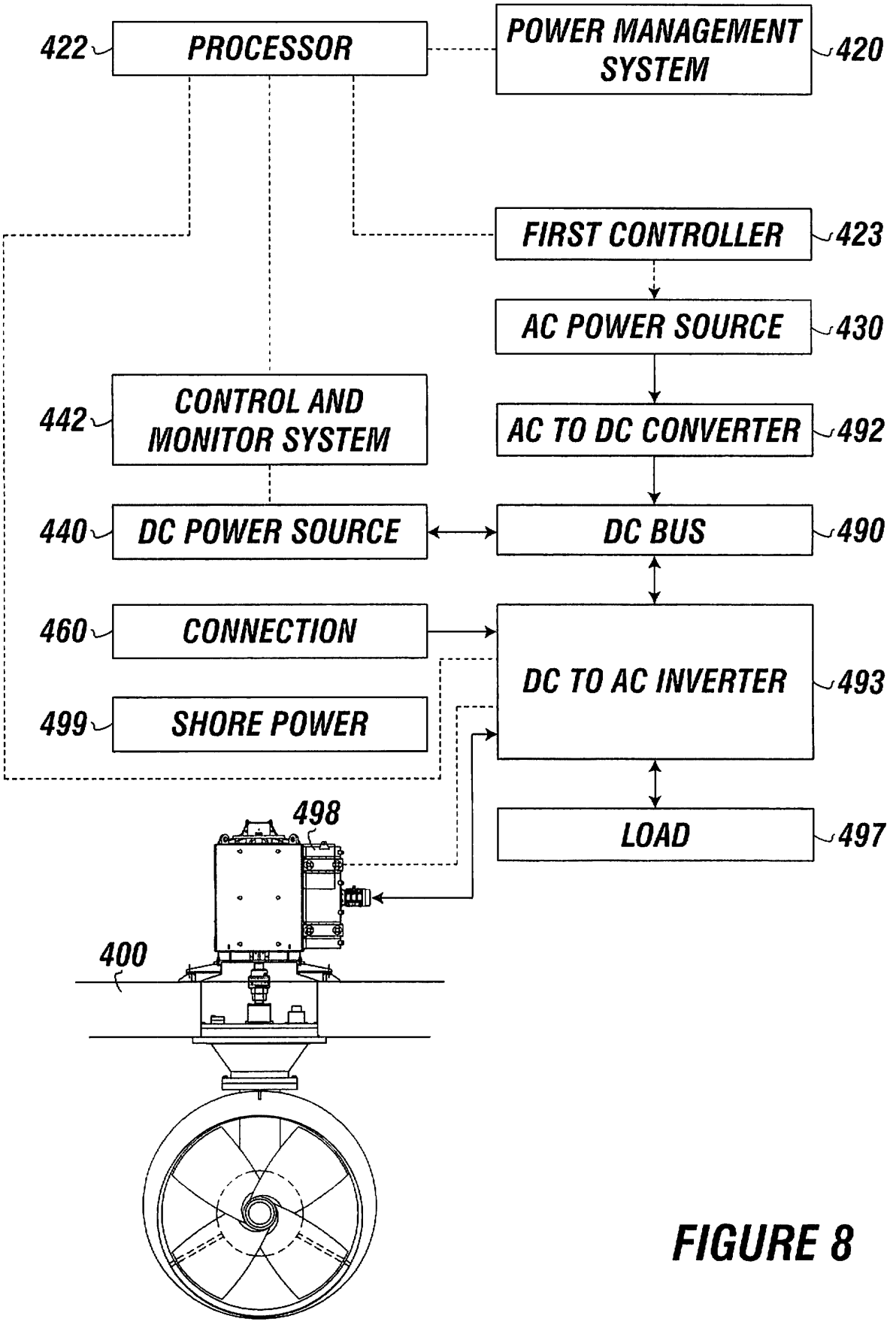
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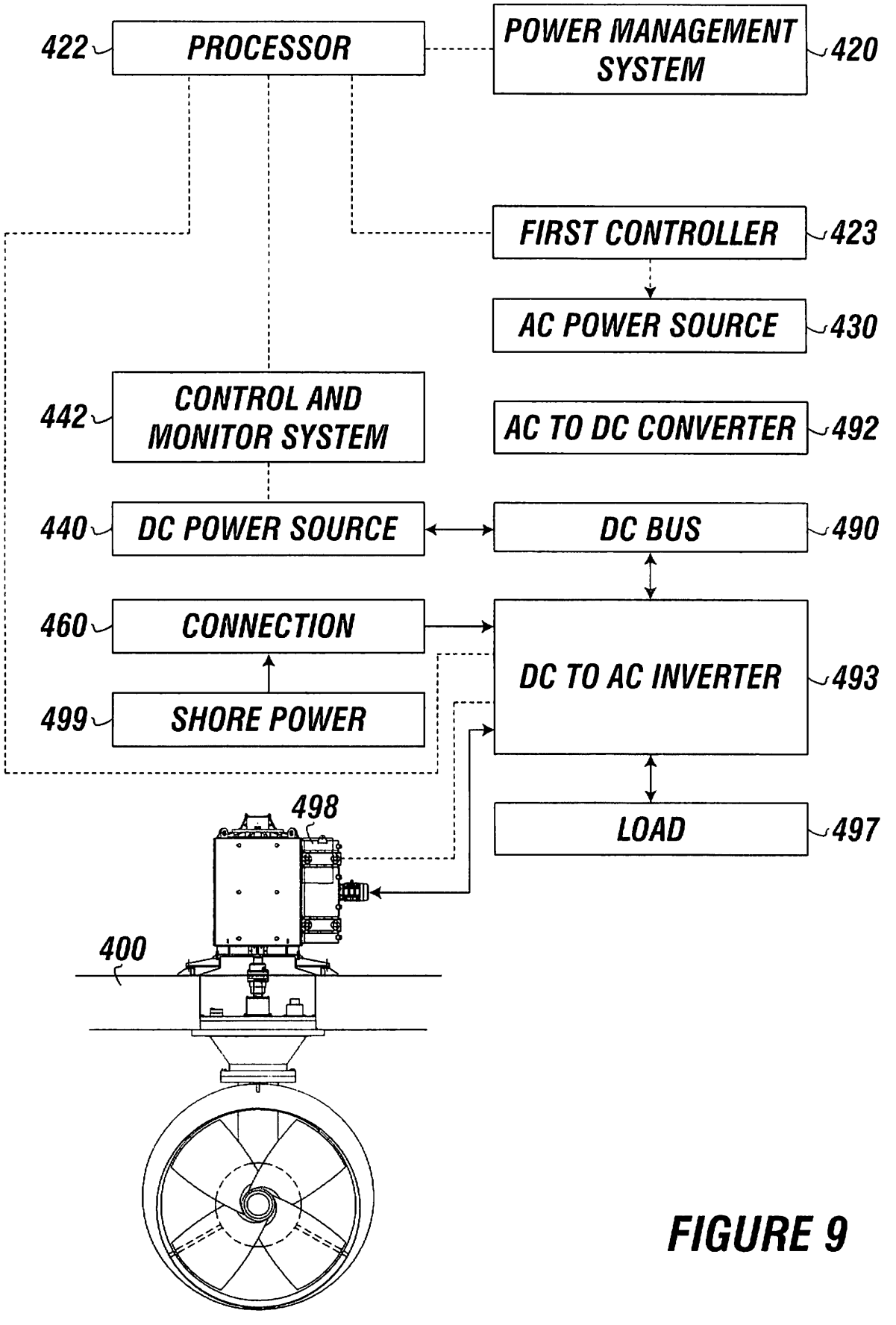
FIGURE 8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498
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FIGURE 9

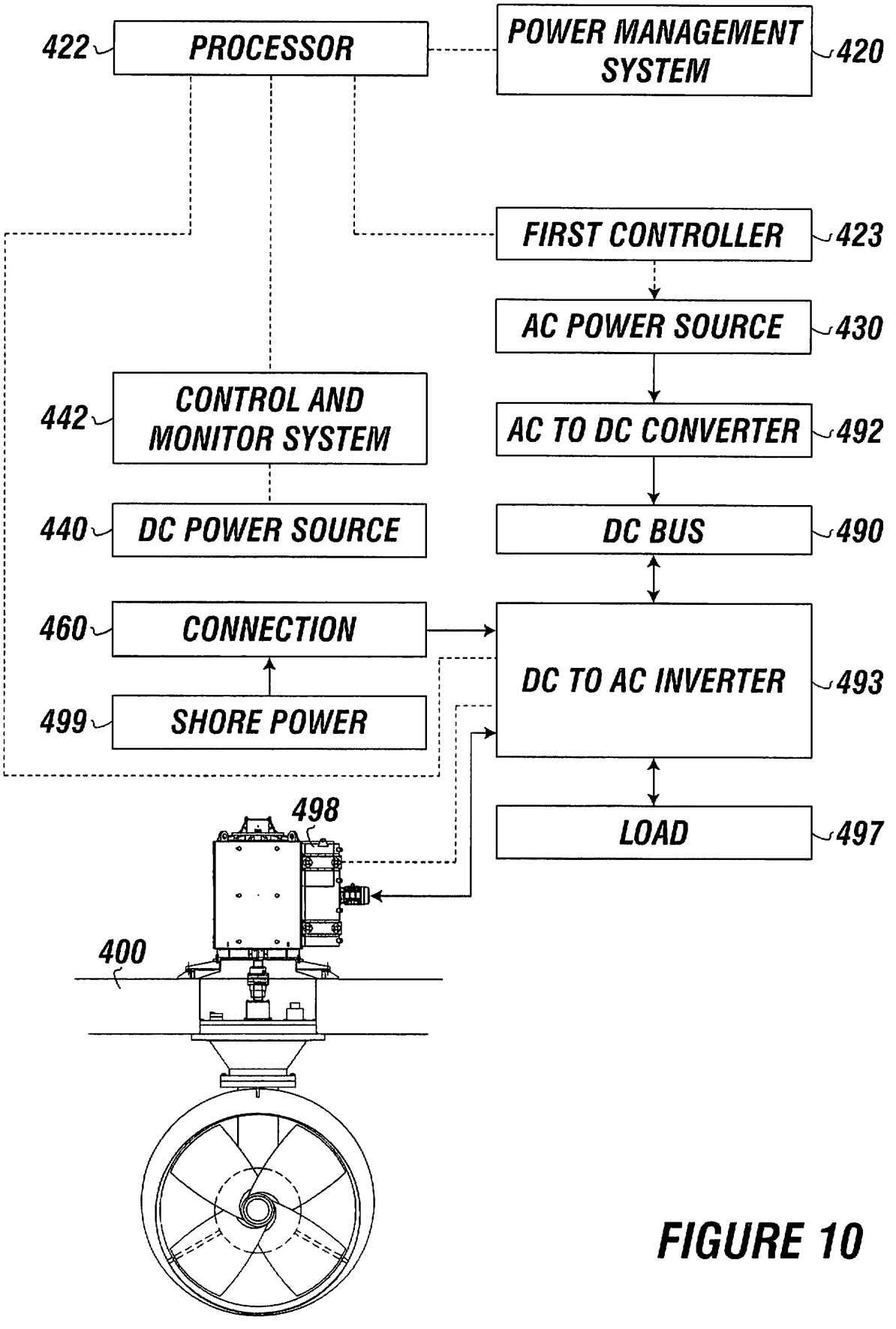
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FIGURE 10