

PETITION TO MAKE SPECIAL BASED ON AGE FOR ADVANCEMENT OF EXAMINATION UNDER 37 CFR 1.102(c)(1)					
Application Information					
Application Number		Confirmation Number		Filing Date	2021-02-22
Attorney Docket Number (optional)	3725194.00143	Art Unit	NA	Examiner	NA
First Named Inventor	Michael Miskin				
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME				
Attention: Office of Petitions An application may be made special for advancement of examination upon filing of a petition showing that the applicant is 65 years of age, or more. No fee is required with such a petition. See 37 CFR 1.102(c)(1) and MPEP 708.02 (IV). APPLICANT HEREBY PETITIONS TO MAKE SPECIAL FOR ADVANCEMENT OF EXAMINATION IN THIS APPLICATION UNDER 37 CFR 1.102(c)(1) and MPEP 708.02 (IV) ON THE BASIS OF THE APPLICANT'S AGE. A grantable petition requires one of the following items: (1) Statement by one named inventor in the application that he/she is 65 years of age, or more; or (2) Certification by a registered attorney/agent having evidence such as a birth certificate, passport, driver's license, etc. showing one named inventor in the application is 65 years of age, or more.					
Name of Inventor who is 65 years of age, or older					
Given Name	Middle Name	Family Name		Suffix	
Robert	L.	Kottritsch			
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 format of the signature. Select (1) or (2) :					
☐ (1) I am an inventor in this application and I am 65 years of age, or more.					
☒ (2) I am an attorney or agent registered to practice before the Patent and Trademark Office, and I certify that I am in possession of evidence, and will retain such in the application file record, showing that the inventor listed above is 65 years of age, or more.					
Signature	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-02-22	
Name	Dennis A. Majewski		Registration Number	65578	

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.

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
<p>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.</p> <p>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.</p>			

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.)
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Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Michael		Miskin		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Sleepy Hollow	State/Province	IL	Country of Residence	US

Mailing Address of Inventor:

Address 1	2 Pinecone Lane				
Address 2					
City	Sleepy Hollow	State/Province	IL		
Postal Code	60118	Country i	US		

Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Robert	L.	Kottritsch		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
City	Shefford Bedfordshire	Country of Residence i	GB		

Mailing Address of Inventor:

Address 1	10 The Hollies				
Address 2					
City	Shefford Bedfordshire	State/Province			
Postal Code	56175BX	Country i	GB		

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

Add

Correspondence Information:

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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

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

Customer Number	24573		
Email Address	chicago.patents@kigates.com	Add Email	Remove Email

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573 PGR2023-00016 - Home Depot		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Pending	Remove			
Application Number		Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
		Continuation of		16740295	2020-01-10	
Prior Application Status		Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)	
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14	
Prior Application Status		Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)	
16274164	Continuation of	15685429	2017-08-24	10271393	2019-04-23	
Prior Application Status		Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)	
15685429	Continuation of	14172644	2014-02-04	9750098	2017-08-29	
Prior Application Status		Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)	
14172644	Continuation of	13322796	2011-11-28	8648539	2014-02-11	
Prior Application Status		Expired	Remove			
Application Number		Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
13322796		a 371 of international		PCTUS2010001597	2010-05-28	
Prior Application Status		Expired	Remove			
Application Number		Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
PCTUS2010001597		Claims benefit of provisional		61217215	2009-05-28	
Prior Application Status		Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)	
PCTUS2010001597	Continuation in part of	12287267	2008-10-06	8179055	2012-05-15	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
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Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3725194.00143 14US07
	Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME	

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).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

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.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

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

Applicant	1	Remove
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p> <p style="text-align: right;">Clear</p>		
☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>		
Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; height: 20px; width: 100%;"></div>		
If the Applicant is an Organization check here. ☒		
Organization Name	Lynk Labs, Inc.	
Mailing Address Information For Applicant:		
Address 1	2511 Technology Drive	
Address 2	Suite 108	
City	Elgin	State/Province IL
Country	US	Postal Code 60123-9323
Phone Number		Fax Number
Email Address		
Additional Applicant Data may be generated within this form by selecting the Add button. Add		

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
<input type="button" value="Remove"/>				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country ⁱ	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address	<input type="text"/>			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-02-22
First Name	Dennis A.	Last Name	Majewski	Registration Number
				65578
Additional Signature may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.**

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

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME			
First Named Inventor/Applicant Name:	Mike Miskin			
Filer:	Dennis A. Majewski/Susan Murrah			
Attorney Docket Number:	3725194.00143 US1407			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	320	320
UTILITY SEARCH FEE	1111	1	700	700
UTILITY EXAMINATION FEE	1311	1	800	800
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 (\$)				1820

Electronic Acknowledgement Receipt

EFS ID:	41983489
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Mike Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00143 US1407
Receipt Date:	22-FEB-2021
Filing Date:	
Time Stamp:	17:33:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 1820
RAM confirmation Number	E20212LH34133090
Deposit Account	021818
Authorized User	US Patent Mail

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)

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Ex. 1003 - Page 14

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		00143-SPEC.pdf	8194060	yes	21
			0681b9be05e6dc6dfac2ecfac3228909259fe29		
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ABSTRACT

An LED lighting system is disclosed. The example LED lighting system includes a first LED circuit and a second LED circuit. The second LED circuit is configured to emit a different color light compared to the first LED circuit. The LED lighting system also includes a switch capable of at least one of switching a voltage level input to at least one of the first LED circuit or the second LED circuit, or switching the second LED circuit 'on' or 'off'. The LED lighting system further includes an LED driver connected to an AC voltage power source. The LED driver is configured to provide a DC voltage output to at least one of the first LED circuit or the second LED circuit. The switch is electrically connected between the DC voltage output and at least one of the first LED circuit or the second LED circuit.

CLAIMS

The invention is claimed as follows:

Claim 1: An LED lighting system comprising:

a first operating LED circuit and at least one additional LED circuit,

at least one of the first operating LED circuit or the at least one additional LED circuit including at least two LEDs connected in either series or parallel, and

the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit;

a switch capable of at least one of:

(a) switching a voltage level input to at least one of the first operating LED circuit or the at least one additional LED circuit, or

(b) switching the at least one additional LED circuit on or off,

wherein (a) or (b) is selectable by a user switching the switch; and

an LED driver including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit,

wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 2: The LED lighting system of Claim 1, wherein the switch has at least two positions.

Claim 3: The LED lighting system of Claim 1, wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 4: The LED lighting system of Claim 1, wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate.

Claim 5: The LED lighting system of Claim 1, wherein the switching of the switch changes light output of the LED lighting device.

Claim 6: The LED lighting system of Claim 1, wherein the AC voltage power source includes one of at least two different AC voltage power sources.

Claim 7: The LED lighting system of Claim 1, further comprising a driver electrically coupled to the switch and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 8: An LED lighting system comprising:
a first operating LED circuit and at least one additional LED circuit,
at least one of the first operating LED circuit or the at least one additional LED circuit including at least two LEDs connected in either series or parallel, and
the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit;
a switch capable of at least one of:
(a) switching a brightness level of at least one of the first operating LED circuit or the at least one additional LED circuit, or
(b) switching the at least one additional LED circuit on or off,
wherein (a) or (b) is selectable by a user switching the switch; and
an LED driver including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit,
wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 9: The LED lighting system of Claim 8, wherein the switch has at least two positions.

Claim 10: The LED lighting system of Claim 8, wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 11: The LED lighting system of Claim 8, wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate.

Claim 12: The LED lighting system of Claim 8, wherein the switching of the switch changes light output of the LED lighting device.

Claim 13: The LED lighting system of Claim 8, wherein the AC voltage power source includes one of at least two different AC voltage power sources.

Claim 14: The LED lighting system of Claim 8, further comprising a driver electrically coupled to the switch and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 15: An LED lighting system comprising:
a first operating LED circuit and at least one additional LED circuit,
the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit;
a switch capable of at least one of:
(a) switching a voltage level input to at least one of the first operating LED circuit or the at least one additional LED circuit, or
(b) switching the at least one additional LED circuit on or off,
wherein (a) or (b) is selectable by switching the switch; and
an LED driver including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit,

wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 16: The LED lighting system of Claim 15, wherein the switch has at least two positions.

Claim 17: The LED lighting system of Claim 15, wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 18: The LED lighting system of Claim 15, wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate.

Claim 19: The LED lighting system of Claim 15, wherein the switching of the switch changes light output of the LED lighting device.

Claim 20: The LED lighting system of Claim 15, wherein the AC voltage power source includes one of at least two different AC voltage power sources.

Multi-Voltage And Multi-Brightness LED Lighting Devices And Methods Of Using Same

RELATED APPLICATIONS

[Para 1] The present application is a continuation of U.S. Patent Application No. 16/740,295, filed January 10, 2020, which is a continuation of U.S. Patent Application No. 16/274,164, filed February 12, 2019, which is a continuation of U.S. Patent Application No. 15/685,429, filed August 24, 2017, which is a continuation of U.S. Patent Application No. 14/172,644, filed February 4, 2014, which is a continuation of U.S. Patent Application No. 13/322,796, filed November 28, 2011, which is a national phase application of International Application No. PCT/US2010/001597, filed May 28, 2010, which claims priority to U.S. Provisional Application No. 61/217,215, filed May 28, 2009, and is a continuation-in-part of U.S. Patent Application No. 12/287,267, filed October 6, 2008, which claims the priority to U.S. Provisional Application No. 60/997,771, filed October 6, 2007; the contents of each of these applications are expressly incorporated herein by reference.

TECHNICAL FIELD

[Para 2] The present invention generally relates to light emitting diodes ("LEDs") for AC operation. The present invention specifically relates to multiple voltage level and multiple brightness level LED devices, packages and lamps.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[Para 3] None.

BACKGROUND OF THE INVENTION

[Para 4] Field of the Invention

[Para 5] The present invention generally relates to light emitting diodes ("LEDs") for multi-voltage level and/or multi-brightness level operation. The present invention specifically relates to multiple voltage level and multiple brightness level light emitting diode circuits, single chips, packages and lamps "devices" for direct AC voltage power source operation, bridge rectified AC voltage power source operation or constant DC voltage power source operation.

Description of the Related Art

[Para 6] LEDs are semiconductor devices that produce light when a current is supplied to them. LEDs are intrinsically DC devices that only pass current in one polarity and historically have been driven by DC voltage sources using resistors, current regulators and voltage regulators to limit the voltage and current delivered to the LED. Some LEDs have resistors built into the LED package providing a higher voltage LED typically driven with 5V DC or 12V DC.

[Para 7] With proper design considerations LEDs may be driven more efficiently with direct AC or rectified AC than with constant voltage or constant current DC drive schemes.

[Para 8] Some standard AC voltage in the world include 12VAC, 24VAC, 100VAC, 110VAC, 120VAC, 220VAC, 230VAC, 240VAC and 277VAC. Therefore, it would be advantageous to have a single chip LED or multi-chip single LED packages that could be easily configured to operate at multiple voltages by simply selecting a voltage and/or current level when packaging the multi-voltage and/or multi-current single chip LEDs or by selecting a specific voltage and/or current level when integrating the LED package onto a printed circuit board or within a finished lighting product. It would also be advantageous to have multi-current LED chips and/or packages for LED lamp applications in order to provide a means of increasing brightness in LED lamps by switching in additional circuits just as additional filaments are switched in for standard incandescent lamps.

[Para 9] US 7,525,248 discloses a chip-scale LED lamp including discrete LEDs capable of being built upon electrically insulative, electrically conductive, or electrically semi conductive substrates. Further, the construction of the LED lamp enables the lamp to be configured for high voltage AC or DC power operation. The LED based solid-state light emitting device or lamp is built upon an electrically insulating layer that has been formed onto a support surface of a substrate. Specifically, the insulating layer may be epitaxially grown onto the substrate, followed by an LED buildup of an n-type semiconductor layer, an optically active layer, and a p-type semiconductor layer, in succession. Isolated mesa structure of individual, discrete LEDs is formed by etching specific portions of the LED buildup down to the insulating layer, thereby forming trenches between adjacent LEDs. Thereafter, the individual LEDs are electrically coupled together through conductive elements or traces being deposited for connecting the n-type layer of one LED and the p-type layer of an adjacent LED, continuing across all of the LEDs to form the solid-state light emitting device. The device may therefore be formed as an

integrated AC/DC light emitter with a positive and negative lead for supplied electrical power. For instance, the LED lamp may be configured for powering by high voltage DC power (e.g., 12V, 24V, etc.) or high voltage AC power (e.g., 110/120V, 220/240V, etc.).

[Para 10] US 7,213,942 discloses a single-*chip* LED device through the use of integrated circuit technology, which can be used for standard high AC voltage (110 volts for North America, and 220 volts for Europe, Asia, etc.) operation. The single-*chip* AC LED device integrates many smaller LEDs, which are connected in series. The integration is done during the LED fabrication process and the final product is a single-*chip* device that can be plugged directly into house or building power outlets or directly screwed into incandescent lamp sockets that are powered by standard AC voltages. The series connected smaller LEDs are patterned by photolithography, etching (such as plasma dry etching), and metallization on a single *chip*. The electrical insulation between small LEDs within a single-*chip* is achieved by etching light emitting materials into the insulating substrate so that no light emitting material is present between small LEDs. The voltage crossing each one of the small LEDs is about the same as that in a conventional DC operating LED fabricated from the same type of material (e.g., about 3.5 volts for blue LEDs).

[Para 11] Accordingly, single chip LEDs have been limited and have not been integrated circuits beyond being fixed series or fixed parallel circuit configurations until the development of AC LEDs. The AC LEDs have still however been single circuit, fixed single voltage designs.

[Para 12] LED packages have historically not been integrated circuits beyond being fixed series or fixed parallel circuit configurations.

[Para 13] The art is deficient in that it does not provide a multi-voltage and/or multi- current circuit monolithically integrated on a single substrate which would be advantageous.

[Para 14] It would further be advantageous to have a multi-voltage and/or multi- brightness circuit that can provide options in voltage level, brightness level and/or AC or DC powering input power preference.

[Para 15] It would further be advantageous to provide multiple voltage level and/or multiple brightness level light emitting LED circuits, chips, packages and lamps "multi- voltage and/or multi-brightness LED devices" that can easily be electrically configured for at least two forward voltage drive levels with direct AC voltage coupling, bridge rectified AC voltage coupling or constant voltage DC power source coupling. This invention comprises circuits and devices that

can be driven with more than one AC or DC forward voltage "multi- voltage" at 6V or greater based on a selectable desired operating voltage level that is achieved by electrically connecting the LED circuits in a series or parallel circuit configuration and/or more than one level of brightness "multi-brightness" based on a switching means that connects and/or disconnects at least one additional LED circuit to and/or from a first LED circuit. The desired operating voltage level and/or the desired brightness level electrical connection may be achieved and/or completed at the LED packaging level when the multi-voltage and/or multi-brightness circuits and/or single chips are integrated into the LED package, or the LED package may have external electrical contacts that match the integrated multi-voltage and/or multi-brightness circuits and/or single chips within, thus allowing the drive voltage level and/or the brightness level select-ability to be passed on through to the exterior of the LED package and allowing the voltage level or brightness level to be selected at the LED package user, or the PCB assembly facility, or the end product manufacturer.

[Para 16] It would further be advantageous to provide at least two integrated circuits having a forward voltage of at least 12VAC or 12VDC or greater on a single chip or within a single LED package that provide a means of selecting a forward voltage when packaging a multi-voltage and/or multi-brightness circuit using discrete die (one LED chip at a time) and wire bonding them into a circuit at the packaging level or when packaging one or more multi- voltage and/or multi-brightness level single chips within a LED package.

[Para 17] It would further be advantageous to provide multi-voltage and/or multi-brightness level devices that can provide electrical connection options for either AC or DC voltage operation at preset forward voltage levels of 6V or greater.

[Para 18] It would further be advantageous to provide multi-brightness LED devices that can be switched to different levels of brightness by simply switching additional circuits on or off in addition to a first operating circuit within a single chip and or LED package. This would allow LED lamps to switch to higher brightness levels just like 2-way or 3-way incandescent lamps do today.

[Para 19] The benefits of providing multi-voltage circuits of 6V or greater on a single chip is that an LED packager can use this single chip as a platform to offer more than one LED packaged product with a single chip that addresses multiple voltage levels for various end customer design requirements. This also increase production on a single product for the chip

maker and improves inventory control. This also improves buying power and inventory control for the LED packager when using one chip.

[Para 20] The present invention provides for these advantages and solves the deficiencies in the art.

SUMMARY OF THE INVENTION

[Para 21] According to one aspect of the invention at least two single voltage AC LED circuits are formed on a single chip or on a substrate providing a multi-voltage AC LED device for direct AC power operation. Each single voltage AC LED circuit has at least two LEDs connected to each other in opposing parallel relation.

[Para 22] According to another aspect of the invention, each single voltage AC LED circuit is designed to be driven with a predetermined forward voltage of at least 6VAC and preferably each single voltage AC LED circuit has a matching forward voltage of 6VAC, 12VAC, 24VAC, 120VAC, or other AC voltage levels for each single voltage AC LED circuit.

[Para 23] According to another aspect of the invention, each multi-voltage AC LED device would be able to be driven with at least two different AC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage AC LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level AC LED circuits in series. By way of example, the second forward voltage drive level of the serially connected AC LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected AC LED circuits. The at least two parallel connected AC LED circuits would be twice the current of the at least two serially connected AC LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage LED device.

[Para 24] According to another aspect of the invention, at least two single voltage series LED circuits, each of which have at least two serially connected LEDs, are formed on a single chip or on a substrate providing a multi-voltage AC or DC operable LED device.

[Para 25] According to another aspect of the invention, each single voltage series LED circuit is designed to be driven with a predetermined forward voltage of at least 6V AC or DC and preferably each single voltage series LED circuit has a matching forward voltage of 6V,

12V, 24V, 120V, or other AC or DC voltage levels. By way of example, each multi-voltage AC or DC LED device would be able to be driven with at least two different AC or DC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage series LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level series LED circuits in series. The second forward voltage drive level of the serially connected series LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected series LED circuits. The at least two parallel connected series LED circuits would be twice the current of the at least two serially connected series LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage series LED device.

[Para 26] According to another aspect of the invention, at least two single voltage AC LED circuits are formed on a single chip or on a substrate providing a multi-voltage and/or multi-brightness AC LED device for direct AC power operation.

[Para 27] According to another aspect of the invention, each single voltage AC LED circuit has at least two LEDs connected to each other in opposing parallel relation. Each single voltage AC LED circuit is designed to be driven with a predetermined forward voltage of at least 6VAC and preferably each single voltage AC LED circuit has a matching forward voltage of 6VAC, 12VAC, 24VAC, 120VAC, or other AC voltage levels for each single voltage AC LED circuit. The at least two AC LED circuits within each multi-voltage and/or multi current AC LED device would be left able to be driven with at least two different AC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage AC LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level AC LED circuits in series. The second forward voltage drive level of the serially connected AC LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected AC LED circuits. The at least two parallel connected AC LED circuits would be twice the current of the at least two serially connected AC LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage LED device.

[Para 28] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate, and at least one bridge circuit made of

LEDs is formed on the same single chip or substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VDC, 24VDC, 120VDC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 29] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VAC, 24VAC, 120VAC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 30] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate, and at least one bridge circuit made of LEDs is formed on the same single chip or substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VDC, 24VDC, 120VDC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward

voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 31] According to another aspect of the invention a multi-voltage and/or multi- current AC LED circuit is integrated within a single chip LED. Each multi-voltage and/or multi-current single chip AC LED LED comprises at least two single voltage AC LED circuits. Each single voltage AC LED circuit has at least two LEDs in anti-parallel configuration to accommodate direct AC voltage operation. Each single voltage AC LED circuit may have may have at least one voltage input electrical contact at each opposing end of the circuit or the at least two single voltage AC LED circuits may be electrically connected together in series on the single chip and have at least one voltage input electrical contact at each opposing end of the two series connected single voltage AC LED circuits and one voltage input electrical contact at the center junction of the at least two single voltage AC LED circuits connected in series. The at least two single voltage AC LED circuits are integrated within a single chip to form a multi-voltage and/or multi-current single chip AC LED.

[Para 32] According to another aspect of the invention, at least one multi-voltage and/or multi-brightness LED devices may be integrated within a LED lamp. The at least two individual LED circuits within the multi-voltage and/or multi-brightness LED device(s) may be wired in a series or parallel circuit configuration by the LED packager during the LED packaging process thus providing for at least two forward voltage drive options, for example 12VAC and 24VAC or 120VAC and 240VAC that can be selected by the LED packager.

[Para 33] According to another aspect of the invention a multi-voltage and/or multi- current AC LED package is provided, comprising at least one multi-voltage and/or multi- current single chip AC LED integrated within a LED package. The multi-voltage and/or multi-current AC LED package provides matching electrical connectivity pads on the exterior of the LED package to the electrical connectivity pads of the at least one multi-voltage and/or multi-current single chip AC LED integrated within the LED package thus allowing the LED package user to wire the multi-voltage and/or multi-current AC LED package into a series or parallel circuit configuration during the PCB assembly process or final product integration process and further providing a AC LED package with at least two forward voltage drive options.

[Para 34] According to another aspect of the invention multiple individual discrete LED chips are used to form at least one multi-voltage and/or multi-current AC LED circuit within a

LED package thus providing a multi-voltage and/or multi current AC LED package. Each multi-voltage and/or multi-current AC LED circuit within the package comprises at least two single voltage AC LED circuits. Each single voltage AC LED circuit has at least two LEDs in anti-parallel configuration to accommodate direct AC voltage operation. The LED package provides electrical connectivity pads on the exterior of the LED package that match the electrical connectivity pads of the at least two single voltage AC LED circuits integrated within the multi-voltage and/or multi-current AC LED package thus allowing the LED package to be wired into a series or parallel circuit configuration during the PCB assembly process and further providing a LED package with at least two forward voltage drive options.

[Para 35] According to another aspect of the invention a multi-voltage and/or multi-current single chip AC LED and/or multi-voltage and/or multi current AC LED package is integrated within an LED lamp. The LED lamp having a structure that comprises a heat sink, a lens cover and a standard lamp electrical base. The multi-voltage and/or multi-current single chip AC LED and/or package is configured to provide a means of switching on at least one additional single voltage AC LED circuit within multi-voltage and/or multi-current AC LED circuit to provide increased brightness from the LED lamp.

[Para 36] According to another broad aspect of the invention at least one multi-current AC LED single chip is integrated within a LED package.

[Para 37] According to another aspect of the invention, at least one single chip multi-current LED bridge circuit is integrated within a LED lamp having a standard lamp base. The single chip multi-current LED bridge circuit may be electrically connected together in parallel configuration but left open to accommodate switching on a switch to the more than one on the single chip and have at least one accessible electrical contact at each opposing end of the two series connected circuits and one accessible electrical contact at the center junction of the at least two individual serially connected LED circuits. The at least two individual circuits are integrated within a single chip.

[Para 38] According to another aspect of the invention When the at least two circuits are left unconnected on the single chip and provide electrical pads for connectivity during the packaging process, the LED packager may wire them into series or parallel connection based on the desired voltage level specification of the end LED package product offering.

[Para 39] According to another broad aspect of the invention a multi-brightness single chip AC LED is provided having at least two LED circuits. Each LED circuit has at least two diodes connected to each other in opposing parallel relation, at least one of which such diodes is an LED thus forming an AC LED circuit that is integrated on a single chip. Each LED circuit within the multi-brightness single chip AC LED is designed to be driven in parallel with the same matching forward voltage such as 12VAC, 24VAC, 120VAC, or other AC voltages level. Each multi-brightness single chip AC LED is designed to operate on at least one single circuit integrated within the multi-brightness single chip AC LED. The multi-brightness single chip AC LED operates on a switch having at least two positions each of which is connected to at least one circuit within the multi-brightness single chip AC LED.

[Para 40] It should be noted that "package" or "packaged" is defined herein as an integrated unit meant to be used as a discrete component in either of the manufacture, assembly, installation, or modification of an LED lighting device or system. Such a package includes LED's of desired characteristics with capacitors and or resistors sized relative to the specifications of the chosen opposing parallel LED's to which they will be connected in series and with respect to a predetermined AC voltage and frequency.

[Para 41] Preferred embodiments of a package may include an insulating substrate whereon the LEDs, capacitors and or resistors are formed or mounted. In such preferred embodiments of a package the substrate will include electrodes or leads for uniform connection of the package to a device or system associated with an AC driver or power source. The electrodes, leads, and uniform connection may include any currently known means including mechanical fit, and/or soldering. The substrate may be such as sapphire, silicon carbide, gallium nitride, ceramics, printed circuit board material, or other materials for hosting circuit components.

[Para 42] A package in certain applications may preferably also include a heat sink, a reflective material, a lens for directing light, phosphor, nano-crystals or other light changing or enhancing substances. In sum, according to one aspect of the invention, the LED circuits and AC drivers of the present invention permit pre-packaging of the LED portion of a lighting system to be used with standardized drivers of known specified voltage and frequency output. Such packages can be of varied make up and can be combined with each other to create desired systems given the scalable and compatible arrangements possible with, and resulting from, the invention.

[Para 43] According to one aspect of the invention, AC driven LED circuits (or "driven circuits") permit or enable lighting systems where LED circuits may be added to or subtracted (either by choice or by way of a failure of a diode) from the driven circuit without significantly affecting the pre-determined desired output range of light from any individual LED and, without the need to: (i) change the value of any discrete component; or, (ii) to add or subtract any discrete components, of any of the pre-existing driven circuit components which remain after the change. During design of a lighting system, one attribute of the LEDs chosen will be the amount of light provided during operation. In this context, it should be understood that depending on the operating parameters of the driver chosen, the stability or range of the voltage and frequency of the driver will vary from the nominal specification based upon various factors including but not limited to, the addition or subtraction of the LED circuits to which it becomes connected or disconnected. Accordingly, as sometimes referred to herein, drivers according to the invention are described as providing "relatively constant" or "fixed" voltage and frequency. The extent of this relative range may be considered in light of the acceptable range of light output desired from the resulting circuit at the before, during, or after a change has been made to the lighting system as a whole. Thus it will be expected that a pre-determined range of desired light output will be determined within which the driven LED circuits of the invention will perform whether or not additional or different LED circuits have been added or taken out of the driven circuit as a whole.

[Para 44] According to an aspect of the invention, an LED circuit driver provides a relatively fixed voltage and relatively fixed frequency AC output such as mains power sources. The LED circuit driver output voltage and frequency delivered to the LED circuit may be higher or lower than mains power voltage and frequencies by using an LED circuit inverter driver.

[Para 45] The higher frequency LED circuit inverter driver may be a electronic transformer, halogen or high intensity discharge (HID) lamp type driver with design modifications for providing a relatively fixed voltage as the LED circuit load changes. Meaning if the LED circuit inverter driver is designed to have an output voltage of 12V LED circuit driver would provide this output as a relatively constant output to a load having one or more than one LED circuits up to the wattage limit of the LED circuit driver even if LED circuits were added to or removed from the output of the LED circuit driver.

[Para 46] The higher frequency inverter having a relatively fixed voltage allows for smaller components to be used and provides a known output providing a standard reference High Frequency LED circuit driver.

[Para 47] Prior art for single chip LED circuits, for example those disclosed in 02004023568 and JP2004006582 do not provide a way to reduce the number of LEDs within the chip below the total forward voltage drop requirements of the source. The present invention however, enables an LED circuit to be made with any number of LEDs within a single chip, package or module by using capacitors or RC networks to reduce the number of LEDs needed to as few as one single LEO. Improved reliability, integration, product and system scalability and solid state lighting design simplicity may be realized with LED circuits and the LED circuit drivers. Individual LED circuits being the same or different colors, each requiring different forward voltages and currents may be driven from a single source LED circuit driver. Each individual LED circuit can self-regulate current by matching the capacitor or RC network value of the LED circuit to the known relatively fixed voltage and frequency of the LED circuit driver whether the LED circuit driver is a mains power source, a high frequency LED circuit driver or other LED circuit driver capable of providing a relatively fixed voltage and relatively fixed frequency output.

[Para 48] According to other aspects of the invention, the LED circuit driver may be coupled to a dimmer switch that regulates voltage or frequency or may have integrated circuitry that allows for adjustability of the otherwise relatively fixed voltage and/or relatively fixed frequency output of the LED circuit driver. The LED circuits get brighter as the voltage and/or frequency of the LED circuit driver output is increased to the LED circuits.

BRIEF DESCRIPTION OF THE DRAWINGS

[Para 49] Figure 1 shows a schematic view of a preferred embodiment of the invention;

[Para 50] Figure 2 shows a schematic view of a preferred embodiment of the invention;

[Para 51] Figure 3 shows a schematic view of a preferred embodiment of the invention;

[Para 52] Figure 4 shows a schematic view of a preferred embodiment of the invention;

[Para 53] Figure 5 shows a schematic view of a preferred embodiment of the invention;

[Para 54] Figure 6 shows a schematic view of a preferred embodiment of the invention;

[Para 55] Figure 7 shows a schematic view of a preferred embodiment of the invention;

[Para 56] Figure 8 shows a schematic view of a preferred embodiment of the invention;
[Para 57] Figure 9 shows a schematic view of a preferred embodiment of the invention;
[Para 58] Figure 10 shows a schematic view of a preferred embodiment of the invention;
[Para 59] Figure 11 shows a schematic view of a preferred embodiment of the invention;
and,
[Para 60] Figure 12 shows a schematic view of a preferred embodiment of the invention;

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[Para 61] Figure 1 discloses a schematic diagram of a multi-voltage and/or multi- brightness LED lighting device 10. The multi-voltage and/or multi-brightness LED lighting device 10 comprises at least two AC LED circuits 12 configured in a imbalanced bridge circuit, each of which have at least two LEDs 14. The at least two AC LED circuits have electrical contacts 16a, 16b, 16c, and 16d at opposing ends to provide various connectivity options for an AC voltage source input. For example, if 16a and 16c are electrically connected together and 16b and 16d are electrically connected together and one side of the AC voltage input is applied to 16a and 16c and the other side of the AC voltage input is applied to 16b and 16d, the circuit becomes a parallel circuit with a first operating forward voltage. If only 16a and 16c are electrically connected and the AC voltage inputs are applied to electrical contacts 16b and 16d, a second operating forward voltage is required to drive the single chip 18. The single chip 18 may also be configured to operate at more than one brightness level "multi-brightness" by electrically connecting for example 16a and 16b and applying one side of the line of an AC voltage source to 16a ad 16b and individually applying the other side of the line from the AC voltage source a second voltage to 26b and 26c.

[Para 62] Figure 2 discloses a schematic diagram of a multi-voltage and/or multi- brightness LED lighting device 20 similar to the multi-voltage and/or multi-brightness LED lighting device 10 described above in figure 1. The at least two AC LED circuits 12 are integrated onto a substrate 22. The at elast two AC LED circuits 12 configured in a imbalanced bridge circuit, each of which have at least two LEDs 14. The at least two AC LED circuits have electrical contacts 16a, 16b, 16c, and 16d on the exterior of the substrate 22 and can be used to electrically configure and/or control the operating voltage and/or brightness level of the multi-voltage and/or multi-brightness LED lighting device.

[Para 63] Figure 3 discloses a schematic diagram of a multi-voltage and/or multi- brightness LED lighting device 30 similar to the multi-voltage and/or multi-brightness LED lighting device 10 and 20 described in figures 1 and 2. The multi-voltage and/or multi- brightness LED lighting device 30 comprises at least two AC LED circuits 32 having at least two LEDs 34 connected in series and anti-parallel configuration. The at least two AC LED circuits 32 have electrical contacts 36a, 36b, 36c, and 36d at opposing ends to provide various connectivity options for an AC voltage source input. For example, if 36a and 36c are electrically connected together and 36b and 36d are electrically connected together and one side of the AC voltage input is applied to 36a and 36c and the other side of the AC voltage input is applied to 36b and 36d, the circuit becomes a parallel circuit with a first operating forward voltage. If only 36a and 36c are electrically connected and the AC voltage inputs are applied to electrical contacts 36b and 36d, a second operating forward voltage is required to drive the multi-voltage and/or multi-brightness lighting device 30. The multi-voltage and/or multi-brightness lighting device 30 may be a monolithically integrated single chip 38, a monolithically integrated single chip integrated within a LED package 38 or a number of individual discrete die integrated onto a substrate 38 to form a multi-voltage and/or multi- brightness lighting device 30.

[Para 64] Figure 4 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED device 30 as described in figure 3 having the at least two AC LED circuits 32 connected in parallel configuration to an AC voltage source and operating at a first forward voltage. A resistor 40 may be used to limit current to the multi-voltage and/or multi- brightness LED lighting device 30.

[Para 65] Figure 5 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED device 30 as described in figure 3 having the at least two AC LED circuits 32 connected in series configuration to an AC voltage source and operating at a second forward voltage that is approximately two times greater than the first forward voltage of the parallel circuit as described in figure 4. A resistor may be used to limit current to the multi-voltage and/or multi-brightness LED lighting device.

[Para 66] Figure 6 discloses a schematic diagram of a multi-voltage and/or multi- brightness LED lighting device 50. The multi-voltage and/or multi-brightness LED lighting device 50 comprises at least two AC LED circuits 52, each of which have at least two LEDs 54 in series and anti-parallel relation. The at least two AC LED circuits 52 have at least three electrical

contacts 56a, 56b and 56c. The at least two AC LED circuits 52 are electrically connected together in parallel at one end 56a and left unconnected at the opposing ends of the electrical contacts 56b and 56c. One side of an AC voltage source line is electrically connected to 56a and the other side of an AC voltage source line is individually electrically connected to 56b and 56c with either a fixed connection or a switched connection thereby providing a first brightness when AC voltage is applied to 56a and 56b and a second brightness when an AC voltage is applied to 56a, 56b and 56c. It is contemplated that the multi-voltage and/or multi-brightness LED lighting device 50 is a single chip, an LED package, an LED assembly or an LED lamp. The multi-brightness switching capability.

[Para 67] Figure 7 discloses a schematic diagram similar to the multi-voltage and/or multi-brightness LED device 50 shown in figure 6 integrated within a lamp 58 and connected to a switch 60 to control the brightness level of the multi-voltage and/or multi-brightness LED lighting device 50.

[Para 68] Figure 8 discloses a schematic diagram a multi-brightness LED lighting device 62 having at least two bridge rectified 68 series LED circuits 69. Each of the at least two bridge rectified 68 series LED circuits 69 that are connected to and rectified with an LED bridge circuit 68 comprising four LEDs 70 configured in a bridge circuit 68. The at least two bridge rectified 68 series LED circuits 69 have at least two LEDs 71 connected in series and electrical contacts 72a, 72b and 72c. When one side of an AC voltage is applied to 72a and the other side of an AC voltage line is applied to 72b and 72c individually, the brightness level of the multi-brightness LED lighting device 62 can be increased and/or decreased I a fixed manner or a switching process.

[Para 69] Figure 9 discloses a schematic diagram the multi-brightness LED lighting device 62 as shown above in figure 8 with a switch 74 electrically connected between the multi-brightness LED lighting device 62 and the AC voltage source 78.

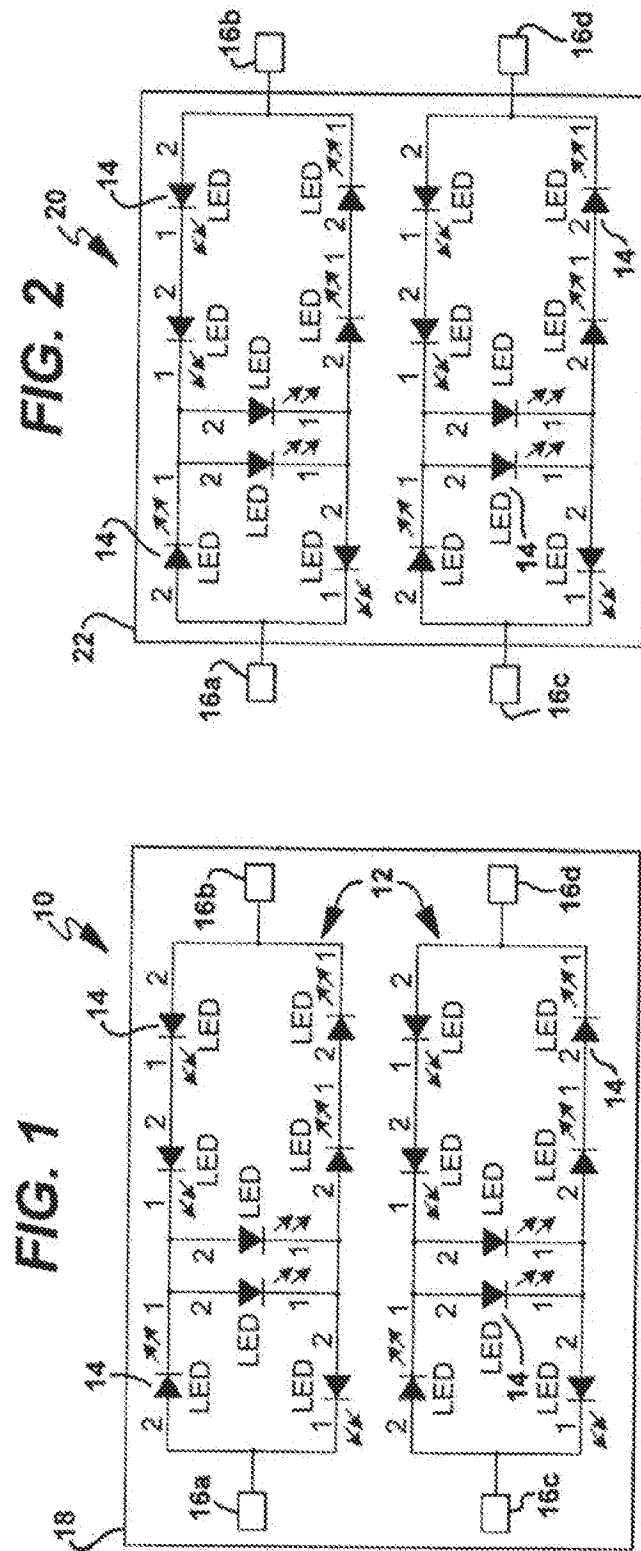
[Para 70] Figure 9 discloses a schematic diagram of at least two single voltage LED circuits integrated with a single chip or within a substrate and forming a multi-voltage and/or multi-brightness LED device.

[Para 71] Figure 10 discloses a schematic diagram of a single chip LED bridge circuit 80 having four LEDs 81 configured into a bridge circuit and monolithically integrated on a substrate

82. The full wave LED bridge circuit has electrical contacts 86 to provide for AC voltage input connectivity and DC voltage output connectivity.

[Para 72] Figure 11 discloses a schematic diagram of another embodiment of a single chip multi-voltage and/or multi-brightness LED lighting device 90. The multi-voltage and/or multi-brightness LED lighting device 90 has at least two series LED circuits 92 each of which have at least two LEDs 94 connected in series. The at least two series LED circuits 92 have electrical contacts 96 at opposing ends to provide a means of electrical connectivity. The at least two series LED circuits are monolithically integrated into a single chip 98. The electrical contacts 96 are used to wire the at least two series LEDs circuit 92 into a series circuit, a parallel circuit or an AC LED circuit all within a single chip.

[Para 73] Figure 12 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED lighting device 90 as shown above in figure 11. The multi-voltage and/or multi-brightness LED lighting device 90 has at least two series LED circuits 92 each of which have at least two LEDs 94 connected in series. The at least two series LED circuits can be monolithically integrated within a single chip or discrete individual die can be integrated within a substrate to form an LED package 100. The LED package 100 has electrical contacts 102 that are used to wire the at least two series LEDs circuit into a series circuit, a parallel circuit or in anti-parallel to form an AC LED circuit all within a single LED package.



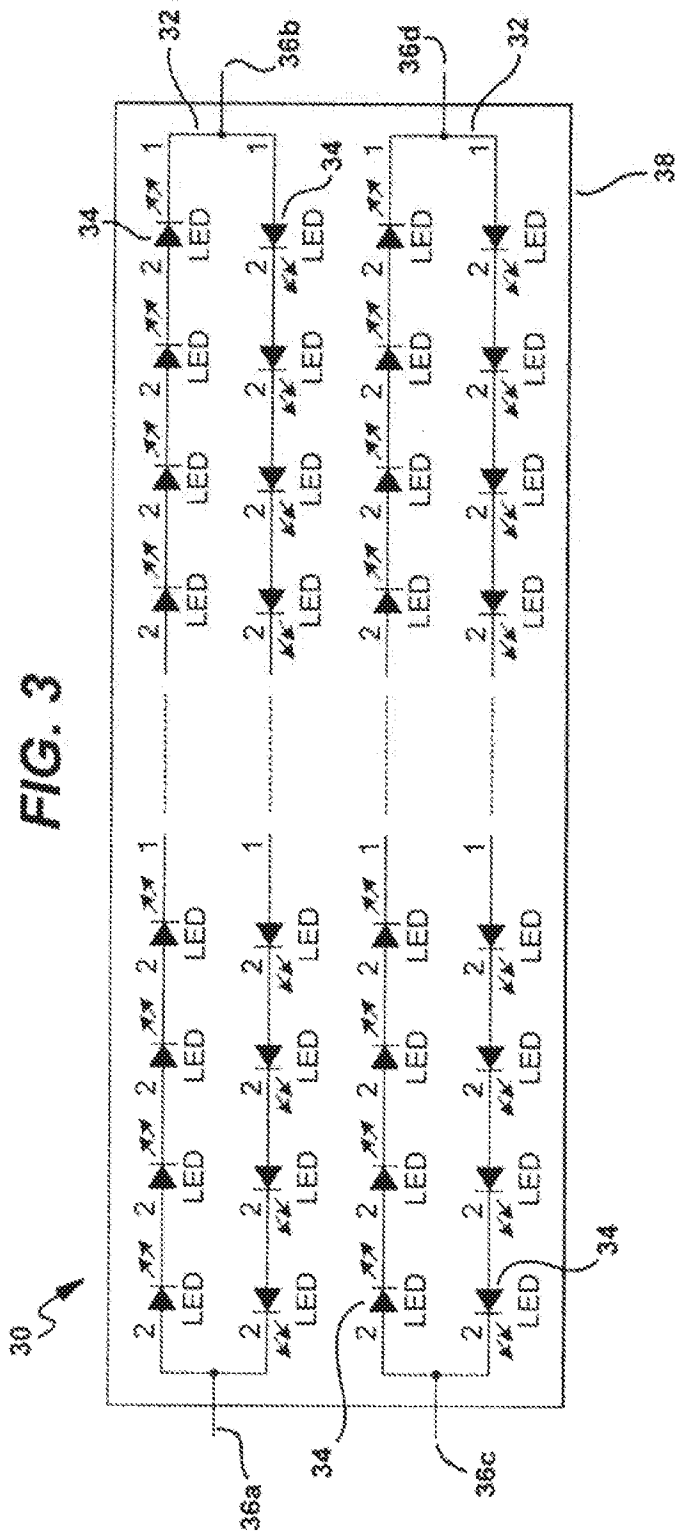


FIG. 4

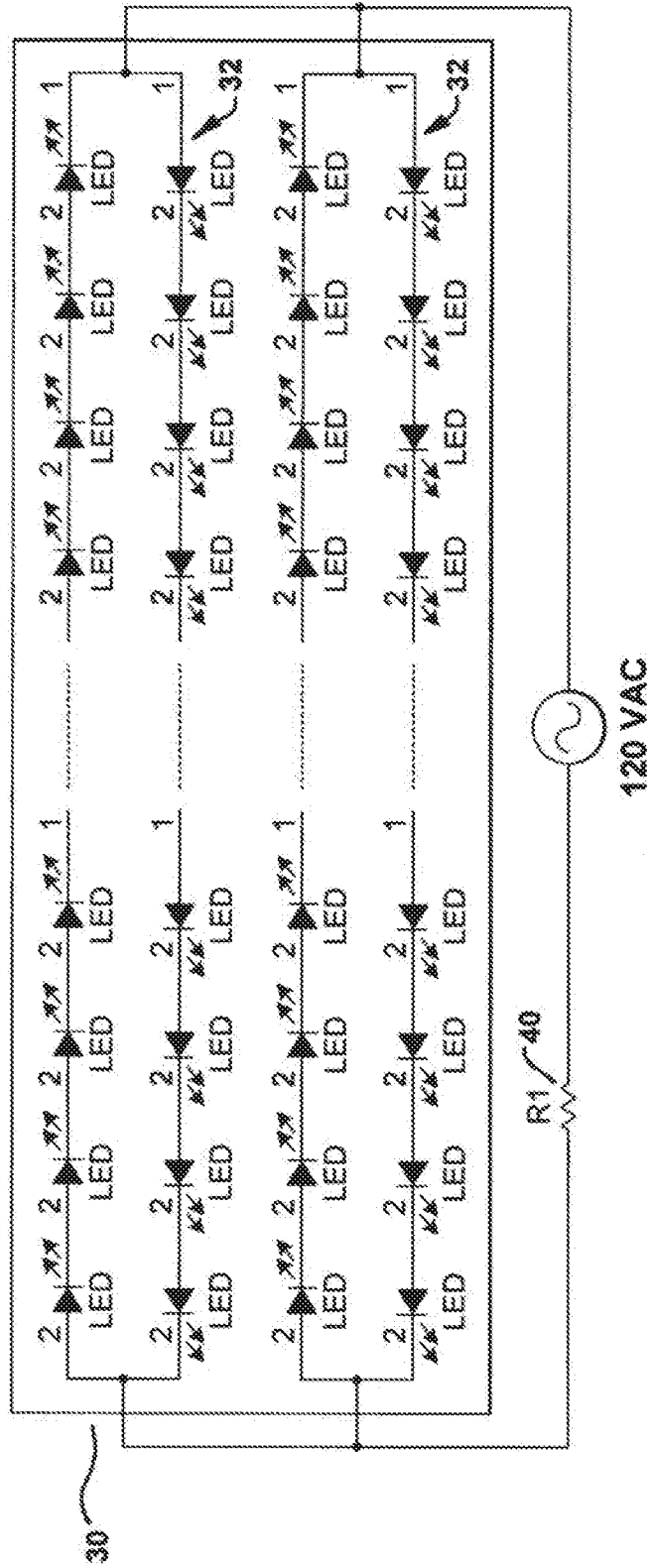


FIG. 5

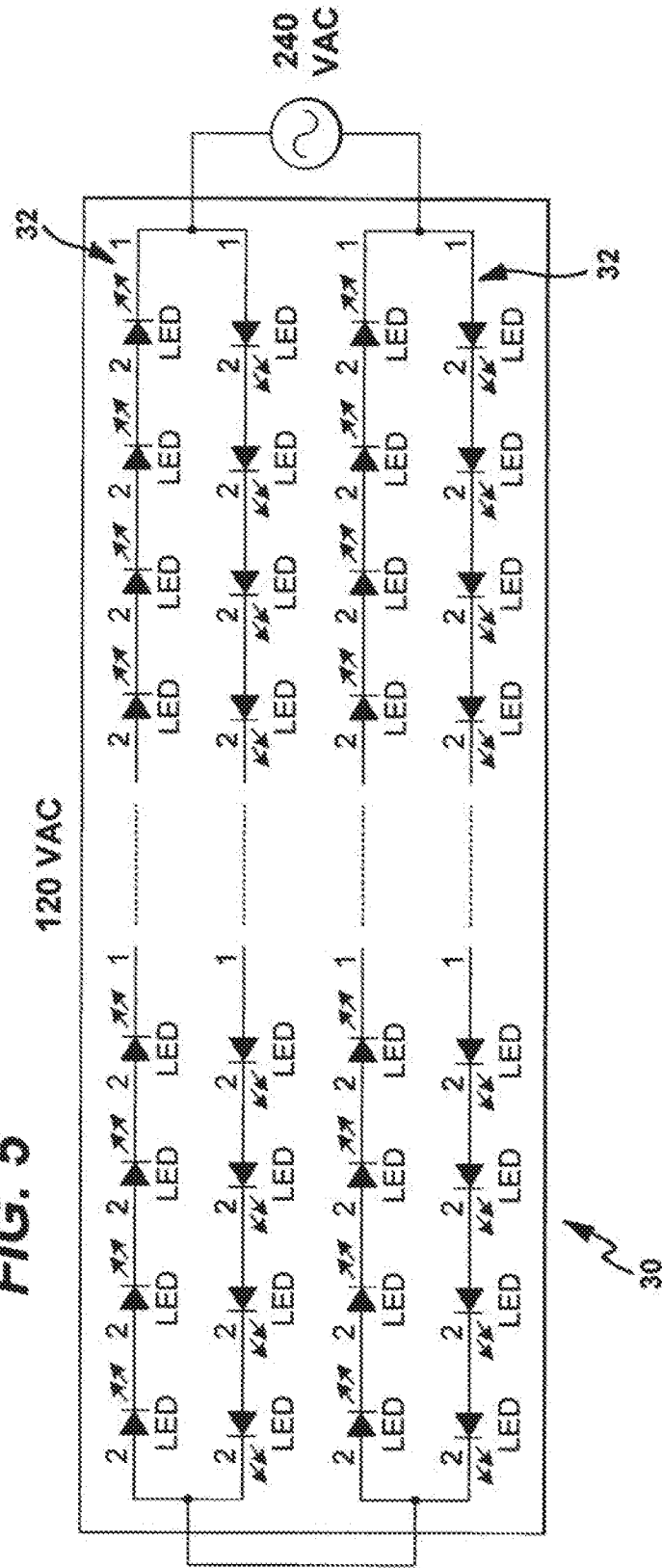


FIG. 7

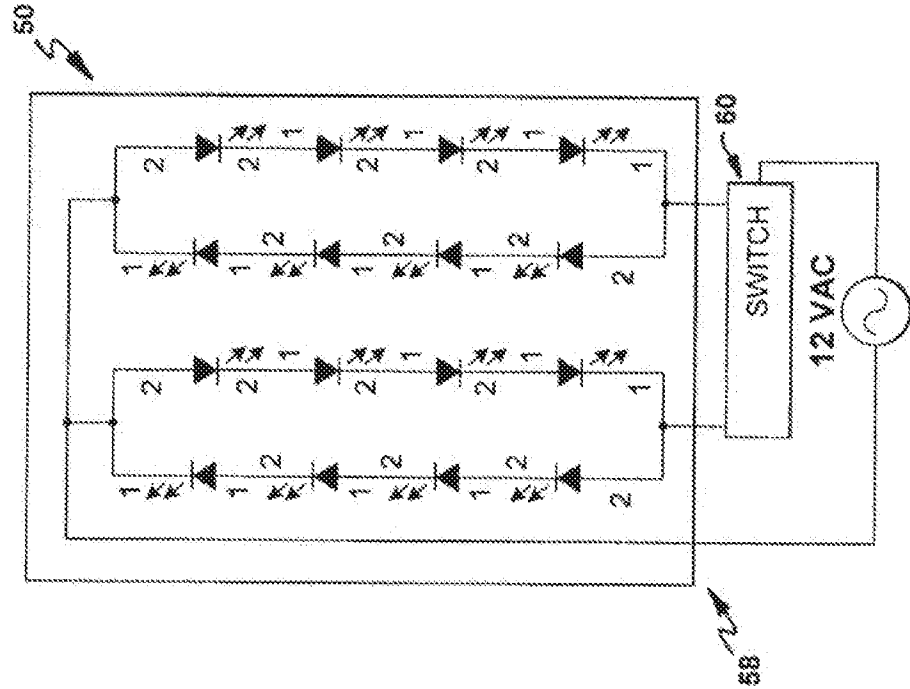


FIG. 6

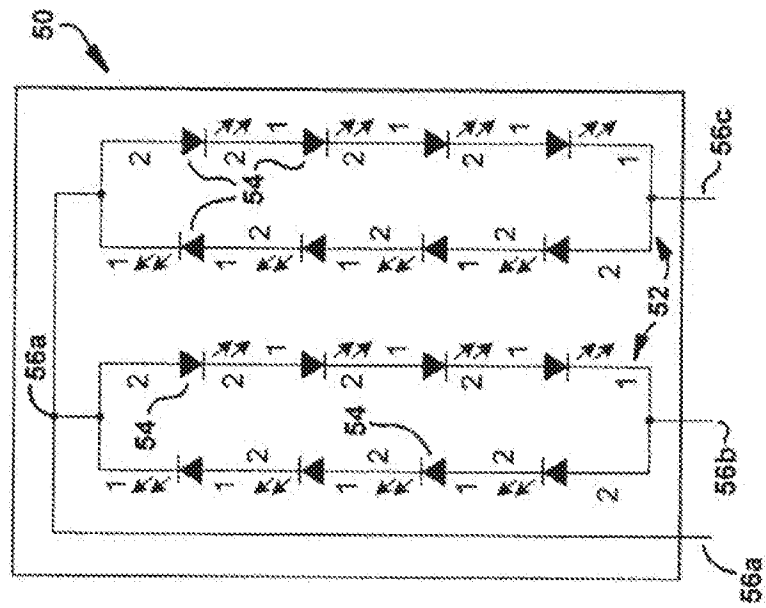


FIG. 8

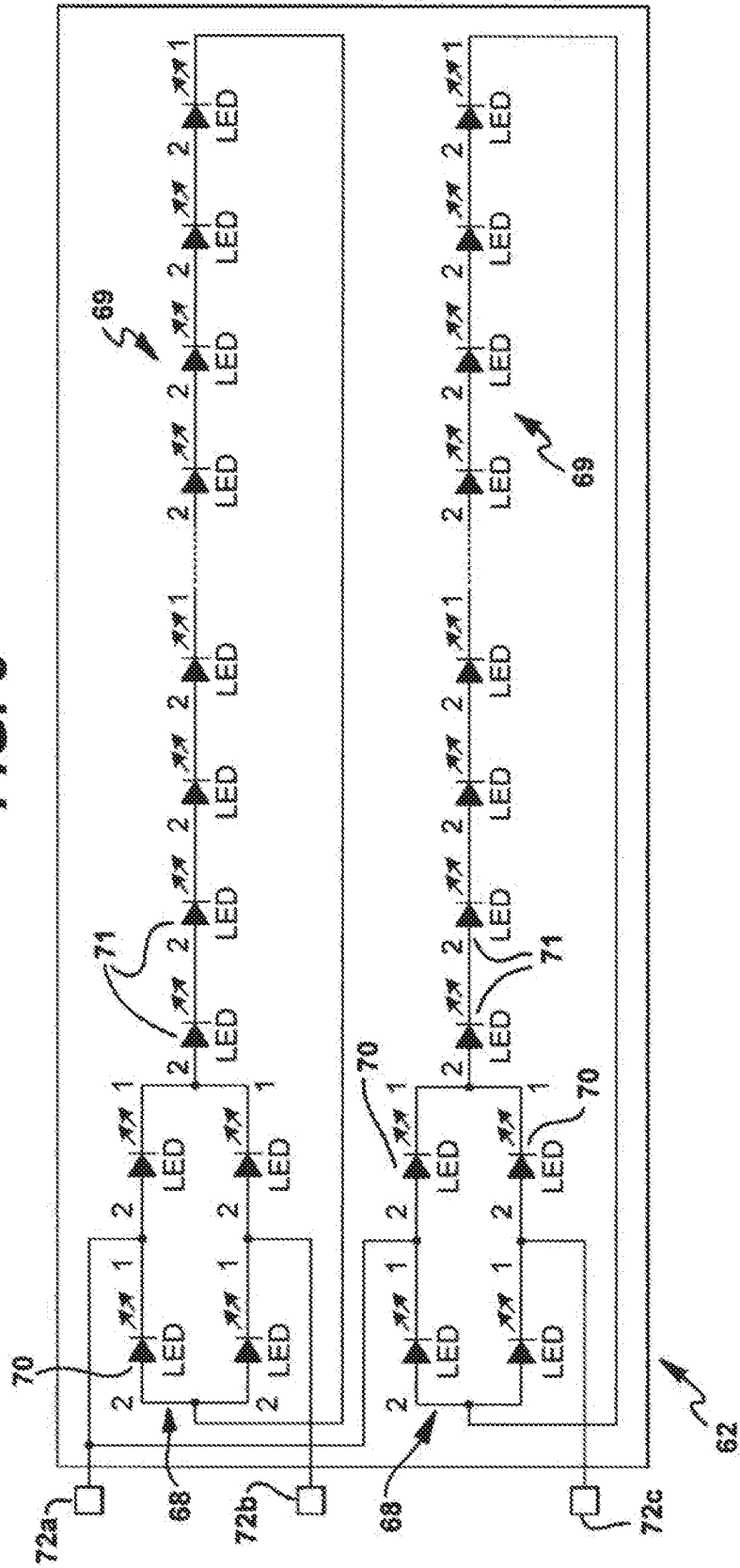


FIG. 9

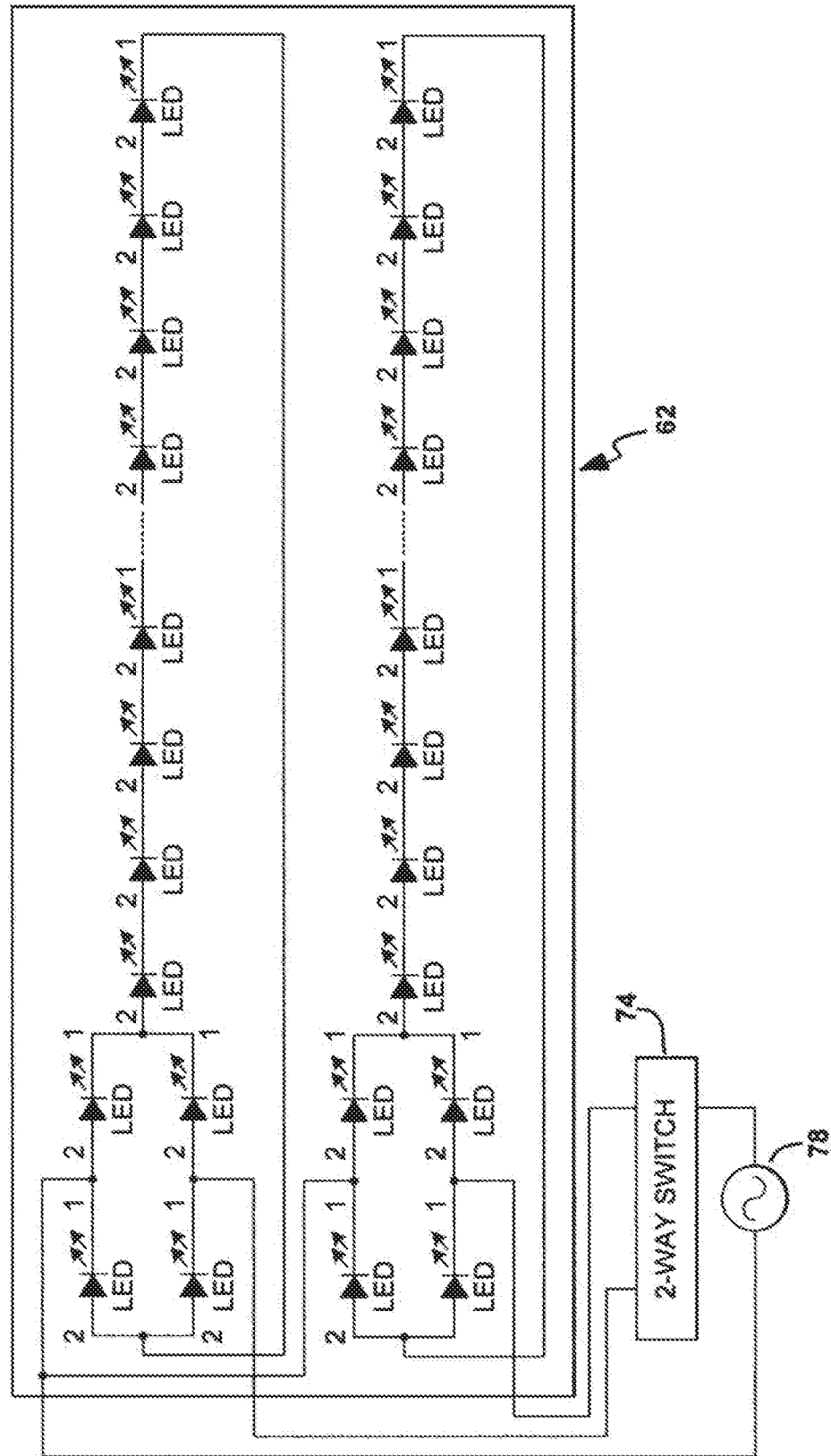


FIG. 10

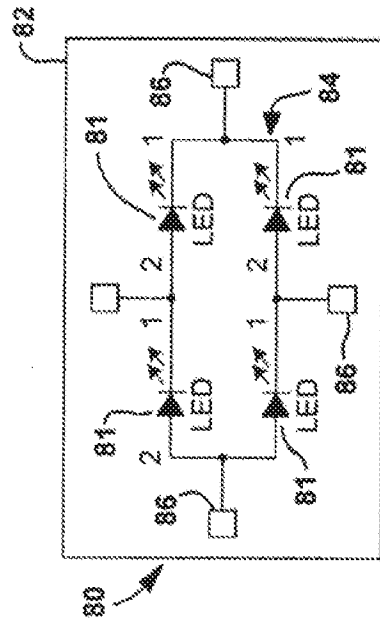


FIG. 11

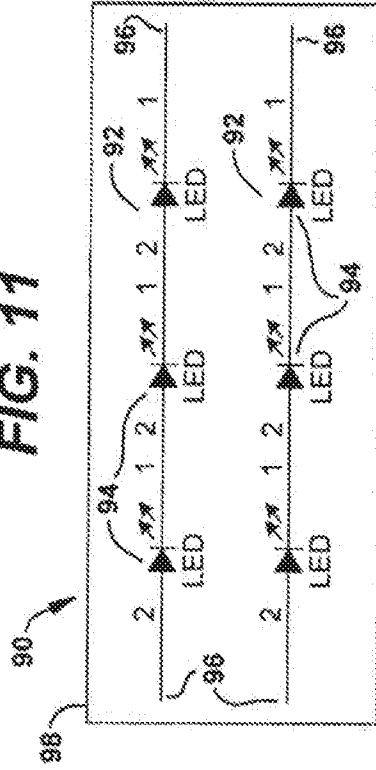
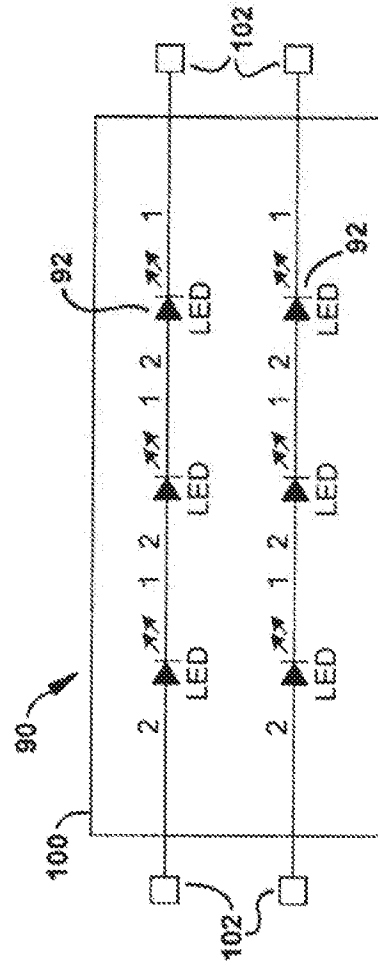


FIG. 12



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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
<p>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.</p> <p>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.</p>			

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.)
--------------------------	---

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	Michael		Miskin		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
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Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Robert	L.	Kottritsch		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
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Address 2					
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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For further information see 37 CFR 1.33(a).

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

Customer Number	24573		
Email Address	chicago.patents@kigates.com	Add Email	Remove Email

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573 PGR2023-00016 - Home Depot		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	16740295	2020-01-10		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16274164	Continuation of	15685429	2019-02-12	10271393	2019-04-23
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15685429	Continuation of	14172644	2017-08-24	9750098	2017-08-29
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14172644	Continuation of	13322796	2014-02-04	8648539	2014-02-11
Prior Application Status	Expired	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13322796	a 371 of international	PCTUS2010001597	2010-05-28		
Prior Application Status	Expired	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
PCTUS2010001597	Claims benefit of provisional	61217215	2009-05-28		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
PCTUS2010001597	a 371 of international	12287267	2008-10-06	8179055	2012-05-15

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
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This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3725194.00143 14US07
	Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME	

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.

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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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☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

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

Applicant	1	Remove
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p> <p style="text-align: right;">Clear</p>		
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If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
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Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; height: 20px; width: 100%;"></div>		
If the Applicant is an Organization check here. ☒		
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Mailing Address Information For Applicant:		
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
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Address 1		<input type="text"/>		
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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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-02-22
First Name	Dennis A.	Last Name	Majewski	Registration Number
				65578
Additional Signature may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	Multi-Voltage And Multi-Brightness LED Lighting Devices And Methods Of Using Same
-------------------------------	--

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 _____
filed on _____.

The above-identified application was made or authorized to be made by me.

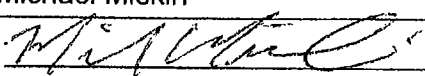
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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: Michael Miskin 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.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	Multi-Voltage And Multi-Brightness LED Lighting Devices And Methods Of Using Same
-----------------------	--

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 _____
 filed on _____.

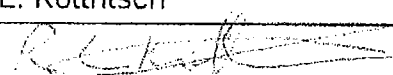
The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001
by fine or imprisonment of not more than five (5) years, or both.**WARNING:**

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LEGAL NAME OF INVENTOR

Inventor: Robert L. Kottritsch 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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		17181802
	Filing Date		2021-02-22
	First Named Inventor	Miskin	
	Art Unit	NA	
	Examiner Name	NA	
	Attorney Docket Number	3725194.00146 14US07	

U.S.PATENTS						Remove
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	6127783		2000-10-03	Pashley et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050195600		2005-09-08	Porchia et al.	
	2	20060238136		2006-10-26	Johnson III et al.	
	3	20030156422		2003-08-21	Tatewaki et al.	

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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	03055273	WO		2003-07-03	COLOR KINETICS INC		

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		17181802
Filing Date		2021-02-22
First Named Inventor	Miskin	
Art Unit	NA	
Examiner Name	NA	
Attorney Docket Number	3725194.00146 14US07	

2	2004094896	WO		2004-11-04	COLOR KINETICS, INC.		
3	3162876	JP		2010-09-24	ORION ELECTRIC CO. LTD.		
4	6230386	JP		1987-02-09	STANLEY ELEC CO LTD		
5	2000156526	JP		2000-06-06	ASAHI RUBBER KK		
6	2001291406	JP		2003-04-03	NIPPON ALUM CO LTD		
7	2002057376	JP		2002-02-22	MATSUSHITA ELECTRIC IND CO LTD		
8	2003298118	JP		2003-10-17	TOSHIBA LIGHTING & TECHNOLOGY CORP.		
9	2004111104	JP		2004-04-08	MITSUBISHI ELEC CORP		
10	2005222750	JP		2005-08-18	KUBO KENJI et al.		
11	2007059260	JP		2007-03-08	TOSHIBA LIGHTING & TECHNOLOGY CORP		

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Application Number	17181802
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First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1		

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

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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Filing Date	2021-02-22
First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Dennis A. Majewski/	Date (YYYY-MM-DD)	2021-02-25
Name/Print	Dennis A. Majewski	Registration Number	65578

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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.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		17181802
	Filing Date		2021-02-22
	First Named Inventor	Miskin	
	Art Unit	NA	
	Examiner Name	NA	
	Attorney Docket Number	3725194.00146 14US07	

U.S.PATENTS						Remove
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	6559802		2003-05-06	Goto et al.	
	2	5469020		1995-11-21	Herrick	
	3	6072475		2000-06-06	van Ketwich	
	4	6548967		2003-04-15	Dowling et al.	
	5	4298869		1981-11-03	Okuno	
	6	5803579		1998-09-08	Turnbull et al.	
	7	6016038		2000-01-18	Mueller et al.	
	8	6028694		2000-02-22	Schmidt	

**INFORMATION DISCLOSURE
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Application Number		17181802
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First Named Inventor	Miskin	
Art Unit	NA	
Examiner Name	NA	
Attorney Docket Number	3725194.00146 14US07	

9	6292901		2001-09-18	Lys et al.	
10	6234648		2001-05-22	Borner	
11	6357889		2002-03-19	Duggal et al.	
12	6528954		2003-03-04	Lys et al.	
13	6714348		2004-03-30	Dunn	
14	6861658		2005-03-01	Fiset	
15	7038399		2006-05-02	Lys et al.	
16	7288902		2007-10-30	Melanson	
17	7344279		2008-03-18	Mueller et al.	
18	7583901		2009-09-01	Nakagawa et al.	
19	5636303		1997-06-03	Che et al.	

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20	5936599	1999-08-10	Reymond
21	6636003	2003-10-21	Rahm et al.
22	8272757	2012-09-25	Fan et al.
23	8314571	2012-11-20	Jonsson
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	1	20030219035		2003-11-27	Schmidt	
	2	20010054005		2001-12-20	Hook et al.	
	3	20020048169		2002-04-25	Dowling et al.	
	4	20020181231		2002-12-15	Luk	

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Examiner Name	NA	
Attorney Docket Number	3725194.00146 14US07	

5	20030100837		2003-07-24	Piegras et al.	
6	20030137258		2003-07-24	Piegras et al.	
7	20040218387		2003-11-04	Gerlach	
8	20050128751		2005-06-16	Roberge et al.	
9	20070258231		2007-11-08	Koemer et al.	
10	20060176692		2006-08-10	Lee et al.	
11	20080094005		2008-04-24	Rabiner et al.	
12	20080094837		2008-04-24	Dobbins et al.	
13	20080252197		2008-10-16	Li et al.	
14	20100308738		2010-12-09	Shteynberg et al.	
15	20080116818		2008-05-22	Shteynberg et al.	

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Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

16	20090079362	2009-03-26	Shteynberg et al.
17	20100109564	2010-05-06	Shin et al.
18	20110148327	2011-06-23	Van de Ven et al.
19	20040264193	2004-12-30	Okumura
20	20100259183	2010-10-14	Leshniak
21	20110115407	2011-05-19	Wibben et al.
22	20100072905	2010-03-25	Kim et al.

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	1	9922338	WO		1999-05-06	BRITISH TELECOMMUNICATION PUBLIC LIMITED COMPANY		
	2	0215320	WO		2002-02-21	INCA SYSTEMS CO., LTD.		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number	17181802
Filing Date	2021-02-22
First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

3	2003019072	WO	2003-03-06	Okumura
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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	17181802
Filing Date	2021-02-22
First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Dennis A. Majewski/	Date (YYYY-MM-DD)	2021-02-25
Name/Print	Dennis A. Majewski	Registration Number	65578

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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.

Electronic Acknowledgement Receipt

EFS ID:	42023046
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	25-FEB-2021
Filing Date:	
Time Stamp:	16:07:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	00146-SB08-A.pdf	612865	no	5
			ffdf1dc4daa7e4a02f4d045037bf60b73e41bc79		

Warnings:

PGR2023-00016 - Home Depot

Ex. 1003 - Page 70

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	00146-SB08-B.pdf	613636	no	8
			ca4987fb3f45cf070b1cd0c4c735cdb12c672e258		
Warnings:					
Information:					
<p>A U.S. Patent Number Citation is required in the Information Disclosure Statement (IDS) form. You may remove the form to add the required data in order to correct the Informational Message or if you chose not to, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.</p>					
Total Files Size (in bytes):			1226501		
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/181,802	02/22/2021	Michael Miskin	3725194.00143 14US07

CONFIRMATION NO. 5141

IMPROPER CFR REQUEST



24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

Date Mailed: 03/05/2021

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

Prior-Filed Nonprovisional Application has been Improperly Indicated as a National Stage (35 U.S.C. 371) Application

Applicant submitted a benefit claim to a prior-filed nonprovisional application and improperly indicated that the prior-filed application is a national stage application under 35 U.S.C. 371. The Office's records show that the prior-filed application is an application filed under 35 U.S.C. 111(a). The Office has entered the benefit claim to the prior-filed application as a benefit claim to an application filed under 35 U.S.C. 111(a). Any request for a corrected filing receipt to include the indication that the prior-filed application is a national stage application will not be granted unless applicant supplies evidence that the prior application was in fact a national stage application. Accordingly, applicant should not submit such request without such evidence. Applicant should submit a corrected application data sheet (ADS) to delete the indication that the prior-filed application is a national stage application.

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.

/hteshome/

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 17/181,802				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	320			
SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A			N/A	700			
EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	800			
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>	20	minus 20 = *			OR	x 100 =	0.00			
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	3	minus 3 = *				x 480 =	0.00			
APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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 <small>(37 CFR 1.16(j))</small>							0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL		TOTAL	1820			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	x	=	OR	x	=
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee <small>(37 CFR 1.16(s))</small>							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus	**	=	x	=	OR	x	=
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee <small>(37 CFR 1.16(s))</small>							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>							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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UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/181,802	02/22/2021	2685	1820	3725194.00143 14US07	20	3

CONFIRMATION NO. 5141

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

FILING RECEIPT



Date Mailed: 03/05/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Michael Miskin, Sleepy Hollow, IL;
Robert L. Kottritsch, Shefford Bedfordshire, UNITED KINGDOM;

Applicant(s)

Lynk Labs, Inc., Elgin, IL;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/740,295 01/10/2020 PAT 10932341
which is a CON of 16/274,164 02/12/2019 PAT 10537001
which is a CON of 15/685,429 08/24/2017 PAT 10271393 *
which is a CON of 14/172,644 02/04/2014 PAT 9750098 *
which is a CON of 13/322,796 11/28/2011 PAT 8648539
which is a 371 of PCT/US2010/001597 05/28/2010
which claims benefit of 61/217,215 05/28/2009

(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: 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: 03/02/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/181,802**

Projected Publication Date: 06/10/2021

Non-Publication Request: No

Early Publication Request: No

Title

MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

Preliminary Class

340

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 Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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

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community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		17181802
	Filing Date		2021-02-22
	First Named Inventor	Miskin	
	Art Unit	NA	
	Examiner Name	NA	
	Attorney Docket Number	3725194.00146 14US07	

U.S.PATENTS						Remove
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	3869641		1975-03-04	Goldberg	
	2	4218627		1980-08-19	Kiesel	
	3	4298869		1981-11-03	Okuno	
	4	5699218		1997-12-16	Kadah	
	5	5790013		1998-08-04	Hauck	
	6	6107744		2000-08-22	Bavaro et al	
	7	6541919		2003-04-01	Roach et al.	
	8	6614103		2003-09-02	Durocher et al.	

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Examiner Name	NA	
Attorney Docket Number	3725194.00146 14US07	

9	6781570		2004-08-24	Arrigo et al.	
10	7053560		2006-05-30	Ng	
11	7081722		2006-07-25	Huynh et al.	
12	7489086		2009-02-10	Miskin et al.	
13	7258463		2007-08-21	Sloan et al.	
14	7419281		2008-09-02	Porchia et al.	
15	7748877		2010-07-06	Colby	
16	7859196		2010-12-28	Lee et al.	
17	7961113		2011-06-14	Rabiner et al.	
18	8129917		2012-03-06	Kim et al.	
19	8148905		2012-04-03	Miskin et al.	

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Attorney Docket Number	3725194.00146 14US07	

20	8179055		2012-05-15	Miskin et al.	
21	8198819		2012-06-12	Lenk	
22	8203275		2012-06-19	Ruxton	
23	6072280		2000-06-06	Allen	
24	4408151		1983-10-04	Justice et al.	
25	7014336		2006-03-21	Ducharme et al.	
26	7462997		2008-12-09	Mueller et al.	
27	9184497		2015-01-10	Chen et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

Add

U.S.PATENT APPLICATION PUBLICATIONS

Remove

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20020080663		2002-06-27	Kameyama et al.	

**INFORMATION DISCLOSURE
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(Not for submission under 37 CFR 1.99)

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2	20030043611		2003-03-06	Bockle et al.	
3	20030122502		2003-07-03	Clauberg et al.	
4	20030169014		2003-09-11	Kadah	
5	20030175004		2003-09-18	Garito et al.	
6	20040075399		2004-04-22	Hall	
7	20040080941		2004-04-29	Jiang et al.	
8	20040183380		2004-09-23	Otake	
9	20040189218		2004-09-30	Leong et al.	
10	20040201988		2004-10-14	Allen	
11	20050168156		2005-08-04	Li et al.	
12	20050040773		2005-02-24	Lebens et al.	

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13	20050110426		2005-05-26	Shao	
14	20050173990		2005-08-11	Andersen et al.	
15	20060038542		2006-02-23	Park et al.	
16	20060103913		2005-05-18	Handschy et al.	
17	20060138971		2006-06-29	Uang et al.	
18	20060158130		2006-07-20	Furukawa	
19	20060256826		2006-11-16	Lin et al.	
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21	20070115248		2007-05-24	Roberts et al.	
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23	20070273299		2007-11-29	Miskin et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		17181802
Filing Date		2021-02-22
First Named Inventor	Miskin	
Art Unit	NA	
Examiner Name	NA	
Attorney Docket Number	3725194.00146 14US07	

24	20080116816	2008-05-22	Neuman et al.
25	20080130288	2008-06-05	Catalano et al.
26	20080136347	2008-06-12	Lin et al.
27	20080158915	2008-07-03	Williams
28	20080203405	2008-08-28	Rooymans
29	20080203936	2008-08-28	Mariyama et al.
30	20080211421	2008-09-04	Lee et al.
31	20080218098	2008-09-11	Lee et al.
32	20090009100	2009-01-08	Rooymans
33	20090021185	2009-01-22	Ng
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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		17181802
Filing Date		2021-02-22
First Named Inventor	Miskin	
Art Unit	NA	
Examiner Name	NA	
Attorney Docket Number	3725194.00146 14US07	

35	20090174337		2009-07-09	Miskin et al.	
36	20090295300		2009-12-03	King	
37	20100039794		2010-02-18	Ghanem et al.	
38	20100072905		2010-03-25	Kim et al.	
39	20100072280		2010-03-25	McGill et al.	
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42	20120043897		2012-02-23	Miskin et al.	
43	20120206050		2012-08-16	Spero	
44	20130051001		2013-02-28	Miskin	

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(Not for submission under 37 CFR 1.99)

Application Number		17181802
Filing Date		2021-02-22
First Named Inventor	Miskin	
Art Unit		NA
Examiner Name	NA	
Attorney Docket Number		3725194.00146 14US07

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	1215944	EP		2002-06-19	GENERAL ELECTRIC COMPANY		
	2	08137429	JP		1996-05-31	FUKUSHIMA		
	3	11-330561	JP		1999-11-30	Oki Electric Inc. Co LTD		
	4	03/075126	WO		2003-09-12	Lynk Labs, Inc.		
	5	2005084080	WO		2005-09-09			
	6	2007001116	WO		2007-01-04	Seoul Opto Devices Co., Ltd.		
	7	2008124701	WO		2008-10-16	Sunovia Energe Technologies, Inc.		
	8	2011049613	WO		2011-04-28	Lynk Labs, Inc.		
	9	2011082168	WO		2011-11-17	Lynk Labs, Inc.		
	10	2011143510	WO		2011-11-17	Lynk Labs, Inc.		

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	17181802
Filing Date	2021-02-22
First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

11	2008062941	WO	2008-05-29	Dae Won et al.
12	2009045548	WO	2005-04-09	Lynk Labs, Inc.

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	European Search Report dated October 22, 2012 in related European Application - 7 pages	
	2	International Search Report and Written Opinion for International Application No. PCT/US2010/001597 mailed July 30, 2010 - 14 pages	
	3	Examination Report Under Sections 12 & 13 of the Patent Act for Indian Application No. 9150/delnp/2011 mailed April 5, 2018 - 6 pages	
	4	Examination Report Under Sections 12 & 13 of the Patent Act for Indian Application No. 5795/delnp/2012 mailed August 29, 2018 - 6 pages	
	5	Canadian Office Action Application No. 2,763,598 mailed July 3, 2018 - 3 pages	
	6	US Office Action Application No. 16/443,759 mailed August 9, 2019 - 7 pages	
	7	US Office Action Application No. 15/334,001 mailed September 13, 2019 - 17 pages	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
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Application Number	17181802
Filing Date	2021-02-22
First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

8	Extended European Search Report mailed January 14, 2020, Application No. EP19177733.3 - 10 pages
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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	17181802
Filing Date	2021-02-22
First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Dennis A. Majewski/	Date (YYYY-MM-DD)	2021-03-10
Name/Print	Dennis A. Majewski	Registration Number	65578

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
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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.
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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.
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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:	42139686
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	10-MAR-2021
Filing Date:	22-FEB-2021
Time Stamp:	15:09:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	00146-SB08-C.pdf	614832	no	12
			7c34b4555850e1a9106803fc7965362b0014b58e		

Warnings:

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Ex. 1003 - Page 90

Information:	
Total Files Size (in bytes):	614832
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Michael Miskin et al.
Appl. No.: 17/181,802
Conf. No.: 5141
Filed: February 22, 2021
Title: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES
AND METHODS OF USING SAME
Art Unit: 2685
Examiner: NA
Docket No.: 3725194.00146 (14US07)

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

REQUEST FOR CORRECTED FILING RECEIPT

Sir:

Attached is a marked-up copy of the official filing receipt received from the USPTO in the above-identified patent application for which issuance of a corrected filing receipt is respectfully requested. There is an error in that the following data is:

- ☒ [X] incorrectly entered
and/or
- ☐ [] omitted
 - ☐ [] Inventor(s)
 - ☐ [] Applicant(s)
 - ☒ [X] **Domestic Priority**
 - ☐ [] Foreign Applications
 - ☐ [] Title
 - ☐ [] Total Claims and/or Independent Claims
 - ☐ [] Attorney Docket No.
 - ☐ [] **Other - Inventor(s) Residence**

in that the filing receipt should read as follows:

Domestic Priority data as claimed by applicant

This application is a CON of 16/740,295 01/10/2020 PAT 10932341
which is a CON of 16/274,164 02/12/2019 PAT 10537001
which is a CON of 15/685,429 08/24/2017 PAT 10271393
which is a CON of 14/172,644 02/04/2014 PAT 9750098
which is a CON of 13/322,796 11/28/2011 PAT 8648539
which is a 371 of PCT/US2010/001597 05/28/2010
which claims the benefit of 61/217,215 05/28/2009
PCT/US2010/01597 is a CIP of 12/287,267 10/08/2008 PAT 8179055
which claims the benefit of 60/997,771 10/06/2007

The Domestic Priority was entered correctly on the ADS at the time of filing and should be corrected on the Filing Receipt. The second entry of PCT/US2010/001597 was cut off on the Application Data Sheet form because the form did not now allow enough space for the number. This resulted in an incorrect appearance of the full priority claim. For the reasons discussed above, please generate another Filing Receipt incorporating the requested corrections. We have also included an Amended ADS to show the complete priority claim. To the extent the Patent Office requires any further information or documentation regarding this matter, Applicant respectfully requests that the Patent Office contact the undersigned attorney. Applicant does not believe a fee is owed.

If any fees are deemed owed with this submission, please charge deposit account number 02-1818. If any such charges are applied, please indicate Attorney Docket No. 3725194.00146 on the account statement.

Respectfully submitted,

K&L GATES LLP

BY /Dennis A. Majewski/
Dennis A. Majewski
Reg. No. 65,578
Customer No. 24573
312 807-4329

Dated: March 15, 2021



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
17/181,802	02/22/2021	2685	1820	3725194.00143 14US07	20	3

CONFIRMATION NO. 5141

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

FILING RECEIPT



Date Mailed: 03/05/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Michael Miskin, Sleepy Hollow, IL;
Robert L. Kotritsch, Shefford Bedfordshire, UNITED KINGDOM;

Applicant(s)

Lynk Labs, Inc., Elgin, IL;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/740,295 01/10/2020 PAT 10932341
which is a CON of 16/274,164 02/12/2019 PAT 10537001
which is a CON of 15/685,429 08/24/2017 PAT 10271393 *
which is a CON of 14/172,644 02/04/2014 PAT 9750098 *
which is a CON of 13/322,796 11/28/2011 PAT 8648539
which is a 371 of PCT/US2010/001597 05/28/2010 PCTUS2010001597 is a CIP of 12287267 10/06/2008
which claims benefit of 61/217,215 05/28/2009 PAT 8179055 which claims the benefit of 60997771
(*)Data provided by applicant is not consistent with PTO records. 10/06/2007

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: 03/02/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/181,802**

Projected Publication Date: 06/10/2021

Non-Publication Request: No

Early Publication Request: No

Title

MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

Preliminary Class

340

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.

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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).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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Electronic Acknowledgement Receipt

EFS ID:	42179701
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	15-MAR-2021
Filing Date:	22-FEB-2021
Time Stamp:	15:16:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	00146-Amended-ADS-A.pdf	4578341	no	9
			c032675258c746c9e7aaf1a13dbe4b4accac b961		

Warnings:

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			b53a8981281f583a1cb00460c4292f2d91415706		
Warnings:					
Information:					
			Total Files Size (in bytes):	7880259	
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					

AMENDED ADS

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	17/181,802
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Michael		Miskin		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Sleepy Hollow	State/Province	IL	Country of Residence	US
Mailing Address of Inventor:					
Address 1	2 Pinecone Lane				
Address 2					
City	Sleepy Hollow	State/Province	IL		
Postal Code	60118	Country	US		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Robert	L.	Kottritsch		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
City	Shefford Bedfordshire	Country of Residence ⁱ	GB		
Mailing Address of Inventor:					
Address 1	10 The Hollies				
Address 2					
City	Shefford Bedfordshire	State/Province			
Postal Code	56175BX	Country ⁱ	GB		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					

Correspondence Information:

PGR2023-00016 - Home Depot

Ex. 1003 - Page 100

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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

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

Customer Number	24573		
Email Address	chicago.patents@kigates.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed ☐	
Application Type	Nonprovisional 3725194.00146 14US07		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573	PGR2023-00016 - Home Depot	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	16740295	2020-01-10		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16274164	Continuation of	15685429	2017-08-24	10271393	2019-04-23
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15685429	Continuation of	14172644	2014-02-04	9750098	2017-08-29
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14172644	Continuation of	13322796	2011-11-28	8648539	2014-02-11
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13322796	a 371 of international	PCTUS2010001597	2010-05-28		
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
PCTUS2010001597	Claims benefit of provisional	61217215	2009-05-28		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
PCTUS2010001597	Continuation in part of	12287267	2008-10-06	8179055	2012-05-15

PCT/US2010/001597

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
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 priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Remove
			Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

☐ NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

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.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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.

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

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

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

[Clear](#)

☒ Assignee
 ☐ Legal Representative under 35 U.S.C. 117
 ☐ Joint Inventor

☐ Person to whom the inventor is obligated to assign.
 ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name Lynk Labs, Inc.

Mailing Address Information For Applicant:

Address 1	2511 Technology Drive		
Address 2	Suite 108		
City	Elgin	State/Province	IL
Country	US	Postal Code	60123-9323
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ¹		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-03-15
First Name	Dennis A.	Last Name	Majewski	Registration Number 65578

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07

CONFIRMATION NO. 5141

IMPROPER CFR REQUEST



OC000000124139981

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

Date Mailed: 03/17/2021

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Power of Attorney, Claims, Fees, System Limitations, and Miscellaneous

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The ADS submitted on 03/15/2021 was not properly marked up to show the desired changes. For information being changed relative to the information already of record, additions must be shown with underlining, and deletions must be shown with strike-through or brackets. See 37 CFR 1.76(c)(2)

In order to make changes to the information of record, an ADS must be properly signed and properly marked up relative to the current information of record.

Proper signature: The ADS must be signed with a handwritten signature or proper S-signature by:

- A patent practitioner, with the practitioner's registration number accompanying the signature (e.g., immediately below or adjacent to the signature), or
- The applicant, if the applicant is an individual other than the inventor(s) and no power of attorney has been appointed, or
- All of the inventors, if no other applicant has been established and no power of attorney has been appointed.

A proper S-signature consists of only letters and/or Arabic numerals, with appropriate spaces and commas, periods, apostrophes, or hyphens for punctuation contained between a first single forward slash mark before, and a second single forward slash mark after, the S-signature.

Proper markings: The ADS must identify the changes being made with underlining for insertions and strike-through or brackets for text removed. No other markings or indications are acceptable. Where an ADS providing corrected or updated information does not contain all of the sections of the ADS, the entire section in which changes are being made must be included in the ADS. Information of record can generally be found on the latest filing receipt.

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.

/lqchau/

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COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA VA 22313-1451

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K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690



**Courtesy Reminder for
Application Serial No: 17/181,802**

Attorney Docket No: 3725194.00146 14US07
Customer Number: 24573
Date of Electronic Notification: 03/17/2021

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

USpatentmail@klgates.com

To view your correspondence online or update your email addresses, please visit us anytime at **<https://ppair-my.uspto.gov/pair/PrivatePair>**.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141
24573	7590	03/31/2021	EXAMINER	
K&L Gates LLP-Chicago P.O. Box 1135 Chicago, IL 60690			ART UNIT	PAPER NUMBER
			2844	
			NOTIFICATION DATE	DELIVERY MODE
			03/31/2021	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):

USpatentmail@klgates.com



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of:

MISKIN, MICHAEL, et al.

Application No. 17/181,802

Filed: February 22, 2021

Attorney Docket No. 3725194.00146 14US07

:
:
:
:

DECISION ON PETITION
TO MAKE SPECIAL UNDER
37 CFR 1.102(c)(1)

This is a decision on the petition under 37 CFR 1.102(c)(1), filed February 22, 2021, to make the above-identified application special based on applicant's age as set forth in MPEP § 708.02, Section II.

The petition is **GRANTED**.

A grantable petition to make an application special under 37 CFR 1.102(c)(1) and MPEP § 708.02, Section II: Applicant's Age, must be accompanied by evidence showing that the applicant is 65 years of age, or more, such as applicant's statement or a statement from a registered practitioner that he or she has evidence that the applicant is 65 years of age or older. No fee is required.

The instant petition includes a statement from a registered practitioner that he/her has evidence that inventor Robert L. Kottritsch, is over 65 years of age.

The application is being forwarded to the Technology Center Art Unit 2844 for action on the merits commensurate with this decision.

Telephone inquiries concerning this decision should be directed to Dale Hall at 571-272-3586.

All other inquiries concerning either the examination or status of the application should be directed to the Technology Center.

/Dale A. Hall/

Paralegal Specialist, OPET

AMENDED ADS

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	17/181,802
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
<small>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.</small>			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Michael		Miskin		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Sleepy Hollow	State/Province	IL	Country of Residence	US
Mailing Address of Inventor:					
Address 1	2 Pinecone Lane				
Address 2					
City	Sleepy Hollow	State/Province	IL		
Postal Code	60118	Countryⁱ	US		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Robert	L.	Kottritsch		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					
City	Shefford Bedfordshire	Country of Residenceⁱ	GB		
Mailing Address of Inventor:					
Address 1	10 The Hollies				
Address 2					
City	Shefford Bedfordshire	State/Province			
Postal Code	56175BX	Countryⁱ	GB		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add

Correspondence Information:

PGR2023-00016 - Home Depot

Ex. 1003 - Page 113

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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

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

Customer Number	24573		
Email Address	chicago.patents@kgates.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed	☐
Application Type	Nonprovisional 3725194.00146 14US07		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	16740295	2020-01-10		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16274164	Continuation of	15685429	2017-08-24	10271393	2019-04-23
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15685429	Continuation of	14172644	2014-02-04	9750098	2017-08-29
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14172644	Continuation of	13322796	2011-11-28	8648539	2014-02-11
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13322796	a 371 of international	PCTUS2010001597	2010-05-28		
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
PCTUS2010001597	Claims benefit of provisional	61217215	2009-05-28		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
PCTUS2010001597	Continuation in part of	12287267	2008-10-06	8179055	2012-05-15

PCT/US2010/001597

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
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 priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

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.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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.

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

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

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

[Clear](#)

☒ Assignee
 ☐ Legal Representative under 35 U.S.C. 117
 ☐ Joint Inventor

☐ Person to whom the inventor is obligated to assign.
 ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name Lynk Labs, Inc.

Mailing Address Information For Applicant:

Address 1	2511 Technology Drive		
Address 2	Suite 108		
City	Elgin	State/Province	IL
Country	US	Postal Code	60123-9323
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-04-05
First Name	Dennis A.	Last Name	Majewski	Registration Number 65578

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.

Electronic Acknowledgement Receipt

EFS ID:	42367454
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	05-APR-2021
Filing Date:	22-FEB-2021
Time Stamp:	16:51:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	00146-AMENDED-ADS.pdf	3619786	no	9
			581396f66a3a5e7894c74ae6be8bc7e9caccf424		

Warnings:

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Ex. 1003 - Page 122

Information:	
This is not an USPTO supplied ADS fillable form	
Total Files Size (in bytes):	3619786
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>	



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141
24573	7590	04/27/2021		
K&L Gates LLP-Chicago P.O. Box 1135 Chicago, IL 60690			EXAMINER HAMMOND, CRYSTAL L	
			ART UNIT	PAPER NUMBER
			2844	
			NOTIFICATION DATE	DELIVERY MODE
			04/27/2021	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):

USpatentmail@klgates.com

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 103

2. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-20 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lefebvre (US 2003/0179585) in view of Allen (US 2004/0201988).

(1) regarding Claim 1:

Lefebvre discloses an LED lighting system comprising: a first operating LED circuit (15 in Fig 3) and at least one additional LED circuit (16 in Fig 3), at least one of the first operating LED circuit or the at least one additional LED circuit including at least two LEDs connected in either series or parallel ([0021]), and;

a switch (46, 48 in Fig 3) capable of at least one of:

(a) switching a voltage level input to at least one of the first operating LED circuit or the at least one additional LED circuit ([0024]), or

(b) switching the at least one additional LED circuit on or off ([0024]), wherein (a) or (b) is selectable by a user switching the switch ([0024]-it's in a vehicle with a user inside); and

an LED driver (80, 86 or 88 in Fig 5) including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit ([0032]),

wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit (See Fig 3).

However, Lefebvre does not disclose the different colors.

Allen, in the same field of endeavor, discloses:

the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit ([0049]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the features of Allen into the system of Lefebvre in order to increase circuit utility and application.

(2) regarding Claim 2:

The combination of Lefebvre and Allen further discloses:

wherein the switch has at least two positions (See 48 and 46 in Fig 3 of Lefebvre).

(3) regarding Claim 3:

The combination of Lefebvre and Allen further discloses:

wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit ([0024] of Lefebvre).

(4) regarding Claim 4:

The combination of Lefebvre and Allen further discloses:

wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate ([0019] of Lefebvre).

(5) regarding Claim 5:

The combination with Lefebvre and Allen further discloses:

wherein the switching of the switch changes light output of the LED lighting device ([0024] of Lefebvre).

(6) regarding Claim 6:

The combination with Lefebvre and Allen further discloses:

wherein the AC voltage power source includes one of at least two different AC voltage power sources ([0008], [0012], [0026] of Lefebvre).

(7) regarding Claim 7:

further comprising a driver (80, 86 or 88 in Fig 5 of Lefebvre) electrically coupled to the switch and at least one of the first operating LED circuit or the at least one additional LED circuit.

(8) regarding Claim 8:

Lefebvre discloses an LED lighting system comprising: a first operating LED circuit (15 in Fig 3) and at least one additional LED circuit (16 in Fig 3), at least one of the first operating LED circuit or the at least one additional LED circuit including at least two LEDs connected in either series or parallel ([0021]), and;

a switch (46, 48 in Fig 3) capable of at least one of:

(a) switching a brightness level of at least one of the first operating LED circuit or the at least one additional LED circuit ([0024]), or

(b) switching the at least one additional LED circuit on or off ([0024]), wherein (a) or (b) is selectable by a user switching the switch ([0024]-it's in a vehicle with a user inside); and

an LED driver (80, 86 or 88 in Fig 5) including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit ([0032]),

wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit (See Fig 3).

However, Lefebvre does not disclose the different colors.

Allen, in the same field of endeavor, discloses:

the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit ([0049]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the features of Allen into the system of Lefebvre in order to increase circuit utility and application.

(9) regarding Claim 9:

The combination of Lefebvre and Allen further discloses:

wherein the switch has at least two positions (See 48 and 46 in Fig 3 of Lefebvre).

(10) regarding Claim 10:

The combination of Lefebvre and Allen further discloses:

wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit ([0024] of Lefebvre).

(11) regarding Claim 11:

The combination of Lefebvre and Allen further discloses:

wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate ([0019] of Lefebvre).

(12) regarding Claim 12:

The combination with Lefebvre and Allen further discloses:

wherein the switching of the switch changes light output of the LED lighting device ([0024] of Lefebvre).

(13) regarding Claim 13:

The combination with Lefebvre and Allen further discloses:

wherein the AC voltage power source includes one of at least two different AC voltage power sources ([0008], [0012], [0026] of Lefebvre).

(14) regarding Claim 14:

further comprising a driver (80, 86 or 88 in Fig 5 of Lefebvre) electrically coupled to the switch and at least one of the first operating LED circuit or the at least one additional LED circuit.

(15) regarding Claim 15:

Lefebvre discloses an LED lighting system comprising: a first operating LED circuit (15 in Fig 3) and at least one additional LED circuit (16 in Fig 3),

a switch (46, 48 in Fig 3) capable of at least one of:

(a) switching a voltage level input to at least one of the first operating LED circuit or the at least one additional LED circuit ([0024]), or

(b) switching the at least one additional LED circuit on or off ([0024]), wherein (a) or (b) is selectable by switching the switch ([0024]-it's in a vehicle with a user inside); and

an LED driver (80, 86 or 88 in Fig 5) including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit ([0032]),

wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit (See Fig 3).

However, Lefebvre does not disclose the different colors.

Allen, in the same field of endeavor, discloses:

the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit ([0049]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the features of Allen into the system of Lefebvre in order to increase circuit utility and application.

(16) regarding Claim 16:

The combination of Lefebvre and Allen further discloses:

wherein the switch has at least two positions (See 48 and 46 in Fig 3 of Lefebvre).

(17) regarding Claim 17:

The combination of Lefebvre and Allen further discloses:

wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit ([0024] of Lefebvre).

(18) regarding Claim 18:

The combination of Lefebvre and Allen further discloses:

wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate ([0019] of Lefebvre).

(19) regarding Claim 19:

The combination with Lefebvre and Allen further discloses:

wherein the switching of the switch changes light output of the LED lighting device ([0024] of Lefebvre).

(20) regarding Claim 20:

The combination with Lefebvre and Allen further discloses:

wherein the AC voltage power source includes one of at least two different AC voltage power sources ([0008], [0012], [0026] of Lefebvre).

Conclusion

1. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CRYSTAL L HAMMOND whose telephone number is (571)270-1682. The examiner can normally be reached on M-F 12pm-4pm Alt Fridays.

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, Alexander Taningco can be reached on 571-272-8048. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <https://ppair-my.uspto.gov/pair/PrivatePair>. 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.

/CRYSTAL L HAMMOND/
Primary Examiner, Art Unit 2844

Notice of References Cited	Application/Control No. 17/181,802		Applicant(s)/Patent Under Reexamination Miskin et al.	
	Examiner CRYSTAL L HAMMOND		Art Unit 2844	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
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*	B	US-20080116816-A1	05-2008	Neuman; Robert C.	H05B45/37	315/185S
	C					
	D					
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	J					
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Search Notes 	Application/Control No. 17/181,802	Applicant(s)/Patent Under Reexamination Miskin et al.
	Examiner CRYSTAL L HAMMOND	Art Unit 2844

CPC - Searched*		
Symbol	Date	Examiner
text search in combination with H05B45/40 or H05B45/00 or Y10T29/49002	04/19/2021	clh

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
Search Notes	Date	Examiner
inventor name search	04/19/2021	clh
east text search attached	04/19/2021	clh

Interference Search			
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BIB DATA SHEET

CONFIRMATION NO. 5141

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
17/181,802	02/22/2021	362	2844	3725194.00146 14US07
RULE				
APPLICANTS Lynk Labs, Inc., Elgin, IL;				
INVENTORS Michael Miskin, Sleepy Hollow, IL; Robert L. Kottritsch, Shefford Bedfordshire, UNITED KINGDOM;				
** CONTINUING DATA ***** This application is a CON of 16/740,295 01/10/2020 PAT 10932341 which is a CON of 16/274,164 02/12/2019 PAT 10537001 which is a CON of 15/685,429 08/24/2017 PAT 10271393 * which is a CON of 14/172,644 02/04/2014 PAT 9750098 * which is a CON of 13/322,796 11/28/2011 PAT 8648539 which is a 371 of PCT/US2010/001597 05/28/2010 which claims benefit of 61/217,215 05/28/2009 (*)Data provided by applicant is not consistent with PTO records.				
** FOREIGN APPLICATIONS *****				
** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 03/02/2021				
Foreign Priority claimed	☐ Yes ☒ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS
35 USC 119(a-d) conditions met	☐ Yes ☒ No		IL	8
Verified and	/CRYSTAL L HAMMOND/	Initials		TOTAL CLAIMS
Acknowledged	Examiner's Signature			20
INDEPENDENT CLAIMS				
3				
ADDRESS K&L Gates LLP-Chicago P.O. Box 1135 Chicago, IL 60690 UNITED STATES				
TITLE MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME				
FILING FEE RECEIVED 1820	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	

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

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	Filing Date		2021-02-22
	First Named Inventor	Miskin	
	Art Unit	NA	
	Examiner Name	NA	
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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
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	European Search Report dated October 22, 2012 in related European Application - 7 pages	
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	3	Examination Report Under Sections 12 & 13 of the Patent Act for Indian Application No. 9150/delnp/2011 mailed April 5, 2018 - 6 pages	
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8	Extended European Search Report mailed January 14, 2020, Application No. EP19177733.3 - 10 pages
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Application Number	17181802
Filing Date	2021-02-22
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Art Unit	NA
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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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SIGNATURE

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

Signature	/Dennis A. Majewski/	Date (YYYY-MM-DD)	2021-03-10
Name/Print	Dennis A. Majewski	Registration Number	65578

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EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S119	940	(("9247597") or ("9516716") or ("20140361697") or ("10757783") or ("10652979") or ("20160143097") or ("10537001") or ("10433382") or ("20200389960") or ("10111286") or ("10271393") or ("20190297697") or ("10555385") or ("20180110101") or ("8823274") or ("10187937") or ("9491825") or ("20140125237") or ("9918363") or ("10206256") or ("20180139810") or ("10349479") or ("9591706") or ("9445463") or ("20200092967") or ("20200275536") or ("8648539") or ("9750098") or ("9320098") or ("9131569") or ("9474113") or ("20170188426") or ("10362649") or ("20140153232") or ("10492260") or ("10681782") or ("20190182919") or ("20160007420") or ("9351363") or ("10750583") or ("8598812") or ("20160381743") or ("8547025") or ("9924572") or ("9781791") or ("20180146521") or ("7148632") or ("8674609") or ("9839077") or ("20170354005") or ("20190132914") or ("20190335557") or ("8638043") or ("20150382417") or ("8847504") or ("8853949") or ("10687400") or ("9414453") or ("20120293083") or ("20180027617") or ("8476836") or ("9398650") or ("20130278161") or ("9661699") or ("8896221") or ("10575376") or ("9622316") or ("10834792") or ("10390400") or ("7569996") or ("9253849") or ("10548188") or ("9739430") or ("8638047") or ("20120069560") or ("8299726") or ("20160150610") or ("9414452") or ("20040135522") or ("20130002158") or ("10638582") or ("20120187847") or ("20120306393") or ("9265102") or ("10015852") or ("7375476") or ("20160381754") or ("8319443") or ("20120038284") or ("20150334794") or ("20140049189") or	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/19 15:47

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	or ("10499481") or ("20190313491") or ("8164281") or ("9237617") or ("20140036488") or ("9013109") or ("7946730") or ("10306720") or ("8669718") or ("9398654") or ("20120051035") or ("9271349") or ("20070273299") or ("8573807") or ("8786201") or ("20050057187") or ("8680787") or ("9226353") or ("20200120778") or ("20200260554") or ("9949332") or ("10178734") or ("9549443") or ("9516712") or ("20130057152") or ("8723436") or ("10849200") or ("8587956") or ("20120019714") or ("9433055") or ("20190306940") or ("8502463") or ("10368421") or ("9265107") or ("10321541") or ("9967933") or ("20090021182") or ("20160205734") or ("20170354001") or ("8492992") or ("10187945") or ("20140306615") or ("8421366") or ("20060012997") or ("9258865") or ("7781979") or ("20080024070") or ("9125261") or ("6791283") or ("9220143") or ("8860319") or ("8564206") or ("20100026215") or ("20190132913") or ("20170231051") or ("20120286683") or ("20100264838") or ("10321529") or ("9609714") or ("20180279427") or ("9161401") or ("8217587") or ("20130038210") or ("8698407") or ("20140132164") or ("20120119682") or ("20120153863") or ("20160057827") or ("10492251") or ("20090309501") or ("9681504") or ("8519640") or ("20170295616")).PN. or ("20180014368") or ("9084315") or ("10154556") or ("20110193491") or ("10237932") or ("8704462") or ("10492252") or ("10772175") or ("8587205") or ("20190223265") or ("7489089") or ("20130063047") or ("10201045") or ("20140217908") or ("20170257916") or ("20190327800") or ("9553248") or ("10542597") or ("20130026949") or ("20170099707") or ("7564198") or ("10129939") or ("9049765") or ("9801250") or ("10405392") or ("8947014") or ("9306387") or ("9729005") or ("20150115811") or ("8598797") or ("9167639") or ("9743473") or			
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	("20180184490") or ("9713226") or ("8089217") or ("7772801") or ("9057489") or ("8143769") or ("9392655") or ("9726364") or ("20180027626") or ("20130200810") or ("9661706") or ("20100244703") or ("20110169417") or ("8529088") or ("8240873") or ("8143793") or ("10178723") or ("9131561") or ("9961736") or ("6989807") or ("8456109") or ("9232590") or ("20040012959") or ("20140339999") or ("9155143") or ("10856386") or ("20140232270") or ("20130119887") or ("9681518") or ("20080203936") or ("20140210351") or ("8710764") or ("20170310160") or ("20050225979") or ("9432116") or ("10701786") or ("9055634") or ("9253844") or ("9560709") or ("7307391") or ("9565726") or ("7656103") or ("20130249431") or ("20170251534") or ("20100052566") or ("7847489") or ("10212769") or ("9814110") or ("20170135171") or ("8089218") or ("20120187863") or ("9167644") or ("10544929") or ("20130300292") or ("20130229119") or ("9113525") or ("20110068706") or ("20200008279") or ("10091854") or ("8890424")).PN. or ("20150022087") or ("8632215") or ("20140042933") or ("20190335558") or ("20170064781") or ("8525434") or ("20170034883") or ("20130049626") or ("9167656") or ("8796943") or ("10362652") or ("20160212805") or ("8569956") or ("20200196415") or ("10165631") or ("9370063") or ("20150145436") or ("9730286") or ("8896217") or ("20110057572") or ("20140240974") or ("9759391") or ("20120262080") or ("20200113024") or ("20140049186") or ("20100308738") or ("10537008") or ("9980342") or ("8841864") or ("20140301074") or ("20100277083") or ("20170034879") or ("8716945") or ("10021756") or ("9113528") or ("7221104") or ("10098195") or ("8773026") or ("20070228999") or ("20120176046") or ("10257892") or ("8866396") or ("9332613") or ("8410720") or ("20110057564") or				
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		("20140339984") or ("9107254") or ("20090322254") or ("20140035463") or ("20140292217") or ("9041313") or ("20070030678") or ("20130026925") or ("20160099773") or ("20110127917") or ("20120235575") or ("6218785") or ("10757773")).PN.				
S120	8,491	(parallel series) and LED with string and switch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/04/19 15:47
S121	359	S119 and S120	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/04/19 15:47
S122	9	(michael adj2 miskin).inv.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2021/04/19 15:52
S123	0	(robert adj2 kottritsch).inv.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2021/04/19 15:53
S124	56,373	(H05B45/40 or H05B45/00 or Y10T29/49002).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2021/04/19 15:56
S125	0	S122 and S120	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2021/04/19 15:56

S126	4	S122 and S124	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2021/04/19 15:57
S127	7	("20070103899" "8076680" "8384299").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	OFF	2021/04/19 17:25
S128	3	("20070103899" "8076680" "8384299").PN.	US-PGPUB; USPAT; USOCR	ADJ	OFF	2021/04/21 17:31
S129	116	("20040080941" "20060103913" "20060138971" "20060158130" "20070247852" "20090295300" "6667497" "7339198" "20070103899" "20080017871" "20080116818" "5803579" "6357889" "6528954" "7038399" "7344279" "9184497" "20030043611" "20120268008" "9198237" "20110001422" "20100259183" "6028694" "7583901" "6127783" "20080211421" "5699218" "6614103" "7535028" "20090289267" "20030137258" "20070258231" "20110148327" "6636003" "6714348" "7064498" "20030169014" "20030175004" "20060285332" "20080203405" "20080203936" "20080218098" "20120293083" "20160095180" "3869641" "7489086" "4271408" "20030100837" "20080094005" "20090079362" "20100109564" "6861658" "7288902" "20030156422" "20060238136" "7462997" "20060038542" "20080116816" "20100039794" "5790013" "6762562" "6781570" "6909234" "7019062" "8179055" "8841855" "20100277084" "20060176692" "20080252197" "6234648" "6292901" "20030122502" "20040201988"	US-PGPUB; USPAT; USOCR	ADJ	OFF	2021/04/21 17:36

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S130	6	("20030179585" "20040140771" "20040165384" "6040663" "6430064" "6580228").PN.	US-PGPUB; USPAT; USOCR	ADJ	OFF	2021/04/21 18:05
S131	5	("20060158130" "20070273299" "20080203405" "20100052566" "7165876").PN.	US-PGPUB; USPAT; USOCR	ADJ	OFF	2021/04/21 18:25
S132	31	(US-20080116816-\$ or US- 20100072905-\$ or US-20080203405-\$ or US-20060158130-\$ or US- 20070273299-\$ or US-20050168156-\$ or US-20090174337-\$ or US- 20090021185-\$ or US-20040201988-\$ or US-20090167190-\$ or US- 20110260648-\$ or US-20110169408-\$ or US-20070115248-\$ or US- 20070139317-\$ or US-20020101197-\$ or US-20180376555-\$ or US- 20180352622-\$ or US-20160095180-\$ or US-20140361697-\$ or US- 20120293083-\$ or US-20020130985-\$ or US-20060012997-\$ or US- 20130250579-\$ or US-20150233566-\$ or US-20100320499-\$ or US- 20080130288-\$.did. or (US- 20030179585-\$.did. or (US-8179055-\$ or US-7748877-\$ or US-10197224-\$ or US-9622316-\$.did.	US-PGPUB; USPAT	OR	OFF	2021/04/22 11:19
S133	23	S132 and (different with color colour)	US-PGPUB; USPAT	OR	ON	2021/04/22 11:20

EAST Search History (Interference)

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4/22/2021 1:08:27 PM

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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		17181802
	Filing Date		2021-02-22
	First Named Inventor	Miskin	
	Art Unit	NA	
	Examiner Name	NA	
	Attorney Docket Number	3725194.00146 14US07	

U.S.PATENTS						Remove
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	6127783		2000-10-03	Pashley et al.	

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	1	20050195600		2005-09-08	Porchia et al.	
	2	20060238136		2006-10-26	Johnson III et al.	
	3	20030156422		2003-08-21	Tatewaki et al.	

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	1	03055273	WO		2003-07-03	COLOR KINETICS INC		

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First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

2	2004094896	WO		2004-11-04	COLOR KINETICS, INC.		
3	3162876	JP		2010-09-24	ORION ELECTRIC CO. LTD.		
4	6230386	JP		1987-02-09	STANLEY ELEC CO LTD		
5	2000156526	JP		2000-06-06	ASAHI RUBBER KK		
6	2001291406	JP		2003-04-03	NIPPON ALUM CO LTD		
7	2002057376	JP		2002-02-22	MATSUSHITA ELECTRIC IND CO LTD		
8	2003298118	JP		2003-10-17	TOSHIBA LIGHTING & TECHNOLOGY CORP.		
9	2004111104	JP		2004-04-08	mitsubishi elec corp		
10	2005222750	JP		2005-08-18	KUBO KENJI et al.		
11	2007059260	JP		2007-03-08	TOSHIBA LIGHTING & TECHNOLOGY CORP		

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Attorney Docket Number	3725194.00146 14US07

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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First Named Inventor	Miskin
Art Unit	NA
Examiner Name	NA
Attorney Docket Number	3725194.00146 14US07

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Dennis A. Majewski/	Date (YYYY-MM-DD)	2021-02-25
Name/Print	Dennis A. Majewski	Registration Number	65578

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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.
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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: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

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	First Named Inventor	Miskin	
	Art Unit	NA	
	Examiner Name	NA	
	Attorney Docket Number	3725194.00146 14US07	

U.S.PATENTS						Remove
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	6559802		2003-05-06	Goto et al.	
	2	5469020		1995-11-21	Herrick	
	3	6072475		2000-06-06	van Ketwich	
	4	6548967		2003-04-15	Dowling et al.	
	5	4298869		1981-11-03	Okuno	
	6	5803579		1998-09-08	Turnbull et al.	
	7	6016038		2000-01-18	Mueller et al.	
	8	6028694		2000-02-22	Schmidt	

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9	6292901		2001-09-18	Lys et al.	
10	6234648		2001-05-22	Borner	
11	6357889		2002-03-19	Duggal et al.	
12	6528954		2003-03-04	Lys et al.	
13	6714348		2004-03-30	Dunn	
14	6861658		2005-03-01	Fiset	
15	7038399		2006-05-02	Lys et al.	
16	7288902		2007-10-30	Melanson	
17	7344279		2008-03-18	Mueller et al.	
18	7583901		2009-09-01	Nakagawa et al.	
19	5636303		1997-06-03	Che et al.	

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20	5936599	1999-08-10	Reymond
21	6636003	2003-10-21	Rahm et al.
22	8272757	2012-09-25	Fan et al.
23	8314571	2012-11-20	Jonsson
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	1	20030219035		2003-11-27	Schmidt	
	2	20010054005		2001-12-20	Hook et al.	
	3	20020048169		2002-04-25	Dowling et al.	
	4	20020181231		2002-12-15	Luk	

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5	20030100837	2003-07-24	Piegras et al.
6	20030137258	2003-07-24	Piegras et al.
7	20040218387	2003-11-04	Gerlach
8	20050128751	2005-06-16	Roberge et al.
9	20070258231	2007-11-08	Koemer et al.
10	20060176692	2006-08-10	Lee et al.
11	20080094005	2008-04-24	Rabiner et al.
12	20080094837	2008-04-24	Dobbins et al.
13	20080252197	2008-10-16	Li et al.
14	20100308738	2010-12-09	Shteynberg et al.
15	20080116818	2008-05-22	Shteynberg et al.

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16	20090079362	2009-03-26	Shteynberg et al.
17	20100109564	2010-05-06	Shin et al.
18	20110148327	2011-06-23	Van de Ven et al.
19	20040264193	2004-12-30	Okumura
20	20100259183	2010-10-14	Leshniak
21	20110115407	2011-05-19	Wibben et al.
22	20100072905	2010-03-25	Kim et al.

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	1	9922338	WO		1999-05-06	BRITISH TELECOMMUNICATION PUBLIC LIMITED COMPANY		
	2	0215320	WO		2002-02-21	INCA SYSTEMS CO., LTD.		

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3	2003019072	WO	2003-03-06	Okumura
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Signature	/Dennis A. Majewski/	Date (YYYY-MM-DD)	2021-02-25
Name/Print	Dennis A. Majewski	Registration Number	65578

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07

CONFIRMATION NO. 5141

PUBLICATION NOTICE



OC000000126222950

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

Title:MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

Publication No.US-2021-0176839-A1

Publication Date:06/10/2021

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Applicant: Lynk Labs, Inc.
Appl. No.: 17/181,802
Conf. No.: 5141
Filed: February 22, 2021
Title: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES
AND METHODS OF USING SAME
Art Unit: 2844
Examiner: Crystal L. Hammond
Docket No.: 3725194.00146 (14US07)

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Alexandria, VA 22313-1450

RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

In response to the non-final Office Action dated April 27, 2021, please amend the above-identified patent application as follows:

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

Remarks begin on page 6 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (original): An LED lighting system comprising:
a first operating LED circuit and at least one additional LED circuit,
at least one of the first operating LED circuit or the at least one additional LED circuit
including at least two LEDs connected in either series or parallel, and
the at least one additional LED circuit being configured to emit a different color light
compared to the first operating LED circuit;
a switch capable of at least one of:
(a) switching a voltage level input to at least one of the first operating LED circuit or
the at least one additional LED circuit, or
(b) switching the at least one additional LED circuit on or off,
wherein (a) or (b) is selectable by a user switching the switch; and
an LED driver including an input configured to connect to an AC voltage power source,
the LED driver configured to provide a DC voltage output to at least one of the first operating
LED circuit or the at least one additional LED circuit,
wherein the switch is electrically connected between the DC voltage output and at least
one of the first operating LED circuit or the at least one additional LED circuit.

Claim 2 (original): The LED lighting system of Claim 1, wherein the switch has at least
two positions.

Claim 3 (original): The LED lighting system of Claim 1, wherein the switching of the
switch provides at least two different DC forward voltages to at least one of the first operating
LED circuit or the at least one additional LED circuit.

Claim 4 (original): The LED lighting system of Claim 1, wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate.

Claim 5 (original): The LED lighting system of Claim 1, wherein the switching of the switch changes light output of the LED lighting device.

Claim 6 (currently amended): The LED lighting system of Claim 1, wherein ~~the AC voltage power source includes one of at least two different AC voltage power sources~~ the LED driver is configured to cause the DC voltage output to have a lower voltage than the AC voltage power source.

Claim 7 (original): The LED lighting system of Claim 1, further comprising a driver electrically coupled to the switch and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 8 (original): An LED lighting system comprising:
a first operating LED circuit and at least one additional LED circuit,
at least one of the first operating LED circuit or the at least one additional LED circuit including at least two LEDs connected in either series or parallel, and
the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit;
a switch capable of at least one of:
(a) switching a brightness level of at least one of the first operating LED circuit or the at least one additional LED circuit, or
(b) switching the at least one additional LED circuit on or off,
wherein (a) or (b) is selectable by a user switching the switch; and
an LED driver including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit,

wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 9 (original): The LED lighting system of Claim 8, wherein the switch has at least two positions.

Claim 10 (original): The LED lighting system of Claim 8, wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 11 (original): The LED lighting system of Claim 8, wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate.

Claim 12 (original): The LED lighting system of Claim 8, wherein the switching of the switch changes light output of the LED lighting device.

Claim 13 (currently amended): The LED lighting system of Claim 8, wherein ~~the AC voltage power source includes one of at least two different AC voltage power sources~~ the LED driver is configured to cause the DC voltage output to have a lower voltage than the AC voltage power source.

Claim 14 (original): The LED lighting system of Claim 8, further comprising a driver electrically coupled to the switch and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 15 (original): An LED lighting system comprising:
a first operating LED circuit and at least one additional LED circuit,
the at least one additional LED circuit being configured to emit a different color light compared to the first operating LED circuit;
a switch capable of at least one of:

(a) switching a voltage level input to at least one of the first operating LED circuit or the at least one additional LED circuit, or
(b) switching the at least one additional LED circuit on or off,
wherein (a) or (b) is selectable by switching the switch; and
an LED driver including an input configured to connect to an AC voltage power source, the LED driver configured to provide a DC voltage output to at least one of the first operating LED circuit or the at least one additional LED circuit,
wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 16 (original): The LED lighting system of Claim 15, wherein the switch has at least two positions.

Claim 17 (original): The LED lighting system of Claim 15, wherein the switching of the switch provides at least two different DC forward voltages to at least one of the first operating LED circuit or the at least one additional LED circuit.

Claim 18 (original): The LED lighting system of Claim 15, wherein the switch, the first operating LED circuit, and the at least one additional LED circuit are mounted on a single insulating substrate.

Claim 19 (original): The LED lighting system of Claim 15, wherein the switching of the switch changes light output of the LED lighting device.

Claim 20 (currently amended): The LED lighting system of Claim 15, wherein ~~the AC voltage power source includes one of at least two different AC voltage power sources~~ the LED driver is configured to cause the DC voltage output to have a lower voltage than the AC voltage power source.

REMARKS

This Response is to the non-final Office Action dated April 27, 2021. Claims 1 to 20 are currently pending and stand rejected. In this Response, Claims 6, 13, and 20 are amended. No new matter has been added by the amendments. Support for the amendments can be found in paragraphs [0043] and [0044] of Applicant's Specification. In view of the arguments provided herein, Applicant respectfully requests favorable reconsideration.

Please charge deposit account number 02-1818 for any fees associated with this Response. If any such charges are applied, please indicate Attorney Docket No. 3725194.00146 on the account statement.

The 35 U.S.C. § 103(a) Rejections

The Office Action rejected Claims 1 to 20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Publication No. 2003/0179585 to Lefebvre ("*Lefebvre*") in view of U.S. Publication No. 2004/0201988 to Allen ("*Allen*"). The Office Action at pages 2 and 3 relied on *Lefebvre* to disclose the following feature of independent Claim 1:

a switch electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit.

The Office Action points to Fig. 5 from *Lefebvre* as disclosing an LED driver. For convenience, Fig. 5 from *Lefebvre* is reproduced below. Fig. 5 fails to show a switch electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit. Instead, Fig. 5 shows bridge rectifiers (80, 86, 88) connected to terminals (54, 55, 56, 57) and a lighting assembly (70). Fig. 4 from *Lefebvre* shows switches (66, 68) connected to an AC power source, but do not show LED drivers, let alone switches (66, 68) electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit.

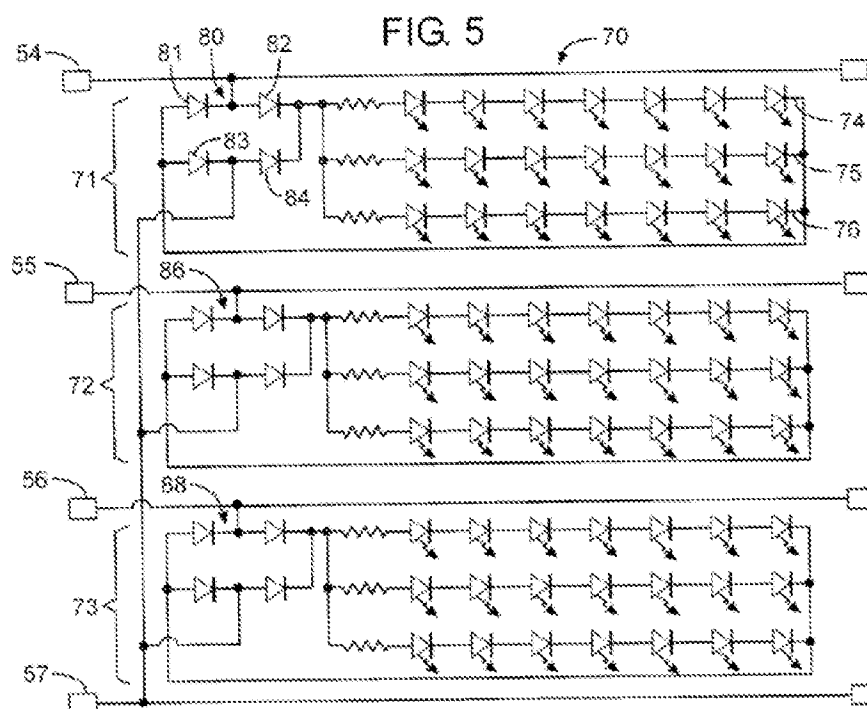


Fig. 5 from *Lefebvre*

Even if *Lefebvre*'s circuits of Figs. 4 and 5 were combined, the switches would be placed *before* the bridge rectifiers (80, 86, 88). The switches of Claim 1 instead are located after a DC voltage output (of an LED driver), which provides for control of a DC voltage rather than attempting to control an AC voltage that is later converted into a DC voltage. Placing a switch *after* an LED driver is more efficient since the LED driver can optionally output a lower voltage, thereby reducing the amount of high voltage isolation needed for the switch. This LED driver-switch configuration enables the use of smaller and safer switches, and is safer for a user to actuate the switch while there is power being delivered through the lighting system. For at least this reason, *Lefebvre* fails to disclose a switch electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit. Independent Claim 1 is accordingly patentable over *Lefebvre*.

Allen does not cure the deficiencies of *Lefebvre*. *Allen* discloses an LED light string without switches or LED drivers. (See *Allen*, pars. [0050] to [0055]). Applicant respectfully submits that independent Claim 1 is patentable over any combination of *Allen* and *Lefebvre*.

Claims 2 to 7 depend from Claim 1. The patentability of Claim 1 for the reasons discussed above renders moot the rejection of these dependent claims.

Independent Claims 8 and 15 include similar features as present Claim 1. For example, Claims 8 and 15 recite, in part, a switch electrically connected between a DC voltage output and at least one of a first operating LED circuit or at least one additional LED circuit. Independent Claims 8 and 15 and dependent Claims 9 to 14 and 16 to 20 are patentable for the same reasons as independent Claim 1. Applicant respectfully submits that present Claims 1 to 20 are in condition for allowance.

Conclusion

An earnest endeavor has been made to place this application in condition for formal allowance, and allowance is courteously solicited. If the Examiner has any questions regarding this Response, Applicant respectfully requests that the Examiner contact the undersigned.

Respectfully submitted,

K&L Gates LLP

BY /Dennis A. Majewski/
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Dated: June 22, 2021

Electronic Acknowledgement Receipt

EFS ID:	43054547
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	22-JUN-2021
Filing Date:	22-FEB-2021
Time Stamp:	15:44:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		00146-Response-NFOA.pdf	233330	yes	8
			eb65bce3b5fd81a3678e93e3ce402f0e5b98dae9		

Multipart Description/PDF files in .zip description			
Document Description	Start	End	
Amendment/Req. Reconsideration-After Non-Final Reject	1	1	
Claims	2	5	
Applicant Arguments/Remarks Made in an Amendment	6	8	

Warnings:

Information:

Total Files Size (in bytes):	233330
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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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 17/181,802		Filing Date 02/22/2021		☐ To be Mailed					
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO													
APPLICATION AS FILED - PART I													
		(Column 1)	(Column 2)										
FOR		NUMBER FILED	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 \$100 =									
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *		x \$480 =									
☐ 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													
		(Column 1)	(Column 2)		(Column 3)								
AMENDMENT	06/22/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)				
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0		x \$100 =		0				
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x \$480 =		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			
		(Column 1)	(Column 2)		(Column 3)								
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)				
	Total (37 CFR 1.16(i))	*	Minus	**	=		x \$0 =						
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x \$0 =						
	☐ 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.								LIE					
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".								/SHEILA D CHAPMAN/					
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".													
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.													

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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



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NOTICE OF ALLOWANCE AND FEE(S) DUE

24573 7590 07/15/2021
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

EXAMINER	
HAMMOND, CRYSTAL L	
ART UNIT	PAPER NUMBER
2844	

DATE MAILED: 07/15/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141

TITLE OF INVENTION: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	10/15/2021

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), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

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.

24573 7590 07/15/2021
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

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

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141

TITLE OF INVENTION: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	10/15/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAMMOND, CRYSTAL L	2844	362-227000

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 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141
24573	7590	07/15/2021	EXAMINER	
K&L Gates LLP-Chicago			HAMMOND, CRYSTAL L	
P.O. Box 1135			ART UNIT	
Chicago, IL 60690			PAPER NUMBER	
			2844	
DATE MAILED: 07/15/2021				

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 30 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. 17/181,802	Applicant(s) Miskin et al.	
	Examiner CRYSTAL L HAMMOND	Art Unit 2844	AIA (FITF) Status No

-- 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 arguments filed 06/22/2021.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☒ The allowed claim(s) is/are 1-20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

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

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

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

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

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

* Certified copies not received: _____.

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

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

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

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

/CRYSTAL L HAMMOND/ Primary Examiner, Art Unit 2844	
--	--

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

2. Claims 1-20 are allowed.
3. The following is an examiner's statement of reasons for allowance: Claims 1, 8 and 15 require that the switch is electrically connected between the DC voltage output and at least one of the first operating Led circuit or the at least one additional LED circuit. The switch is placed after the LED driver which is more efficient since the LED driver can optionally output a lower voltage.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CRYSTAL L HAMMOND whose telephone number is (571)270-1682. The examiner can normally be reached on M-F 12pm-4pm Alt Fridays.

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, Alexander Taningco can be reached on 571-272-8048. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <https://ppair-my.uspto.gov/pair/PrivatePair>. 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.

/CRYSTAL L HAMMOND/
Primary Examiner, Art Unit 2844

Issue Classification 	Application/Control No. 17/181,802	Applicant(s)/Patent Under Reexamination Miskin et al.
	Examiner CRYSTAL L HAMMOND	Art Unit 2844

CPC						
Symbol					Type	Version
H05B	/	45	/	40	F	2020-01-01
H05B	/	45	/	42	I	2020-01-01
H05B	/	45	/	00	I	2020-01-01
Y10T	/	29	/	49002	A	2015-01-15

CPC Combination Sets					
Symbol				Type	Set
	/		/		

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/CRYSTAL L HAMMOND/ Primary Examiner, Art Unit 2844	11 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

Issue Classification 	Application/Control No. 17/181,802	Applicant(s)/Patent Under Reexamination Miskin et al.
	Examiner CRYSTAL L HAMMOND	Art Unit 2844

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H05B45/40	/	45	/	40
H05B45/42	/	45	/	42
H05B45/00	/	45	/	00
NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/CRYSTAL L HAMMOND/ Primary Examiner, Art Unit 2844	11 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

Issue Classification 	Application/Control No. 17/181,802	Applicant(s)/Patent Under Reexamination Miskin et al.
	Examiner CRYSTAL L HAMMOND	Art Unit 2844

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47
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CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	10	19	19										
2	2	11	11	20	20										
3	3	12	12												
4	4	13	13												
5	5	14	14												
6	6	15	15												
7	7	16	16												
8	8	17	17												
9	9	18	18												

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 20	
/CRYSTAL L HAMMOND/ Primary Examiner, Art Unit 2844 (Primary Examiner) _____ (Date) 11 July 2021		O.G. Print Claim(s) 1	O.G. Print Figure 7

Search Notes 	Application/Control No. 17/181,802	Applicant(s)/Patent Under Reexamination Miskin et al.
	Examiner CRYSTAL L HAMMOND	Art Unit 2844

CPC - Searched*		
Symbol	Date	Examiner
text search in combination with H05B45/40 or H05B45/00 or Y10T29/49002	04/19/2021	clh

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
inventor name search	04/19/2021	clh
east text search attached	04/19/2021	clh
updated text search attached	07/11/2021	clh

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	text search in combination with all classes/subclasses	07/11/2021	clh

/CRYSTAL L HAMMOND/ Primary Examiner, Art Unit 2844	
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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

BIB DATA SHEET

CONFIRMATION NO. 5141

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
17/181,802	02/22/2021	362	2844	3725194.00146 14US07
APPLICANTS Lynk Labs, Inc., Elgin, IL; INVENTORS Michael Miskin, Sleepy Hollow, IL; Robert L. Kottritsch, Shefford Bedfordshire, UNITED KINGDOM; ** CONTINUING DATA ***** This application is a CON of 16/740,295 01/10/2020 PAT 10932341 which is a CON of 16/274,164 02/12/2019 PAT 10537001 which is a CON of 15/685,429 08/24/2017 PAT 10271393 * which is a CON of 14/172,644 02/04/2014 PAT 9750098 * which is a CON of 13/322,796 11/28/2011 PAT 8648539 which is a 371 of PCT/US2010/001597 05/28/2010 which claims benefit of 61/217,215 05/28/2009 (*)Data provided by applicant is not consistent with PTO records. ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 03/02/2021				
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No ☐ Met after Allowance Verified and <u>/CRYSTAL L</u> <u>HAMMOND/</u> Acknowledged <u>Examiner's Signature</u> <u>Initials</u>				
STATE OR COUNTRY IL				
SHEETS DRAWINGS 8				
TOTAL CLAIMS 20				
INDEPENDENT CLAIMS 3				
ADDRESS K&L Gates LLP-Chicago P.O. Box 1135 Chicago, IL 60690 UNITED STATES				
TITLE MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME				
FILING FEE RECEIVED 1820	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			
				☐ All Fees
				☐ 1.16 Fees (Filing)
				☐ 1.17 Fees (Processing Ext. of time)
				☐ 1.18 Fees (Issue)
				☐ Other _____
				☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S134	31	(US-20080116816-\$ or US-20100072905-\$ or US-20080203405-\$ or US-20060158130-\$ or US-20070273299-\$ or US-20050168156-\$ or US-20090174337-\$ or US-20090021185-\$ or US-20040201988-\$ or US-20090167190-\$ or US-20110260648-\$ or US-20110169408-\$ or US-20070115248-\$ or US-20070139317-\$ or US-20020101197-\$ or US-20180376555-\$ or US-20180352622-\$ or US-20160095180-\$ or US-20140361697-\$ or US-20120293083-\$ or US-20020130985-\$ or US-20060012997-\$ or US-20130250579-\$ or US-20150233566-\$ or US-20100320499-\$ or US-20080130288-\$).did. or (US-20030179585-\$).did. or (US-8179055-\$ or US-7748877-\$ or US-10197224-\$ or US-9622316-\$).did.	US-PGPUB; USPAT	OR	OFF	2021/07/11 11:39
S135	23	S134 and (different with color colour)	US-PGPUB; USPAT	OR	ON	2021/07/11 11:39

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	38	"S14" and parallel and LED and bridge and anode and cathode	USPAT	OR	OFF	2021/07/11 19:08
L2	783	(parallel series) same LED with string same switch	USPAT	OR	ON	2021/07/11 19:16
S136	46	parallel and LED and bridge and series with string and switch and two\$way adjswitch	USPAT	OR	OFF	2021/07/11 17:00

7/11/2021 9:10:09 PM

C:\Users\chammond\Documents\EAST\Workspaces\17181802.wsp

AMENDED ADS

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. OMB 0851-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	17/181,802
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
<small>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.</small>			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Michael		Miskin			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Sleepy Hollow	State/Province	IL	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	2 Pinecone Lane					
Address 2						
City	Sleepy Hollow	State/Province	IL			
Postal Code	60118	Countryⁱ	US			
Inventor 2					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Robert	L.	Kottritsch			
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service						
City	Shefford Bedfordshire	Country of Residenceⁱ	GB			
Mailing Address of Inventor:						
Address 1	10 The Hollies					
Address 2						
City	Shefford Bedfordshire	State/Province				
Postal Code	56175BX	Countryⁱ	GB			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add	

Correspondence Information:

PGR2023-00016 - Home Depot

Ex. 1003 - Page 201

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence information of this application.			
Customer Number	24573		
Email Address	chicago.patents@kgates.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed	☐
Application Type	Nonprovisional 3725194.00146 14US07		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

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

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573	PGR2023-00016 - Home Depot	

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	16740295	2020-01-10		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16274164	Continuation of	15685429	2017-08-24	10271393	2019-04-23
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15685429	Continuation of	14172644	2014-02-04	9750098	2017-08-29
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14172644	Continuation of	13322796	2011-11-28	8648539	2014-02-11
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13322796	a 371 of international	PCTUS2010001597	2010-05-28		
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
PCTUS2010001597	Claims benefit of provisional	61217215	2009-05-28		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
PCTUS2010001597	Continuation in part of	12287267	2008-10-06	8179055	2012-05-15

PCT/US2010/001597

AMENDED ADS

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
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 priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Countryⁱ	Filing Date (YYYY-MM-DD)	Access Codeⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

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.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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.

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

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

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

☒ Assignee
 ☐ Legal Representative under 35 U.S.C. 117
 ☐ Joint Inventor

☐ Person to whom the inventor is obligated to assign.
 ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name

Mailing Address Information For Applicant:

Address 1	2511 Technology Drive		
Address 2	Suite 108		
City	Elgin	State/Province	IL
Country	US	Postal Code	60123-9323
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

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	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-07-23
First Name	Dennis A.	Last Name	Majewski	Registration Number 85578

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.

Electronic Acknowledgement Receipt

EFS ID:	43332930
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	23-JUL-2021
Filing Date:	22-FEB-2021
Time Stamp:	16:25:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	00146-Amended-ADS-FILE.pdf	5324410	no	9
			c9edf2b50dd087a66621c5eea27b7aa572200461		

Warnings:

PGR2023-00016 - Home Depot

Ex. 1003 - Page 210

Information:	
This is not an USPTO supplied ADS fillable form	
Total Files Size (in bytes):	5324410
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>	



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/181,802	02/22/2021	2844	1820	3725194.00146 14US07	20	3

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

CONFIRMATION NO. 5141
CORRECTED FILING RECEIPT



Date Mailed: 09/03/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Michael Miskin, Sleepy Hollow, IL;
Robert L. Kottritsch, Shefford Bedfordshire, UNITED KINGDOM;

Applicant(s)

Lynk Labs, Inc., Elgin, IL;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/740,295 01/10/2020 PAT 10932341
which is a CON of 16/274,164 02/12/2019 PAT 10537001
which is a CON of 15/685,429 08/24/2017 PAT 10271393 *
which is a CON of 14/172,644 02/04/2014 PAT 9750098 *
which is a CON of 13/322,796 11/28/2011 PAT 8648539
which is a 371 of PCT/US2010/001597 05/28/2010
which claims benefit of 61/217,215 05/28/2009

(*)Data provided by applicant is not consistent with PTO records.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: 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: 03/02/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/181,802**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

Preliminary Class

362

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 Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07

CONFIRMATION NO. 5141

IMPROPER CFR REQUEST



24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

Date Mailed: 09/03/2021

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The priority or continuity claim has not been entered because it was not filed during the required time period. Applicant may wish to consider filing a petition to accept an unintentionally delayed claim for priority. See 37 CFR 1.55 or 1.78.

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.

/lqchau/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Miskin et al.
Appl. No.: 17/181,802
Conf. No.: 5141
Filed: February 22, 2021
Title: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES
AND METHODS OF USING SAME
Art Unit: 2844
Examiner: Crystal L. Hammond
Docket No.: 3725194.00146 (14US07)

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

PETITION UNDER 37 C.F.R. 1.78(e)

Sir:

This petition under 37 C.F.R. 1.78(e) is for a delayed claim under 35 U.S.C. § 120 for the benefit of a prior-filed non-provisional application, and is submitted in reply to the Patent Office Communication dated September 3, 2021, regarding the above-referenced application.

REMARKS

In response to the Patent Office Communication dated September 3, 2021, Applicants respectfully request that the Domestic Benefit Claim information for the present application be entered.

Applicants inadvertently added incorrect filing dates in the Application Data Sheet filed on February 22, 2021, which was also inadvertently filed as a duplicate. Applicants respectfully request that the Domestic Benefit Claim be entered to reflect the priority information as set forth in the updated Application Data Sheet filed with this submission.

In accordance with 37 C.F.R. 1.78(e) and 37 C.F.R. 1.17(m), a petition fee of \$2,100.00 is being submitted with this petition.

Applicants respectfully submit that the entire delay from the date that the delayed benefit claim was due (June 2, 2021) was unintentional. *See* 37 C.F.R. 1.78(d)(3) (noting that the benefit claim “must also be submitted within the later of four months from the actual filing date of the later-filed application or sixteen months from the filing date of the prior-filed application”).

Please charge deposit account number 02-1818 for the fee specified above and any other fees deemed owed. For any such charges are applied, please indicate Attorney Docket No. 3725194.00146 on the account statement.

Respectfully submitted,

BY /Dennis A. Majewski/
Dennis A. Majewski
Reg. No. 65,578
Customer No.: 24573
Phone No. 312-807-4329

Dated: September 9, 2021

Electronic Patent Application Fee Transmittal

Application Number:	17181802			
Filing Date:	22-Feb-2021			
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME			
First Named Inventor/Applicant Name:	Michael Miskin			
Filer:	Dennis A. Majewski/Susan Murrah			
Attorney Docket Number:	3725194.00146 14US07			
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:				
PET. DELAY SUB OR RESTORE PRIORITY-CLAIM	1454	1	2100	2100
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 (\$)				2100

Electronic Acknowledgement Receipt

EFS ID:	43722748
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	09-SEP-2021
Filing Date:	22-FEB-2021
Time Stamp:	14:46:23
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$2100
RAM confirmation Number	E202199E46411043
Deposit Account	021818
Authorized User	US Patent Mail

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)

PGR2023-00016 - Home Depot

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	00146-Amended-ADS-Filed-Petition.pdf	3923961	no	9
			c3fb4d9d757cf9e7ddb94bdb741e2b51ee3186de		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2	Petition for review by the Office of Petitions	00146-Petition-filed-with-ADS.pdf	91770	no	2
			f9853c26997ac65bb0d6036a9b61091c421aab1f		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	38272	no	2
			4617b51ef06e8f4b3747eb868d26afd10308e0b4		
Warnings:					
Information:					
Total Files Size (in bytes):			4054003		
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					

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	3725194.00143 14US07
		Application Number	17/181,802
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
<p>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.</p> <p>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.</p>			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael		Miskin	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Sleepy Hollow	State/Province	IL	Country of Residence
				US
Mailing Address of Inventor:				
Address 1		2 Pinecone Lane		
Address 2				
City	Sleepy Hollow	State/Province	IL	
Postal Code	60118	Country i	US	
Inventor 2 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Robert	L.	Kotritsch	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Shefford Bedfordshire	Country of Residence i		GB
Mailing Address of Inventor:				
Address 1		10 The Hollies		
Address 2				
City	Shefford Bedfordshire	State/Province		
Postal Code	56175BX	Country i	GB	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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

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

Customer Number	24573		
Email Address	chicago.patents@kgates.com	Add Email	Remove Email

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed	☐
Application Type	Nonprovisional 3725194.00146 14US07		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

Please Select One:	☒ Customer Number	US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573 PGR2023-00016 - Home Depot		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Pending		Remove	
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
	Continuation of		16740295	2020-01-10	
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16274164	Continuation of	15685429	2019-02-12 2017-08-24	10271393	2019-04-23
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15685429	Continuation of	14172644	2017-08-24 2014-02-04	9750098	2017-08-29
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14172644	Continuation of	13322796	2014-02-04 2011-11-28	8648539	2014-02-11
Prior Application Status		Expired		Remove	
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
13322796	a 371 of international		PCTUS2010001597	2010-05-28	
Prior Application Status		Expired		Remove	
Application Number	Continuity Type		Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	
PCTUS2010001597	Claims benefit of provisional		61217215	2009-05-28	
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
PCTUS2010001597	a 374 of international	12287267	2008-10-06	8179055	2012-05-15

PCT/US2010/001597 Continuation in part of

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

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.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant	1		<input type="button" value="Remove"/>
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p>			
<input type="button" value="Clear"/>			
☒ Assignee	Legal Representative under 35 U.S.C. 117		Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
<div> <div></div> <div></div> </div>			
Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/>			
If the Applicant is an Organization check here. ☒			
Organization Name	ynk Labs, Inc.		
Mailing Address Information For Applicant:			
Address 1	2511 Technology Drive		
Address 2	Suite 108		
City	Elgin	State/Province	IL
Country	US	Postal Code	60123-9323
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>			

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
<input type="button" value="Remove"/>				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country ⁱ	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address	<input type="text"/>			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application **and** either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-09-09
First Name	Dennis A.	Last Name	Majewski	Registration Number 65578
Additional Signature may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Miskin et al.
Appl. No.: 17/181,802
Conf. No.: 5141
Filed: February 22, 2021
Title: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES
AND METHODS OF USING SAME
Art Unit: 2844
Examiner: Crystal L. Hammond
Docket No.: 3725194.00146 (14US07)

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

COMMUNICATION FOR PETITION UNDER 37 C.F.R. 1.78(e)

Sir:

This updated communication for petition under 37 C.F.R. 1.78(e) is for a delayed claim under 35 U.S.C. § 120 for the benefit of a prior-filed non-provisional application regarding the above-referenced application.

REMARKS

Applicants have made one small amendment to the Amended ADS previously filed on September 9, 2021 which did not properly identify the application priority on the bottom of page 3 of this Amended ADS. Applicants respectfully request that the Domestic Benefit Claim be entered to reflect the priority information as set forth in the updated Application Data Sheet filed with this submission.

Applicants respectfully submit that the entire delay from the date that the delayed benefit claim was due (February 22, 2021) was unintentional. Please grant our petition.

Please charge deposit account number 02-1818 for the fee specified above and any other fees deemed owed. Petition fees were previously paid. For any such charges are applied, please indicate Attorney Docket No. 3725194.00146 on the account statement.

Respectfully submitted,

BY /Dennis A. Majewski/

Dennis A. Majewski
Reg. No. 65,578
Customer No.: 24573
Phone No. 312-807-4329

September 28, 2021

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	3725194.00143 14US07
		Application Number	17/181,802
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
<p>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.</p> <p>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.</p>			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael		Miskin	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Sleepy Hollow	State/Province	IL	Country of Residence
				US
Mailing Address of Inventor:				
Address 1		2 Pinecone Lane		
Address 2				
City	Sleepy Hollow	State/Province	IL	
Postal Code	60118	Country i	US	
Inventor 2 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Robert	L.	Kotritsch	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Shefford Bedfordshire	Country of Residence i		GB
Mailing Address of Inventor:				
Address 1		10 The Hollies		
Address 2				
City	Shefford Bedfordshire	State/Province		
Postal Code	56175BX	Country i	GB	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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

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

Customer Number	24573		
Email Address	chicago.patents@kgates.com	Add Email	Remove Email

Application Information:

Title of the Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Attorney Docket Number	3725194.00143 14US07	Small Entity Status Claimed	☐
Application Type	Nonprovisional 3725194.00146 14US07		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

Please Select One:	☒ Customer Number	US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24573 PGR2023-00016 - Home Depot		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim 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.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	16740295	2020-01-10		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16740295	Continuation of	16274164	2019-02-12	10537001	2020-01-14
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16274164	Continuation of	15685429	2019-02-12 2017-08-24	10271393	2019-04-23
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15685429	Continuation of	14172644	2017-08-24 2014-02-04	9750098	2017-08-29
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14172644	Continuation of	13322796	2014-02-04 2011-11-28	8648539	2014-02-11
Prior Application Status	Expired	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13322796	a 371 of international	PCTUS2010001597	2010-05-28		
Prior Application Status	Expired	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
PCTUS2010001597	Claims benefit of provisional	61217215	2009-05-28		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
PCT/US2010/001597	Continuation in part of	12287267	2008-10-06	8179055	2012-05-15

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12287267	Claims benefit of provisional	60997771	2007-10-06
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	3725194.00143 14US07
	Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME	

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).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

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.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ **A. Applicant DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ **B. Applicant DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant	1		<input type="button" value="Remove"/>
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p>			
<input type="button" value="Clear"/>			
☒ Assignee	Legal Representative under 35 U.S.C. 117		Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
<div> <div></div> <div></div> </div>			
Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/>			
If the Applicant is an Organization check here. ☒			
Organization Name	ynk Labs, Inc.		
Mailing Address Information For Applicant:			
Address 1	2511 Technology Drive		
Address 2	Suite 108		
City	Elgin	State/Province	IL
Country	US	Postal Code	60123-9323
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>			

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
<input type="button" value="Remove"/>				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country ⁱ	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address		<input type="text"/>		
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application **and** either box A or B is **not** checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

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	/Dennis A. Majewski/		Date (YYYY-MM-DD)	2021-09-28
First Name	Dennis A.	Last Name	Majewski	Registration Number 65578
Additional Signature may be generated within this form by selecting the Add button. <input type="button" value="Add"/>				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	3725194.00143 14US07
		Application Number	
Title of Invention	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME		

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.

Electronic Acknowledgement Receipt

EFS ID:	43885519
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	28-SEP-2021
Filing Date:	22-FEB-2021
Time Stamp:	13:15:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	00146-Second-Communication-re-Amended-ADS.pdf	87897	no	2
			e2f249028a1491d39dffa42243f3e6e54d0b3d6d		

Warnings:

PGR2023-00016 - Home Depot

Ex. 1003 - Page 243

Information:					
2	Application Data Sheet	00146-Amended-ADS-B.pdf	3917067	no	9
			7564ea519125a5d14cbf95ae2679e9f451f1b950		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
Total Files Size (in bytes):				4004964	
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					



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UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/181,802	02/22/2021	2844	1820	3725194.00146 14US07	20	3

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

CONFIRMATION NO. 5141
CORRECTED FILING RECEIPT



Date Mailed: 10/01/2021

Receipt is acknowledged of this non-provisional utility 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 FIRST INVENTOR, 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 corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction 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 provided that the request is grantable.

Inventor(s)

Michael Miskin, Sleepy Hollow, IL;
Robert L. Kottritsch, Shefford Bedfordshire, UNITED KINGDOM;

Applicant(s)

Lynk Labs, Inc., Elgin, IL;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/740,295 01/10/2020 PAT 10932341
which is a CON of 16/274,164 02/12/2019 PAT 10537001
which is a CON of 15/685,429 08/24/2017 PAT 10271393
which is a CON of 14/172,644 02/04/2014 PAT 9750098
which is a CON of 13/322,796 11/28/2011 PAT 8648539
which is a 371 of PCT/US2010/001597 05/28/2010
which claims benefit of 61/217,215 05/28/2009
and is a CIP of 12/287,267 10/06/2008 PAT 8179055
which claims benefit of 60/997,771 10/06/2007

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: 03/02/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/181,802**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

Preliminary Class

362

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 Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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

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community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141
24573	7590	10/04/2021	EXAMINER	
K&L Gates LLP-Chicago			HAMMOND, CRYSTAL L	
P.O. Box 1135			ART UNIT	PAPER NUMBER
Chicago, IL 60690			2844	
			NOTIFICATION DATE	DELIVERY MODE
			10/04/2021	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):

USpatentmail@klgates.com



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P.O. Box 1450
Alexandria, VA 22313-1450
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K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

In re Application of Miskin et al.
Application No.: 17/181,802
Filing Date: 22 February 2021
Attorney Docket No.: 3725194.00146 14US07
For: MULTI-VOLTAGE AND
MULTI-BRIGHTNESS LED LIGHTING
DEVICES AND METHODS OF USING SAME

**DECISION ON PETITION
UNDER 37 CFR 1.78(e)**

This is a decision on the petition under 37 CFR 1.78(e), filed 09 September 2021 and supplemented on 28 September 2021, to accept an unintentionally delayed claim under 35 U.S.C. 120 for the benefit of priority to one or more prior-filed nonprovisional or international applications.

Under 37 CFR 1.78(e), a petition to accept an unintentionally delayed claim under 35 U.S.C. 120 for the benefit of a prior-filed application must be accompanied by:

- (i) the reference required by 35 U.S.C. 120 and 37 CFR 1.78(d)(2) to the prior-filed application, unless previously submitted;
- (ii) the petition fee set forth in 37 CFR 1.17(m); and
- (iii) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(d)(3) and the date the claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional.

With regard to item (i), a proper reference to the prior-filed application(s) has been included in an application data sheet as required by 37 CFR 1.78(d)(2).

With regard to item (ii), the petition fee set forth in 37 CFR 1.17(m) has been submitted.

With regard to item (iii), the statement of unintentional delay contained in the petition differs slightly from the language contained in 37 CFR 1.78(e)(3) and is hereby construed as a statement that the entire delay between the date the claim was due under 1.78(d)(3) and the date the claim was filed was unintentional. If this interpretation is incorrect, applicant is required to immediately notify the Office. As construed, the provided statement of unintentional delay is acceptable.

For the reasons above, the petition under 37 CFR 1.78(e) is **GRANTED**.

Applicant is advised that the inclusion of a prior-filed application on any filing receipt should not be construed as meaning that the present application is necessarily entitled to the benefit of the prior-filed application. In order for an application to be entitled to the benefit of the prior-filed application, all other requirements under 35 U.S.C. 120 and 37 CFR 1.78 must be met.

This matter is being referred to the Office of Publications for appropriate action.

/bethanne dayoan/

BETHANNE C DAYOAN
PCT Legal Examiner
International Patent Legal Administration
(571)272-3209

ATTACHMENT: corrected filing receipt



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07

24573
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

CONFIRMATION NO. 5141
PUB REQUEST ACCEPTANCE
LETTER



OC000000128937439

Date Mailed: 10/07/2021

NOTICE OF ACCEPTANCE OF PUBLICATION REQUEST

The request for voluntary publication, amended publication, early publication, redacted publication, republication, corrected publication or revised publication has been received for this application. The request, including payment of any necessary fee(s), is in compliance with 37 CFR 1.215, 1.217, 1.219 or 1.221.

The projected publication date is 01/13/2022.

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.

/npfarmer/

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

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.

24573 7590 07/15/2021
K&L Gates LLP-Chicago
P.O. Box 1135
Chicago, IL 60690

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

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/181,802	02/22/2021	Michael Miskin	3725194.00146 14US07	5141

TITLE OF INVENTION: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	10/15/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAMMOND, CRYSTAL L	2844	362-227000

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 03-09 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.

K&L Gates LLP

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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Lynk Labs, Inc.

Elgin, IL

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

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 02-1818

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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 /Dennis A. Majewski/

Date October 15, 2021

Typed or printed name Dennis A. Majewski

Registration No. 65578

Electronic Patent Application Fee Transmittal

Application Number:	17181802			
Filing Date:	22-Feb-2021			
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME			
First Named Inventor/Applicant Name:	Michael Miskin			
Filer:	Dennis A. Majewski/Susan Murrah			
Attorney Docket Number:	3725194.00146 14US07			
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	1200	1200

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1200

Electronic Acknowledgement Receipt

EFS ID:	44039971
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	15-OCT-2021
Filing Date:	22-FEB-2021
Time Stamp:	13:23:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 1200
RAM confirmation Number	E20210ED24072366
Deposit Account	021818
Authorized User	US Patent Mail

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)

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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)	00146-Issue-Fee.pdf	168196	no	1
			fab7f56912a45917b76ffd9c0a79c6afafe8e2c8		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38255	no	2
			9b941d5bfe84705e5e71d4c3984ec0bed09b48b4		
Warnings:					
Information:					
Total Files Size (in bytes):			206451		
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					

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	17/181,802
Filing Date	February 22, 2021
First Named Inventor	Michael Miskin
Title	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
Art Unit	2844
Examiner Name	Crystal L. Hammond
Attorney Docket Number	3725194.00146 14US07

SIGNATURE of Applicant or Patent Practitioner

Signature	/Dennis A. Majewski/	Date (Optional)	October 18, 2021
Name	Dennis A. Majewski	Registration Number	65578
Title (if Applicant is a juristic entity)	Attorney of Record		
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.

This collection of information is required by 37 CFR 1.131, 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.**

Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

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:

24573

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 assignment 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:

24573

OR

☐

Firm or individual name

Address

City

State

Zip

Country

Telephone

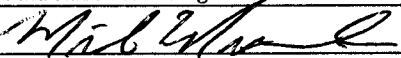
Email

Assignee name and address: Lynk Labs, Inc.
2511 Technology Drive, Suite 108
Elgin, Illinois 60123

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 	Date 5/29/2020
Name Michael Miskin	Telephone 847-783-0123
Title President/CEO - Lynk Labs, Inc.	

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 update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 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.

Electronic Acknowledgement Receipt

EFS ID:	44056976
Application Number:	17181802
International Application Number:	
Confirmation Number:	5141
Title of Invention:	MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME
First Named Inventor/Applicant Name:	Michael Miskin
Customer Number:	24573
Filer:	Dennis A. Majewski/US Patent Mail
Filer Authorized By:	Dennis A. Majewski
Attorney Docket Number:	3725194.00146 14US07
Receipt Date:	18-OCT-2021
Filing Date:	22-FEB-2021
Time Stamp:	17:09:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	00146-373-C-A.pdf	2607695	no	3
			4269720dcd7cfa5b025ff0b0bda3284e039d92f9		

Warnings:

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Ex. 1003 - Page 260

Information:					
2	Power of Attorney	00146-POA.pdf	335385	no	2
			aa74beba5f9568a2854ffa8d201961d49a35149		
Warnings:					
Information:					
Total Files Size (in bytes):				2943080	
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					

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.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Michael MiskinApplication No./Patent No.: 17181802Filed/Issue Date: February 22, 2021Titled: MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAMELynk Labs, Inc., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 055374, Frame 0572, or for which a copy thereof is attached.
- B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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Ex. 1003 - Page 262

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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.☐ Additional documents in the chain of title are listed on a supplemental sheet(s).☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.**[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]**

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Dennis A. Majewski/

Signature

Dennis A. Majewski

Printed or Typed Name

October 18, 2021

Date

65,578

Title or Registration 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.
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POA ACCEPTANCE LETTER

24573
K&L Gates LLP-Chicago
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Date Mailed: 10/21/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/18/2021.

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

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/



Espacenet

Bibliographic data: JP2003047177 (A) — 2003-02-14

WIRELESS COMMUNICATION SYSTEM, MOBILE TERMINAL, WIRELESS BASE STATION, AND WIRELESS COMMUNICATION METHOD

Inventor(s): EZAKI YASUMASA; SUZUKI HIROSHI ± (EZAKI YASUMASA, ; SUZUKI HIROSHI)

Applicant(s): HITACHI INT ELECTRIC INC ± (HITACHI KOKUSAI ELECTRIC INC)

Classification: - **international:** *H04B7/26; H04M15/00; H04W52/00; H04W52/02; H04W88/08*; (IPC1-7): H02J17/00; H04B7/26; H04M15/00

- **cooperative:**

Application number: JP20010231540 20010731

Priority number (s): JP20010231540 20010731

Abstract of JP2003047177 (A)

PROBLEM TO BE SOLVED: To provide a mobile terminal, which receives power supply using electromagnetic wave sent responding to a signal for demanding power, by sending the signal for demanding power according to lowering the battery voltage of the mobile terminal; a wireless base station which sends electromagnetic wave for power supply, and a wireless communication system using them, and a wireless communication method. **SOLUTION:** The wireless communication system, which charges a secondary battery 160 of the mobile terminal 100 using microwave for sending power sent from the wireless base station 200 to the mobile terminal 100, comprises the mobile terminal 100, which detects the battery voltage of the secondary battery 160 and sends a signal for demanding power supply and the one for demanding power supply stop to the wireless base station 200 based on the battery voltage; and the wireless base station 200, which sends a microwave for power transmission according to the signal for demanding power supply and the one for demanding power supply stop.



Espacenet

Bibliographic data: JP2002090663 (A) — 2002-03-27
METHOD AND DEVICE FOR REPLACING OPTICAL FIBER

Inventor(s): TOKUMURA KEIU; JITSUNO TAKAHISA; TSUBAKIMOTO KOJI;
TAMAMURA HISASHI ± (TOKUMURA KEIU, ; JITSUNO
TAKAHISA, ; TSUBAKIMOTO KOJI, ; TAMAMURA HISASHI)

Applicant(s): NIPPON HIYUMEN LENS KK ± (NIPPON HIYUMEN LENS KK)

Classification: - **international:** G02B26/08; G02B6/26; (IPC1-7): G02B26/08;
G02B6/26

- **cooperative:**

Application number: JP20000278383 20000913

Priority number (s): JP20000278383 20000913

Abstract of JP2002090663 (A)

PROBLEM TO BE SOLVED: To provide an optical fiber replacing device which easily realizes reduction in facility cost, suppression of propagation loss, and an increase in connection number and is resistant to even a high-output laser beam. **SOLUTION:** This device is equipped with transmission-side optical fibers 42a to 42c, which have collimator lenses 41a to 41c formed integrally on their tip end surfaces; reception-side optical fibers 45a to 45c, which face the transmission-side optical fibers 42a to 42c across a free space 43 and have collimator lenses 44a to 44c which are formed integrally on their tip end surfaces; and optical deflectors 54a to 54c, and 55a to 55c, which control the propagation directions of light signals emitted from the transmission-side optical fibers 42a to 42c and collimated into parallel light beams by the collimator lenses 41a to 41c in the free space and make the light signals incident on arbitrary reception-side optical fibers selected from among the reception-side optical fibers 45a to 45c via the collimator lenses.



Espacenet

Bibliographic data: JPH08149063 (A) — 1996-06-07

PORTABLE TELEPHONE SYSTEM
Inventor(s): OCHIAI YASUYOSHI ± (OCHIAI YASUYOSHI)

Applicant(s): OCHIAI YASUYOSHI ± (OCHIAI YASUYOSHI)

Classification: - **international:** *H04B7/15; H04B7/26; H04M17/02; H04W52/00; H04W84/06*; (IPC1-7): H02J17/00; H04B7/15; H04B7/26; H04M17/02

 - **cooperative:**
Application number: JP19940282162 19941116

Priority number (s): JP19940282162 19941116

Abstract of JPH08149063 (A)

PURPOSE: To provide a portable telephone system which can have calls via a communication satellite and also can perform the cordless supply of power through the transmission of microwaves. **CONSTITUTION:** A portable telephone system consists primarily of a transceiver 6 which transmits and receives the radio waves via a communication satellite 2, and a battery power supply 7 which charges a battery by converting the microwaves transmitted from the satellite 2 into the direct currents. Thus a call is attained to a desired opposite party even in the mountain areas, on the seas and over the frontier excluding the places where the radio waves are hard to reach from the satellite 2. Then the power necessary for call can be supplied in a busy mode as long as the radio waves can be received from the satellite 2 owing to a fact that the power supply 7 converts the microwaves received from the satellite 2 into the direct currents and charges the battery. Thus it is possible to communicate with a desired opposite party at a desired time and for a necessary time.



Espacenet

Bibliographic data: KR20030073747 (A) — 2003-09-19

Colored light variable type many purposes lighting apparatus

Inventor(s): KIM WAN HO [KR]; SONG SANG BIN [KR]; YEO IN SEON [KR];
 YOO YONG SU [KR] ± (여인선, ; 송상빈, ; 김완호, ; 유용수)

Applicant(s): NAT UNIV CHONNAM [KR] ± (대한민국(전남대학교총장))

Classification: - **international:** H05B43/00; (IPC1-7): H05B43/00
 - **cooperative:** G09F13/005 (KR); H05B45/20 (KR); H05B45/37 (KR); G09F2013/222 (KR)
Application number: KR20020013458 20020313 Global Dossier
Priority number (s): KR20020013458 20020313

Also published as: KR100481045 (B1)
Abstract of KR20030073747 (A)

PURPOSE: A color-varying multi-purpose illumination device is provided to achieve improved productivity of color, while reducing costs for installation of illumination device. **CONSTITUTION:** A color-varying multi-purpose illumination device comprises a rectifying circuit(100) for rectifying an AC power into a DC power; a power supply circuit (200) for adjusting the DC power into an operating power for a lamp turn-on operation and supplying the adjusted power; a selection switch unit for performing a switching operation for selecting a lamp turn-on operation for each control mode; a control unit (300) operating by the operating power supplied from the power supply circuit, and which generates a control signal in accordance with the control mode selected by the selection switch unit; a lamp turn-on drive circuit(500) for receiving a control signal from the control unit and driving a lamp turn on/off operation when the operating power is applied from the power supply circuit; and a three-color lamp turn-on unit for performing a lamp turn on/off operation corresponding to the control mode selected from the selection switch unit in accordance with the driving of the lamp turn-on drive circuit.

**Espacenet****Bibliographic data: KR100367215 (B1) — 2003-01-14**

LIGHT EMITTING DIODE LIGHTING APPARATUS AND CONTROL METHOD THEREOF

Inventor(s): LEE SANG WOO ± (LEE, SANG WOO)
Applicant(s): NURIPLAN CO LTD ± (NURIPLAN CO., LTD)
Classification: - **international:** G09G3/14; (IPC1-7): G09G3/14
- **cooperative:**
Application number: KR20020053743 20020906 Global Dossier
Priority number(s): KR20020053743 20020906

Abstract of KR100367215 (B1)

PURPOSE: An LED(Light Emitting Diode) lighting apparatus and a control method thereof are provided to enable a lighting equipment to have various color tones by controlling power supplied to each emitting diode through a control device.

CONSTITUTION: A lighting unit(80) includes a plurality of emitting diodes having three primary colors of light. An input unit(10) inputs a control instruction. A driving unit(70) controls colors of the lighting unit(80) by controlling power supplied to the lighting unit (80). A control unit(50) driven by an instruction inputted through the input unit(10) compares the temperature detected through the temperature detecting unit(32) with the data stored the storing unit(20) and controls the driving unit(70) so as to change the colors of the lighting unit(80) according to the compared result.

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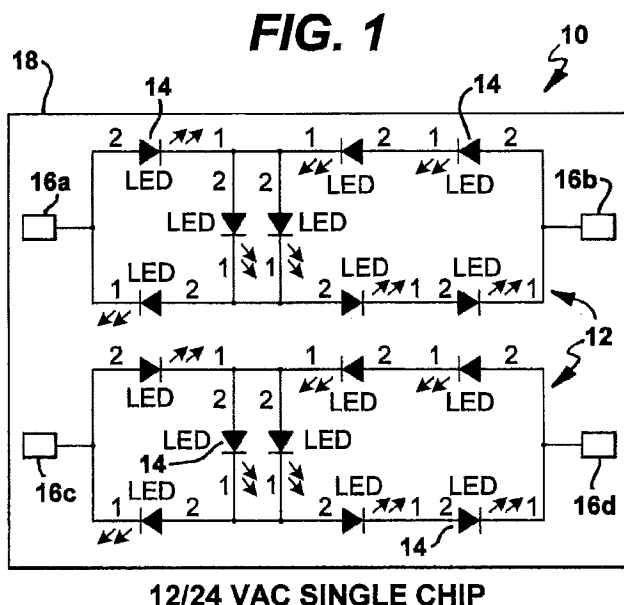


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[Continued on next page]

(54) Title: HIGH FREQUENCY MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES



(57) Abstract: A system and method transforming AC voltage to a high-frequency AC voltage and providing the high-frequency AC voltage to an AC LED circuit or rectifying the high-frequency circuit to a DC voltage and providing the DC voltage to a DC LED circuit.

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HIGH FREQUENCY MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES

RELATED APPLICATIONS

[Para 1] The application is a continuation-in-part of U.S. Patent Application No. 12/287,267, filed October 6, 2008, which claims priority to U.S. Provisional Application No. 60/997,771, filed October 6, 2007; this application is also a continuation-in-part of U.S. Patent Application No. 12/364,890 filed February 3, 2009 which is a continuation of U.S. Application No. 11/066,414 (now U.S. Patent No. 7,489,086) filed February 25, 2005 which claims priority to U.S. Provisional Application No. 60/547,653 filed February 25, 2004 and U.S. Provisional Application No. 60/559,867 filed April 6, 2004; this application is also a continuation in part of International Application No. PCT/US2010/001597 filed May 28, 2010 which is a continuation-in-part of U.S. Application No. 12/287,267, and claims priority to U.S. Provisional Application No. 61/217,215, filed May 28, 2009; this application is also a continuation-in-part of International Application No. PCT/US2010/001269 filed April 30, 2010 which is a continuation-in-part of U.S. Application No. 12/287,267, and claims priority to U.S. Provisional Application No. 61/215,144, filed May 1, 2009; this application also claims priority to U.S. Provisional Application No. 61/284,927 filed December 28, 2009 and U.S. Provisional Application No. 61/335,069 filed December 31, 2009; the contents of each of these applications are expressly incorporated herein by reference.

TECHNICAL FIELD

[Para 2] The present invention generally relates to light emitting diodes ("LEDs") for AC operation. The present invention specifically relates to multiple voltage level, multiple brightness level, and voltage selectable LED devices, packages and lamps, high frequency driven LED circuits and high frequency drivers and drive methods for LEDs.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[Para 3] None.

BACKGROUND OF THE INVENTION

[Para 4] Field of the Invention

[Para 5] The present invention generally relates to light emitting diodes ("LEDs") for high frequency and selectable voltage, multi-voltage level and/or multi-brightness level operation. The present invention specifically relates to high frequency operation, voltage selectable, multiple voltage level and multiple brightness level light emitting diode circuits, single chips, packages and lamps "devices" for direct AC voltage power source operation or bridge rectified AC voltage power source operation..

[Para 6] Description of the Related Art

[Para 7] LEDs are semiconductor devices that produce light when a current is supplied to them. LEDs are intrinsically DC devices that only pass current in one polarity and historically have been driven by DC voltage sources using resistors, current regulators and voltage regulators to limit the voltage and current delivered to the LED. Some LEDs have resistors built into the LED package providing a higher voltage LED typically driven with 5V DC or 12V DC.

[Para 8] Some standard AC voltages in the world include 12VAC, 24VAC, 100VAC, 110VAC, 120VAC, 220VAC, 230VAC, 240VAC and 277VAC. Therefore, it would be advantageous to have a single chip LED or multi-chip single LED packages and/or devices that could be easily configured to operate at multiple voltage levels and/or multiple brightness levels by simply selecting a voltage and/or current level when packaging the multi-voltage and/or multi-current single chip LEDs or by selecting a specific voltage and/or current level when integrating the LED package onto a printed circuit board or within a finished lighting product. It would also be advantageous to have multi-current LED chips and/or packages for LED lamp applications in order to provide a means of increasing brightness in LED lamps by switching in additional circuits just as additional filaments are switched in for standard incandescent lamps.

[Para 9] US 7,525,248 discloses a *chip*-scale LED lamp including discrete LEDs capable of being built upon electrically insulative, electrically conductive, or electrically semi conductive substrates. Further, the construction of the LED lamp enables the lamp to be configured for high voltage AC or DC power operation. The LED based solid-state light

emitting device or lamp is built upon an electrically insulating layer that has been formed onto a support surface of a substrate. Specifically, the insulating layer may be epitaxially grown onto the substrate, followed by an LED buildup of an n-type semiconductor layer, an optically active layer, and a p-type semiconductor layer, in succession. Isolated mesa structure of individual, discrete LEDs are formed by etching specific portions of the LED buildup down to the insulating layer, thereby forming trenches between adjacent LEDs. Thereafter, the individual LEDs are electrically coupled together through conductive elements or traces being deposited for connecting the n-type layer of one LED and the p-type layer of an adjacent LED, continuing across all of the LEDs to form the solid-state light emitting device. The device may therefore be formed as an integrated AC/DC light emitter with a positive and negative lead for supplied electrical power. For instance, the LED lamp may be configured for powering by high voltage DC power (e.g., 12V, 24V, etc.) or high voltage AC power (e.g., 110/120V, 220/240V, etc.).

[Para 10] US 7,213,942 discloses a single-*chip* LED device through the use of integrated circuit technology, which can be used for standard high AC voltage (110 volts for North America, and 220 volts for Europe, Asia, etc.) operation. The single-*chip AC LED* device integrates many smaller LEDs, which are connected in series. The integration is done during the LED fabrication process and the final product is a single-*chip* device that can be plugged directly into house or building power outlets or directly screwed into incandescent lamp sockets that are powered by standard AC voltages. The series connected smaller LEDs are patterned by photolithography, etching (such as plasma dry etching), and metallization on a single *chip*. The electrical insulation between small LEDs within a single-*chip* is achieved by etching light emitting materials into the insulating substrate so that no light emitting material is present between small LEDs. The voltage crossing each one of the small LEDs is about the same as that in a conventional DC operating LED fabricated from the same type of material (e.g., about 3.5 volts for blue LEDs).

[Para 11] Accordingly, single chip LEDs have been limited and have not been integrated circuits beyond being fixed series, fixed parallel or series parallel circuit configurations until the development of AC LEDs. The AC LEDs have still however been single circuit or parallel circuit fixed single voltage designs.

[Para 12] LED packages have historically not been integrated circuits beyond being fixed series, fixed parallel or fixed series parallel LED circuit configurations.

[Para 13] The art is deficient in that it does not provide a multi-voltage and/or multi-current circuit monolithically integrated on a single substrate which would be advantageous.

[Para 14] It would further be advantageous to have a multi-voltage and/or multi-brightness circuit that can provide options in voltage level, brightness level and/or AC or DC powering input power preference.

[Para 15] It would further be advantageous to provide multiple voltage level and/or multiple brightness level light emitting LED circuits, chips, packages and lamps “multi-voltage and/or multi-brightness LED devices” that can easily be electrically configured for at least two forward voltage drive levels with direct AC voltage coupling, bridge rectified AC voltage coupling or constant voltage DC power source coupling. This invention comprises circuits and devices that can be driven with more than one AC or DC forward voltage “multi-voltage” at 6V or greater based on a selectable desired operating voltage level that is achieved by electrically connecting the LED circuits in a series or parallel circuit configuration and/or more than one level of brightness “multi-brightness” based on a switching means that connects and/or disconnects at least one additional LED circuit to and/or from a first LED circuit. The desired operating voltage level and/or the desired brightness level electrical connection may be achieved and/or completed at the LED packaging level when the multi-voltage and/or multi-brightness circuits and/or single chips are integrated into the LED package, or the LED package may have external electrical contacts that match the integrated multi-voltage and/or multi-brightness circuits and/or single chips within, thus allowing the drive voltage level and/or the brightness level select-ability to be passed on through to the exterior of the LED package and allowing the voltage level or brightness level to be selected at the LED package user, or the PCB assembly facility, or the end product manufacturer.

[Para 16] It would further be advantageous to provide at least two integrated circuits having a forward voltage of at least 12VAC or 12VDC or greater on a single chip or within a single LED package that provide a means of selecting a forward voltage when packaging a multi-voltage and/or multi-brightness circuit using discrete die (one LED chip at a time) and wire bonding them into a circuit at the packaging level or when packaging one or more multi-voltage and/or multi-brightness level single chips within a LED package.

[Para 17] It would further be advantageous to provide multi-voltage and/or multi-brightness level devices that can provide electrical connection options for either AC or DC voltage operation at preset forward voltage levels of 6V or greater.

[Para 18] It would further be advantageous to provide multi-brightness LED devices that can be switched to different levels of brightness by simply switching additional circuits on or off in addition to a first operating circuit within a single chip and or LED package. This

would allow LED lamps to switch to higher brightness levels just like 2-way or 3-way incandescent lamps do today.

[Para 19] The benefits of providing multi-voltage circuits of 6V or greater on a single chip is that an LED packager can use this single chip as a platform to offer more than one LED packaged product with a single chip that addresses multiple voltage levels for various end customer design requirements. This also increase production on a single product for the chip maker and improves inventory control. This also improves buying power and inventory control for the LED packager when using one chip.

[Para 20] It would further be advantageous to have a LED lighting assembly which includes LED circuitry for AC or DC drive and a high frequency AC voltage transformer or inverter that could be used to convert low frequency voltages, like for example mains voltage or some other low voltage at 50/60 Hz, to a high frequency without a change in the voltage provided. For example, it would be advantageous to have a LED lighting power supply and/or driver capable of receiving 120 VAC at 60 Hz and be able to provide a high frequency AC output directly to an AC driven LED circuit(s), or alternatively to a DC driven LED circuit(s) through an AC-to-DC rectifier at a voltage equal to or different from the original input voltage to the power supply and/or driver.

[Para 21] It would be further advantageous to combine multiple-voltage LED chips, packages, circuits, lamps, etc., high frequency AC voltage power supplies and/or transformers to drive LEDs by either directly connecting a high frequency transformer or inverter to an AC driven LED circuit(s), or by operably connecting an AC-to-DC rectifier between the high frequency transformer or inveter and a DC driven LED circuit. With proper design considerations LEDs may be driven more efficiently with direct AC or rectified AC than with constant voltage or constant current DC drive schemes. High frequency AC transformers or inverters can be made smaller and more cost effective than constant current or constant voltage DC drivers or power supplies currently being used to power LEDs. The higher the frequency, the smaller the transformer can be made. With proper design consideration and based on the wattage and the frequency of the AC voltage output of the power supply, a high frequency AC voltage transformer can be made small enough to be mounted directly onto a LED lighting PCB assembly.

[Para 22] The present invention provides for these advantages and solves the deficiencies in the art.

SUMMARY OF THE INVENTION

[Para 23] According to one aspect of the invention at least two single voltage AC LED circuits are formed on a single chip or on a substrate providing a multi-voltage AC LED device for direct AC power operation. Each single voltage AC LED circuit has at least two LEDs connected to each other in opposing parallel relation.

[Para 24] According to another aspect of the invention, each single voltage AC LED circuit is designed to be driven with a predetermined forward voltage of at least 6VAC and preferably each single voltage AC LED circuit has a matching forward voltage of 6VAC, 12VAC, 24VAC, 120VAC, or other AC voltage levels for each single voltage AC LED circuit.

[Para 25] According to another aspect of the invention, each multi-voltage AC LED device would be able to be driven with at least two different AC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage AC LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level AC LED circuits in series. By way of example, the second forward voltage drive level of the serially connected AC LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected AC LED circuits. The at least two parallel connected AC LED circuits would be twice the current of the at least two serially connected AC LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage LED device.

[Para 26] According to another aspect of the invention, at least two single voltage series LED circuits, each of which have at least two serially connected LEDs, are formed on a single chip or on a substrate providing a multi-voltage AC or DC operable LED device.

[Para 27] According to another aspect of the invention, each single voltage series LED circuit is designed to be driven with a predetermined forward voltage of at least 6V AC or DC and preferably each single voltage series LED circuit has a matching forward voltage of 6V, 12V, 24V, 120V, or other AC or DC voltage levels. By way of example, each multi-voltage AC or DC LED device would be able to be driven with at least two different AC or DC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage series LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level series LED circuits in series. The second forward voltage drive level of the serially connected series LED circuits would be

approximately twice the level of the first forward voltage drive level of the parallel connected series LED circuits. The at least two parallel connected series LED circuits would be twice the current of the at least two serially connected series LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage series LED device.

[Para 28] According to another aspect of the invention, at least two single voltage AC LED circuits are formed on a single chip or on a substrate providing a multi-voltage and/or multi-brightness AC LED device for direct AC power operation.

[Para 29] According to another aspect of the invention, each single voltage AC LED circuit has at least two LEDs connected to each other in opposing parallel relation. Each single voltage AC LED circuit is designed to be driven with a predetermined forward voltage of at least 6VAC and preferably each single voltage AC LED circuit has a matching forward voltage of 6VAC, 12VAC, 24VAC, 120VAC, or other AC voltage levels for each single voltage AC LED circuit. The at least two AC LED circuits within each multi-voltage and/or multi current AC LED device would be able to be driven with at least two different AC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage AC LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level AC LED circuits in series. The second forward voltage drive level of the serially connected AC LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected AC LED circuits. The at least two parallel connected AC LED circuits would be twice the current of the at least two serially connected AC LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage LED device.

[Para 30] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate, and at least one bridge circuit made of LEDs is formed on the same single chip or substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VDC, 24VDC, 120VDC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in

parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 31] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VAC, 24VAC, 120VAC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 32] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate, and at least one bridge circuit made of standard diodes, LEDs or some combination thereof is provided separate of the LED circuit or formed on the same single chip or substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VDC, 24VDC, 120VDC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 33] According to another aspect of the invention a multi-voltage and/or multi-current AC LED circuit is integrated within a single chip LED. Each multi-voltage and/or multi-current single chip AC LED comprises at least two single voltage AC LED circuits. Each single voltage AC LED circuit has at least two LEDs in anti-parallel configuration to accommodate direct AC voltage operation. Each single voltage AC LED circuit may have at least one voltage input electrical contact at each opposing end of the circuit or the at least two single voltage AC LED circuits may be electrically connected together in series on the single chip and have at least one voltage input electrical contact at each

opposing end of the two series connected single voltage AC LED circuits and one voltage input electrical contact at the center junction of the at least two single voltage AC LED circuits connected in series. The at least two single voltage AC LED circuits are integrated within a single chip to form a multi-voltage and/or multi-current single chip AC LED.

[Para 34] According to another aspect of the invention, at least one multi-voltage and/or multi-brightness LED devices may be integrated within a LED lamp. The at least two individual LED circuits within the multi-voltage and/or multi-brightness LED device(s) may be wired in a series or parallel circuit configuration by the LED packager during the LED packaging process thus providing for at least two forward voltage drive options, for example 12VAC and 24VAC or 120VAC and 240VAC that can be selected by the LED packager.

[Para 35] According to another aspect of the invention a multi-voltage and/or multi-current AC LED package is provided, comprising at least one multi-voltage and/or multi-current single chip AC LED integrated within a LED package. The multi-voltage and/or multi-current AC LED package provides matching electrical connectivity pads on the exterior of the LED package to the electrical connectivity pads of the at least one multi-voltage and/or multi-current single chip AC LED integrated within the LED package thus allowing the LED package user to wire the multi-voltage and/or multi-current AC LED package into a series or parallel circuit configuration during the PCB assembly process or final product integration process and further providing a AC LED package with at least two forward voltage drive options.

[Para 36] According to another aspect of the invention multiple individual discrete LED chips are used to form at least one multi-voltage and/or multi-current AC LED circuit within a LED package thus providing a multi-voltage and/or multi current AC LED package. Each multi-voltage and/or multi-current AC LED circuit within the package comprises at least two single voltage AC LED circuits. Each single voltage AC LED circuit has at least two LEDs in anti-parallel configuration to accommodate direct AC voltage operation. The LED package provides electrical connectivity pads on the exterior of the LED package that match the electrical connectivity pads of the at least two single voltage AC LED circuits integrated within the multi-voltage and/or multi-current AC LED package thus allowing the LED package to be wired into a series or parallel circuit configuration during the PCB assembly process and further providing a LED package with at least two forward voltage drive options.

[Para 37] According to another aspect of the invention a multi-voltage and/or multi-current single chip AC LED and/or multi-voltage and/or multi current AC LED package is integrated within an LED lamp. The LED lamp having a structure that comprises a heat sink,

a lens cover and a standard lamp electrical base. The multi-voltage and/or multi-current single chip AC LED and/or package is configured to provide a means of switching on at least one additional single voltage AC LED circuit within multi-voltage and/or multi-current AC LED circuit to provide increased brightness from the LED lamp.

[Para 38] According to another broad aspect of the invention at least one multi-current AC LED single chip is integrated within a LED package.

[Para 39] According to another aspect of the invention, at least one single chip multi-current bridge circuit having standard diodes, LEDs, or some combination thereof is integrated within a LED lamp having a standard lamp base. The single chip multi-current bridge circuit may be electrically connected together in parallel configuration but left open to accommodate switching on a switch to the more than one on the single chip and have at least one accessible electrical contact at each opposing end of the two series connected circuits and one accessible electrical contact at the center junction of the at least two individual serially connected LED circuits. The at least two individual circuits are integrated within a single chip.

[Para 40] According to another aspect of the invention when the at least two circuits are left unconnected on the single chip and provide electrical pads for connectivity during the packaging process, the LED packager may wire them into series or parallel connection based on the desired voltage level specification of the end LED package product offering.

[Para 41] According to another aspect of the invention, a high frequency transformer or inverter may provide power to at least one multi-voltage and/or multi-brightness LED device or chip. The high frequency transformer or inverter may be either packaged with the LED device or chip and may provide direct AC voltage to the LED device or chip, or as a separate driver or power supply for the LED device or chip capable of being electrically connected to the LED device or chip. The high frequency transformer or inverter is designed to receive a voltage at a low frequency, like for example a voltage at 50/60 Hz like a mains voltage, and output a voltage at a high frequency. The high frequency transformer or inverter may also be configured to step-up or step-down the voltage provided to the transformer or inverter from a source voltage.

[Para 42] According to another aspect of the invention, a high-frequency transformer or inverter may provide power to a DC driven-LED circuit, chip, or device or an LED circuit, chip or device containing one or more series strings of LEDs through a rectifier having standard diodes, LEDs, or some combination thereof may be electrically connected between the high-frequency transformer or inverter and. The rectifier may be provided independently

from the high-frequency transformer or inverter and the LED circuit, chip, or device and electrically connected at its input to the high-frequency transformer or inverter and at its output to the LED circuit, chip or device. Alternatively, the rectifier may be packaged with the high-frequency transformer or inverter forming a power supply or driver for the LED circuit, chip, or device. The rectifier may likewise be packaged directly with, or as part of, an LED circuit, chip, or device. As should be appreciated by those having skill in the art, packaging the rectifier directly with the LED circuit, chip, or device allows for an LED package containing a DC-driven LED circuit, chip, or device, or one or more series strings of LEDs, to be directly plugged into any power supply or driver providing an AC voltage output and operate. As a further alternative, a high-frequency inverter, rectifier, and LED circuit, chip, or device may be packaged into a single lighting device capable of being directly incorporated into a lighting element, or may be incorporated directly into a lamp or other OEM product utilizing LED light.

[Para 43] According to another aspect of the invention, a two-way or three-way switch may be provided directly between a high-frequency inverter providing power to a LED circuits, chip, or device and the LED circuits, chip or device, or in the alternative between a LED circuits, chip, or device and a rectifier having standard diodes, LEDs, or some combination thereof electrically connected to a high-frequency transformer or inverter.

BRIEF DESCRIPTION OF THE DRAWINGS

- [Para 44]** FIG. 1 shows a schematic view of a preferred embodiment of the invention;
[Para 45] FIG. 2 shows a schematic view of a preferred embodiment of the invention;
[Para 46] FIG. 3 shows a schematic view of a preferred embodiment of the invention;
[Para 47] FIG. 4 shows a schematic view of a preferred embodiment of the invention;
[Para 48] FIG. 5 shows a schematic view of a preferred embodiment of the invention;
[Para 49] FIG. 6a shows a schematic view of a preferred embodiment of the invention;
[Para 50] FIG. 6b shows a schematic view of a preferred embodiment of the invention;
[Para 51] FIG. 7a shows a schematic view of a preferred embodiment of the invention;
[Para 52] FIG. 7b shows a schematic view of a preferred embodiment of the invention;
[Para 53] FIG. 8 shows a schematic view of a preferred embodiment of the invention;
[Para 54] FIG. 9 shows a schematic view of a preferred embodiment of the invention;
[Para 55] FIG. 10 shows a schematic view of a preferred embodiment of the invention;
[Para 56] FIG. 11 shows a schematic view of a preferred embodiment of the invention;
[Para 57] FIG. 12 shows a schematic view of a preferred embodiment of the invention;

- [Para 58] FIG. 13 shows a schematic view of a preferred embodiment of the invention;
[Para 59] FIG. 14 shows a schematic view of a preferred embodiment of the invention;
[Para 60] FIG. 15 shows a schematic view of a preferred embodiment of the invention;
[Para 61] FIG. 16 shows a block diagram of a preferred embodiment of the invention;
[Para 62] FIG. 17 shows a block diagram of a preferred embodiment of the invention;
[Para 63] FIG. 18 shows a block diagram of a preferred embodiment of the invention;
[Para 64] FIG. 19 shows a block diagram of a preferred embodiment of the invention;
and,
[Para 65] FIG. 20 shows a block diagram of a preferred embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[Para 66] FIG. 1 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 10. The multi-voltage and/or multi-brightness LED lighting device 10 comprises at least two AC LED circuits 12 configured in an imbalanced bridge circuit, each of which have at least two LEDs 14. The at least two AC LED circuits have electrical contacts 16a, 16b, 16c, and 16d at opposing ends to provide various connectivity options for an AC voltage source input. For example, if 16a and 16c are electrically connected together and 16b and 16d are electrically connected together and one side of the AC voltage input is applied to 16a and 16c and the other side of the AC voltage input is applied to 16b and 16d, the circuit becomes a parallel circuit with a first operating forward voltage. If only 16a and 16c are electrically connected and the AC voltage inputs are applied to electrical contacts 16b and 16d, a second operating forward voltage is required to drive the single chip 18. The single chip 18 may also be configured to operate at more than one brightness level “multi-brightness” by electrically connecting for example 16a and 16b and applying one side of the line of an AC voltage source to 16a and 16b and individually applying the other side of the line from the AC voltage source a second voltage to 16b and 16c.

[Para 67] FIG. 2 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 20 similar to the multi-voltage and/or multi-brightness LED lighting device 10 described above in FIG. 1. The at least two AC LED circuits 12 are integrated onto a substrate 22. The at least two AC LED circuits 12 configured in a imbalanced bridge circuit, each of which have at least two LEDs 14. The at least two AC LED circuits have electrical contacts 16a, 16b, 16c, and 16d on the exterior of the substrate 22 and can be used to electrically configure and/or control the operating voltage and/or brightness level of the multi-voltage and/or multi-brightness LED lighting device.

[Para 68] FIG. 3 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 30 similar to the multi-voltage and/or multi-brightness LED lighting device 10 and 20 described in FIGs. 1 and 2. The multi-voltage and/or multi-brightness LED lighting device 30 comprises at least two AC LED circuits 32 having at least two LEDs 34 connected in series and anti-parallel configuration. The at least two AC LED circuits 32 have electrical contacts 36a, 36b, 36c, and 36d at opposing ends to provide various connectivity options for an AC voltage source input. For example, if 36a and 36c are electrically connected together and 36b and 36d are electrically connected together and one side of the AC voltage input is applied to 36a and 36c and the other side of the AC voltage input is applied to 36b and 36d, the circuit becomes a parallel circuit with a first operating forward voltage. If only 36a and 36c are electrically connected and the AC voltage inputs are applied to electrical contacts 36b and 36d, a second operating forward voltage is required to drive the multi-voltage and/or multi-brightness lighting device 30. The multi-voltage and/or multi-brightness lighting device 30 may be a monolithically integrated single chip 38, a monolithically integrated single chip integrated within a LED package 38 or a number of individual discrete die integrated onto a substrate 38 to form a multi-voltage and/or multi-brightness lighting device 30.

[Para 69] FIG. 4 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED device 30 as described in FIG. 3 having the at least two AC LED circuits 32 connected in parallel configuration to an AC voltage source and operating at a first forward voltage. A resistor 40 may be used to limit current to the multi-voltage and/or multi-brightness LED lighting device 30.

[Para 70] FIG. 5 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED device 30 as described in FIG. 3 having the at least two AC LED circuits 32 connected in series configuration to an AC voltage source and operating at a second forward voltage that is approximately two times greater than the first forward voltage of the parallel circuit as described in FIG. 4. A resistor may be used to limit current to the multi-voltage and/or multi-brightness LED lighting device.

[Para 71] FIGs. 6a and 7a disclose schematic diagrams of a multi-voltage and/or multi-brightness LED lighting devices 50. The multi-voltage and/or multi-brightness LED lighting devices 50 comprises at least two AC LED circuits 52, each of which have at least two LEDs 54 in series and anti-parallel relation. The at least two AC LED circuits 52 have at least three electrical contacts 56a, 56b and 56c, and in the case of FIG. 7a a fourth electrical contact 56d. The at least two AC LED circuits 52 are electrically connected together in parallel at one end

56a and left unconnected at the opposing ends of the electrical contacts 56b and 56c, and in the case of FIG. 7a, 56d. One side of an AC voltage source line is electrically connected to 56a and the other side of an AC voltage source line is individually electrically connected to 56b, 56c, and 56d with either a fixed connection or a switched connection thereby providing a first brightness when AC voltage is applied to 56a and 56b and a second brightness when an AC voltage is applied to 56a, 56b and 56c, and a third brightness when an AC voltage is applied to 56a, 56b, 56c, and 56d. It is contemplated that the multi-voltage and/or multi-brightness LED lighting devices 50 are a single chip, an LED package, an LED assembly or an LED lamp.

[Para 72] FIGs. 6b and 7b disclose a schematic diagram similar to the multi-voltage and/or multi-brightness LED device 50 shown in FIGs. 6a and 7a integrated within a lamp 58 and connected to a switch 60 to control the brightness level of the multi-voltage and/or multi-brightness LED lighting device 50.

[Para 73] FIG. 8 discloses a schematic diagram of a multi-brightness LED lighting device 62 having at least two bridge rectifiers 68 in series with LED circuits 69. Each of the at least two bridge rectifiers 68 in series with LED circuits 69 comprise four LEDs 70 configured in a bridge circuit 68. LED circuits 69 have at least two LEDs 71 connected in series and electrical contacts 72a, 72b and 72c. When one side of an AC voltage is applied to 72a and the other side of an AC voltage line is applied to 72b and 72c individually, the brightness level of the multi-brightness LED lighting device 62 can be increased and/or decreased in a fixed manner or a switching process.

[Para 74] FIG. 9 discloses a schematic diagram the multi-brightness LED lighting device 62 as shown above in FIG. 8 with a switch 74 electrically connected between the multi-brightness LED lighting device 62 and the AC voltage source 78.

[Para 75] FIG. 9 discloses a schematic diagram of at least two single voltage LED circuits integrated with a single chip or within a substrate and forming a multi-voltage and/or multi-brightness LED device.

[Para 76] FIG. 10 discloses a schematic diagram of a single chip LED bridge circuit 80 having four LEDs 81 configured into a bridge circuit and monolithically integrated on a substrate 82. The full wave LED bridge circuit has electrical contacts 86 to provide for AC voltage input connectivity and DC voltage output connectivity.

[Para 77] FIG. 11 discloses a schematic diagram of another embodiment of a single chip multi-voltage and/or multi-brightness LED lighting device 90. The multi-voltage and/or multi-brightness LED lighting device 90 has at least two series LED circuits 92 each of

which have at least two LEDs 94 connected in series. The at least two series LED circuits 92 have electrical contacts 96 at opposing ends to provide a means of electrical connectivity. The at least two series LED circuits are monolithically integrated into a single chip 98. The electrical contacts 96 are used to wire the at least two series LEDs circuit 92 into a series circuit, a parallel circuit or an AC LED circuit all within a single chip.

[Para 78] FIG. 12 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED lighting device 90 as shown above in FIG. 11. The multi-voltage and/or multi-brightness LED lighting device 90 has at least two series LED circuits 92 each of which have at least two LEDs 94 connected in series. The at least two series LED circuits can be monolithically integrated within a single chip or discrete individual die can be integrated within a substrate to form an LED package 100. The LED package 100 has electrical contacts 102 that are used to wire the at least two series LEDs circuit into a series circuit, a parallel circuit or in anti-parallel to form an AC LED circuit all within a single LED package.

[Para 79] As seen in FIGs. 13-15, a single rectifier 110 may be provided for two or more LED circuits 92, each containing at least two LEDs 94 connected in series. The single rectifier 110 comprises standard diodes 112 connected to an AC voltage source 116, or in the alternative may be connected to a driver or power supply which ultimately provides an AC voltage, like for example a high frequency AC driver 118. The single rectifier 110 is electrically connected to the LED circuits 92. Specifically, the rectifier 110 connects to a common junction of an anode of at least one LED 94 in each LED circuit 92, and to the cathode of at least one LED 94 in each LED circuit 92. As shown in FIG. 15, the rectifier may instead be connected to a switch, allowing for either one or both of LED circuits 92 to be operative at any given time.

[Para 80] It is contemplated by the invention that diodes 112 in FIGs. 13-15 are interchangeable with LEDs 70 in rectifiers 68 in FIGs. 8 and 9 and vice versa. As should be appreciated by those having skill in the art, any combination of LEDs 70 and diodes 112 can be used in rectifiers 68 and 110, so long as rectifiers 68 and 110 provide DC power from an AC source.

[Para 81] As shown in FIGs. 13 and 14, and further shown in FIGs. 16-20, any lighting devices, chips, or AC LED or DC LED circuits contemplated by the present invention may be powered through a high-frequency AC driver, inverter or transformer 118. As shown in FIG. 13, any AC source 116 may be connected to the high-frequency driver or inverter or transformer 118, however, as shown in Figs. 16-20 it is contemplated that low frequency

voltage 124, like for example a mains voltage, is provided to the high-frequency driver or transformer or inverter 118.

[Para 82] FIGs. 16 and 17 show two embodiments of an AC LED lighting system 140 wherein a high-frequency AC driver, inverter, or transformer 118 provides a high-frequency voltage to an AC LED circuit, lighting device, or chip 126. AC LED circuit, lighting device, or chip 126 may be any of the devices, circuits, or chips shown and described in FIGs. 1-7, like for example LED lighting devices 10, 20, 30 and/or AC LED circuits 12, 32, or any combination thereof. When multiple AC LED circuits, lighting devices, or chips are connected to the high-frequency driver in combination, such AC LED circuit(s), lighting device(s), or chip(s) may be connected together in either a series relationship, a parallel relationship, or a series-parallel relationship.

[Para 83] As shown in FIG. 16, the high-frequency AC driver, inverter or transformer 118 may be packaged separately from an (or multiple) AC LED circuit, device, or chip 126. In such embodiments a power source 128 provides voltage to the high-frequency AC driver, inverter or transformer 118 which steps up the frequency of the voltage to a higher frequency and provides the higher-frequency voltage to the AC LED circuit(s), device(s), or chip(s) 126. High-frequency AC driver, inverter, or transformer 118 may further include necessary circuitry, for example a transformer, for stepping-up or stepping-down the AC voltage provided by the power source 128.

[Para 84] As shown in FIG. 17, high-frequency AC driver, inverter, or transformer 118 may be packaged with AC LED circuit(s), device(s), or chip(s) 126 in a unitary AC LED light bulb, lighting element 130. It is contemplated by the invention that a switch may be configured between the high-frequency driver, inverter, or transformer 118 and the AC LED circuit(s), device(s), or chip(s) 126 for selectively operating one or more AC LED circuit, lighting device, or chip. For example, as shown in FIGs. 6A, 6B, 7A, and 7B a 2-way or 3-way switch may be attached at the input side of the AC LED circuit(s), lighting device(s), or chip(s). Such a switch may be located between the high-frequency AC driver, inverter, or transformer 118, and the AC LED circuit(s), lighting device(s), or chip(s).

[Para 85] FIGs. 14 and 18-20 show a DC LED lighting system 142 having a DC LED circuit(s), device(s), or chip(s) 92, 132 being powered by a high-frequency AC driver, inverter, or transformer 118 through a rectifier 110. In operation, the combination of AC sources 116, 128, high-frequency AC driver, inverter or transformer 118, and DC LED circuit, device, or chip 92, 132 operate in substantially the same manner as that described with respect to FIGs. 16 and 17. However, in each system shown in FIGs. 14 and 18-20,

rectifier 110 rectifies the high-frequency AC voltage output of the high-frequency AC driver, inverter, or transformer before a voltage is provided to the DC LED circuit(s), device(s), or chip(s) 92, 132. DC LED circuit(s), device(s), or chip(s) 132 are not limited in form to just circuit 92, and instead may take the form of any of the lighting devices, circuits, or chips shown and described, for example, in FIGs. 8-12. When multiple DC LED circuits, lighting devices, or chips are connected to the high-frequency driver in combination, such DC LED circuit(s), lighting device(s), or chip(s) may be connected together in either a series relationship, a parallel relationship, or a series-parallel relationship. Additionally, as shown in FIG. 15, a switch, like for example a 2-way switch or a 3-way switch, may also be attached at the input side of DC LED circuit(s), device(s), or chip(s).

[Para 86] As shown in FIGs. 18-20, like in an AC embodiment, AC driver, inverter, or transformer 118, rectifier 110, and DC LED circuit(s), device(s), or chip(s) 132 may be packaged in any number of ways. As shown in FIG. 18, each element may be packaged separately and electrically connected together in series. Alternatively, as shown in FIG. 19, a DC LED driver 134 may be formed by combining the high-frequency AC driver, inverter, or transformer 118 with rectifier 110. As shown in FIG. 20, an additional alternative contemplated by the invention is forming a DC LED lighting element 136, which may be embodied as a light bulb, lighting system, lamp, etc., wherein the DC LED lighting element 136 includes each of a high-frequency AC driver, inverter, or transformer 118, a rectifier 110, and a DC LED circuit(s), lighting device(s), or chip(s) 132. It should be appreciated by those having skill in the art that a lighting element containing only rectifier 110 and a DC LED circuit(s), lighting device(s), or chip(s) 132 may also be designed. Such lighting elements have the advantage of being able to be plugged into any AC source, whether it is a high-frequency AC driver, inverter, or transformer, or a simple mains voltage, and provide a light output in the same manner as the imbalanced circuit shown in, for example FIGs. 1-7.

CLAIMS

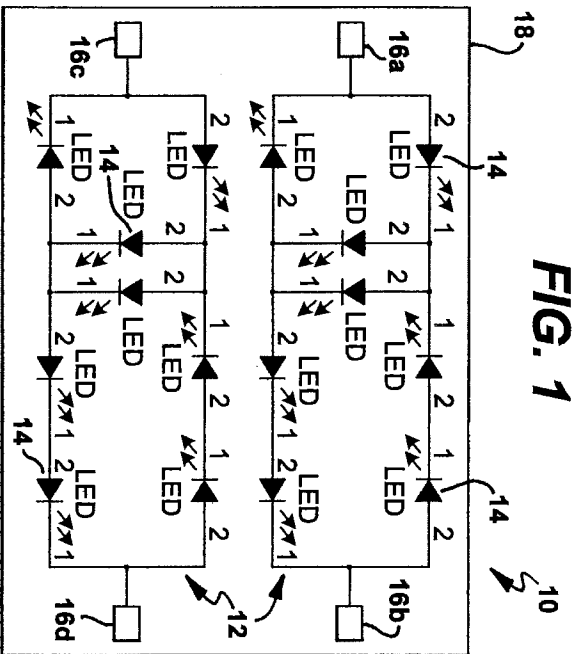
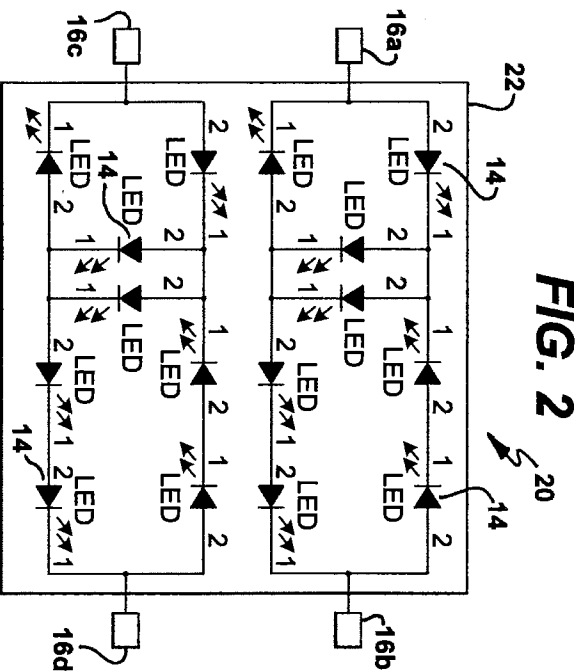
What is claimed is:

1. A lighting system powered by an AC voltage source, the lighting system comprising:
 - a. a high-frequency AC driver which outputs a relatively constant voltage at a relatively constant frequency, wherein the relatively constant frequency output is substantially higher than the frequency of an input voltage; and,
 - b. at least two LED circuits each of which have at least two LEDs connected in series, electrically connected to the high-frequency AC driver.
2. The lighting system of claim 1 wherein each of the at least two LED circuits include:
 - a. at least two LEDs connected in an opposing series relationship such that the anode of each of the at least two LEDs form a first node;
 - b. at least two LEDs connected in an opposing series relationship such that the cathode of each of the at least two LEDs form a second node; and,
 - c. a cross connecting LED connecting the first node to the second node such that the cathode of the cross connecting LED is connected to the first node, and the anode of the cross connecting LED is connected to the second node.
3. The lighting system of claim 2 wherein each of the at least two LED circuits are capable of being connected to the high-frequency AC driver in either a series relationship or a parallel relationship.
4. The lighting system of claim 3 wherein each of the two LED circuits have substantially identical forward operating voltages.
5. The lighting system of claim 4 further comprising a switch configured between the high-frequency AC driver and the at least two LED circuits.
6. The lighting system of claim 5 wherein the switch is a two-way switch.
7. The lighting system of claim 5 wherein the switch is a three-way switch.
8. The lighting system of claim 1 wherein the high-frequency AC driver and at least two LED circuits are packaged separately.
9. The lighting system of claim 1 wherein the high-frequency AC driver and at least two LED circuits are packaged together forming an AC LED lighting device.

10. The lighting system of claim 1 further comprising a bridge rectifier electrically connected between the high-frequency AC driver and the at least two LED circuits.
11. The lighting system of claim 10 wherein the at least two LED circuits include at least two LEDs connected in series.
12. The lighting system of claim 10 wherein the bridge rectifier is formed using diodes.
13. The lighting system of claim 10 wherein the bridge rectifier is formed using LEDs.
14. The lighting system of claim 10 wherein the bridge rectifier is formed using a combination of diodes and LEDs.
15. The lighting system of claim 11 wherein each of the at least two LED circuits are capable of being connected in either a series relationship or a parallel relationship.
16. The lighting system of claim 15 wherein each of the at least two LED circuits have a substantially identical forward operating voltage.
17. The lighting system of claim 16 further comprising a switch configured between the high-frequency AC driver and the at least two LED circuits.
18. The lighting system of claim 17 wherein the switch is a two-way switch.
19. The lighting system of claim 17 wherein the switch is a three-way switch.
20. The lighting system of claim 10 wherein the high-frequency AC driver, the bridge rectifier, and at least two LED circuits are packaged separately.
21. The lighting system of claim 10 wherein the high-frequency AC driver and the bridge rectifier are packaged together forming a DC LED driver.
22. The lighting system of claim 10 wherein the high-frequency AC driver, the bridge rectifier, and the at least two LED circuits are packaged together forming a DC LED lighting device.
23. The lighting system of claim 10 wherein the rectifier and the at least two LED circuits are packaged together.
24. A LED lighting device comprising:
 - a. at least one LED circuit;
 - b. the at least one LED circuit having at least two LEDs connected in series;

- c. a bridge rectifier wherein the at least one LED circuit being electrically connected to the bridge rectifier.
25. The LED lighting device of claim 24 further comprising at least one additional LED circuit wherein the at least one additional LED circuit includes two LEDs connected in series.
26. The LED lighting device of claim 25 wherein a second bridge rectifier is electrically connected to the at least one additional LED circuit.
27. The LED lighting device of claim 25 wherein the at least one additional LED circuit is electrically connected to the bridge rectifier.
28. The LED lighting device of claim 27 wherein a switch is electrically connected between:
- a. the bridge rectifier and,
 - b. the at least one LED circuit and the at least one additional LED circuit.
29. The LED lighting device of claim 26 wherein a switch is electrically connected to the inputs of each of the bridge rectifier and the second bridge rectifier.
30. The LED lighting device of claims 28 and 29 wherein the at least one LED circuit and the at least one additional LED circuit have a substantially identical forward voltage.
31. The LED lighting device of claim 30 wherein the at least LED circuit and the at least one additional LED circuit are capable of being connected in either a series relationship or a parallel relationship.
32. The LED lighting device of claims 24-31 further comprising a high-frequency AC driver attached to one or more of the bridge rectifier and the second bridge rectifier.
33. A LED lighting device comprising:
- a. at least two LED circuits;
 - b. each of the at least two LED circuits having at least two LEDs connected in series;
 - c. a bridge rectifier wherein each of the at least two LED circuits are electrically connected to the bridge rectifier in a parallel relationship.

34. A method of providing light, the method comprising the steps of:
- a. providing an AC voltage at a first frequency;
 - b. transforming the AC voltage at a first frequency to a provided voltage at a second frequency;
 - c. supplying the provided voltage at the second frequency to at least two LED circuits.
35. The method of claim 34 wherein a high-frequency AC driver transforms the AC voltage at the first frequency to the provided voltage at the second frequency.
36. The method of claim 35 wherein the AC voltage and the provided voltage are substantially identical AC voltages.
37. The method of claim 35 wherein the provided voltage is a second AC voltage less than the AC voltage.
38. The method of claim 35 wherein the provided voltage is a second AC voltage greater than the AC voltage.
39. The method of claim 35 further comprising the step of rectifying the provided voltage at the second frequency prior to supplying the provided voltage to the at least two LED circuits.
40. The method of claim 39 wherein a bridge rectifier rectifies the provided voltage at the second frequency.
41. The method of claims 35-40 further comprising the step of selecting how many of the at least two LED circuits receive the provided AC voltage.
42. The method of claim 41 wherein one of a two-way switch or a three-way switch is used to select how many of the at least two LED circuits are supplied with the provided voltage.



1 / 13

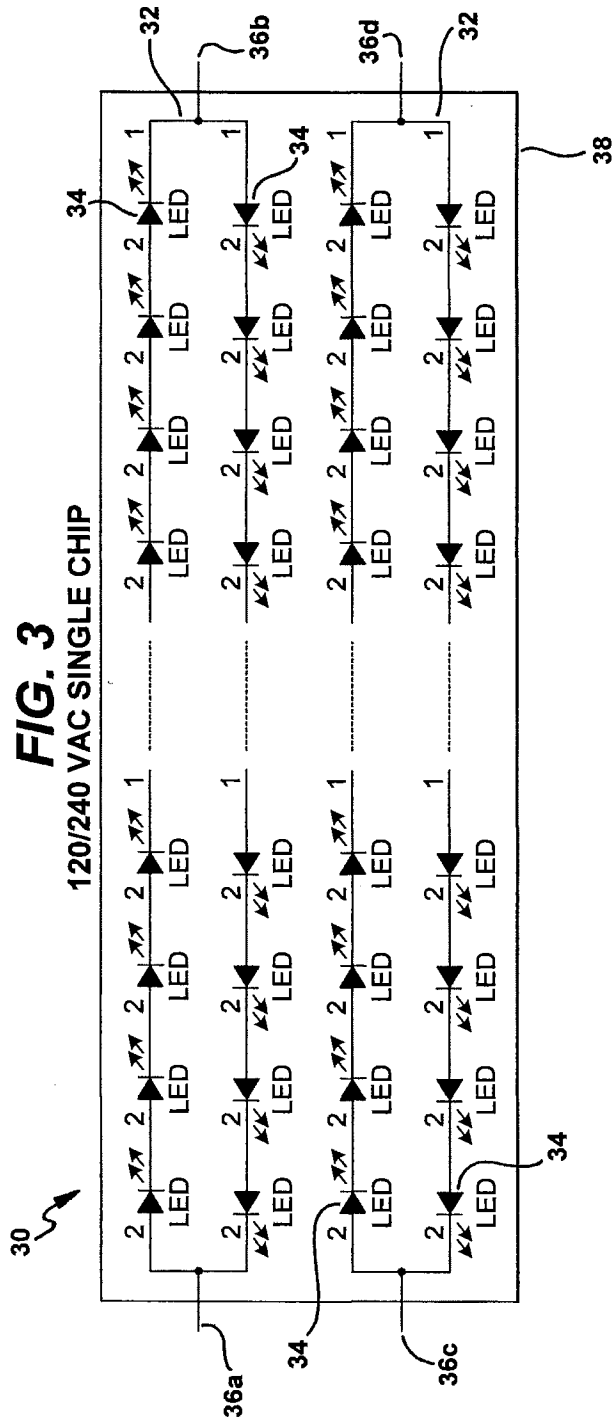
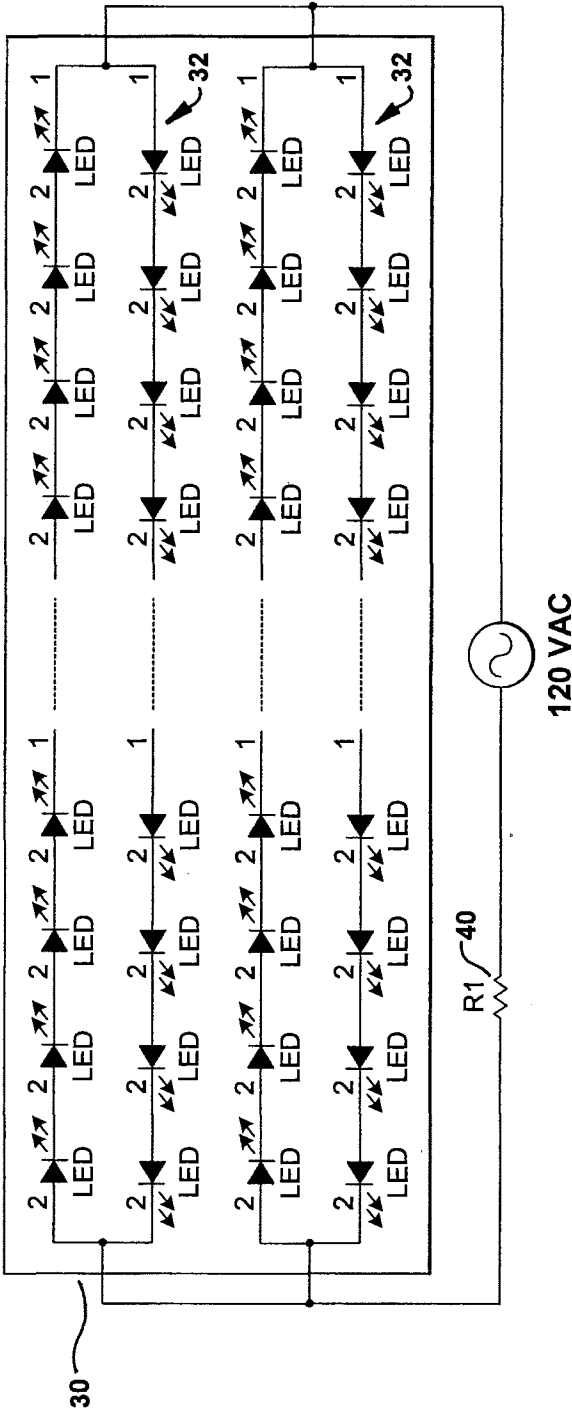
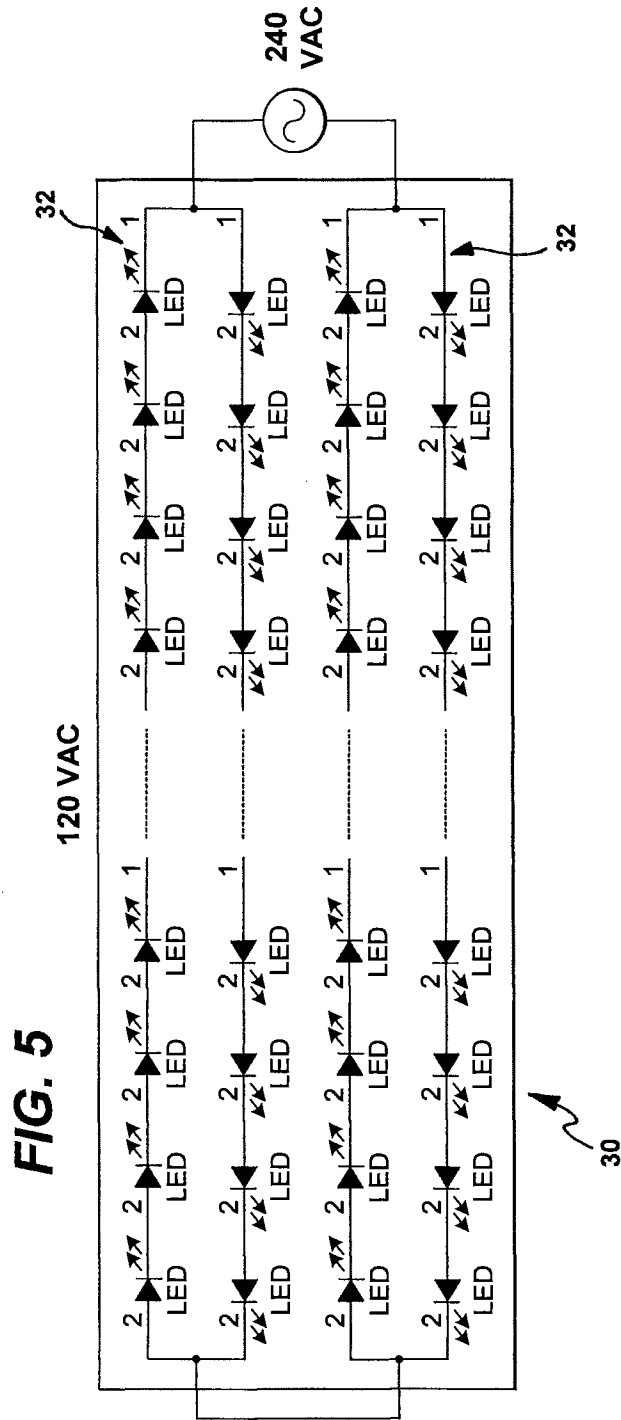


FIG. 4



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FIG. 6A
2-WAY SINGLE CHIP 12V
AC LED FOR 2-WAY LAMP

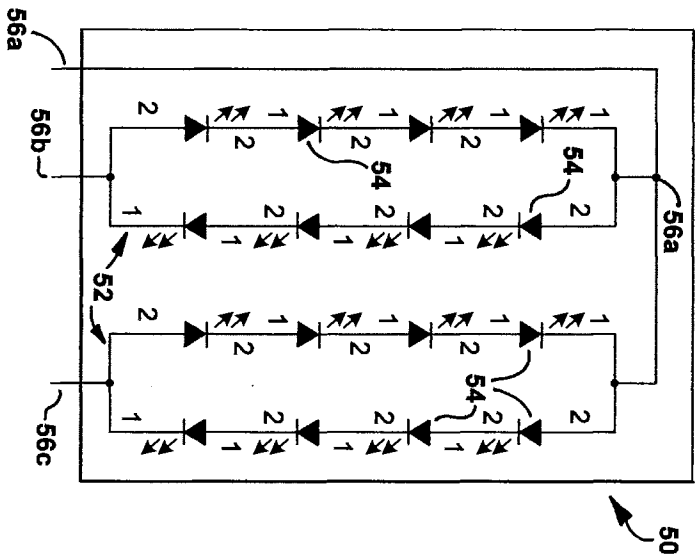


FIG. 6B
2-WAY SINGLE CHIP
AC LED FOR 2-WAY LAMP

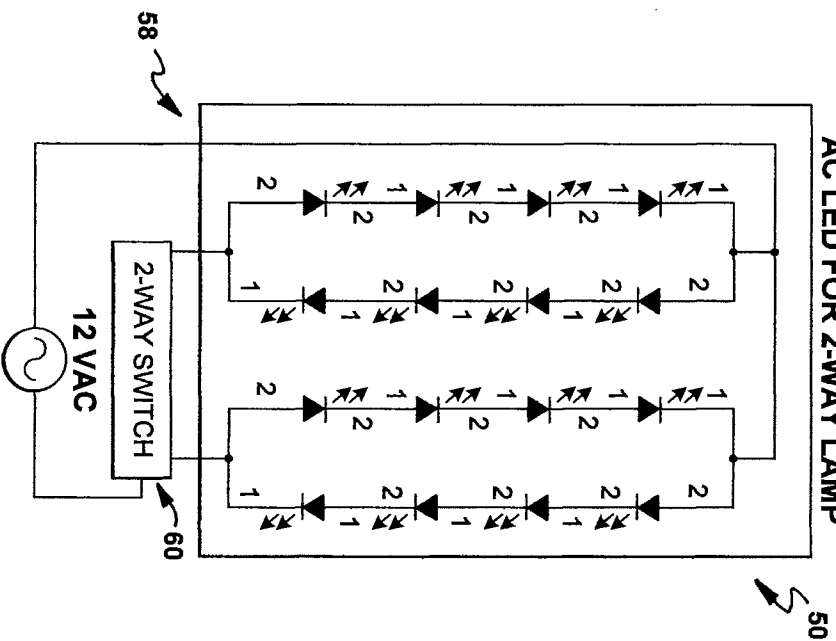
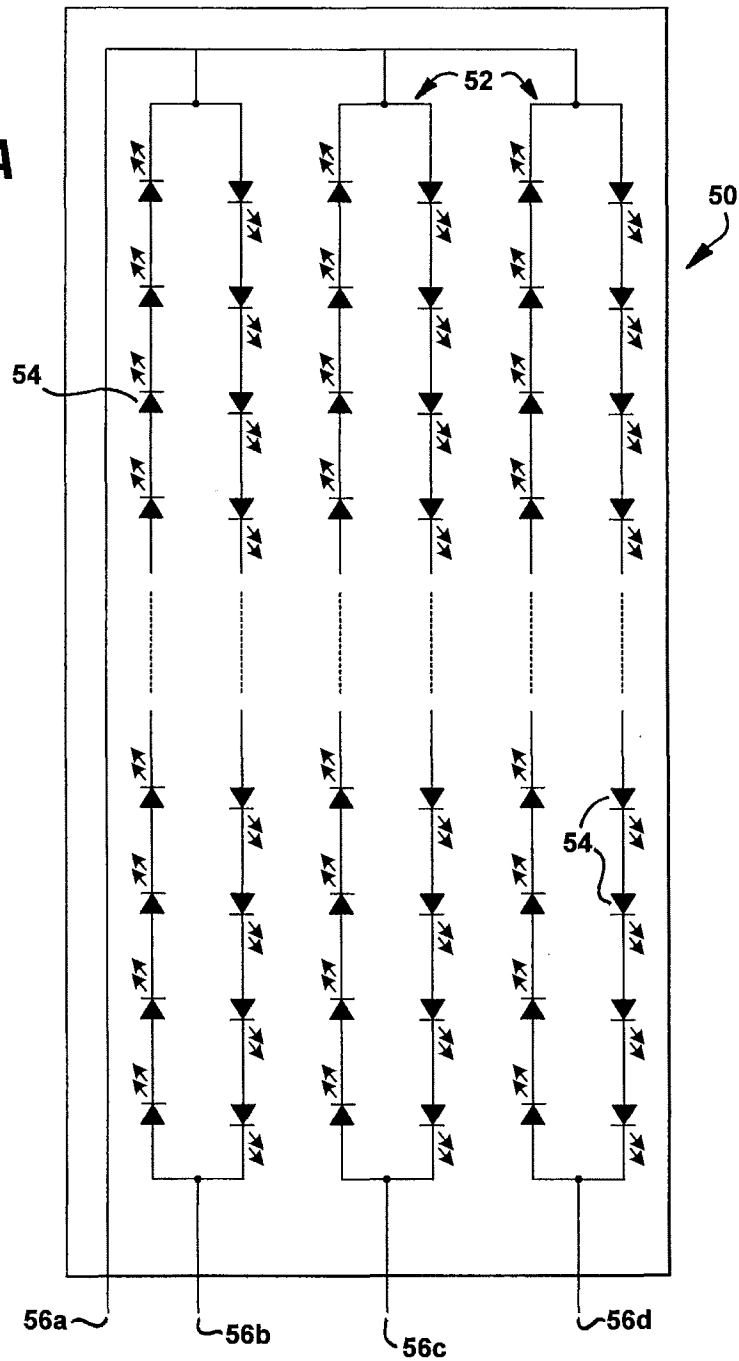


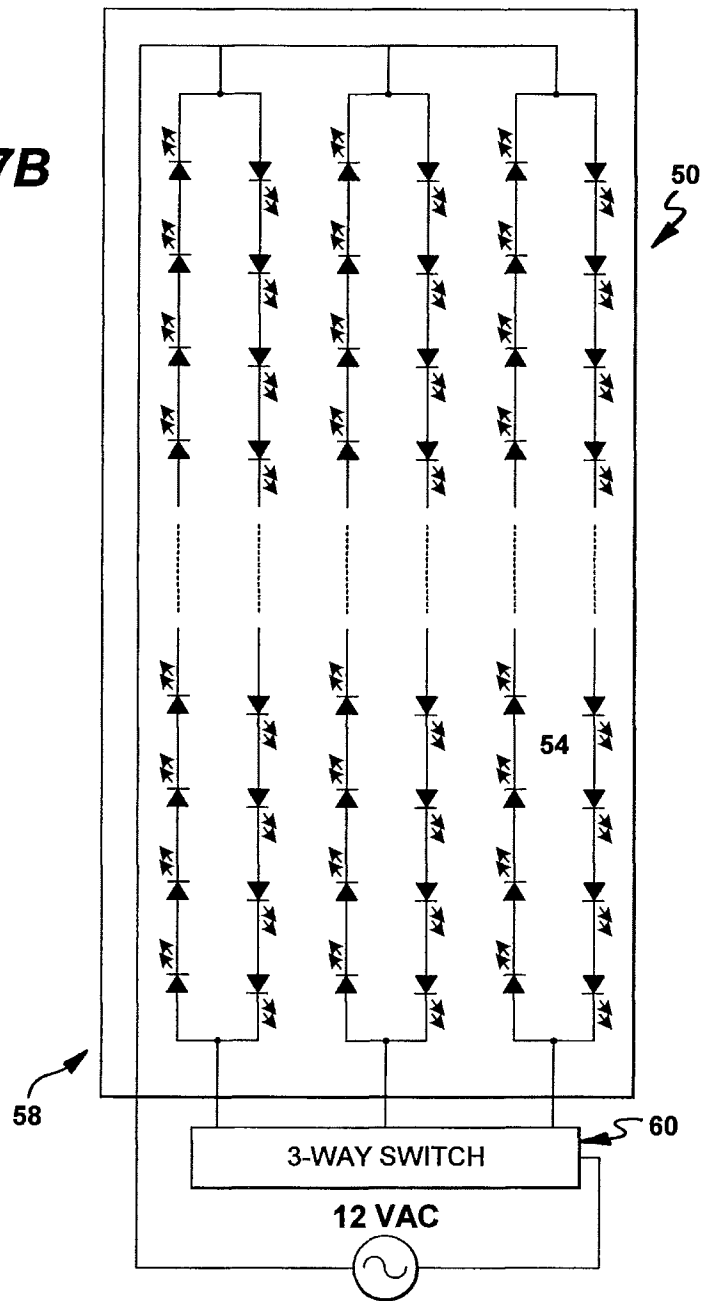
FIG. 7A

3-WAY SINGLE CHIP AC LED FOR 3-WAY BULB



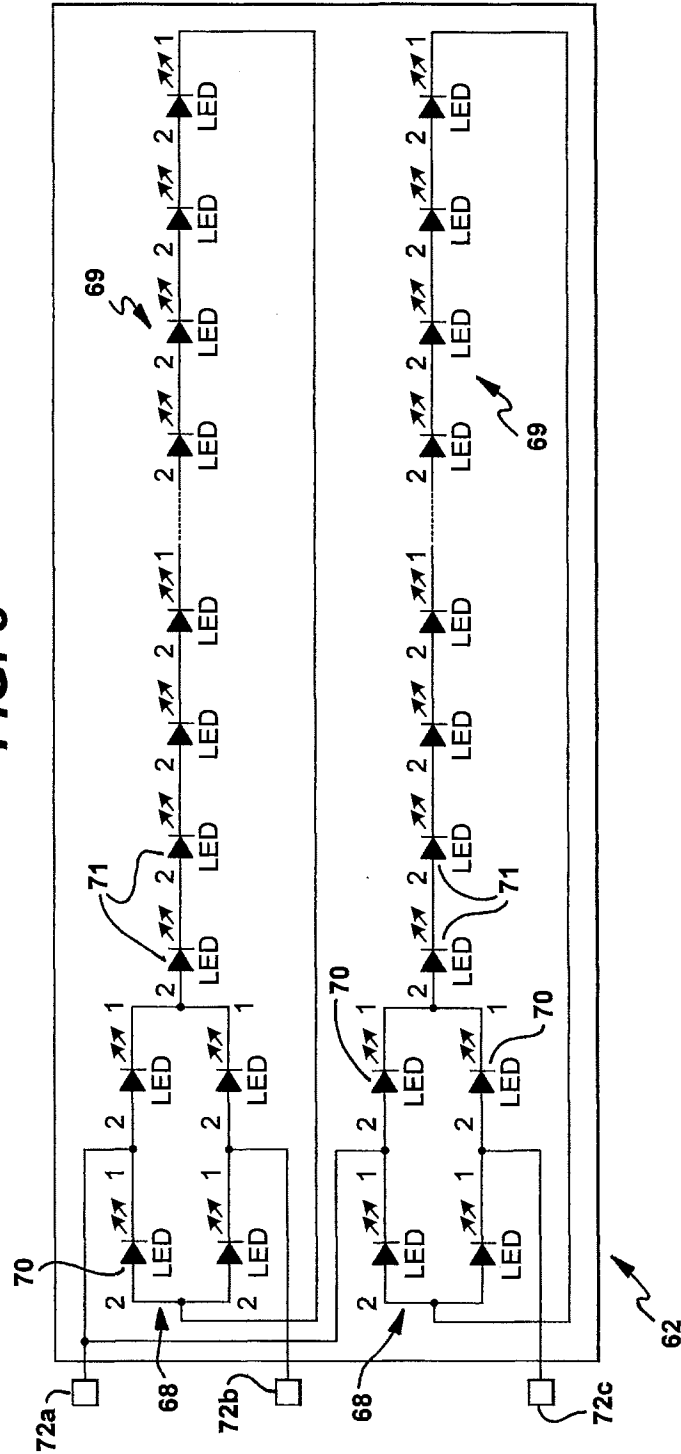
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3-WAY SINGLE CHIP AC LED FOR 3-WAY BULB

FIG. 7B

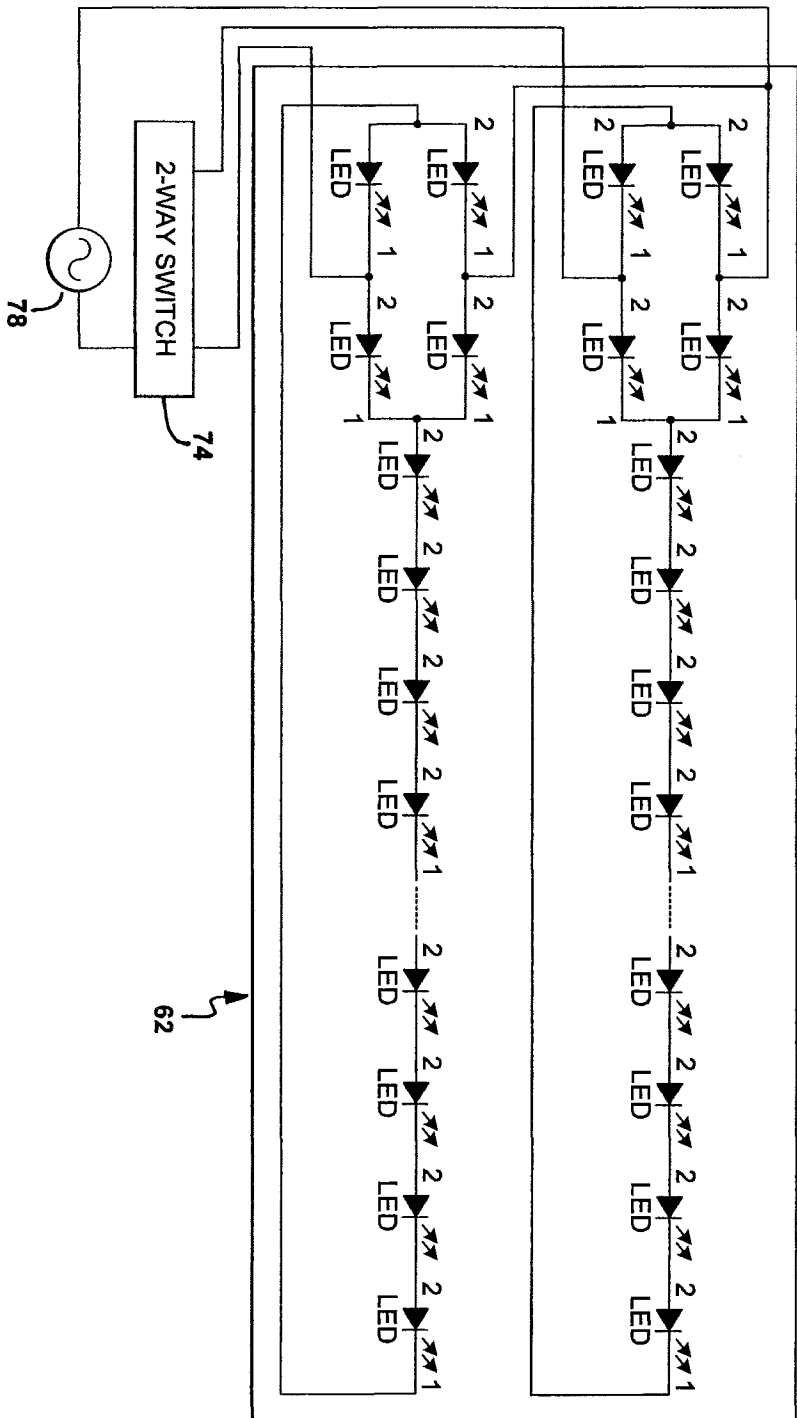
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FIG. 8



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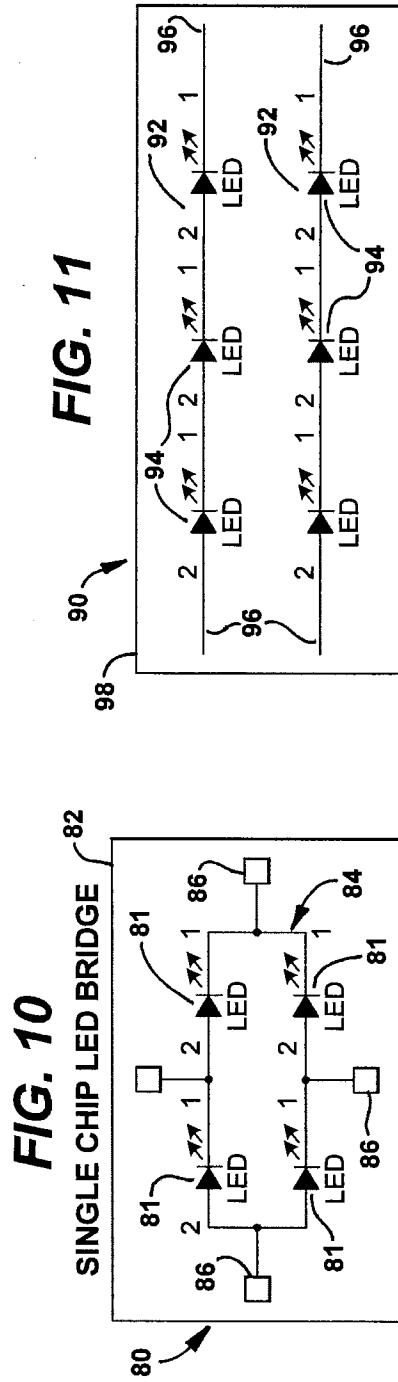
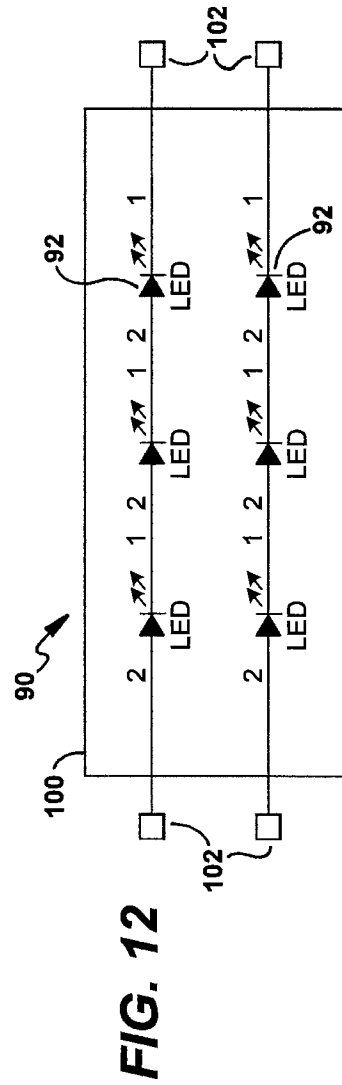
FIG. 9



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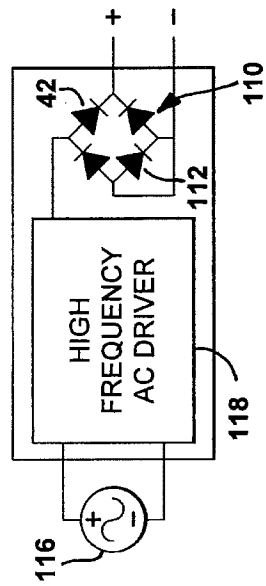


FIG. 13

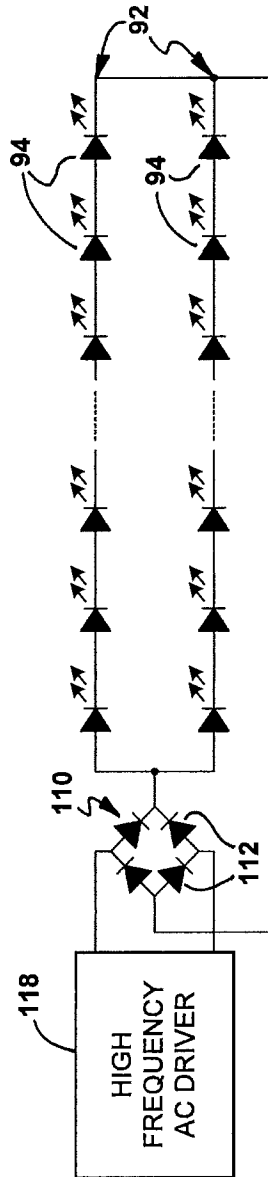


FIG. 14

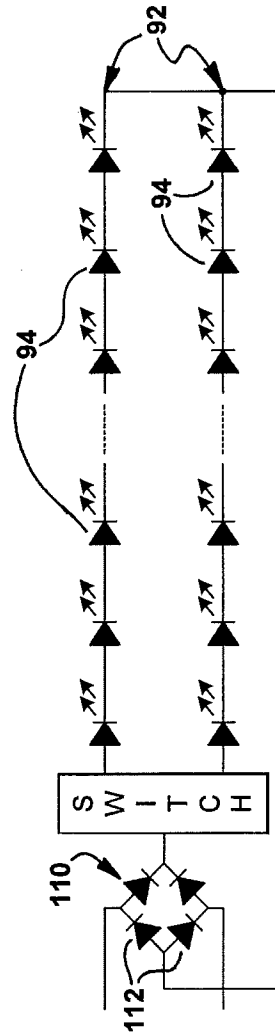


FIG. 15

FIG. 16

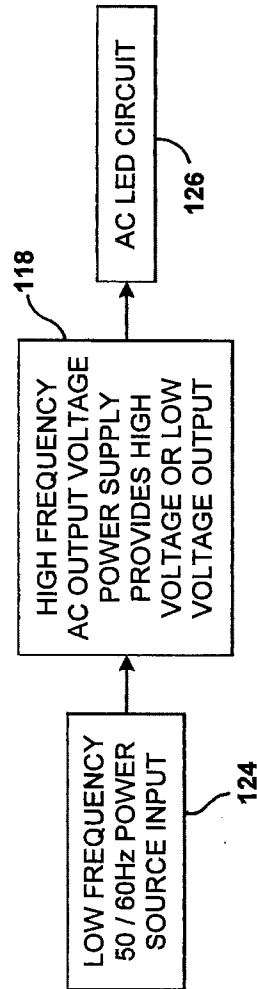
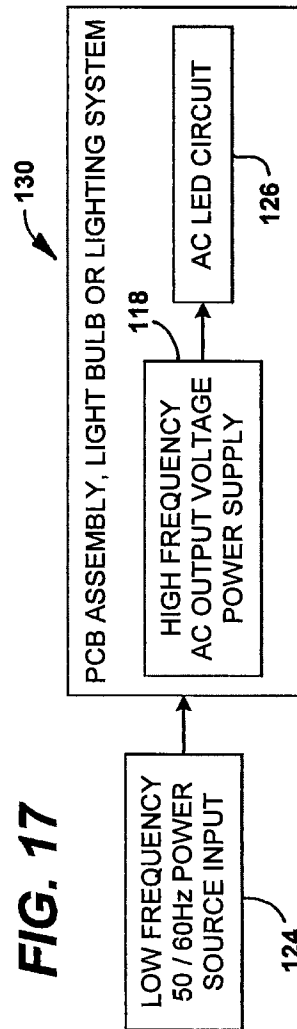
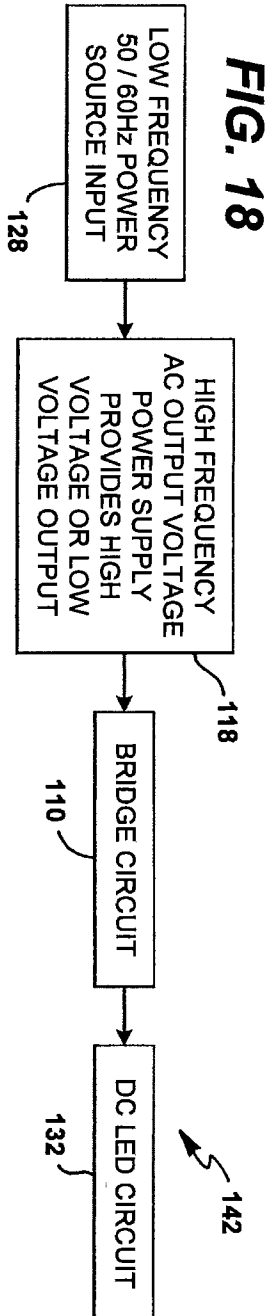
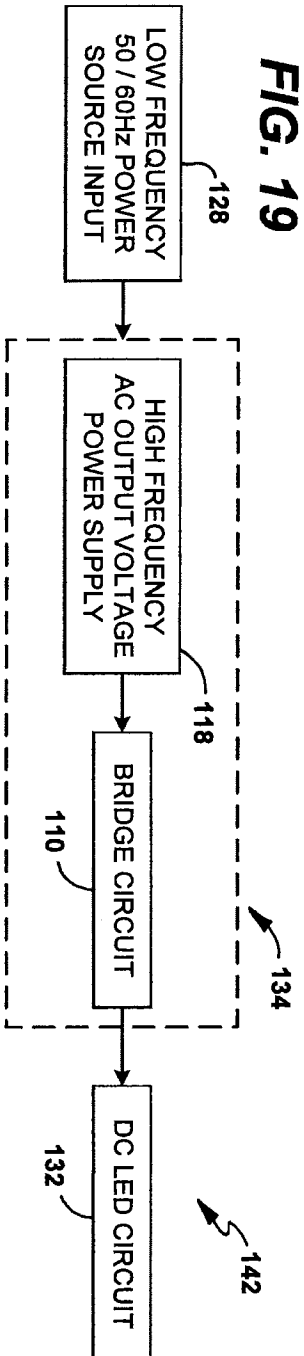


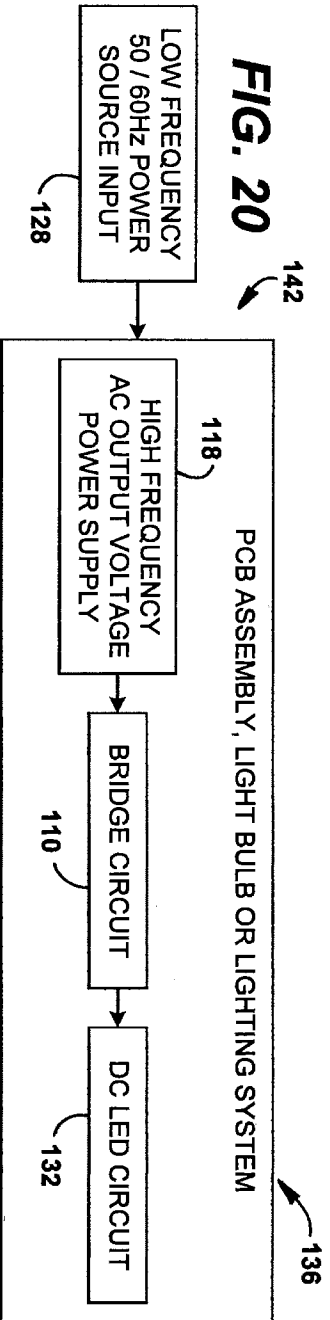
FIG. 17



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PCT/US2010/062235

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 10/62235

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H05B 37/00 (2011.01) USPC - 315/185R 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) USPC: 315/185R Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC: 362/800; 315/185R, 200R, 246, 250, 291 (keyword limited - see search terms below) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST (PGPB, USPT, USOC, EPAB, JPAB); GOOGLE; Google Scholar Terms: lighting, led, transformer, voltage, frequency, ac, dc, rectifier, driver, bridge, constant, cathode, anode, port, node, switch, series, input.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 2009/0295300 A1 (King) 03 December 2009 (03.12.2009), entire document, especially abstract, para [0009], [0015], [0031], [0033], [0035], [0053], [0059], [0060], [0061], [0065], [0069], [0070], [0082], [0086], [0089], [0092], [0101], [0108].	24-31, 33-42 — 1-23
Y	US 2008/0203936 A1 (Mariyama et al.) 28 August 2008 (28.08.2008), entire document, especially abstract, para [0012], [0015], [0017], [0018], [0019], [0053], [0129], [0133], [0136].	1-23
A	US 2008/0158915 A1 (Williams) 03 July 2008 (03.07.2008), entire document, especially abstract, para [0008], [0009], [0010], [0050].	1-31, 33-42
☐ Further documents are listed in the continuation of Box C. ☐		
* 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 but 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 14 February 2011 (14.02.2011)		Date of mailing of the international search report 08 MAR 2011
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. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/62235

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 32
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)



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VERIFIED STATEMENT OF TRANSLATION

I, Randi Simons, have reviewed Patent publication WO/2003/009535 A1 and U.S. Patent No. 8,326,225. In my opinion, the English version of the specification, Abstract, and figures of U.S. Patent No. 8,326,225 are substantially the same as the Japanese version of the specification, Abstract, and drawings of WO/2003/009535 A1. I understand that willful false statements and the like are punishable by fine or imprisonment, or both, pursuant to 18 U.S.C. § 1001.

I certify under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Randi Simons

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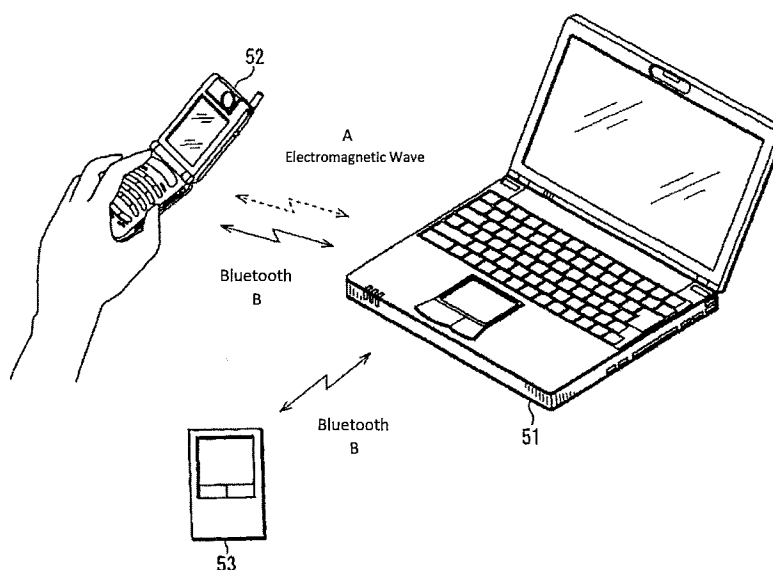
- (51) International Patent Classification⁷: **H04L 12/28**
(21) International Application No.: PCT/JP02/07198
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Kita Shinagawa, Shinagawa-ku, Tokyo 141-0001 (JP)

(continued)

(54) Title: COMMUNICATION SYSTEM AND METHOD



WO 03/009535 A1



A...ELECTROMAGNETIC WAVE
B...BLUETOOTH

(57) Abstract: A communication system and method capable of easily identifying a communication mate. A cellular telephone (52) has a non-contact IC card communicating with a reader/writer of a personal computer (51) by an electromagnetic wave. When an electromagnetic wave radiated from the reader-writer is received by the non-contact IC card, the cellular telephone (52) reports the card ID set in the

(continued)



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Attached Publications:
— International Search Report
— Amendment, Specification

(81) Designated countries (national): CN, KR, US

(84) Designated countries (regional): European patents (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR). Regarding two-character codes and other abbreviations, see "Guidance Note on Codes and Abbreviations" at the beginning of each volume of the regularly published PCT Gazette.

non-contact IC card to the personal computer (51). This card ID includes a Bluetooth address of the cellular telephone (52). When the personal computer (51) fetches the Bluetooth address of the cellular telephone (52) and a PDA (53) upon query, the personal computer (51) identifies the cellular telephone (52) as a Bluetooth device to establish synchronization according to the Bluetooth address reported in advance. The present invention can be applied to an information processing apparatus such as a personal computer and a cellular telephone.

(57) Abstract:

The present invention pertains to a communication system and method capable of easily identifying a communication partner. A portable telephone 52 is provided with a non-contact IC card for communicating by means of electromagnetic waves with the reader/writer of a personal computer 51. When the non-contact IC card receives an electromagnetic wave emitted from the reader/writer, the portable telephone 52 reports a card ID set in the non-contact IC card to the personal computer 51. This card ID includes a Bluetooth address for the portable telephone 52. When the personal computer 51 has obtained the Bluetooth address of the portable telephone and a PDA 53 during an inquiry, based on a Bluetooth address previously reported it identifies the portable telephone 52 as a Bluetooth device with which to establish synchronization. The present invention can be applied to an information processing device such as a personal computer or a portable telephone.

Specification

COMMUNICATION SYSTEM AND METHOD

TECHNICAL FIELD

- 5 The present invention relates to communication systems and methods capable of specifying a terminal serving as partner of communication, and of starting communication more easily and quickly, especially when Bluetooth® is used for communication.

BACKGROUND ART

- 10 Bluetooth has attracted attention recently as a wireless communication means for short distances, and various devices conforming thereto have been developed and marketed.

Bluetooth is a wireless communication standard standardized by a Bluetooth SIG (special interest group), and uses the 2.4 GHz band (IMS (industrial science medical) band) for communication with other devices having Bluetooth modules.

- 15 Networks employing Bluetooth are called Piconets or Scatternets according to their forms. A Scatternet is formed by connecting a plurality of Piconets mutually. In each network, there are Bluetooth devices which play roles called a master and a slave. Hereinafter, a Bluetooth device which plays the role of a master may be called a master, and a Bluetooth device which plays the role of a slave may be called a slave.

- 20 FIG. 1 is a view showing the concept of Piconets and a Scatternet.

As shown in FIG. 1, in each Piconet, there is one master, and a slave or a plurality of slaves perform communication under the control of the master. In this example case, Piconet 1 is formed of a master 1, a slave 1-1, and a slave 1-2, and Piconet 2 is formed of a master 2 and a slave 2-1.

A Scatternet is formed when Piconet 1 and Piconet 2 are mutually connected. In FIG. 1, a

25

communication link between Piconet 1 and Piconet 2 is disabled.

5 To form such Piconets to transmit and receive various pieces of information, it is necessary for all Bluetooth devices in the Piconets to establish synchronization in a frequency domain and a time domain.

Synchronization in frequency and time domains will be described.

10 In Bluetooth, a master, for example, sends a signal to a slave at a frequency width of 79 MHz. The master does not occupy the entire frequency width of 79 MHz at the same time to send information, but sends information by changing (hopping) the transmission frequency of the information at random at a frequency-width interval of 1 MHz.

The receiving slave establishes synchronization with the transmission frequency of the master, hopped at random, to change the receiving frequency, if necessary, to receive the information sent from the master.

15 These patterns of the frequencies changed by the master and the slave are called frequency-hopping patterns. When the master and the slave share a frequency-hopping pattern, synchronization in the frequency domain is established.

20 In Bluetooth, time-division multiplexing is applied to a communication path (channel) between the master and each slave at a time interval of 625 μ s in order to allow communication between the master and a plurality of slaves. This time interval of 625 μ s is called a time slot. When the time slot is shared, synchronization in the time domain is established.

As described later in detail, each slave calculates a frequency-hopping pattern for establishing synchronization in the frequency domain, according to the Bluetooth address of the master, and adds an offset to the Bluetooth clock managed by the slave, according to the Bluetooth clock of the master to obtain the timing of the timeslot to establish synchronization in the time domain.

25 Each Bluetooth device has a unique 48-bit Bluetooth address, and a frequency-hopping pattern is

uniquely calculated according to the address. Each Bluetooth device manages its own Bluetooth clock.

Therefore, before a Piconet is formed, various pieces of information, including the Bluetooth address and the Bluetooth clock used for establishing synchronization in the frequency domain and the time domain, are transmitted and received between the master and slaves.

Conventional processing of a Bluetooth device for establishing synchronization in the frequency domain and the time domain and for forming a Piconet will be described next by referring to flowcharts shown in FIG. 2 and FIG. 3.

Processing for establishing synchronization among the master 1, the slave 1-1, and the slave 1-2 shown in FIG. 1, and for forming Piconet 1, will be explained. Packets to be transmitted and received will be described later in detail. The entire flow will be described here.

In step S1, the master 1 broadcasts an IQ (inquiry) packet to detect a slave(s) existing therearound.

As shown in FIG. 1, for example, when there exists a slave 1-1 and a slave 1-2 in a vicinity of the master 1, the slave 1-1 receives in step S31 an IQ packet sent from the master 1, the processing proceeds to step S32, and the slave 1-1 sends a packet (FHS packet) indicating its own attribute information to the master.

In the same way, when the slave 1-2 receives an IQ packet in step S51, the processing proceeds to step S52, and the slave 1-2 sends an FHS packet to the master.

FHS packets sent from slaves to the master include the Bluetooth address and the Bluetooth clock of each slave, as slave attribute information.

The master 1 receives in step S2 the FHS packet sent from the slave 1-1, and receives in step S3 the FHS packet sent from the slave 1-2.

The series of processes from broadcasting an IQ packet to receiving an FHS packet sent in response to the IQ packet, performed by the master, and the series of processes from receiving a sent IQ packet to sending an FHS packet in response to the IQ packet, performed by slaves, are called an "inquiry".

In step S4, the master 1 sends an ID packet generated according to the FHS packet received in step S2, to the slave 1-1.

5 When the slave 1-1 receives the ID packet in step S33, the processing proceeds to step S34, and the slave 1-1 sends the same ID packet as that received, to the master 1 to report that packet transmission and receiving are possible.

10 When the master 1 receives in step S5 the ID packet sent from the slave 1-1, the processing proceeds to step S6, and the master 1 sends an FHS packet to the slave 1-1 to report the Bluetooth address and the Bluetooth clock of the master 1 as attribute information to the slave 1-1.

In step S35, the slave 1-1 receives the FHS packet from the master 1. With this, the master 1 and the slave 1-1 have mutually exchanged their Bluetooth addresses and Bluetooth clocks, which are required to establish synchronization in the Piconet.

15 In step S36, the slave 1-1 sends an ID packet to the master 1 to report that the FHS packet has been received.

In step S37, the slave 1-1 establishes synchronization with the master 1 according to the Bluetooth address and the Bluetooth clock sent from the master 1. Processing of a slave for establishing synchronization according to information reported by the master will be described later in detail.

20 When the master 1 receives the report from the slave 1-1 in step S7, the processing proceeds to step S8, and, after the master 1 has transmitted and received the FHS packets and the ID packets to and from the slave 1-1, the master 1 transmits and receives FHS packets and ID packets to and from the slave 1-2. In other words, the processes of step S8 to step S11 performed by the master 1 and the processes of step S53 to step S57 performed by the slave 1-2 are the same as the processes of step S4 to step S7 and the processes of step S33 to step S37, described above.

25

More specifically, the master 1 sends an ID packet to the slave 1-2 in step S8, and in response to this transmission, the slave 1-2 sends an ID packet to report that the ID packet sent by the master 1 has been received. Then, the master 1 sends an FHS packet to the slave 1-2 in step S10 to report its own attribute information.

When the slave 1-2 receives the FHS packet from the master 1 in step S55, the processing proceeds to step S56, and the slave 1-2 sends an ID packet to the master 1. In step S57, the slave 1-2 establishes synchronization with the master 1 according to the Bluetooth address and Bluetooth clock reported by the master 1.

The series of processes from the "inquiry", described above, to the establishment of synchronization is called "paging".

In step S12, the master 1 requests the slave 1-1 to report the Bluetooth device name. A Bluetooth device name is assigned to each Bluetooth device, and the user can change the assignment.

A Bluetooth device name is used, for example, when the user who is operating the master selects a partner of communication. If a partner of communication needed to be selected by its Bluetooth address, the user would need to memorize the 48-bit numerals indicating the addresses of all Bluetooth devices existing in the Piconet.

When the slave 1-1 receives the request from the master 1 in step S38, the processing proceeds to step S39, and the slave 1-1 reports its assigned Bluetooth device name to the master 1.

In step S13, the master 1 receives the Bluetooth device name reported by the slave 1-1.

In step S14, the master 1 also requests the slave 1-2 to report the Bluetooth device name.

When the slave 1-2 receives the request from the master 1 in step S58, the processing proceeds to step S59, and the slave 1-2 reports its assigned Bluetooth device name to the master 1.

5 When the master 1 receives the report from the slave 1-2 in step S15, the processing proceeds to step S16, and the master 1 displays a screen for selecting a slave to be communicated with, on a display block. On this selection screen, the Bluetooth device names obtained in step S13 and step S15 are displayed. The user can use the selection screen to select a slave to be communicated with.

10 FIG. 4 is a view showing an example selection screen to be displayed on the Bluetooth device (master) after the establishment of synchronization.

As shown in the figure, a selection window 1 is shown, and a master display block 11 in which information of the master operated by the user is indicated is provided at the left-hand side.

15 The master display block 11 is formed of a device-name display block 11A and an address display block 11B. The device-name display block 11A shows the Bluetooth device name of the master, and the address display block 11B shows the Bluetooth address of the master.

More specifically, the upper row of the device-name display block 11A indicates the category of the Bluetooth device of the master, and the lower row indicates the Bluetooth device name, which can be changed according to the user's desire. In this example case, the category of the master is set to "Computer (personal computer)", and the device name is set to "Computer for Red".

20 Almost at the center of the selection window 1, profile selection buttons 12 are shown vertically. The user selects a profile for a slave. A profile specifies the communication method for a slave. In FIG. 4, eight profile selection buttons 12 are shown.

At the right-hand side of the selection window 1, slave display blocks 13 to 19 are shown. Each slave display block has a device-name display block and an address display block in the same way as for the master display block 11.

5 In the example case shown in FIG. 4, communication is currently being performed between the master and the slave indicated by the slave display block 16. In the slave display block 16, the category of the Bluetooth device is set to "Portable telephone" and the Bluetooth device name is set to "Portable telephone for Red".

10 FIG. 5 is a view showing another example selection screen to be displayed on the Bluetooth device after the establishment of synchronization.

On a selection window 31, profiles are shown at the left-hand side, and the Bluetooth device names of slaves are shown with white arrows sandwiched between the profiles and the names. In this example case, the master can communicate by Bluetooth, for example, with the slave (player for Black) indicated at the first row of the selection window 31 using a profile for transmission of a music file.

15 However, when the Piconet has been established by the processes described above and communication is started, the Bluetooth devices with which communication can be made are listed as shown in FIG. 4 and FIG. 5, but the user needs to specify the partner of communication.

After the user selects the partner of communication, the user further needs to select a profile according to the device of the partner.

20 As a system using Bluetooth, for example, a system has been proposed in which the charges for goods purchased at vending machines are paid by the use of portable telephones having a built-in a Bluetooth module. As a general rule it is expected that a partner of communication will need to be selected, as described above.

25 Therefore, compared with cases in which bills are actually used for payment, purchase procedures for vending machines may become more troublesome.

DISCLOSURE OF INVENTION

Taking the above situations into consideration, the present invention makes it possible, when communicating with Bluetooth, to identify a terminal as a partner of communication, and for communication to be started more easily and quickly.

5 An information processing apparatus of a communication system according to the present invention is characterized by including a first acquisition processing means for acquiring the identification information of a communication terminal located close by using a first wireless communication block for transmitting electric power and for transmitting and receiving data by a loop antenna for the communication terminal, second acquisition processing means for acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from
10 the plurality of communication terminals by using a second wireless communication block for transmitting and receiving data, an identification processing means for identifying a partner of communication by using the identification information acquired by the first acquisition processing means and the attribute information acquired by the second acquisition processing means, and a first synchronization establishment processing means for establishing synchronization for wireless
15 communication performed by using the communication terminal identified by the identification processing means and the second wireless communication block. The communication terminal is characterized by including a first providing processing means for providing the information processing apparatus with the identification information of the communication terminal by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric
20 power obtained through a loop antenna, a second providing processing means for providing the attribute information of the communication terminal by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and a second synchronization establishment processing means for establishing synchronization by transmitting and receiving a
25 predetermined signal through the fourth wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

An information processing method for an information processing apparatus, constituting a communication method according to the present invention is characterized by including a first
30 acquisition processing step of acquiring the identification information of a nearby communication terminal by using a first wireless communication block for transferring electric power and for transmitting and receiving data by a loop antenna for the communication terminal, a second acquisition processing step of acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of
35 communication terminals by using a second wireless communication block for transmitting and receiving data, an identification processing step of identifying a partner of communication by using the identification information acquired in the first acquisition processing step and the attribute information acquired in the second acquisition processing step, and a first synchronization establishment

processing step of establishing synchronization for wireless communication performed by using the communication terminal identified in the identification processing step and the second wireless communication block. An information processing method for the communication terminal is characterized by including a first providing processing step of providing the information processing apparatus with the identification information of the communication terminal by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, a second providing processing step of providing the attribute information of the communication terminal by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and a second synchronization establishment processing step of establishing synchronization by transmitting and receiving a predetermined signal through the fourth communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

A first information processing apparatus according to the present invention is characterized by including a first acquisition processing means for acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing means for acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, an identification processing means for identifying the partner of communication by using the identification information acquired by the first acquisition processing means and the attribute information acquired by the second acquisition processing means, and a synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the identification processing means and the second wireless communication block.

The wireless communication distance of the first wireless communication block may be made shorter than the wireless communication distance of the second wireless communication block.

The first acquisition processing means may acquire the identification information of a nearby communication terminal by using the first wireless communication block for transmitting electric power and transmitting and receiving data by a loop antenna vis-à-vis the communication terminal.

The attribute information may include address information making it possible to identify each of the plurality of communication terminals and clock information managed by the communication terminals.

The information processing apparatus may further include an activation processing means for activating the second wireless communication block in response to the acquisition of the identification information by the first acquisition processing means.

The information processing apparatus may be configured such that the identification information

includes at least the Bluetooth address of the communication terminal, the second acquisition processing means acquires a plurality of FHS packets returned respectively by the plurality of communication terminals in response to IQ packets sent by using the second wireless communication block, and the synchronization establishment processing means sends an ID packet to the communication terminal identified by the identifying processing means, by using the second wireless communication block, and further sends an FHS packet of the information processing apparatus when the communication terminal responds to the transmission of the ID packet.

An information processing method for the first information processing apparatus, according to the present invention is characterized by including a first acquisition processing step of acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing step of acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, a specifying processing step of identifying a partner of communication by using the identification information acquired in the first acquisition processing step and the attribute information acquired by the second acquisition processing step, and a synchronization establishment processing step of establishing synchronization for wireless communication performed by using the communication terminal identified in the identification processing step and the second wireless communication block.

The wireless communication distance of the first wireless communication block may be made shorter than the wireless communication distance of the second wireless communication block.

In the first acquisition processing step, the identification information of a nearby communication terminal may be acquired by using the first wireless communication block for transmitting electric power and for transmitting and receiving data by a loop antenna vis-à-vis the communication terminal.

The attribute information may include address information which can identify each of the plurality of communication terminals and information for clocks managed by the communication terminals.

The information processing method may be configured such that, in the second acquisition processing step, a plurality of FHS packets returned respectively by the plurality of communication terminals in response to IQ packets sent by using the second wireless communication block are obtained, and, in the synchronization establishment processing step, an ID packet is sent to the communication terminal identified in the identification processing step, by using the second wireless communication block, and an FHS packet of the information processing apparatus is further sent when the communication terminal responds to the transmission of the ID packet.

A communication terminal according to the present invention is characterized by including a first providing processing means for providing its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, a second providing processing means for providing its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus, and a synchronization establishment processing means for establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

The wireless communication distance of the first wireless communication block may be made shorter than the wireless communication distance of the second wireless communication block.

The first providing processing means may provide the identification information of the communication terminal by using the first wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, in response to a predetermined request sent from the information processing apparatus.

The identification information may include at least address information which can identify the communication terminal.

The attribute information may include the address information and clock information managed by the communication terminal.

The information processing apparatus may further include an activation processing means for activating the second wireless communication block in response to the provision of the identification information by the first providing processing means.

The information processing apparatus may be configured such that the identification information includes at least Bluetooth address information, the second providing processing means sends an FHS packet in response to an IQ packet received by using the second wireless communication block, and the synchronization establishment processing means returns, in response to an ID packet received by using the second wireless communication block, the ID packet, and returns the ID packet again when an FHS packet is further received.

A communication method for a communication terminal, according to the present invention is characterized by including a first providing processing step of a communication terminal providing its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, a second providing processing step of the communication terminal providing its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing

apparatus, and a synchronization establishment processing step of establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

5 In the first providing processing step, the communication terminal may provide its own identification information by using the first wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, in response to a predetermined request sent from the information processing apparatus.

10 The identification information may include at least address information which identifies its own terminal.

The attribute information may include the address information and clock information managed by its own terminal.

15 The communication method may further include an activation processing step of activating the second wireless communication block in response to the provision of the identification information in the first providing processing step.

20 The communication method may be configured such that the identification information includes at least Bluetooth address information; in the second providing processing step, an FHS packet is sent in response to an IQ packet received by using the second wireless communication block; and, in the synchronization establishment processing step, in response to an ID packet received by using the second wireless communication block, the ID packet is returned, and the ID packet is returned again when an FHS packet is further received.

25 A first extension apparatus according to the present invention is characterized by including a connection terminal for transmitting and receiving data electrically connected to an information processing apparatus, a first acquisition processing means for acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing means for acquiring the attribute information of each of a plurality of communication terminals from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, an identification processing means for identifying a partner of communication by using the identification information
30 acquired by the first acquisition processing means and the attribute information acquired from the plurality of communication terminals, and a synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the identification processing means and the second wireless communication block.

35 A second extension apparatus according to the present invention is characterized by including a connection terminal electrically connected to the communication terminal, for transmitting and receiving data, a first providing processing means for the connection terminal to provide its own

identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a request sent from an information processing apparatus, a second providing processing means for the connection terminal to provide its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus, and a synchronization establishment processing means for establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

A first program according to the present invention is characterized by making an information processing apparatus execute a first acquisition processing step of acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing step of acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, an identification processing step of identifying a partner of communication by using the identification information acquired in the first acquisition processing step and the attribute information acquired in the second acquisition processing step, and a synchronization establishment processing step of establishing synchronization for wireless communication performed by using the communication terminal identified in the identification processing step and the second wireless communication block.

A second program according to the present invention is characterized by a first providing processing step of a communication terminal providing its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, a second providing processing step of the communication terminal providing its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus, and a synchronization establishment processing step of establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

A second information processing apparatus according to the present invention is characterized by including a first acquisition processing means for acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a storage processing means for storing, as history information, information related to a plurality of communication terminals with which communication were performed by using a second wireless communication block for transmitting and receiving desired data, an identification

processing means for identifying a partner of communication by using the identification information acquired by the first acquisition processing means and the history information, and a synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the specifying processing means and the second wireless communication block.

The information processing apparatus may be configured such that the history information includes at least Bluetooth address information, and the synchronization establishment processing means sends an ID packet generated according to the Bluetooth address information to the communication terminal identified by the identification processing means and, when a response to the ID packet is made by the communication terminal, further sends its own FHS packet.

In a communication system and a communication method according to the present invention, the identification information of a nearby communication terminal is acquired by using a first wireless communication block for transmitting electric power and for transmitting and receiving data vis-a-vis the communication terminal by a loop antenna, the attribute information of each of a plurality of communication terminals, which include the communication terminal, is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving data, and a partner of communication is identified by using the identification information and the attribute information. Then, synchronization is established for wireless communication performed by using the identified communication terminal and the second wireless communication block. The identification information of the communication terminal is provided to an information processing apparatus by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, the attribute information of the communication terminal is provided by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and synchronization is established by transmitting and receiving a predetermined signal through the fourth communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

In a first information processing apparatus, an information processing method, and a program according to the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, the attribute information of each of a plurality of communication terminals, which include the communication terminal, is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, and a partner of communication is identified by using the acquired identification information and the acquired attribute information. Synchronization is also established for wireless communication performed by using the identified communication terminal and the second wireless communication block.

In a communication terminal, a communication method, and a program according to the present

invention, a communication terminal provides its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, and provides its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus. Synchronization is also established by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

In a first extension apparatus according to the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, electrically connected to an information processing apparatus, and the attribute information of each of a plurality of communication terminals is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data. A partner of communication is identified by using the acquired identification information and the attribute information acquired from the plurality of communication terminals, and synchronization is established for wireless communication performed by using the identified communication terminal and the second wireless communication block.

In a second extension apparatus according to the present invention, a communication terminal provides its own identification information. in response to a request sent from an information processing apparatus. by using a connection terminal for transmitting and receiving data, electrically connected to the communication terminal, and a first wireless communication block for transmitting and receiving predetermined data, and provides its own attribute information, in response to a request sent from an information processing apparatus, by using a second wireless communication block for transmitting and receiving data. Then, synchronization is established by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus, when synchronization is established for wireless communication performed by the second wireless communication block.

In a second information processing apparatus according to the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, information related to a plurality of communication terminals with which communication has been performed by using a second wireless communication block for transmitting and receiving desired data is stored as history information, and a partner of communication is identified by using the acquired identification information and history information. Synchronization is also established for wireless communication performed by using the identified communication terminal and the second wireless communication block.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view showing the concept of Piconets and a Scatternet.

FIG. 2 is a flowchart describing conventional processes for establishing synchronization in a Piconet.

FIG. 3 is a flowchart following that shown in FIG. 2, describing the conventional processes for establishing synchronization in a Piconet.

5 FIG. 4 is a view showing an example display on a screen for selecting a communication terminal.

FIG. 5 is a view showing another example display on the screen for selecting a communication terminal.

FIG. 6 is a view showing an example structure of a communication system to which the present invention is applied.

10 FIG. 7 is a view showing an example appearance of the personal computer shown in FIG. 6.

FIG. 8 is a view showing another example appearance of the personal computer shown in FIG. 6.

FIG. 9 is a view showing still another example appearance of the personal computer shown in FIG. 6.

FIG. 10 is a view showing a side face of the personal computer shown in FIG. 6.

FIG. 11 is a block diagram showing an example structure of the personal computer shown in FIG. 6.

15 FIG. 12 is a block diagram showing an example structure of the non-contact-IC-card reader/writer shown in FIG. 11.

FIG. 13 is a block diagram showing an example structure of the Bluetooth module shown in FIG. 11.

FIG. 14 is a view showing an example appearance of a portable telephone shown in FIG. 6.

FIG. 15 is a view showing another example appearance of the portable telephone shown in FIG. 6.

20 FIG. 16 is a block diagram showing an example structure of the portable telephone shown in FIG. 6.

FIG. 17 is a block diagram showing an example structure of the non-contact IC card shown in FIG. 16.

FIG. 18 is a view showing example specifications of the non-contact IC card shown in FIG. 17.

FIG. 19 is a block diagram showing an example function structure of the portable telephone shown in FIG. 6.

25 FIG. 20 is a flowchart describing processes of the communication system shown in FIG. 6.

FIG. 21 is a flowchart following that shown in FIG. 20, describing the processes of the communication system shown in FIG. 6.

FIG. 22 is a flowchart describing other processes of the communication system shown in FIG. 6.

FIG. 23 is a flowchart following that shown in FIG. 21, describing the other processes of the communication system shown in FIG. 6.

FIG. 24A is a view showing another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

5 FIG. 24B is a view showing another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

FIG. 25A is a view showing still another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

10 FIG. 25B is a view showing still another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

FIG. 26A is a view showing an example structure of the portable telephone shown in FIG. 6, in a sketch manner.

FIG. 26B. is a view showing an example structure of the portable telephone shown in FIG. 6, in a sketch manner.

15 FIG. 27 is a flowchart describing processes of the portable telephone shown in FIG. 6.

FIG. 28 is a flowchart describing other processes of the portable telephone shown in FIG. 6.

FIG. 29 is a flowchart describing still other processes of the portable telephone shown in FIG. 6.

FIG. 30 is a view showing the concept of a ubiquitous society to which the present invention is applied.

20

BEST MODES FOR CARRYING OUT THE INVENTION

FIG. 6 is a view showing an example structure of a communication system to which the present invention is applied.

25 In the communication system shown in FIG. 6, a personal computer 51, a portable telephone 52, and a PDA (personal digital assistant) 53 each have a Bluetooth module therein, and can transmit and receive various pieces of information by short-distance wireless communication conforming to Bluetooth.

30 The portable telephone 52 also has a non-contact IC card (IC tag) 246 (see FIG. 16) therein. The personal computer 51 is provided with a non-contact-IC-card reader/writer 105 (see FIG. 11) for reading and writing various pieces of information to and from the non-contact IC card 246. Therefore, communication can be performed between the personal computer 51 and the portable telephone 52 not only by Bluetooth communication but also through electromagnetic waves emitted from the non-

contact-IC-card reader/writer 105.

In the communication system to which the present invention is applied, when the personal computer 51 serves as the master of a Piconet, for example, the personal computer 51 identifies the portable telephone 52 as a slave for performing communication by Bluetooth, according to information
5 obtained from the portable telephone 52 through electromagnetic waves, and performs processing (the above-described inquiry processing) for establishing synchronization in the Piconet.

The processing will be described later in detail by referring to a flowchart. When the user brings the portable telephone 52 closer to the personal computer 51 and the portable telephone 52 receives electromagnetic waves emitted by the non-con- tact-IC-card reader/writer 105 of the personal
10 computer 51, the built-in non-contact IC card 246 of the portable telephone 52 sends identification information (hereinafter called a card ID) that has been set, to the personal computer 51.

The card ID is the same information, for example, as the Bluetooth address (information pertaining thereto) specified for the portable telephone 52. When the personal computer 51 obtains the Bluetooth addresses of the portable telephone 52 and the PDA 53 by the above-described inquiry, the
15 personal computer 51 refers to the Bluetooth address already reported to identify the portable telephone 52 corresponding thereto, and identifies it as a partner of communication.

Therefore, in FIG. 6, both the portable telephone 52 and the PDA 53 respond to the inquiry of the personal computer 51, but paging performed thereafter is performed only between the personal computer 51 and the portable telephone 52.

20 With these processes, the user can start Bluetooth communication just by bringing the portable telephone 52 closer to the personal computer 51 as shown in the figure without selecting a partner of communication on the selection screen described above.

When the user sends predetermined data from the PDA 53 to the personal computer 51 by Bluetooth, for example, the user needs to select the personal computer 51 as a partner of
25 communication on the above-described screen. When the user sends data from the portable telephone 52, the user can send predetermined data to the personal computer 51 without performing such a troublesome process.

The structure of the communication system shown in FIG. 6 will be described next.

FIG. 7 to FIG. 10 show appearances of the personal computer 51 shown in FIG. 6. This notebook-type personal computer 51 is basically formed of a body 61 and a display block 62 which can be opened and closed against the body 61. FIG. 7 is a perspective appearance view showing a state in which the display block 62 is opened against the body 61. FIG. 8 is a plan of the body 61. FIG. 9 is an enlarged view of a portion around a jog dial 63, described later, provided to the body 61. FIG. 10 is a side view of the body 61, viewed from the jog dial 63 side.

The body 61 is provided at its upper surface with a keyboard 64 operated when various characters and symbols are input, a touch sensitive pad 65 serving as a pointing device operated when a pointer (mouse cursor) is moved, and a power switch 67, and is also provided at a side face with the jog dial 63, a slot 68, an IEEE-1394 port 70, and others. Instead of the touch sensitive pad 65, a stick-type pointing device, for example, can be provided.

At the front surface of the display block 62, an LCD (liquid-crystal display) 66 for displaying images is provided. At an upper right portion of the display block 62, a power lamp PL, a battery lamp BL, and, if necessary, other LED lamps such as a message lamp ML, are provided. The power lamp PL, the battery lamp BL, the message lamp ML, and others can also be provided at a lower portion of the display block 62.

The jog dial 63 is incorporated between keys of the keyboard 64 in the body 61 so as to have roughly the same height as the keys. The jog dial 63 is used for executing predetermined processes when rotated in directions indicated by the arrow "a" in FIG. 9, and for executing a process when pressed in a direction indicated by the arrow "b". The jog dial 63 may be located at the left-hand side of the body 61. Alternatively, the jog dial 63 may be located at the left-hand side or the right-hand side of the display block 62 provided with the LCD 66, or may be located between the "G" key and the "H" key of the keyboard 64 in the vertical direction. The jog dial 63 may also be located at a center portion of the front part so as to be able to be operated by a thumb while the touch sensitive pad 65 is operated by a forefinger. Alternatively, the jog dial 63 may be located in the horizontal direction along the upper

edge or the lower edge of the touch sensitive pad 65, or may be located in the vertical direction between the right button and the left button of the touch sensitive pad 65. Further, the jog dial 63
5 may be located at a predetermined angle in a tilted direction where it is easier to operate the jog dial 63 by fingers without limiting the direction to the vertical direction or the horizontal direction. Furthermore, the jog dial 63 may be located at a side of a mouse serving as a pointing device, where the jog dial 63 can be operated by a thumb.

FIG. 11 is a block diagram showing the electrical structure of the personal computer 51.

10 A CPU (central processing unit) 81 is, for example, formed of a Pentium (registered trademark) processor manufactured by Intel Corporation, and is connected to a host bus 82. The host bus 82 is further connected to a bridge 83, and the bridge 83 is also connected to an AGP (accelerated graphics port) 84 and to a PCI bus 85. The bridge 83 is, for example, formed of 400BX manufactured by Intel Corporation, and controls devices around the CPU 81 and a RAM 86 (random access memory). Further,
15 the bridge 83 is connected to a video controller 87 through the AGP 84. The bridge 83 and a bridge 107 form a so-called chip set.

The bridge 83 is also connected to the RAM 86 and to a cache memory 88. The cache memory 88 caches data used by the CPU 81. Although not shown in the figure, a primary cache memory is built into the CPU 81.

20 The RAM 86 is, for example, formed of DRAM (dynamic random access memory), and stores a program executed by the CPU 81 and data required for the operations of the CPU 81. More specifically, when the RAM 86 has been activated, an electronic mail program 86A, an auto-pilot program 86B, a jog-dial-state monitoring program 86C, a jog-dial driver 86D, an operating program (OS) 86E, a

reader/writer control program 86F, a Bluetooth control program 86G, and other application programs 86H1 to 86Hn are transferred from an HDD 114 to the RAM 86, and stored in the RAM 86.

5 The electronic mail program 84A sends and receives correspondence via a modem 92 from a communication line such as a telephone line 93 through a network. The electronic mail program 84A has a new mail acquisition function as a special function. The new mail acquisition function determines whether mail addressed to the user has arrived in a mail box 96 on a mail server 95 provided by an Internet service provider 94, and, when mail addressed to the user has arrived, acquires the mail.

10 The auto-pilot program 86B sequentially activates a plurality of processes (or programs) specified in advance, in the order specified in advance.

15 The jog-dial-state monitoring program 86C receives from the application programs 86H1 to 86Hn notifications as to whether they can be operated with the jog dial. When an application program can be operated with the jog dial, the jog-dial-state monitoring program 86C performs a process to display operations which can be executed by operating the jog dial 63 to the user by the use of the user interface function of the application program. The jog-dial-state monitoring program 86C waits for an event for the jog dial 63, and has a list for receiving reports from the application programs. A jog-dial driver 86D executes various functions corresponding to operations on the jog dial 63.

20 The OS (operating system) 86E controls the basic operations of the computer. Typical operating systems include Windows (registered trademark) 95 and Windows (registered trademark) 98 of Microsoft, Inc., and MAC OS (registered trademark) of Apple Computer, Inc.

5 The reader/writer control program 86F controls a non-contact-IC-card reader/writer 105 (hereinafter sometimes called a reader/writer 105) to detect a terminal having a non-contact IC card therein and located close to the personal computer 51, and transmits and receives various pieces of information to and from the terminal via electromagnetic waves.

The Bluetooth control program 86G controls a Bluetooth module 106 to detect a Bluetooth device existing in the vicinity, to establish synchronization in order to communicate with the Bluetooth device, and to perform other processes.

10 The video controller 87 is connected to the PCI bus 85, is further connected to the bridge 83 through the AGP 84, and controls the display of the LCD 66 according to data sent through the PCI bus 85 or the AGP 84.

The PCI bus 85 is connected to a sound controller 89, and it is connected to a speaker 90 and a microphone 66. The sound controller 89 receives audio input at the microphone 66, and sends audio signals to the speaker 90.

15 The PCI bus 85 is also connected to the modem 92 and to a PC-card-slot interface 98.

The modem 92 can connect to the Internet 97 or to the mail server 95 through the telephone line 93 or the Internet service provider 94.

20 To add an optional function, an interface card 99 is mounted to the slot 68 connected to the PC-card-slot interface 98, which allows data to be sent and received to and from an external apparatus. For example, the interface card 99 can be connected to a drive 100, and can send and receive data to and from a magnetic disk 101, an optical disk 102, an magnetooptical disk 103, semiconductor memory 104, and other devices inserted into the drive 100.

The drive 100, which sends and receives data to and from the magnetic disk 101, the optical disk 102,

the magneto-optical disk 103, and the semiconductor memory 105 can also be connected through a USB port 115.

5 The PCI bus 85 is further connected to the bridge 107. The bridge 107 is, for example, formed of PIIX4E manufactured by Intel Corporation, and controls various input-and-output operations. More specifically, the bridge 107 is formed of an IDE (integrated drive electronics) controller/configuration register 108, an IDE interface 109, a timer circuit 110, and a USB (universal serial bus) interface 111, and controls a device connected to an IDE bus 113, a device connected to a USB port 115, or a device connected through an ISA/EIO (industry standard architecture/extended input output) bus 112 and
10 I/O interface 117.

When a GPS (global positioning system) antenna 116 is mounted to the USB port 115, for example, the USB interface 111 sends position data and time data sent from the GPS antenna 116, to the CPU 81 through the PCI bus 85, the bridge 83, and the host bus 82.

15 The IDE controller/configuration register 108 is formed of two IDE controllers, so-called primary IDE and secondary IDE controllers, a configuration register, etc.

The primary IDE controller is connected to a connector (not shown) through the IDE bus 113, and the connector is connected to the HDD 114. The secondary IDE controller can be connected to an external apparatus through another IDE bus (not shown).

20 The HDD 114 stores an electronic mail program 114A, an auto-pilot program 114B, a jog-dial-state monitoring program 114C, a jog-dial driver 114D, an OS (operating program) 114E, a reader/writer control program 114F, a Bluetooth control program 114G, and other application programs 114H1 to 114Hn, and data used in these programs. The programs 114A to 114Hn stored in the HDD 114 are

sequentially transferred to the RAM 86 and stored therein during activation (booting-up) processing.

5 The ISA/EIO bus 112 is further connected to the I/O interface 117. The I/O interface 117, a ROM 118, a RAM 119, and a CPU 120 are mutually connected.

The ROM 118 stores, for example, an IEEE-1394 interface program 118A, a LED control program 118B, a touch-sensitive-pad-input monitoring program 118C, a key-input monitoring program 118D, a wake-up program 118E, and a jog-dial-state monitoring program 118F in advance.

10 The IEEE-1394 interface program 118A inputs and outputs through an IEEE-1394 input-and-output port 70 data conforming to IEEE 1394. The LED control program 118B controls the turning-on of the power lamp PL, the battery lamp BL, and, if necessary, other LED lamps such as the message lamp ML. The touch-sensitive-pad-input monitoring program 118C monitors an input made by the user with the use of the touch sensitive pad 65. The key-input monitoring program 118D monitors an input made by the user with the use of the keyboard 64 or other key switches. The wake-up program 118E determines
15 based on current-time data sent from the timer circuit 110 in the bridge 108 whether a time specified in advance has arrived. When the specified time has arrived, the wake-up program 118E manages each chip power supply in order to activate a predetermined process (or program). The jog-dial-state monitoring program 118F always monitors the rotation of the rotation-type encoder block of the jog dial 63 or the pressing of the jog dial 63.

20 A BIOS (basic input/output system) 118G is further written into the ROM 118. The BIOS is a basic

input and output system, and is a software program which controls data input and output between the OS and the application programs, and peripheral units (such as the display, the keyboard, and the HDD).

The RAM 119 has a LED-control register, a touch-sensitive-panel input-status register, a key input status register, a time setting register, an I/O register for monitoring a jog-dial state, an IEEE-1394 interface register, etc., as registers 119A to 119F. When the jog dial 63 is pressed, the LED-control register controls the turning-on of the message lamp ML, which displays the startup state of electronic mail at that moment. When the jog dial 63 is pressed, the key-input status register stores an operation key flag. The time setting register can be set to any time.

The I/O interface 117 is also connected to the jog dial 63, the keyboard 64, the touch sensitive pad 65, and the IEEE-1394 input-and-output port 70 through connectors not shown. When the user performs an operation by using the jog dial 63, the keyboard 64, or the touch sensitive panel 65, the I/O interface 117 receives a signal corresponding to the operation from the jog dial 63, the keyboard 64, or the touch sensitive panel 65, and outputs the signal to the ISA/EIO bus 112. Further, the I/O interface 117 sends and receives data to and from the outside through the IEEE-1394 input-and-output port 70. The I/O interface 117 is also connected to the power lamp PL, the battery lamp BL, the message lamp ML, a power-supply control circuit 121, and other lamps formed of LEDs.

The power-supply control circuit 121 is connected to a built-in battery 122 or to AC power, supplying necessary power to each block, and controlling charging of the built-in battery 122 and a secondary battery for a peripheral apparatus. The CPU 120 monitors through the I/O interface 117 a power switch 67 operated to turn on or off the power.

Even when the power is off, the CPU 120 can always execute the IEEE-1394 interface program 118A to the BIOS 118G by the use of an internal power supply. More specifically, even when no windows are

opened on the LCD 66 of the display block 62, the IEEE-1394 interface program 118A to the BIOS 118G are always operating. Therefore, even when the power switch is turned off and the OS 86E is not activated by the CPU 81, the CPU 120 is always executing the jog-dial-state monitoring program 118E to have a programmable-power-key (PPK) function without providing a special key for the personal computer 51. When the personal computer 51 is in a power-save state or in a powered off state, for example, the user can activate desired software or a desired script file just by pressing the jog dial 63.

FIG. 12 is a block diagram showing an example detailed structure of the non-contact-IC-card reader/writer 105 shown in FIG. 11.

An IC 131 is formed of a CPU 151, a SPU (signal processing unit) 152, a SCC (serial communication controller) 153, and a memory 154. The memory 154 is formed of a ROM 161 and a RAM 161. The CPU 151 and the memory 154 are mutually connected through a bus 155.

The CPU 151 deploys to the RAM 162 a control program stored in the ROM 161 to execute various processes according to response data sent from the non-contact IC card 246 and a control signal sent from the CPU 81 shown in FIG. 11. For example, the CPU 151 generates a command to be sent to the non-contact IC card 246, outputs the command to the SPU 152 through the bus 155, and applies an authentication process to data sent from the non-contact IC card 246.

When a portable telephone 52 is located close to the CPU 151 and the card ID is reported by a process performed by each block, described later, the CPU 151 reports the card ID to the Bluetooth module 106 and performs other processes under the control of the CPU 81.

When response data sent from the non-contact IC card 246 is sent from a demodulation block 134 to the SPU 152, the SPU 152 applies, for example, BPSK (binary phase shift keying) modulation

(decoding of Manchester code) to the data and sends obtained data to the CPU 151. When a command to be sent to the non-contact IC card 246 is sent through the bus 155 to the SPU 152, the SPU 152 applies BPSK modulation (encoding to form Manchester code) to the command and outputs obtained data to a modulation block 132.

The SCC 153 sends data sent from the CPU 81 through the bus 155 to the CPU 151, and outputs data sent from the CPU 151 through the bus 155 to the CPU 81.

The modulation block 132 applies ASK (amplitude shift keying) modulation to a carrier wave having a predetermined frequency (for example, 13.56 MHz) sent from an oscillating circuit (OSC) 133, according to data sent from the SPU 152, and outputs the generated modulated wave from an antenna 135 as an electromagnetic wave. The demodulation block 134 demodulates a modulated wave (ASK-modulated wave) obtained through the antenna 135, and outputs demodulated data to the SPU 152.

The antenna 135 emits a predetermined electromagnetic wave, and determines based on a change in the load thereof whether a non-contact IC card 246 (portable telephone 52) is located nearby. When it is determined that a non-contact IC card 246 is located nearby, the antenna 135 sends and receives various types of data to and from the non-contact IC card 246.

FIG. 13 is a block diagram showing an example detailed structure of the Bluetooth module 106 shown in FIG. 11.

A CPU 171 deploys to a RAM 173 a control program stored in a ROM 172 to control the operation of the entire Bluetooth module 106. The CPU 171 to the RAM 173 are mutually connected through a bus 175. A flash memory 174 is also connected to the bus 175.

The flash memory 174 stores information set for each Bluetooth device, such as a Bluetooth device name, which can be changed according to the user's desire, and the Bluetooth address unique to each

Bluetooth device.

5 Since the Bluetooth address is a 48-bit identifier and is unique to each Bluetooth device, it is used in various processes related to the management of Bluetooth devices.

As described above, to establish synchronization in a Piconet, for example, it is necessary for all slaves to obtain information related to the frequency hopping pattern of the master. The frequency hopping pattern is calculated by the slaves according to the Bluetooth address of the master.

10 More specifically, the Bluetooth address is divided into lower-order 24 bits of LAP (low address part), the next higher-order 8 bits of UAP (upper address part), and the remaining 16 bits of NAP (non-significant address part). To calculate the frequency hopping pattern, 28 bits formed of the entire LAP, 24 bits, and lower-order four bits of the UAP are used.

15 Each slave can calculate the frequency hopping pattern according to the Bluetooth clock reported from the master and the above-described 28 bits of the Bluetooth address of the master obtained during paging for establishing synchronization in the Piconet.

20 The frequency hopping pattern includes an inquiry frequency hopping pattern used during an inquiry, a paging frequency hopping pattern used during paging, and a channel frequency hopping pattern used in communication between a slave and the master after synchronization is established in the Piconet. When these three frequency hopping patterns do not need to be individually distinguished, they are hereinafter collectively called a frequency hopping pattern.

Back to FIG. 13, the flash memory 174 stores a link key used to authenticate the Bluetooth device serving as the other part of communication and used to encrypt data to be transmitted, after synchronization is established in the Piconet, which is provided to the CPU 171 if necessary.

An input-and-output interface 176 manages the input and output of data sent from the CPU 81 shown in FIG. 11 and data sent from a baseband control block 177, based on instructions from the CPU 171.

The baseband control block 177 sends data sent from the input-and-output interface 176 to a GFSK (Gaussian frequency shift keying) modulation block 191 in order to send the data to the portable telephone 52, and outputs data sent from a GFSK demodulation block 197 to the bus 175 or to the input-and-output interface 176.

The GFSK modulation block 191 limits, with a filter, a high-frequency component of data sent from the baseband control block 177, performs frequency modulation as first modulation, and outputs obtained data to a spectrum spreading block 192.

The spectrum spreading block 192 switches the carrier frequency according to the frequency hopping pattern calculated as described above and reported from a hopping synthesizer block 195, applies spectrum spreading to received data, and outputs an obtained signal to a communication control block 193. In Bluetooth, the spectrum spreading block 192 hops the frequency at an interval of 625 μ s to send data.

The communication control block 193 uses the 2.4 GHz band to send a signal to which spectrum spreading has been applied, from an antenna 194. The communication control block 193 outputs a signal received by the antenna 194 to an inverse spectrum spreading block 196.

The inverse spectrum spreading block 196 hops the receiving frequency according to the frequency hopping pattern reported from the hopping synthesizer block 195 to, for example, obtain a signal sent from the portable telephone 52. The inverse spectrum spreading block 196 also applies inverse spectrum spreading to the obtained signal to reproduce the original signal of the portable telephone 52, and outputs the signal to the GFSK demodulation block 197. The GFSK demodulation block 197 applies GFSK demodulation to a signal sent from the inverse spectrum spreading block 196, and outputs obtained data to the baseband control block 177.

An example structure of the portable telephone 52 will be described next.

FIG. 14 shows an example appearance structure of the portable telephone 52 shown in FIG. 6.

5 As shown in FIG. 14, the portable telephone 52 is formed of a display block 212 and a body 213, and is foldable at a center hinge block 211.

The display block 212 has a transmission and receiving antenna 214 which can be extended and retracted. The portable telephone 52 sends and receives radio waves to and from a base station, which is a fixed wireless terminal, through the antenna 214.

10 The display block 212 also has a camera block 215 which can swivel at an angle range of roughly 180 degrees, at an upper center block. The portable telephone 52 takes pictures of a desired object by a CCD (charge coupled device) camera 216 of the camera block 215.

When the user swivels the camera block 215 at an angle of roughly 180 degrees, the display block 212 has a speaker 224 provided at the center of the rear surface side of the camera block 215, at the front side, as shown in FIG. 15. This switches the portable telephone 52 into a normal voice communication state.

15 The display block 212 is also provided at the center with a liquid-crystal display 217. The liquid-crystal display 217 displays a radio-wave receiving state, the remaining amount of battery, the names and telephone numbers of destinations input into a telephone directory, a transmission history, the contents of electronic mail, simplified home pages, images taken by the CCD camera 216 of the camera block 215, and so on.

20 The body 213 is provided at the surface with operation keys 218, such as numeral keys "0" to "9", a call key, a redial key, an end-of-call and power key, a clear key, and an electronic mail key. Various instructions corresponding to the operations of the operation keys 218 are input to the portable telephone 52.

At a lower part of the operation keys 218, the body 213 is also provided with a memo button 219 and a microphone 220. When the memo button 219 is operated, the portable telephone 52 records the sound of the other party during a call. The portable telephone 52 collects the sound of the user during a call by the microphone 220.

5 At an upper part of the operation keys 218, the body 213 is provided with a jog dial 221 which can be swiveled, with its surface slightly protruding from the surface of the body 213. The portable telephone 52 executes various operations, such as a scroll operation for the telephone directory or electronic mail, a page roll operation for a simplified home page, and an image drive operation, according to swivel operations of the jog dial 221.

10 For example, the body 213 selects a desired telephone number from a plurality of telephone numbers listed in the telephone directory displayed on the liquid-crystal display 217, according to a swivel operation of the jog dial 221 performed by the user, fixes the selected telephone number when the jog dial 221 is pressed toward the inside direction of the body 213, and makes a call to the telephone number.

15 A battery pack is mounted to the body 213 at its rear surface side. When the end-of-call and power key is turned on, the battery pack supplies electric power to each circuit block to make it ready for operation.

20 The body 213 is provided with a memory stick slot 222 for mounting a detachable memory stick (registered trademark), at the upper left side. When the memo button 219 is pressed, the portable telephone 52 records the sound of the other party during a call in a mounted memory stick 223. The portable telephone 52 also records electronic mail, simplified home pages, and images taken by the CCD camera 216 in the mounted memory stick 223, according to the user's operations.

25 The memory stick 223 is a flash memory card developed by the Sony Corporation, who is the applicant of the present invention. The memory stick 223 has a flash memory device, which is an EEPROM (electrically erasable and programmable read only memory), a non-volatile memory electrically rewritable and erasable, in a compact and thin plastic case 21.5 mm long, 50 mm wide, and 2.8 mm deep. Various types of data, such as images, sound, and music, can be written into and read

from the memory stick 223 through its 10-pin terminal.

Therefore, since the memory stick 223 can be mounted to the portable telephone 52, the portable telephone 52 can share data with other electronic units through the memory stick 223.

When a module (chip) for adding a predetermined function is incorporated into the memory stick 223, and the memory stick 223 is mounted to the memory stick slot 222, the functions of the portable telephone 52 are further extended.

For example, when a memory stick 223 in which a Bluetooth module and a non-contact IC card are incorporated is mounted to the portable telephone 52, as described later, even if those modules are not built into the portable telephone 52, the functions of the portable telephone 52 are extended to allow Bluetooth communication with the personal computer 51 and communication with the use of the non-contact IC card.

FIG. 16 shows an example inside structure of the portable telephone 52.

To a main control block 231 for controlling each block of the display block 212 and the body 213 synthetically, a power-supply circuit block 235, an operation-input control block 232, an image encoder 233, a camera interface (I/F) block 234, an LCD control block 236, a multiplexing and separation block 238, a modulation and demodulation circuit block 239, an audio codec 240, an infrared communication block 245, a non-contact IC card 246, and a Bluetooth module 247 are mutually connected through a main bus 241, and an image encoder 233, an image decoder 237, a multiplexing and separation block 238, a memory stick control block 243, a modulation and demodulation circuit block 239, and an audio codec 240 are mutually connected through a synchronization bus 242.

When the end-of-call and power key is turned on by a user's operation, the power-supply circuit block 235 supplies electric power to each block from the battery pack to make the portable telephone 52 ready for operation. When, as described later, the noncontact IC card 246 instructs the power-supply circuit block 235 to activate the Bluetooth module 247, it supplies electric power to the Bluetooth module 247 and activates it

When the Bluetooth module 247 is powered off, the timing for turning power on based on an instruction from the noncontact IC card 246 is when, for example, a portable telephone is located close

to the personal computer 51 and the non-contact IC card receives electromagnetic waves emitted from the non-contact-IC-card reader/writer 105.

5 In the portable telephone 52, under the control of the main control block 231 formed of a CPU, a ROM, a RAM, etc., an audio signal collected by the microphone 220 is converted to digital audio data by the audio codec 240 during telephone-call mode. The modulation and demodulation circuit block 239 applies spectrum spreading processing to the digital audio data, and the transmission and receiving block 244 applies digital-to-analog conversion processing and frequency conversion processing, and transmits through the antenna 214 in the portable telephone 52.

10 During the telephone-call mode in the portable telephone 52, a signal received by the antenna 214 is amplified, frequency conversion processing and analog-to-digital conversion processing are applied to the amplified signal, the modulation and demodulation circuit block 239 applies inverse spectrum spreading processing, and the audio codec 240 converts to an analog audio signal. The portable telephone 52 outputs the sound corresponding to the analog audio signal from the speaker 224.

15 When electronic mail is to be sent from the portable telephone 52 during data communication mode, text data input by operations of the operation keys 218 and the jog dial 221 is sent to the main control block 231 through the operation-input control block 232.

20 Under the control of the main control block 231, the modulation and demodulation circuit block 239 applies spectrum spreading processing to the text data, the transmitting and receiving circuit block 244 applies digital-to-analog conversion processing and frequency conversion processing, and the obtained signal is sent to the base station through the antenna 214.

25 When electronic mail is received by the portable telephone 52 during data communication mode, the modulation and demodulation circuit block 239 applies the inverse spectrum spreading processing to a signal received from the base station through the antenna 214 to recover the original text data, and it is displayed as electronic mail on the liquid-crystal display 217 through the LCD control block 236.

Then, the portable telephone 52 can store the electronic mail received according to the user's operation in the memory stick through the memory-stick control block 243.

When image data is to be sent from the portable telephone 52 during the data communication mode, image data captured by the CCD camera 216 is sent to the image encoder 233 through the camera interface block 234.

5 When image data captured by the CCD camera 216 is not sent, the portable telephone 52 can display the image data through the camera interface block 234 and the LCD control block 236 directly on the liquid-crystal display 217.

The image encoder 233 applies compression encoding to the image data sent from the CCD camera 216 by a predetermined encoding method, such as MPEG (Moving Picture Experts Group) 2 or MPEG 4 to convert to encoded image data, and sends it to the multiplexing and separation block 238.

10 At the same time, the portable telephone 52 sends sound collected by the microphone 220 during image capturing performed by the CCD camera 216, to the multiplexing and separation block 238 as digital audio data through the audio codec 240.

15 The multiplexing and separation block 238 multiplexes the encoded image data sent from the image encoder 233 and the audio data sent from the audio codec 240 by a predetermined method, the modulation and demodulation circuit block 239 applies the spectrum spreading processing to the multiplexed data obtained as a result, the transmission and receiving circuit block 244 applies the digital-to-analog conversion processing and the frequency conversion processing, and then the data is sent through the antenna 214.

20 When the portable telephone 52 receives the data of a moving-picture file linked to a simplified home page during data communication mode, for example, the modulation and demodulation circuit block 239 applies the inverse spectrum spreading processing to a signal received from the base station through the antenna 214, and the multiplexed data obtained as a result is sent to the multiplexing and separation block 238.

25 The multiplexing and separation block 238 separates the multiplexed data into encoded image data and audio data, sends the encoded image data to the image decoder 237 through the synchronization

bus 242, and sends the audio data to the audio codec 240 through the synchronization bus 242.

5 The image decoder 237 decodes the encoded image data by the decoding method corresponding to the predetermined encoding method, such as MPEG2 or MPEG4, to generate reproduced moving-picture data, and sends it to the liquid-crystal display 217 through the LCD control block 236. With this, the portable telephone 52 displays moving-picture data included, for example, in a moving-picture file linked to a simplified home page.

10 At the same time, the audio codec 240 converts the audio data into an analog audio signal, and sends it to the speaker 242. With this, the portable telephone 52 reproduces audio data included, for example, in a moving-picture file linked to a simplified home page.

In the same way as for electronic mail, the portable telephone 52 can record data linked to a received simplified home page into the memory stick 223 through the memory-stick control block 243 by a user's operation.

15 When the non-contact IC card 246 is located close to the personal computer 51 and receives electromagnetic waves emitted from the reader/writer 105, the non-contact IC card 246 sends various pieces of information to the reader/writer 105.

FIG. 17 is a block diagram showing an example detailed structure of the non-contact IC card 246.

20 The non-contact IC card 246 is formed, for example, of an antenna (loop antenna) 270 and a capacitor 271 both shown in the figure, and an IC which incorporates any other structures in one chip, and performs half duplex communication of various pieces of data with the reader/writer 105 by using electromagnetic induction. The non-contact IC card 246 does not necessarily have to be shaped as a card. The IC card is a name used for convenience of description, and means that it has functions described above or described later. As a unit which basically provides the same function as the non-contact IC card 246, Felica (registered trademark), for example, has been available.

25 A CPU 261 develops in a RAM 263 a control program stored in a ROM 262 to control the operation of the entire non-contact IC card 246. When the antenna 270 receives electromagnetic waves emitted

from the reader/writer 105, for example, the CPU 261 reports the card ID thereof as identification information assigned to the non-contact IC card 246, to the reader/writer 105.

The card ID can be changed in a desired way. For example, the card ID may either be or include the same name as the Bluetooth device name assigned to the Bluetooth module 247 (portable telephone 52).

In an interface block 269, the envelope of a modulated wave (ASK modulated wave) received through the antenna 270 is detected to demodulate the wave by an ASK demodulation block 283, and data obtained by the demodulation is output to a BPSK demodulation block 272. An LC circuit formed of the antenna 270 and the capacitor 271 generates resonance by an electromagnetic wave having a predetermined frequency emitted from the reader/writer 105.

In the interface block 269, an AC magnetic field excited at the antenna 270 is rectified by the ASK demodulation block 283, stabilized by a voltage regulator 281, and supplied to each block as DC power. The electric power of the electromagnetic wave emitted from the reader/writer 105 is adjusted, as described later, so as to generate a magnetic field sufficient for the electric power required by the non-contact IC card 246.

In the interface block 269, an oscillating circuit 284 generates a signal having the same frequency as the clock frequency of data, and outputs the signal to a PLL block not shown.

When data such as the card ID is sent to the reader/writer 105, for example, a predetermined switching device, for example, is turned on/off according to data sent from a BPSK modulation block 268, and, only when the switching device is on, a predetermined load is connected in parallel to the antenna 270 to change the load of the antenna 270 in the interface block 269.

An ASK modulation block 282 applies ASK modulation to the modulated wave sent from the reader/writer 105 and received by the antenna 270, by the use of the change of the load of the antenna 270, and sends the modulation component to the reader/writer 105 through the antenna 270 (to

change the terminal voltage of the antenna 135 of the reader/writer 105) (load switching method).

When data demodulated by the ASK demodulation block 283 is BPSK modulated, the BPSK demodulation block 272 demodulates the data (decoding of Manchester code) according to a clock signal sent from the PLL block not shown, and outputs the demodulated data to a data receiving block 273. The data receiving block 273 outputs the received data, if necessary, to the CPU 261 and others.

The BPSK modulation block 268 applies BPSK modulation (encoding to form Manchester code) to data sent from a data transmission block 267, and outputs the modulated data to the ASK modulation block 282.

The non-contact IC card 246 not only reports the card ID to the personal computer 51, but also performs various processes, such as authentication processing with the reader/writer 105 and encryption processing for data to be transmitted.

FIG. 18 is a view showing example specifications of the non-contact IC card 246.

As described above, communication between the reader/writer 105 and the non-contact IC card 246 are performed at half duplex, and the communication rate is, for example, 211.87 kbps.

Also as shown in the figure, the center frequency of frequency bands used for electric power transmission from the reader/writer 105 to the non-contact IC card 246, data transfer from the reader/writer 105 to the non-contact IC card 246, and data transfer from the non-contact IC card 246 to the reader/writer 105 is, for example, 13.56 MHz.

The power of radio waves output from the reader/writer 105 for electric power transfer is, for example, 350 mW, and the communication length is, for example, about 10 cm although it depends on communication environments such as antenna characteristics.

As described above, ASK modulation is applied to data which has been encoded to be Manchester code and the modulated data is transferred from the reader/writer 105 to the non-contact IC card 246. The modulation factor (the maximum amplitude of a data signal/the maximum amplitude of the carrier wave) is, for example, about 0.1. Data transfer from the non-contact IC card 246 to the reader/writer 105 is performed, as described above, by converting output data to a transmission signal by the load

switching method (the switching device is turned on/off according to the output data to change the load of the antenna 135).

Back to FIG. 16, the Bluetooth module 247 forms a Piconet together, for example, with the Bluetooth module 106 of the personal computer 51, and transmits and receives various pieces of data under the control of the main control block 231.

Since the Bluetooth module 247 has the same structure as that shown in FIG. 13, a detailed description thereof is omitted. In the following description, the CPU of the Bluetooth module 106 is called, for example, a CPU 171A, and the CPU of the Bluetooth module 247 is called a CPU 171B. The other components are also called in the same way.

In the above description, the portable telephone 52 includes the non-contact IC card 246 and the Bluetooth module 247. For example, the structure may be made such that the non-contact IC card 246 and the Bluetooth module 247 are incorporated into the memory stick 223, the memory stick 223 is mounted to the portable telephone 52, and the noncontact IC card 246 and the Bluetooth module 247 are controlled by the memory-stick control block 243.

FIG. 19 is a view showing example function blocks of the portable telephone 52.

A host program 301 provides basic functions for the portable telephone 52, such as a telephone call function and an electronic-mail transmission and receiving function. A non-contact-IC-card control program 302 controls the operation of the non-contact IC card 246, and also performs various processes in cooperation with a card-ID setting program 303, a Bluetooth control program 304, and others.

When a portable telephone 52 is located close to the personal computer 51, for example, the non-contact-IC-card control program 302 sends the card ID corresponding to the Bluetooth address to the reader/writer 105, and activates the Bluetooth module 247 (Bluetooth control program 304) in response to receiving electromagnetic waves from the reader/writer 105.

The card-ID setting program 303 manages the card ID stored in the EEPROM 264, and rewrites it if so instructed by a user. The card-ID setting program 303 also rewrites and sets the card ID so as to

include the Bluetooth address assigned to the Bluetooth module 247.

The Bluetooth control program 304 controls the operation of the Bluetooth module 247 to implement communication with other Bluetooth devices. A Bluetooth-device-name setting program
5 305 manages the Bluetooth device name specified in a flash memory 174B (the flash memory of the Bluetooth module 247).

The operation of the communication system shown in FIG. 6 will be described next.

A series of processes in which the personal computer 51 specifies the partner of communication and establishes synchronization only with that Bluetooth device in the Piconet will be described first by
10 referring to flowcharts shown in FIG. 20 and FIG. 21.

It is assumed in the following processes that the personal computer 51 serves as the master and the other Bluetooth devices (the portable telephone 52 and the PDA 53) serve as slaves. In the following description of the flowcharts, communication means Bluetooth communication performed after synchronization is established in the Piconet and the partner of communication is identified.

15 In step S121, the reader/writer control program 86F emits electromagnetic waves in order to detect a terminal (portable telephone 52) having a built-in non-contact IC card. The reader/writer control program 86F controls the reader/writer 105 by a predetermined control command to emit electromagnetic waves from the antenna 135 at a predetermined interval.

When the portable telephone 52 is located close to the personal computer 51 and the
20 electromagnetic waves are received in step S131, the non-contact-IC-card control program 302 proceeds to step S132. The card ID corresponding to the Bluetooth address assigned to the Bluetooth module 247 is read from the EEPROM 264 and reported to the reader/writer 105.

In step S122, the Bluetooth address sent from the non-contact IC card 246 is received. The reader/writer control program 86F proceeds to step S123, and the Bluetooth address is reported to

25

the Bluetooth control program 86G.

In step S101, the Bluetooth control program 86G obtains the Bluetooth address assigned to the portable telephone 52 (Bluetooth module 247).

5 Processes executed in step S102 to step S109 by the Bluetooth control program 86G, processes executed in step S141 and subsequent steps by the Bluetooth control program 304, and processes executed in step S161 and subsequent steps by the Bluetooth control program of the PDA 53 are the same as the inquiry and paging described by referring to FIG. 2 and FIG. 3.

10 In step S102, the Bluetooth control program 86G controls the Bluetooth module 106 to broadcast an IQ packet.

More specifically, the Bluetooth control program 86G uses 24 bits (9E8B33) of the LAP and four bits (all 0) of the UAP both specified in advance and the entire Bluetooth clock of 28 bits to generate an inquiry frequency hopping pattern.

15 The Bluetooth control program 86G also uses one address block of the LAP ranging from 9E8B00 to 9E8B3F specified in advance to generate IAC (inquiry access code), and broadcasts the IQ packet formed of the access code, by the calculated inquiry hopping pattern.

20 A packet transmitted and received by Bluetooth is formed of 68-bit or 72-bit basic access code indicating the destination of the transmission packet, a 54-bit packet header which includes a parameter for managing a communication link, and a payload of 0 bits to 2745 bits (variable length) serving as user data.

The IQ packet broadcasted from the antenna 194 by the process of each block of the Bluetooth module 106 is received by the Bluetooth control program 304 of the portable telephone 52 in step

S141, and is received by the Bluetooth control program of the PDA 53 in step S161.

In step S142, the Bluetooth control program 304 sends an FHS packet for reporting slave attributes to the personal computer 51, responding to the inquiry. In the FHS packet, the payload includes
5 information related to the Bluetooth address and the Bluetooth clock of the Bluetooth module 247.

The Bluetooth control program 86G receives the FHS packet in step S103 to obtain the attribute information of the portable telephone 52.

In step S162, an FHS packet indicating the attributes of the PDA 53 is sent in the same way. The Bluetooth control program 86G receives the FHS packet in step S104.

10 With the above-described inquiry processes, the Bluetooth control program 86G has obtained the attribute information of all slaves existing in a vicinity.

In step S105, the Bluetooth control program 86G detects the attribute information in the obtained FHS packets, identifies a slave having the Bluetooth address obtained through electromagnetic waves, and identifies it as a partner of communication. More specifically, since the reader/writer control
15 program 86F reports the Bluetooth address of the portable telephone 52 in advance, the Bluetooth control program 86G identifies the portable telephone 52, which has sent the FHS packet that includes the Bluetooth address, as a partner of communication.

Then, the Bluetooth control program 86G performs paging (process for establishing synchronization in the Piconet) only for the portable telephone 52, identified as the partner of communication. In other
20 words, subsequent processes are not performed between the Bluetooth control program 86G and the Bluetooth control program of the PDA 53.

In step S106, the Bluetooth control program 86G generates an ID packet according to the information described in the FHS packet obtained from the portable telephone 52, and sends the

packet to the portable telephone.

More specifically, the Bluetooth control program 86G uses the 24 bits of the LAP and the lower-order four bits of the UAP of the Bluetooth address assigned to the Bluetooth module 247 and the 28 bits of the Bluetooth clock, all included in the FHS packet, to generate a paging frequency hopping pattern.

The Bluetooth control program 86G also uses the LAP of the Bluetooth module 247 to generate a DAC (device access code), and sends an ID packet formed of the DAC to the portable telephone 52 by using the calculated paging frequency hopping pattern.

When the ID packet is received in step S143, the Bluetooth control program 304 proceeds to step S144, and sends the same ID packet to the personal computer 51 to report that the ID packet has been successfully received.

When the ID packet sent from the portable telephone 52 is received in step S107, the Bluetooth control program 86G proceeds to step S108, and sends an FHS packet for reporting its own attributes, to the portable telephone 52.

In step S145, the Bluetooth control program 304 receives the FHS packet sent from the personal computer 51 and obtains the attribute information of the master. The Bluetooth control program 304 proceeds to step S146, and sends an ID packet to the personal computer 51 to report that the FHS packet has been received.

Then, the Bluetooth control program 304 proceeds to step S147, and establishes synchronization with the personal computer 51 in the Piconet.

More specifically, the Bluetooth control program 304 uses the 24 bits of the LAP and the lower-order four bits of the UAP of the Bluetooth address assigned to the personal computer 51 (Bluetooth module

106) and 27 bits of the Bluetooth clock to generate a channel frequency hopping pattern to establish synchronization in the frequency domain.

5 The Bluetooth control program 304 also adds an offset (difference) to the Bluetooth clock managed by the program, according to the Bluetooth clock reported by the personal computer 51, to establish synchronization in the time domain.

In step S109, the Bluetooth control program 86G receives the ID packet sent from the portable telephone 52.

10 After synchronization is established with the portable telephone 52 in the Piconet, the Bluetooth control program 86G proceeds to step S110, and starts Bluetooth communication.

For example, the Bluetooth control program 86G requests a report of available profiles (services) for the portable telephone 52. In Bluetooth, all protocol specifications and user interfaces are specified for each unit expected to have Bluetooth technology, and a profile is specified for each protocol to be used. In the profile, the function of each layer of Bluetooth and coordination with the layer are
15 specified for each application.

The Bluetooth control program 86G selects a predetermined profile from the profiles reported by the portable telephone 52, and performs communication according to the profile.

Mutual authentication may be required before the profiles which can be provided are obtained, or before a profile is selected and communication is performed. Authentication is performed by using link
20 keys specified in the databases of the personal computer 51 and the portable telephone 52.

For example, when the personal computer 51 and the portable telephone 52 perform communication for the first time, the user is asked to input a PIN (personal identification number) code to specify a link key. The link key is set based on an inputted PIN code and a generated random number. The link keys set are associated with the Bluetooth addresses of partners of the communication and
25 recorded in their respective databases.

As link keys, according to usage, "an initialization key", "a single-body key", "a combination key", and "a master key" are specified. As described above, the link key specified according to the PIN code and the random number when communication is performed for the first time is an initialization key.
5 In authentication performed with the use of an initialization key, the initialization key, the Bluetooth address of a terminal which has requested authentication, and a 128-bit random number generated by a terminal which determines authentication are used.

As described above, by communication at the reader/writer 105, the personal computer 51 can
10 obtain the Bluetooth address of the slave with which synchronization needs to be established in the Piconet, from the non-contact IC card 246. Therefore, as shown in FIG. 6, even when the PDA 53 is located close to the personal computer 51, Bluetooth communication is started only between the personal computer 51 and the portable telephone 52 without selection of a terminal.

With this, for example, to perform Bluetooth communication with the personal computer 51, the
15 user of the portable telephone 52 can start the communication just by bringing the portable telephone 52 close to the personal computer 51. To transfer data from the personal computer 51 to the portable telephone 52, the user can also start communication in the same way just by bringing the portable telephone 52 close to the personal computer 51.

In the above description, it is assumed that the Bluetooth modules of the personal computer 51, the
20 portable telephone 52, and the PDA 53 have already been activated. When the Bluetooth modules have not been activated, they may be activated, for example, when electromagnetic waves are received, and then synchronization is established in the Piconet.

A series of processes in which the communication system establishes synchronization in a Piconet when Bluetooth modules are not activated will be described next by referring to flowcharts shown in
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FIG. 22 and FIG. 23.

The processes shown in FIG. 22 and FIG. 23 are basically the same as the synchronization establishment processes described by referring to FIG. 20 and FIG. 21. The processes shown in FIG. 22 and FIG. 23 differ in that the Bluetooth module 247 of the portable telephone 52 is activated in response to receiving electromagnetic waves emitted from the reader/writer 105, and the Bluetooth module 106 of the personal computer 51 is activated in response to the state in which the reader/writer 105 receives the card ID sent from the non-contact IC card 246.

In step 201, the reader/writer control program 86F emits electromagnetic waves to detect a terminal having a built-in noncontact IC card.

When the electromagnetic waves are received in step S211, the non-contact-IC-card control program 302 proceeds to step S212, and instructs the Bluetooth control program 304 (Bluetooth module 246) to perform activation.

For example, the non-contact-IC-card control program 302 reports to the host program 301 that electromagnetic waves have been received. In response to this report, the host program 301 activates the Bluetooth control program 304, and controls the power-supply circuit block 235 to supply electric power to the Bluetooth module 247.

The Bluetooth control program 304 is activated in step S221, and, for example, (in an inquiry-scanning state) waits for an inquiry made by the master (personal computer 51).

After the non-contact-IC-card control program 302 activates the Bluetooth control program 304, the non-contact-IC-card control program 302 proceeds to step S213, and reports the card ID corresponding to the Bluetooth address to the reader/writer 105.

When the card ID is received in step S202, the reader/writer control program 86F proceeds to step S203, activates the Bluetooth control program 86G, and supplies electric power to the Bluetooth module 106.

The Bluetooth control program 86G is activated in step S181, proceeds to step S182, and receives the Bluetooth address (card ID) which the reader/writer control program 86F has obtained from the portable telephone 52.

5 The reader/writer control program 86F activates the Bluetooth control program 86G in step S203, proceeds to step S204, and reports the card ID obtained from the portable telephone 52 to the Bluetooth control program 86G.

10 In subsequent processes (processes in step S183 to step S189, and processes in step S222 to step S227), the Bluetooth control program 86G performs an inquiry and paging, described by referring to FIG. 20 and FIG. 21, for the Bluetooth module 246.

More specifically, the Bluetooth control program 86G identifies the portable telephone 52 as a slave with which synchronization should be established in the Piconet according to the Bluetooth address reported by the reader/writer 105, and establishes synchronization only with the portable telephone 52 in the Piconet.

15 Since the PDA 53 does not receive electromagnetic waves from the reader/writer 105, it is not activated. Therefore, it is easier to identify the partner of communication.

20 As described above, since the Bluetooth module 246 is activated in response to receiving electromagnetic waves, the user of the portable telephone 52 can activate the Bluetooth control program 304 just by bringing the portable telephone 52 close to the personal computer 51 without, for example, performing an operation for activating the Bluetooth control program 304. In the same way as that described above, since the partner of communication is specified according to the card ID reported from the non-contact IC card 246, Bluetooth communication with the personal computer 51 can be performed without any manipulation being performed.

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In the above description, the Bluetooth module 247 of the portable telephone 52 is activated in response to receiving electromagnetic waves emitted from the reader/writer 105, and the Bluetooth module 106 of the personal computer 51 is activated in response to receiving the card ID sent from the portable telephone 52. However, various timings may be used for their activation.

For example, the Bluetooth control program 304 of the portable telephone 52 may be activated at the time (immediately after step S213) that the card ID is reported to the personal computer 51.

It is also possible to turn on power to the portable telephone 52 according to electromotive force generated in response to receiving electromagnetic waves in a state in which the power to the portable telephone 52 is off, and then activate the Bluetooth control program 304.

In the above description, the non-contact IC card 246 and the Bluetooth module 247 are both built into the portable telephone 52. For example, the memory stick 223 in which these modules are incorporated may be mounted to the memory stick slot 222 to execute the above-described processes.

FIG. 24A is a view showing in a sketch manner a memory stick 223 in which the non-contact IC card 246 and the Bluetooth module 247 are incorporated mounted to the portable telephone 52 to extend its functions.

Even when a non-contact IC card 246 or Bluetooth module 247 is not built into the portable telephone 52, for example, the functions of the portable telephone 52 can be extended by mounting the memory stick 223 to the portable telephone 52, and processes for establishing synchronization in the Piconet, described above, can be executed.

A control program for controlling a newly added function is read from the memory stick 223 and installed on the portable telephone 52. The control program may be, for example, installed from a recording medium, such as the magnetic disk 101 to the semiconductor memory 104 shown in FIG. 11, through a USB cable.

Instead of the memory stick 223, an externally connected unit 321 in which the non-contact IC card 246 and the Bluetooth module 247 are incorporated may be used to extend the functions of the portable telephone 52, as shown in FIG. 24B. The externally connected unit 321 is connected, for example, to a USB connector provided at a predetermined position of the portable telephone 52, or to the connector of a charging cable.

FIG. 25A is a view showing in a sketch manner that a Bluetooth module 247 built in the portable telephone 52 and a memory stick 223 used to add the functions of a non-contact IC card 246 to the portable telephone 52.

When the memory stick 223 is mounted to the portable telephone 52, and the card ID assigned into the non-contact IC card 246 is set so as to include the Bluetooth address assigned to the Bluetooth module 247, the processes for establishing synchronization in a Piconet, described above, can be executed. A process for rewriting the card ID will be described later by referring to a flowchart.

As shown in FIG. 25B, only the function of the non-contact IC card 246 can be added by mounting the externally connected unit 321 to the portable telephone 52.

In contrast to FIG. 25A, FIG. 26A is a view showing in a sketch manner that the non-contact IC card 246 is built into the portable telephone 52 and the memory stick 223 is used to add the function of the Bluetooth module 247 to the portable telephone 52. FIG. 26B is a view showing in a sketch manner that the externally connected unit 321 is used to add the functions of the Bluetooth module 247 to the portable telephone 52.

In the following description, when there is no need to distinguish between the memory stick 223 and the externally connected unit 321 which adds the functions of a non-contact IC card 246, the functions of a Bluetooth module 247, or both sets of functions, they are collectively called a function extension unit.

A process for rewriting the card ID as required in the portable telephone 52 will be described next by referring to flowcharts.

A process for rewriting the card ID according to a Bluetooth address in the portable telephone 52 will be described first by referring to a flowchart shown in FIG. 27.

5 In step S251, the host program 301 queries the card-ID setting program 303 for the card ID. When the query is received in step S271, the card-ID setting program 303 proceeds to step S272, reads the card ID specified in the EEPROM 264, and reports it to the host program 301.

When the card ID is received in step S252, the host program 301 proceeds to step S253, and inquires of the Bluetooth control program 304 about the Bluetooth address.

10 When the inquiry is received in step S281, the Bluetooth control program 304 proceeds to step S282, reads the Bluetooth address stored in the flash memory 174B, and reports it to the host program 301.

In step S254, the host program 301 obtains the Bluetooth address reported by the Bluetooth control program 304, and compares it with the card ID already reported. In step S255, the host program 301 determines whether the obtained card ID includes at least the Bluetooth address (information related to the Bluetooth address).

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When the host program 301 determines in step S255 that the card ID is the same as the Bluetooth address, or that the card ID includes the Bluetooth address, the host program 301 terminates. When the host program 301 determines in step S255 that the card ID does not include the Bluetooth address, the host program 301 proceeds to step S256, and reports the obtained Bluetooth address to the card ID setting program 303.

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When the Bluetooth address is received in step S273, the card-ID setting program 303 proceeds to

step S274, and sets the card ID to the Bluetooth address. In other words, the card-ID setting program 304 rewrites the card ID specified in the EEPROM 264 to the Bluetooth address.

5 With this, the card ID includes the Bluetooth address. As described above, bringing the portable telephone 52 close to the personal computer 51 serving as the master allows the personal computer 51 to identify the slave with which synchronization should be established in the Piconet.

10 Including processes described below, the process for rewriting the card ID may be performed at a predetermined interval. Since the non-contact IC card 246 is used in various cases, such as for passing through train gates and paying for purchased goods, other than Bluetooth communication, the user may change the card ID as required. Therefore, when the card ID is rewritten at a predetermined interval, the user does not need to re-specify the card ID every time the user wants to start Bluetooth communication.

15 The card ID may be rewritten at the time that electromagnetic waves sent from the reader/writer 105 are received. With this, the master, which has the reader/writer, can identify the partner of communication more securely.

A process performed in the portable telephone 52 when a function extension unit for adding the function of the noncontact IC card 246 is mounted will be described next by referring to a flowchart shown in FIG. 28.

20 In step S301, the host program 301 determines whether a function extension unit for adding the functions of a non-contact IC card 246 has been mounted. The host program 301 waits until it determines that the unit has been mounted. When the host program 301 determines in step S301 that, for example, the memory stick 223 shown in FIG. 25A or the externally connected unit 321 shown in FIG. 25B has been mounted at a predetermined position, the host program 301 proceeds to step S302.

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Subsequent processes are the same as those described by referring to FIG. 27. More specifically, the host program 301 obtains the card ID and the Bluetooth address, and determines in step S306 whether the card ID includes at least the Bluetooth address.

5 When the host program 301 determines in step S306 that the card ID includes the Bluetooth address, the host program 301 terminates. When the host program 301 determines that the card ID does not include the Bluetooth address, the host program 301 proceeds to step S307, and reports the Bluetooth address to the card-ID setting program 303.

10 The card-ID setting program 303 rewrites, for example, the specified card ID to the received Bluetooth address.

With this, for example, by the user merely purchasing a memory stick 223 for adding the function of the non-contact IC card 246 and mounting the memory stick 223 to the portable telephone 52, the card ID of the non-contact IC card 246 can be rewritten as required.

15 Therefore, the user can use the portable telephone 52 to which the functions have been added to execute the above-described processes for establishing synchronization in the Piconet and to start Bluetooth communication without selecting a partner of communication.

A process performed in the portable telephone 52 when a function extension unit for adding the function of the Bluetooth module 247 is mounted will be described next by referring to a flowchart shown in FIG. 29.

20 In step S341, the host program 301 determines whether a function extension unit for adding the function of the Bluetooth module 247 has been mounted. The host program 301 waits until it determines that the unit has been mounted. When the host program 301 determines in step S341 that, for example, the memory stick 223 shown in FIG. 26A or the externally connected unit 321 shown in FIG. 26B has been mounted at a predetermined position, the host program 301 proceeds to step S342.

25 Subsequent processes are the same as those described by referring to FIG. 27. More specifically, the

host program 301 obtains the card ID and the Bluetooth address, and determines in step S346 whether the card ID includes at least the Bluetooth address.

5 When the host program 301 determines in step S346 that the card ID includes the Bluetooth address, the host program 301 terminates. When the host program 301 determines that the card ID does not include the Bluetooth address, the host program 301 proceeds to step S347, and reports the Bluetooth address to the card-ID setting program 303.

The card-ID setting program 303 rewrites, for example, the specified card ID to the received Bluetooth address.

10 With the above-described processes, for example, by the user merely purchasing a memory stick 223 for adding the functions of a Bluetooth module 247 and mounting the memory stick 223 to the portable telephone 52, the card ID can be rewritten as required. In addition, the user can use the portable telephone 52 to execute the above-described processes for establishing synchronization in the Piconet.

15 In the above description, memory for storing the card ID and the memory for storing the Bluetooth address are provided. One physical memory shared by the non-contact IC card 246 and the Bluetooth module 247 may store those pieces of information. The shared memory may be incorporated into the memory stick 223 or may be built into the portable telephone 52.

20 In the above description, the personal computer 51 serves as the master, and the portable telephone 52 serves as a slave. Of course either device may perform either role. When a reader/writer is also provided for the portable telephone 52, it is also possible that the portable telephone 52 detects the personal computer 51, and establishes synchronization in the Piconet according to the card ID reported from the non-contact IC card of the personal computer 51.

25 The communication system in which the Bluetooth address is obtained by communication between the non-contact IC card and the reader/writer and synchronization is established in the Piconet

according to the Bluetooth address, can also be applied to various pairs of units, in addition to the pair of the personal computer 51 and the portable telephone 52, described above.

For example, a communication system such as that described above can be formed between a portable terminal, such as the portable telephone 52 or the PDA 53, and an apparatus, such as a TV receiver, a car navigation apparatus, a vending machine, or an ATM (automatic teller machine). In this case, the portable terminal, such as the portable telephone 52 or the PDA 53, needs to have at least a Bluetooth module and a non-contact IC card, and the apparatus, such as a TV receiver, a car navigation apparatus, a vending machine, or an ATM, needs to have at least a Bluetooth module, and a reader/writer for a non-contact IC card.

The present invention can also be applied to processing for establishing synchronization in a Piconet formed of a pair of portable telephones, a pair of PDAs, a PDA and digital camera pair, or a PDA and a digital video camera pair if one of the pair has a reader/writer.

The present invention is not limited to a connection between units. It is also possible for electromagnetic-induction communication blocks (a reader/writer and a non-contact IC card) and Bluetooth modules to be provided, for example, to moving objects, such as automobiles, trains, ships, airplanes, inside buildings or all over a city, and to connect them to networks, such as the Internet, LANs (local area networks), or WANs (wide area networks) through the Bluetooth modules to form a so-called ubiquitous society (ubiquitous network society or ubiquitous computing society).

FIG. 30 is a view showing the concept of a ubiquitous society formed by a communication system to which the present invention is applied.

In the figure, the Internet 354 is connected to access points 351 and 352, servers 355 and 356, and a client PC 357, and various pieces of information can be transmitted and received among them.

The access point 351 is provided with a non-contact IC card 371, a Bluetooth module 372, and a reader/writer 373. When the user of the portable telephone 52 merely brings the portable telephone

52 close to the access point 351, the above-described processing for identifying a partner of communication is performed, and then, the user can access the Internet 354 through Bluetooth.

5 The access point 352 is provided with a reader/writer 381 and a wireless LAN access point 382. Therefore, when the user of a PDA 353 having a built-in non-contact IC card 391 and a wireless LAN client 392 merely brings the PDA 353 close to the access point 352, the above-described processing for identifying a partner of communication is performed, and then the user can access the Internet 354 through a wireless LAN.

10 For example, the user of the portable telephone 52 can easily and at any time obtain desired contents from the server 355, participate in a community developed on the server 356, or operate the client PC 357 located at a remote place just by bringing the portable telephone 52 close to any of the access points 351 installed all over the city.

15 When a unique address similar to a Bluetooth address is assigned to each device, the present invention can be applied to communication made by a wireless LAN (IEEE (Institute of Electrical and Electronics Engineers) 802.11b) performed between the access point 352 and the PDA 353 shown in FIG. 33, in addition to communication done by Bluetooth.

20 Specifically, when an IPv6 (Internet protocol version 6) of 128 bits, for example, set by a PDA 353 is reported to the reader/writer 381 of the access point 352, the user of the PDA 353 can access the Internet 354 through the wireless LAN merely by bringing the PDA 353 close to the access point 352.

 The present invention can also be applied to communication performed, for example, by IrDA, HomeRF (SWAP), or Wireless1394, in addition to communication performed by Bluetooth.

 Instead of the above-described communication method in which electric-power transmission and data transfer are performed by using a loop antenna such as that of a non-contact IC card, any

communication methods may be used in which an output is suppressed and a communication distance is made, in advance, shorter than that of the Bluetooth communication method.

5 As described above, in Bluetooth communication, when synchronization is established, and the partner of communication with which synchronization has been established is a terminal performing communication for the first time, it is usually required to input the same PIN code to both units. However, in a case in which the present invention is applied, and the partner of communication is identified, for example, according to identification information provided by communication which uses electromagnetic induction or the like to make Bluetooth communication ready, PIN-code input may
10 be made unnecessary in advance. In this case, a predetermined PIN code is shared by both terminals, for example, by communication which uses electromagnetic induction.

In a case in which the partner of communication is identified, for example, according to identification information provided by communication which uses electromagnetic induction or the like to make Bluetooth communication ready, settings may be made in advance such that communication is
15 performed according to a predetermined profile. In this case, both terminals share profiles which they themselves can provide by communication which uses electromagnetic induction, and predetermined profiles are selected from the profiles.

Instead of the memory stick 223, described above, any devices having a shape which can be inserted into the predetermined slot may be used. For example, devices conforming to an SD-card (registered
20 trademark) standard and devices conforming to a CF-card (registered trademark) standard may be used instead of the memory stick 223.

In the above-described cases, the reader/writer 105 and the non-contact IC card 246 are individually configured. A device having the functions of both of these devices may be respectively provided to the personal computer 51 and the portable telephone 52. In addition, a device having the functions of
25 both may be stored, for example, in the memory stick 223, described above, to extend the functions of the personal computer 51 and the portable telephone 52.

A unit having a reader/writer (such as the personal computer 51, described above) may store information related to units which have performed Bluetooth communication in the past, as history information. With this, when the Bluetooth address of a nearby unit is reported by communication
5 which uses electromagnetic induction, the nearby unit can be identified by referring to the history information.

For example, the Bluetooth address or Bluetooth device name of a unit, or the category of the unit, described by referring to FIG. 2, or profiles which can be provided by the unit, are stored as history information.

10 The above-described series of processes can be implemented not only by hardware but also by software.

When a series of processes is executed by software, a program constituting the software is installed from a network or recording media onto a computer incorporating special hardware, or onto a unit which can execute various functions by installing various programs, such as a general-purpose personal
15 computer.

The recording media include not only packaged media storing the program and distributed separately from the apparatus to provide the program to users, such as a magnetic disk 101 (including a floppy disk), an optical disk 102 (including a CD-ROM (compact disk read-only memory) or DVD (digital versatile disk)), a magneto-optical disk 103 (including an MD (registered trademark (Mini-disk)),
20 or semiconductor memory 104, as shown in FIG. 11, but also units incorporated in advance into the apparatus and provided to users, such as an HDD 114 or ROM 118 which have the program recorded.

In the present specification, steps describing the program recorded in a recording medium include not only processing executed in a time-sequential manner in the described order, but also processing which is not necessarily executed in a time-sequential manner but is processed in parallel or separately.

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In the present specification, system refers to the entire apparatus formed of a plurality of apparatuses.

INDUSTRIAL APPLICABILITY

As described above, according to a communication system and a communication method of the present invention, the identification information of a nearby communication terminal is acquired by using a first wireless communication block for transmitting electric power and for transmitting and receiving data vis-à-vis a communication terminal by a loop antenna, the attribute information of each of a plurality of communication terminals, which include the communication terminal, is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving data, and a partner of communication is identified by using the identification information and the attribute information. Then, synchronization is established for wireless communication performed by using the identified communication terminal and the second wireless communication block. The identification information of the communication terminal is provided to an information processing apparatus by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, the attribute information of the communication terminal is provided by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and synchronization is established by transmitting and receiving a predetermined signal through the fourth communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block. Therefore, a terminal serving as a partner of communication can be identified, and communication can be started more easily and quickly.

According to a first information processing apparatus, an information processing method, and a program of the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, the attribute information of each of a plurality of communication terminals, which include the communication terminal, is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, and a partner of communication is identified by using the acquired identification information and the attribute information. Synchronization is also established for wireless communication performed by using the identified communication terminal and the second wireless communication block. Therefore, a terminal can be identified as a partner of communication, and communication can be started more easily and quickly.

According to a communication terminal, a communication method, and a program of the present invention, a communication terminal provides its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, and provides its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus. Synchronization is also established by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by using the second wireless communication block. Therefore, communication can be started more easily and quickly.

According to a first extension apparatus of the present invention, identification information is acquired from a communication terminal by using a first wireless communication block electrically connected to an information processing apparatus, and for transmitting and receiving predetermined data, and attribute information for each of a plurality of communication terminals is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data. A partner of communication is identified by using the acquired identification information and the attribute information acquired from the plurality of communication terminals, and synchronization is established for wireless communication performed by using the identified communication terminal and the second wireless communication block. Therefore, even when first and second wireless communication blocks are not provided to the information processing apparatus, the functions thereof can be added by the first extension apparatus, and communication can be started more easily and quickly.

According to a second extension apparatus of the present invention, a communication terminal provides its own identification information by using a connection terminal electrically connected to a communication terminal for transmitting and receiving data, and a first wireless communication block for transmitting and receiving predetermined data, in response to a request sent from an information processing apparatus, and provides its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus. Then, synchronization is established by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block. Therefore, even when first

and second wireless communication blocks are not provided to the information processing apparatus, the functions thereof can be added by the second extension apparatus, and communication can be started more easily and quickly.

5 According to a second information processing apparatus of the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, information related to a plurality of communication terminals with which communication has been performed, by using a second wireless communication block for transmitting and receiving desired data, is stored as history information, and a partner of communication is identified by using the acquired identification information and history
10 information. Synchronization is also established for wireless communication performed by using the identified communication terminal and the second wireless communication block. Therefore, communication performed by using the second wireless communication block can be easily started without obtaining information related to communication units with which communication has been performed in the past.

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Claims

1. A communication system in a ubiquitous network, comprising an information processing apparatus and a plurality of communication terminals, characterized in that

the information processing apparatus is provided with:

a first acquisition means for acquiring distinguishing information for a communication terminal, by use of a first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, the nearby communication terminal by means of a loop antenna;

a second acquisition means for acquiring attribute information for each of a plurality of communication terminals from the plurality of communication terminals, including the communication terminal, by use of a second wireless communication unit for transmitting and receiving data;

an identification means for identifying a communication partner by using the distinguishing information obtained from the first acquisition means and the attribute information obtained from the second acquisition means; and,

a first synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and the second wireless communication unit;

and the communication terminals are provided with:

a first providing means for providing one's own distinguishing information to the information processing apparatus, by use of at least some of the induced electric power obtained via a loop antenna and a third wireless communication unit for transmitting and receiving data;

a second providing means for providing one's own attribute information, by use of a fourth wireless communication unit for transmitting and receiving data, in response to a request from the information processing apparatus sent via the second wireless communication unit; and,

a second synchronization-establishment means for transmitting and receiving predetermined signals and establishing synchronization via the fourth wireless communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.

2. A communication method for a communication system in a ubiquitous network, comprising an information processing apparatus and a plurality of communication terminals, characterized in that

the information processing method for the information processing apparatus is provided with:

5 a first acquisition step of acquiring distinguishing information for a communication terminal, by use of a first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, the nearby communication terminal by means of a loop antenna;

10 a second acquisition step of acquiring attribute information for each of the plurality of communication terminals from the plurality of communication terminals, including the communication terminal, by use of the second wireless communication unit for transmitting and receiving data;

an identification step for identifying a communication partner by using the distinguishing information obtained from the first acquisition step and the attribute information obtained from the second acquisition step; and,

15 a first synchronization-establishment step for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification step and the second wireless communication unit;

and the information processing method for the communication terminals is provided with:

20 a first providing step of providing one's own distinguishing information to the information processing apparatus, by use of at least some of the induced electric power obtained via a loop antenna and a third wireless communication unit for transmitting and receiving data;

25 a second providing step of providing one's own attribute information by use of a fourth wireless communication unit for transmitting and receiving data, in response to a request from the information processing apparatus sent via the second wireless communication unit; and,

30 a second synchronization-establishment step for transmitting and receiving predetermined signals and establishing synchronization via the fourth communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.

3. An information processing apparatus characterized in being provided with:

35 a first acquisition means for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;

- a second acquisition means for acquiring attribute information from each of a plurality of communication terminals, including the communication terminal, by use of a second wireless communication unit for transmitting and receiving desired data;
- 5 an identification means for identifying a communication partner by using the distinguishing information obtained by the first acquisition means and the attribute information obtained by the second acquisition means; and,
- 10 a synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and second wireless communication unit.
4. The information processing apparatus of claim 3, characterized in that the distance over which the first wireless communication unit is capable of communicating wirelessly is shorter than the distance over which
- 15 the second wireless communication unit is capable of communicating wirelessly.
5. The information processing apparatus of claim 3, characterized in that the first acquisition means acquires the distinguishing information for the communication terminal by use of the first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, the nearby
- 20 communication terminal by means of a loop antenna.
6. The information processing apparatus of claim 3, characterized in that the attribute information includes address information that makes it possible to distinguish each of the plurality of communication terminals, and information about the clock that the communication terminal manages.
- 25 7. The information processing apparatus of claim 3, characterized in being further provided with an initiation means for initiating the second wireless communication unit in response to the first acquisition means having obtained the distinguishing information.
- 30 8. The information processing apparatus of claim 3, characterized in that
- the distinguishing information includes at least a Bluetooth address for the communication terminal;
- 35 by way of the second acquisition means, the plurality of communication terminals each acquire a plurality of responding FHS packets in response to IQ packets sent by use of the second wireless communication unit; and,
- 40 by way of the synchronization-establishment means, [the information process apparatus] sends ID packets. by use of the second wireless communication unit, to the communication terminal identified

by the identification means, and when there is a response from the communication terminal to an ID packet that was sent, [the information process apparatus] further sends its own FHS packet.

9. An information processing method characterized by being provided with

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a first acquisition step of acquiring distinguishing information from a communication terminal by use of a first wireless communication unit for transmitting and receiving predetermined data;

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a second acquisition step of acquiring attribute information for each of the plurality of communication terminals from the plurality of communication terminals, including the communication terminal, by use of a second wireless communication unit for transmitting and receiving desired data;

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an identification step for identifying a communication partner using the distinguishing information obtained by the first acquisition step and the attribute information obtained by the second acquisition step; and

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a synchronization-establishment step for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification step and the second wireless communication unit.

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10. The information processing method of claim 9 characterized in that the distance over which the first wireless communication unit is capable of communicating wirelessly is shorter than the distance over which the second wireless communication unit is capable of communicating wirelessly.

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11. The information processing method of claim 9 characterized in that the first acquisition step acquires the distinguishing information for the communication terminal by use of the first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, a nearby communication terminal by means of a loop antenna.

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12. The information processing method of claim 9 characterized in that the attribute information includes address information that makes it possible to distinguish each of the plurality of communication terminals, and information about the clock that the communication terminal manages.

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13. The information processing method of claim 9 characterized in that

in the second acquisition step, the plurality of communication terminals each acquire a plurality of responding FHS packets in response to IQ packets sent by use of the second wireless communication unit; and

in the synchronization-establishment step, ID packets are sent, by use of the second wireless communication unit, to the communication terminal identified in the identification step, and when there is a response from the communication terminal to the ID packet that was sent, [the information process apparatus] further sends its own FHS packet.

5

14. A communication terminal characterized by being provided with

10 a first providing means for providing one's own distinguishing information in response to a predetermined request from an information processing apparatus, by use of a first wireless communication unit for transmitting and receiving predetermined data;

a second providing means for providing one's own attribute information in response to a predetermined request from the information processing apparatus, by use of a second wireless communication unit for transmitting and receiving data; and

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a synchronization-establishment means for transmitting and receiving predetermined signals and establishing synchronization via the second wireless communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.

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15. The communication terminal of claim 14 characterized in that the distance over which the first wireless communication unit is capable of communicating wirelessly is shorter than the distance over which the second wireless communication unit is capable of communicating wirelessly.

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16. The communication terminal of claim 14 characterized in that the first providing means provides one's own distinguishing information in response to a predetermined request from the information processing apparatus, by use of a first wireless communication unit that uses at least some of the induced electric power obtained via a loop antenna.

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17. The communication terminal of claim 14 characterized in that the attribute information includes at least address information that can distinguish one's own terminal.

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18. The communication terminal of claim 17 characterized in that the distinguishing information includes at least the address information and information for the clock managed by the communication terminal.

19. The communication terminal of claim 14 characterized in being further provided with an initiation means for initiating the second wireless communication unit in response to the first providing means providing the

distinguishing information.

20. The communication terminal of claim 14 characterized in that

5 the distinguishing information includes at least Bluetooth address information;

by way of the second providing means an FHS packet is returned in response to an IQ packet received using the second wireless communication unit; and,

10 by way of the synchronization-establishment means, in response to an ID packet received using the second wireless communication unit the ID packet is returned, and when an FHS packet is then received the ID packet is sent again.

21. A communication method characterized by being provided with

15 a first providing step for providing one's own distinguishing information in response to a predetermined request from an information processing apparatus by use of a first wireless communication unit for transmitting and receiving predetermined data ;

20 a second providing step for providing one's own attribute information in response to a predetermined request from the information processing apparatus by use of a second wireless communication unit for transmitting and receiving data;

25 a synchronization-establishment step for transmitting and receiving predetermined signals and establishing synchronization via a second wireless communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using a second wireless communication unit.

30 22. The communication method of claim 21 characterized in that in the first providing step [the communication terminal] provides its own distinguishing information in response to a predetermined request from an information processing apparatus by use of a first wireless communication unit for transmitting and receiving data that uses at least some of the induced electric power obtained via a loop antenna.

35 23. The communication method of claim 21 characterized in that the distinguishing information includes at least address information distinguishing one's own terminal.

40 24. The communication method of claim 23 characterized in that the attribute information includes the address information and information about the clock that the communication terminal manages.

25. The communication method of claim 21 characterized in being further provided with an initiation step for initiating the second wireless communication unit in response to the first providing step providing the

distinguishing information.

26. The communication method of claim 21 characterized in that

- 5 the distinguishing information includes at least Bluetooth address information;
- by way of the second providing step an FHS packet is returned in response to an IQ packet received using the second wireless communication unit; and,
- 10 by way of the synchronization-establishment step, in response to an ID packet received by use of the second wireless communication unit the ID packet is returned, and when an FHS packet is then received, the ID packet is sent again.

27. An extension device characterized by being provided with

- 15 a connecting terminal for the purpose of receiving data, electrically connected to the information processing apparatus;
- 20 a first acquisition means for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;
- 25 a second acquisition means for acquiring attribute information from each of a plurality of a communication terminals, by use of a second wireless communication unit for transmitting and receiving desired data; and
- 30 a synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and the second wireless communication unit.

28. An extension device capable of being installed in a communication terminal, characterized by being provided with

- 35 a connecting terminal for the purpose of receiving data, electrically connected to the communication terminal;
- 40 a first providing means for providing one's own distinguishing information, in response to a request from an information processing apparatus, by use of a first wireless communication unit for transmitting and receiving predetermined data;
- 45 a second providing means for providing one's own attribute information in response to a request from the information processing apparatus, by use of a second wireless communication unit for transmitting and receiving data; and

5 a synchronization-establishment means for transmitting and receiving predetermined signals and establishing synchronization via the second wireless communication unit in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.

29. A program that causes the information processing apparatus to execute

10 a first acquisition step for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;

15 a second acquisition step for acquiring attribute information for each of the plurality of wireless terminals from the plurality of wireless terminals, including the wireless terminal, by use of a second wireless communication unit for transmitting and receiving desired data;

an identification step for identifying a communication partner by using the distinguishing information obtained from the first acquisition step and the attribute information obtained from the second acquisition step; and,

20 a synchronization-establishment step for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification step and the second wireless communication unit.

25 30. A program that causes a communication terminal to execute

a first providing step for providing one's own distinguishing information in response to a predetermined request from an information processing apparatus, by use of a first wireless communication unit for transmitting and receiving predetermined data;

30 a second providing step for providing one's own attribute information in response to a predetermined request from the information processing apparatus, by use of a second wireless communication unit for transmitting and receiving data; and,

35 a synchronization-establishment step for transmitting and receiving predetermined signals and establishing synchronization via the second wireless communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.

40 31. An information processing apparatus characterized by being provided with

a first acquisition means for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;

- 5 a recording means for recording, as history information, information pertaining to a plurality of communication terminals with which communication has been performed by use of the second wireless communication unit for transmitting and receiving desired data;
- an identification means for identifying a communication partner by using the distinguishing information obtained by the first acquisitions means and the history information; and,
- 10 a synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and the second wireless communication unit.
32. The information processing apparatus of claim 31 characterized in that
- 15 the history information includes at least Bluetooth address information; and
- by way of the synchronization-establishment means, the information processing apparatus sends ID packets generated on the basis of the Bluetooth address information to the communication terminal identified by the identification means, by use of the second wireless communication unit, and when
- 20 there is a response from the communication terminal to an ID packet that was sent, [the information process apparatus] further sends its own FHS packet.

Amended Claims

[November 7, 2002 (11/07/02), International Bureau, Receiving Office: Claims 1, 2, 3, 9, 27, 29, 30, and 31 of the application have been amended; new claims 33 and 34 have been added; the remaining claims are unaltered (7 pages)]

1. (Amended) A communication system in a ubiquitous network, comprising an information processing apparatus and a plurality of communication terminals, characterized in that
 - the information processing apparatus is provided with:
 - a first acquisition means for acquiring distinguishing information for a communication partner, by use of a first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, the nearby communication terminal by means of a loop antenna;
 - a second acquisition means for acquiring attribute information for each of a plurality of communication terminals from the plurality of communication terminals, including the communication terminal, by use of a second wireless communication unit for transmitting and receiving data;
 - an identification means for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition means; and,
 - a first synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and the second wireless communication unit;
 - and the communication terminals are provided with:
 - a first providing means for providing one's own distinguishing information to the information processing apparatus, by use of at least some of the induced electric power obtained via a loop antenna and a third wireless communication unit for transmitting and receiving data;
 - a second providing means for providing one's own attribute information, by use of a fourth wireless communication unit for transmitting and receiving data, in response to a request from the information processing apparatus sent via the second wireless communication unit; and,
 - a second synchronization-establishment means for transmitting and receiving predetermined signals and establishing synchronization via the fourth wireless communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.
2. (Amended) A communication method for a communication system in a ubiquitous network, comprising

an information processing apparatus and a plurality of communication terminals, characterized in that the information processing method for the information processing apparatus is provided with:

5 a first acquisition step of acquiring distinguishing information for a communication terminal, by use of a first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, the nearby communication terminal by means of a loop antenna;

10 a second acquisition step of acquiring attribute information for each of the plurality of communication terminals from the plurality of communication terminals, including the communication terminal, by use of the second wireless communication unit for transmitting and receiving data;

an identification step for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition step; and,

15

a first synchronization-establishment step for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification step and the second wireless communication unit;

20

and the information processing method for the communication terminals is provided with:

a first providing step of providing one's own distinguishing information to the information processing apparatus, using a third wireless communication unit for transmitting and receiving data that uses at least some induced electric power obtained via a loop antenna;

25

a second providing step of providing one's own attribute information, by use of a fourth wireless communication unit for transmitting and receiving data, in response to a request from the information processing apparatus sent via the second wireless communication unit; and,

30

a second synchronization-establishment step for transmitting and receiving predetermined signals and establishing synchronization via the fourth communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.

35

3. (Amended) An information processing apparatus characterized by being provided with:

a first acquisition means for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;

40

a second acquisition means for acquiring attribute information from each of a plurality of communication terminals, including the communication terminal, by use of a second wireless communication unit for

transmitting and receiving desired data;

an identification means for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition means; and,

a synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and second wireless communication unit.

4. The information processing apparatus of claim 3, characterized in that the distance over which the first wireless communication unit is capable of communicating wirelessly is shorter than the distance over which the second wireless communication unit is capable of communicating wirelessly.

5. The information processing apparatus of claim 3, characterized in that the first acquisition means acquires the distinguishing information for the communication terminal by use of the first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, the nearby communication terminal by means of a loop antenna.

6. The information processing apparatus of claim 3, characterized in that the attribute information includes address information that makes it possible to distinguish each of the plurality of communication terminals, and information about the clock that the communication terminal manages.

7. The information processing apparatus of claim 3, characterized in being further provided with an initiation means for initiating the second wireless communication unit in response to the first acquisition means having obtained the distinguishing information.

8. The information processing apparatus of claim 3, characterized in that

the distinguishing information includes at least a Bluetooth address for the communication terminal;

by way of the second acquisition means, the plurality of communication terminals each acquire a plurality of responding FHS packets in response to IQ packets sent by use of the second wireless communication unit; and,

by way of the synchronization-establishment means, [the information process apparatus] sends ID packets. by use of the second wireless communication unit, to the communication terminal identified

by the identification means, and when there is a response from the communication terminal to an ID packet that was sent, [the information process apparatus] further sends its own FHS packet.

- 5 9. (Amended) An information processing method characterized by being provided with
- a first acquisition step of acquiring distinguishing information from a communication terminal by use of a first wireless communication unit for transmitting and receiving predetermined data;
- 10 a second acquisition step of acquiring attribute information for each of the plurality of communication terminals from the plurality of communication terminals, including the communication terminal, by use of a second wireless communication unit for transmitting and receiving desired data;
- an identification step for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition means; and,
- 15 a synchronization-establishment step for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification step and the second wireless communication unit.
- 20 10. The information processing method of claim 9 characterized in that the distance over which the first wireless communication unit is capable of communicating wirelessly is shorter than the distance over which the second wireless communication unit is capable of communicating wirelessly.
- 25 11. The information processing method of claim 9 characterized in that the first acquisition step acquires the distinguishing information for the communication terminal by use of the first wireless communication unit for transmitting power to, and transmitting and receiving data to and from, a nearby communication terminal by means of a loop antenna.
- 30 12. The information processing method of claim 9 characterized in that the attribute information includes address information that makes it possible to distinguish each of the plurality of communication terminals, and information about the clock that the communication terminal manages.
- 35 13. The information processing method of claim 9 characterized in that
- in the second acquisition step, the plurality of communication terminals each acquire a plurality of responding FHS packets in response to IQ packets sent by use of the second wireless communication unit; and
- 40 in the synchronization-establishment step, ID packets are sent, by use of the second wireless communication unit, to the communication terminal identified in the identification step, and when there

is a response from the communication terminal to an ID packet that was sent, [the information process apparatus] further sends its own FHS packet.

26. The communication method of claim 21 characterized in that

the distinguishing information includes at least Bluetooth address information;

by way of the second providing step, an FHS packet is returned in response to an IQ packet received by use of the second wireless communication unit; and,

by way of the synchronization-establishment step, in response to an ID packet received by use of the second wireless communication unit the ID packet is returned, and when an FHS packet is then received the ID packet is sent again.

27. (Amended) An extension device characterized by being provided with

a connecting terminal for the purpose of receiving data, electrically connected to the information processing apparatus;

a first acquisition means for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;

a second acquisition means for acquiring attribute information for each of a plurality of a communication terminals from the plurality of communication terminals, by use of a second wireless communication unit for transmitting and receiving desired data;

an identification means for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition means; and,

a synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and the second wireless communication unit.

28. An extension device capable of being installed in a communication terminal, characterized by being provided with

a connecting terminal for the purpose of receiving data, electrically connected to the communication terminal;

a first providing means for providing one's own distinguishing information, in response to a request from an information processing apparatus, by use of a first wireless communication unit for transmitting and receiving predetermined data;

- a second providing means for providing one's own attribute information in response to a request from an information processing apparatus, by use of a second wireless communication unit for transmitting and receiving data; and
- 5 a synchronization-establishment means for transmitting and receiving predetermined signals and establishing synchronization in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.
- 10 29. (Amended) A program that causes the information processing apparatus to execute
- a first acquisition step for acquiring distinguishing information from a communication terminal, by use of a first wireless communication unit for transmitting and receiving predetermined data;
- 15 a second acquisition step for acquiring attribute information for each of the plurality of wireless terminals from the plurality of wireless terminals, including the wireless terminal, by use of a second wireless communication unit for transmitting and receiving desired data;
- 20 an identification step for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition means; and,
- 25 a synchronization-establishment step for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification step and the second wireless communication unit.
30. (Amended) A program that causes a communication terminal to execute
- 30 a first providing step for providing one's own distinguishing information in response to a predetermined request from an information processing apparatus, by use of a first wireless communication unit for transmitting and receiving predetermined data;
- 35 a second providing step for providing one's own attribute information in response to a predetermined request from the information processing apparatus, by use of a second wireless communication unit for transmitting and receiving data; and,
- 40 a synchronization-establishment step for transmitting and receiving predetermined signals and establishing synchronization via the second wireless communication unit, in response to a request from the information processing apparatus when synchronization has been established for wireless communication using the second wireless communication unit.
31. (Amended) An information processing apparatus characterized by being provided with
- a first acquisition means for acquiring distinguishing information from a communication terminal, by use

of a first wireless communication unit for transmitting and receiving predetermined data;

5 a recording means for recording, as history information, information pertaining to a plurality of communication terminals with which communication has been performed by use of the second wireless communication unit for transmitting and receiving desired data;

10 an identification means for retrieving the attribute information acquired by the second acquisition means and identifying, as a communication partner, a communication terminal having the distinguishing information obtained from the first acquisition means; and,

a synchronization-establishment means for establishing synchronization for the purpose of performing wireless communication using the communication terminal identified by the identification means and the second wireless communication unit.

15 32. The information processing apparatus of claim 31 characterized in that

the history information includes at least Bluetooth address information; and

20 by way of the synchronization-establishment means, the information processing apparatus sends ID packets generated on the basis of the Bluetooth address information, by use of the second wireless communication unit, to the communication terminal identified by the identification means, and when there is a response from the communication terminal to an ID packet that was sent, [the information processing apparatus] further sends its own FHS packet.

25 33. (Added) The information processing apparatus of claim 3 characterized in that

the first acquisition means operates when a communication terminal is detected nearby, based on a change in load for the first wireless communication unit.

30 34. (Added) The information processing apparatus of claim 9 characterized in that

a process based on the first acquisition step executes when a communication terminal is detected, based on a change in load for the first wireless communication unit.

Written Explanation Based on the Provisions of PCT Article 19

5 Claims 1-3, 9, 27, and 29 are based on Fig. 21 and wording in lines 16-22 on page 41 of the specification which describe step S105 of Fig. 21. The amendments clarify that attribute information obtained from communication using a second wireless communication unit is detected, and from among those communication terminals that have provided attribute information, a communication terminal having distinguishing information obtained using a first wireless communication unit is identified as a communication partner.

10

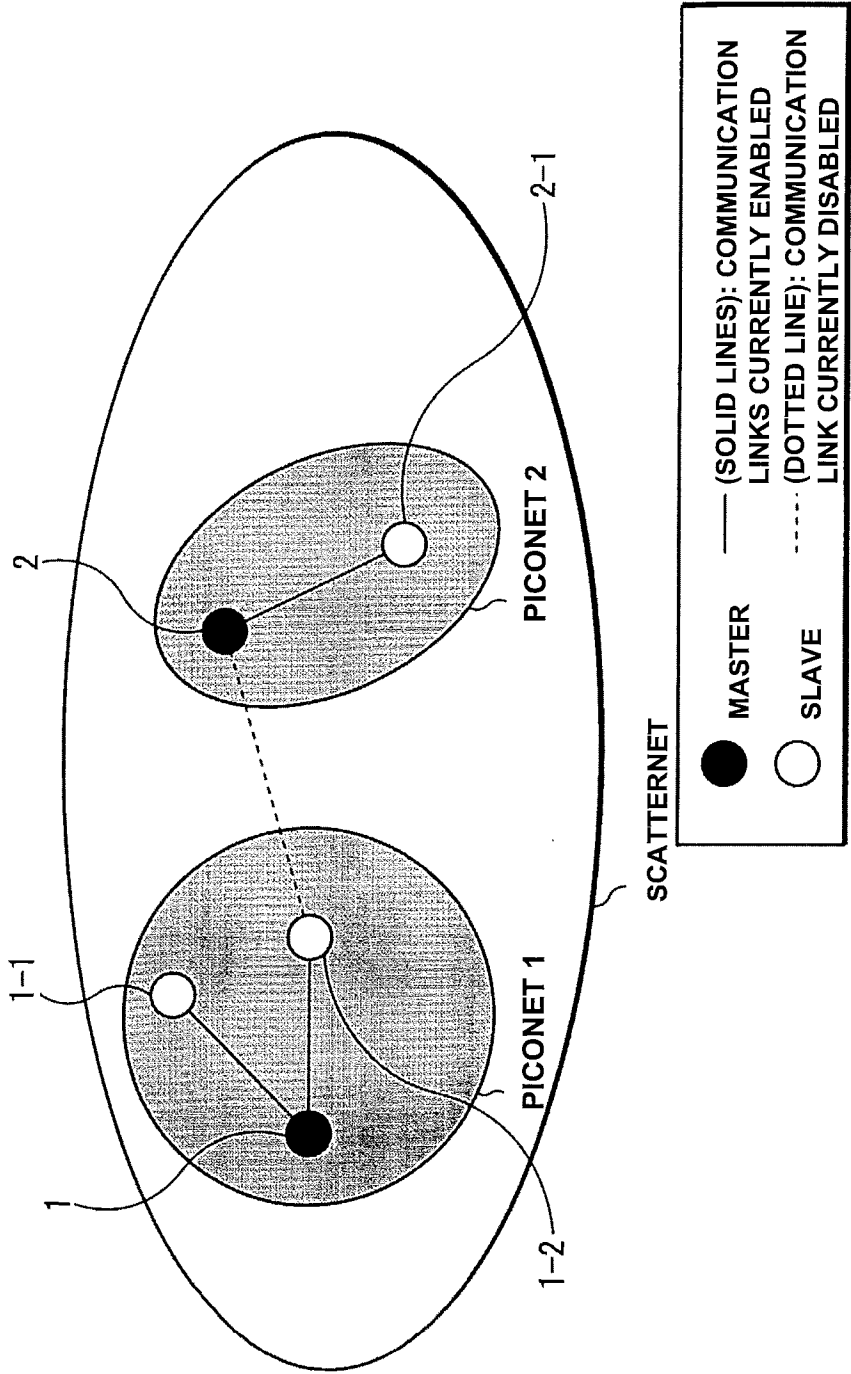
This particular configuration is not disclosed in any of the cited documents. For example, Patent Application No. 2001-156704 discloses listing terminals able to communicate and starting wireless communication with a communication terminal selected for connection, but the user is required to select a predetermined terminal from among the terminals listed (statements in paragraphs [0025], [0039], [0049], 15 [0060], and [0070]).

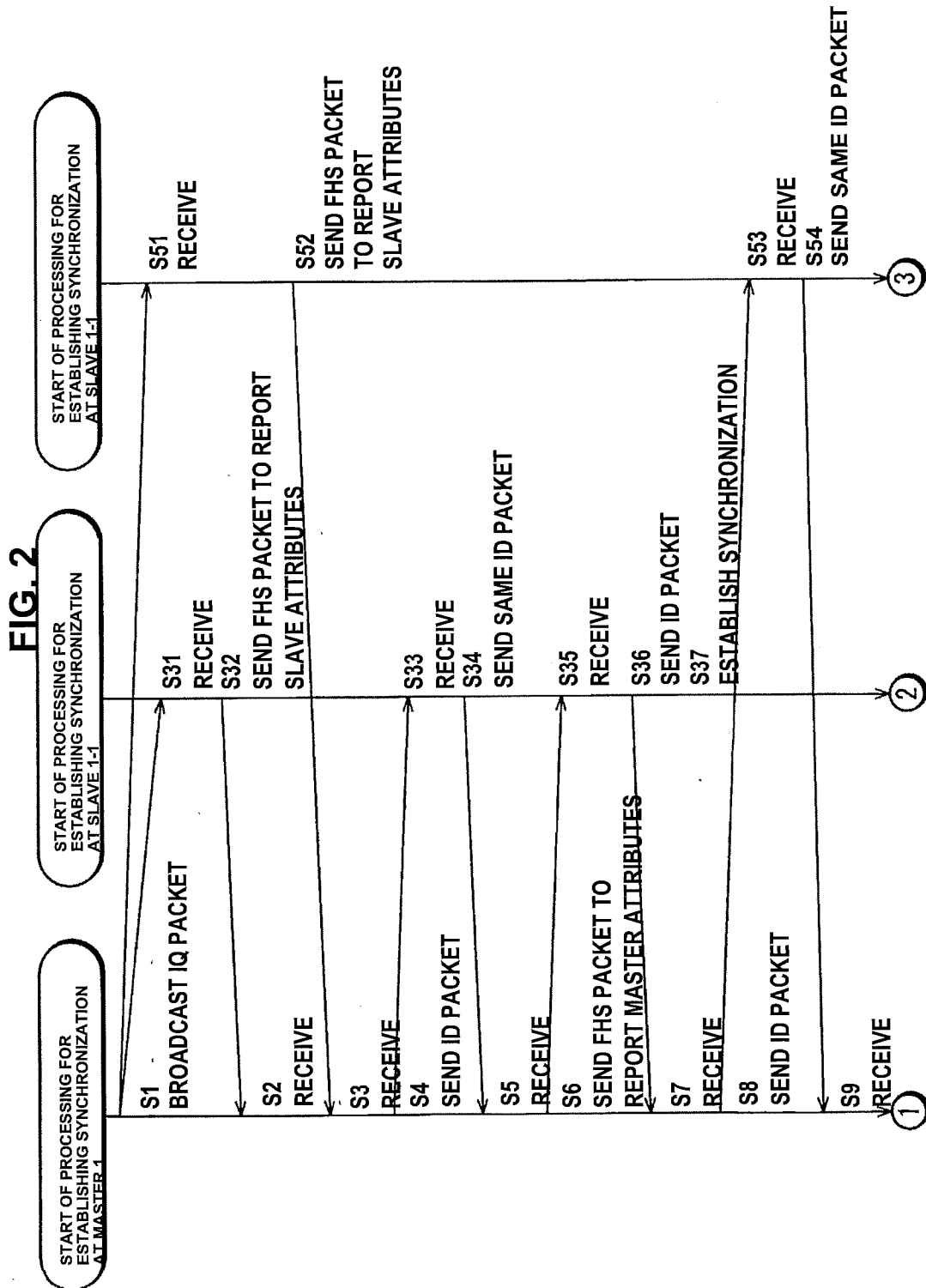
The present invention has the effect of being able to start communication with a terminal merely by bring it into proximity, without the user selecting the terminal as a communication partner.

20

Note, the addition of claims 33 and 34 is based on statements on page 27 of the specification, lines 16-19.

FIG. 1





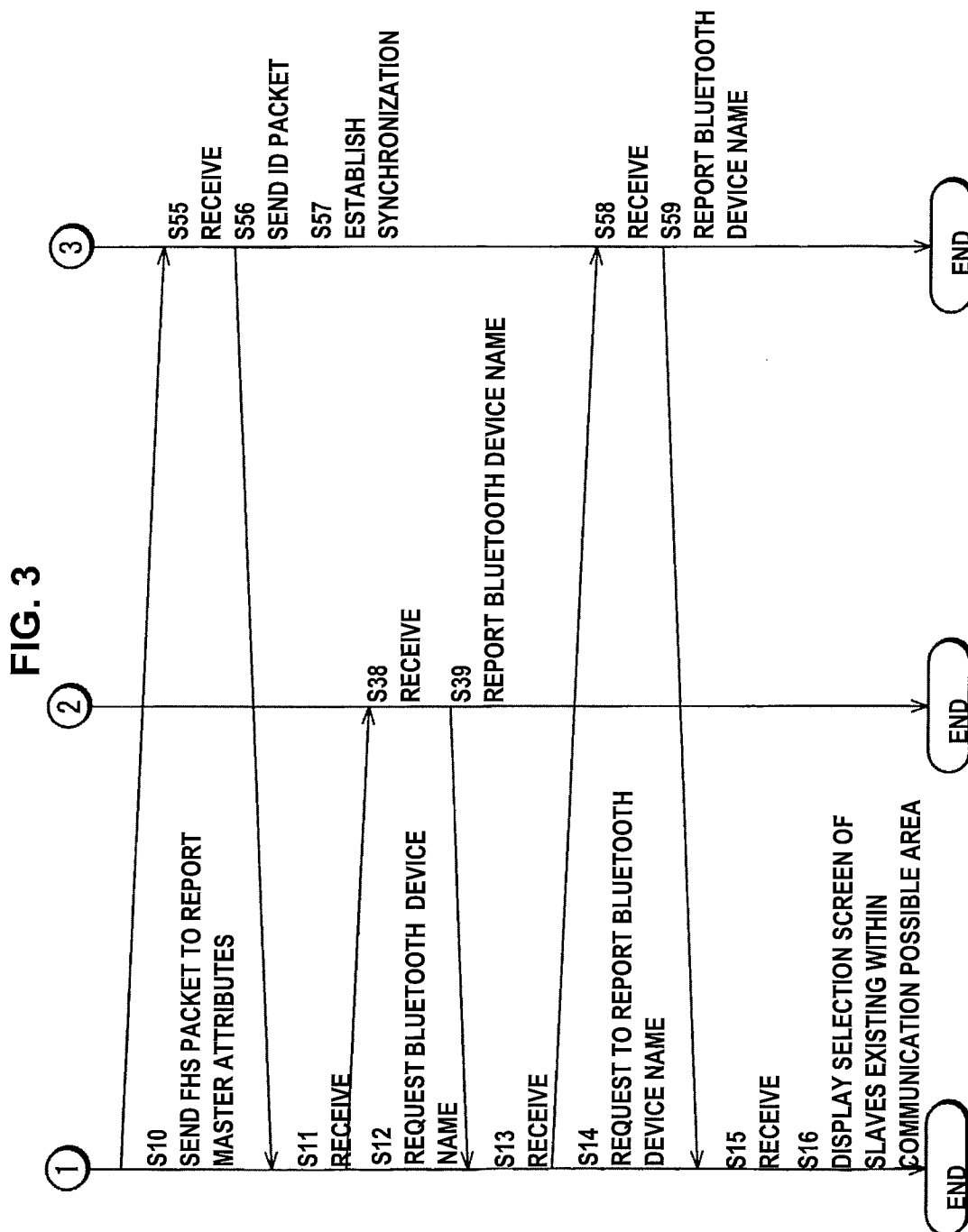


FIG. 4

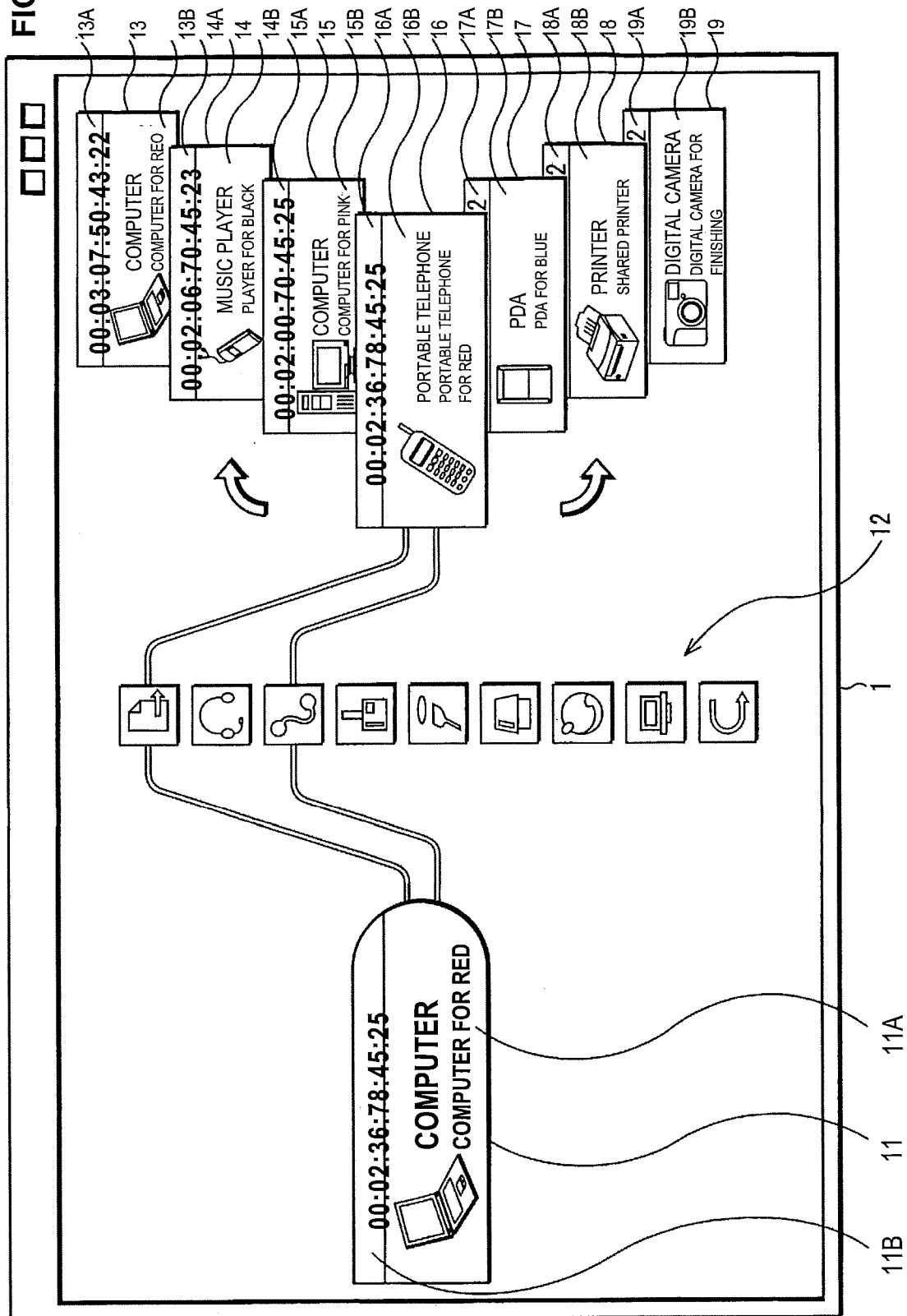


FIG. 5

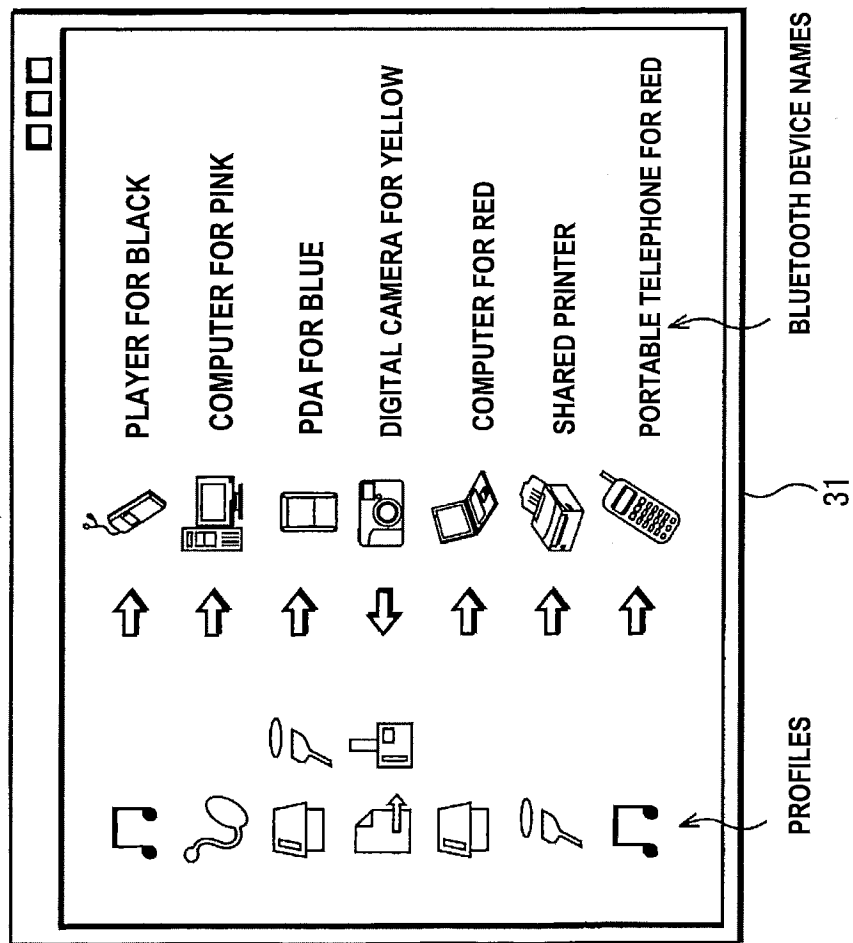


FIG. 6

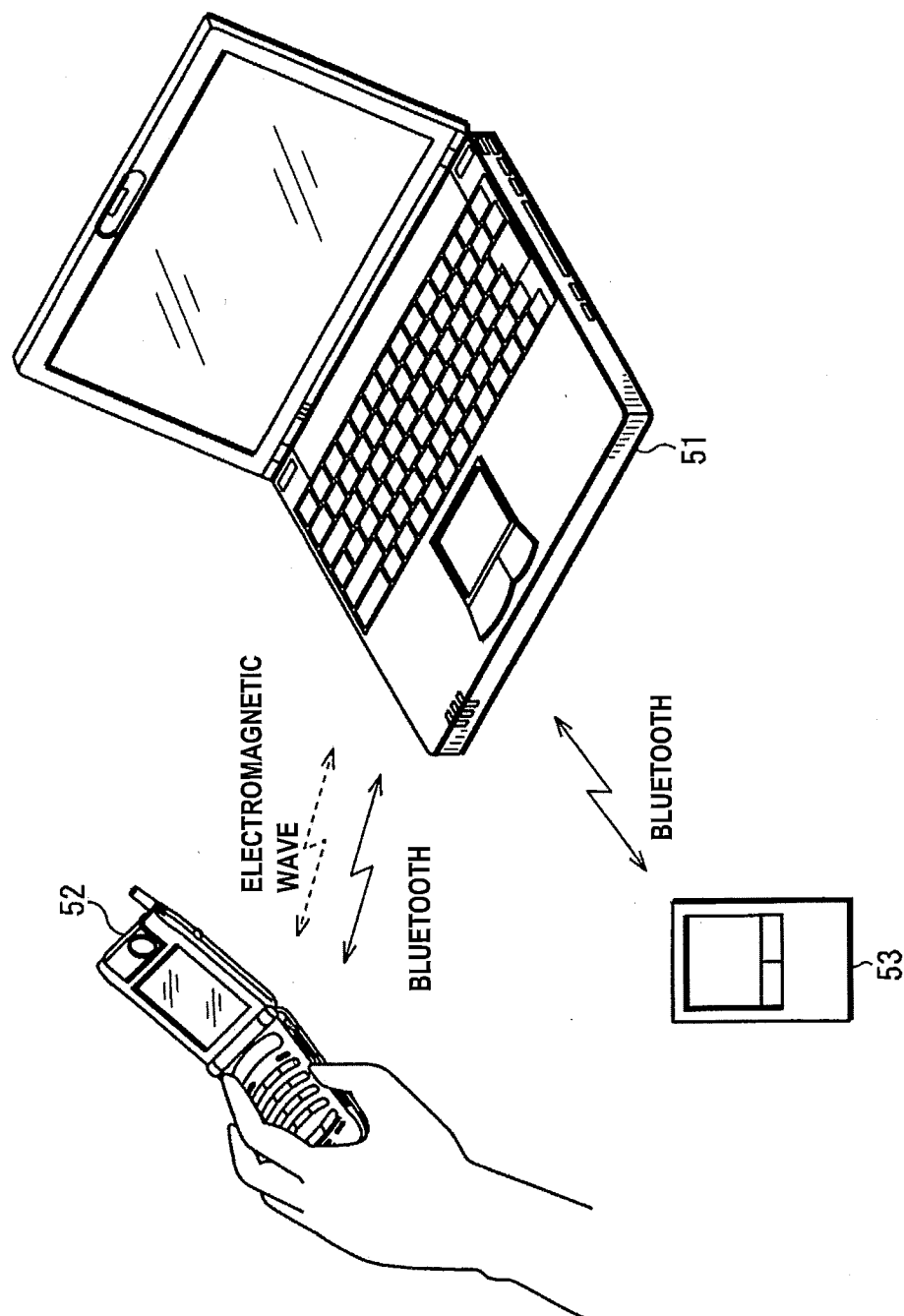


FIG. 7

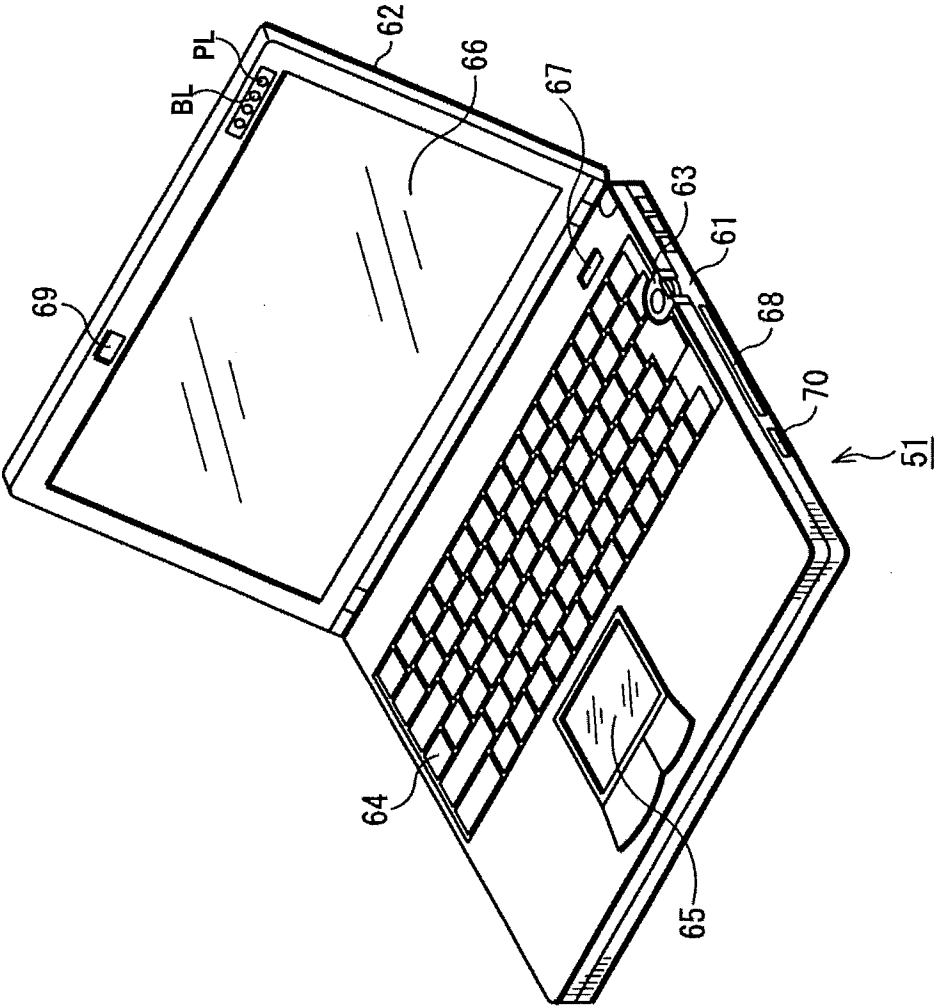


FIG. 8

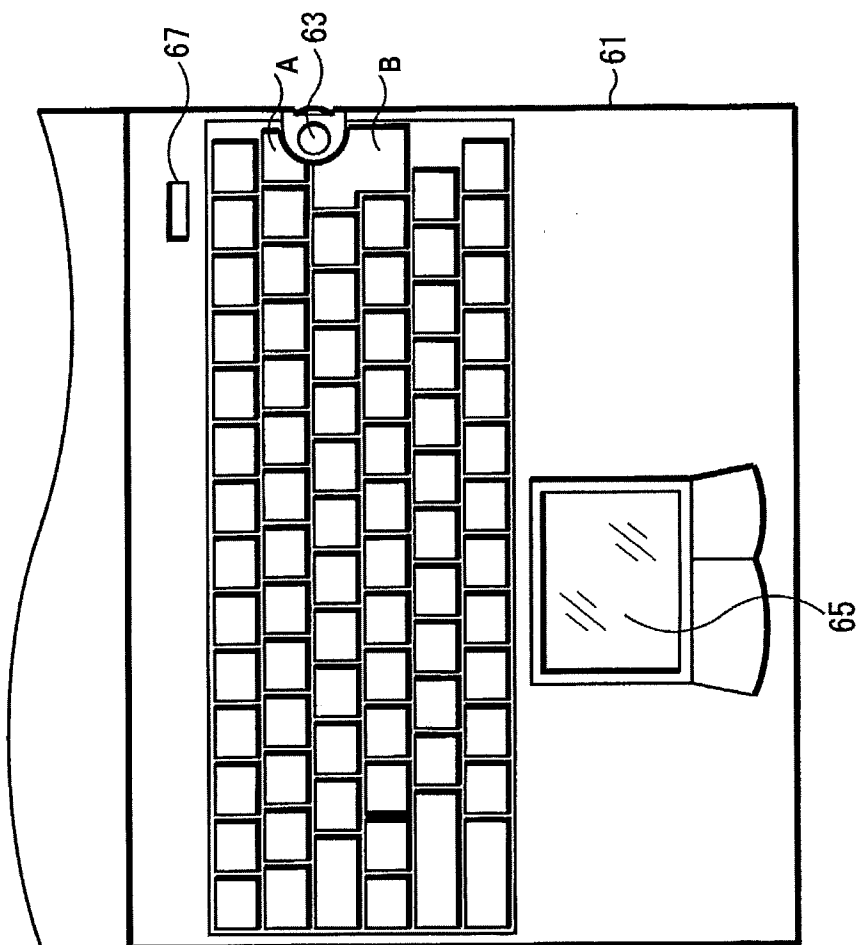


FIG. 9

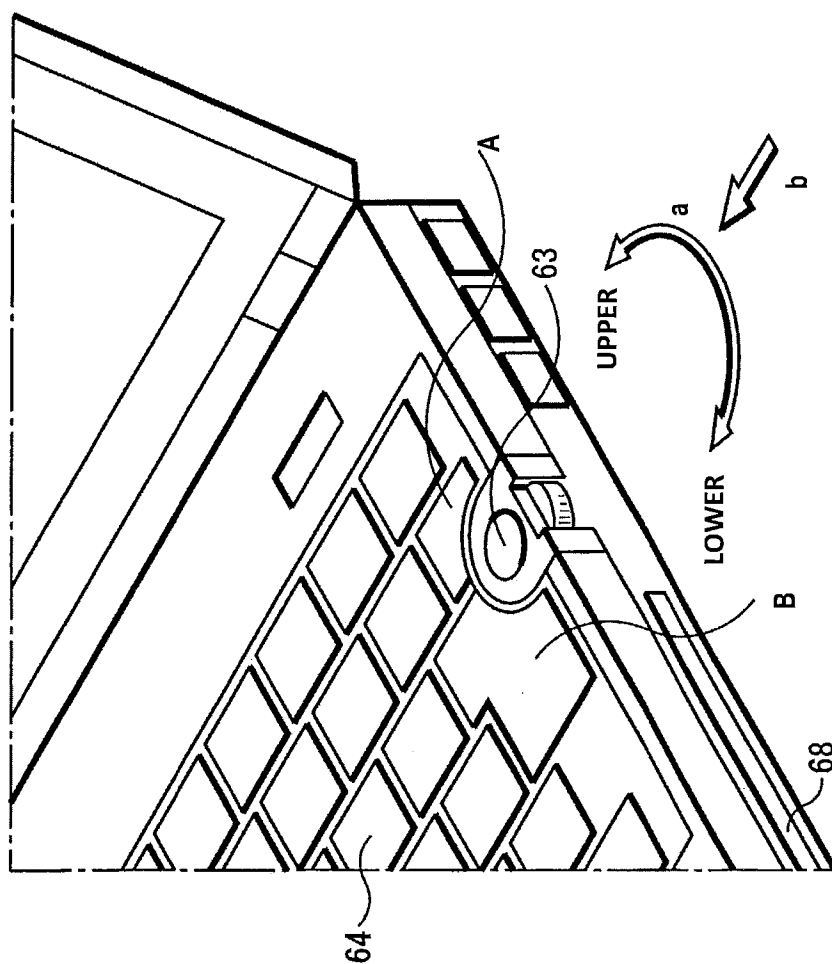


FIG. 10

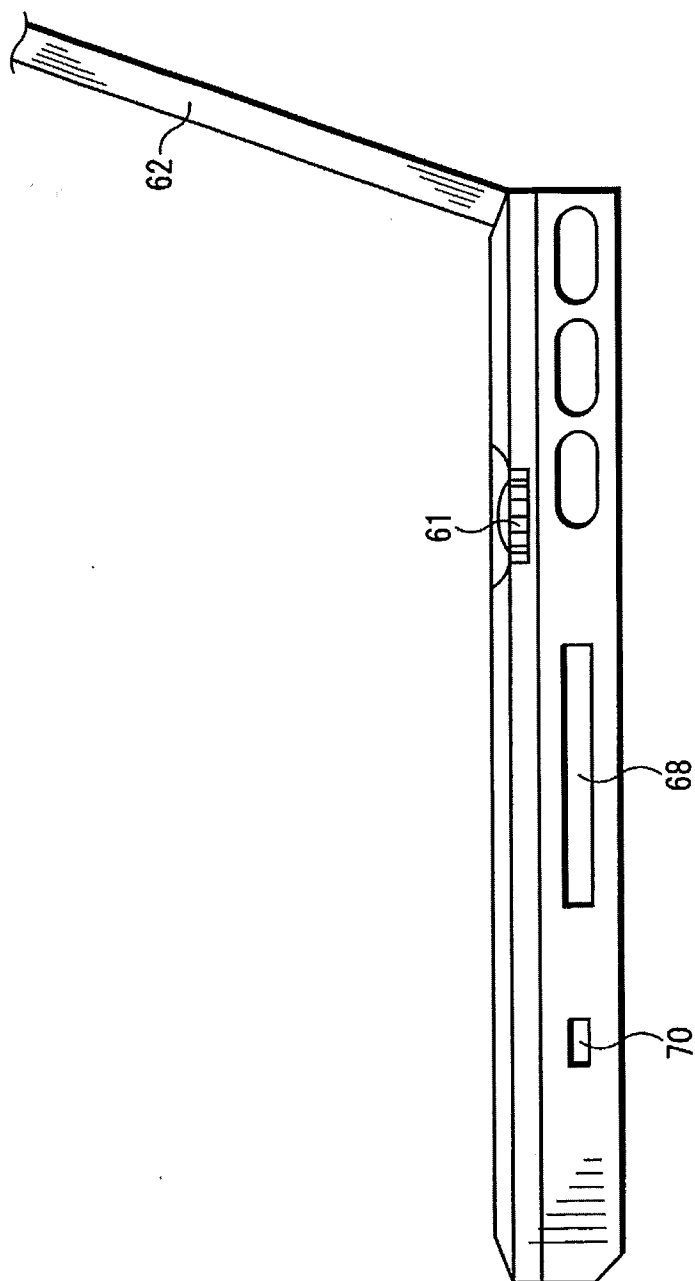


FIG. 11

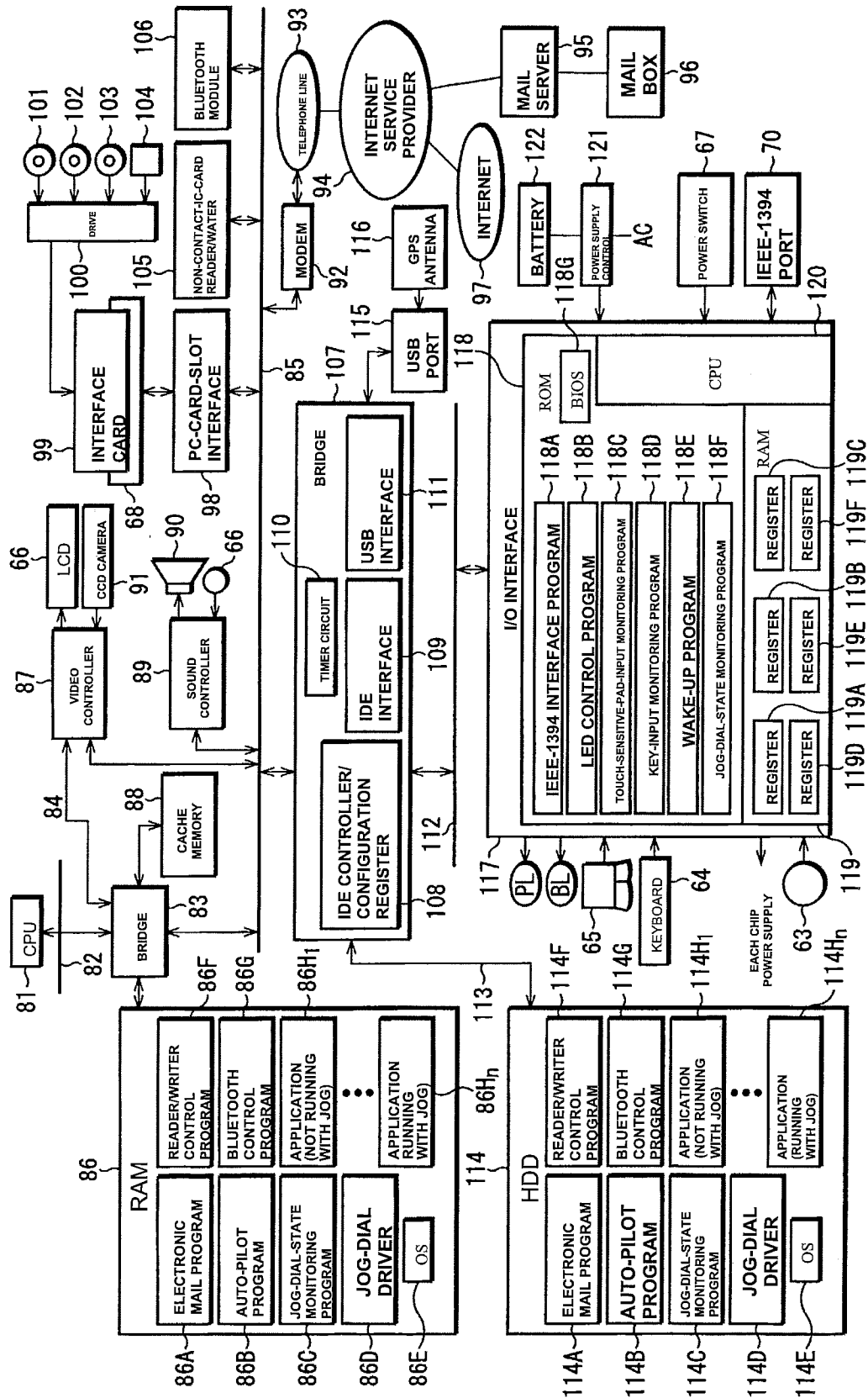
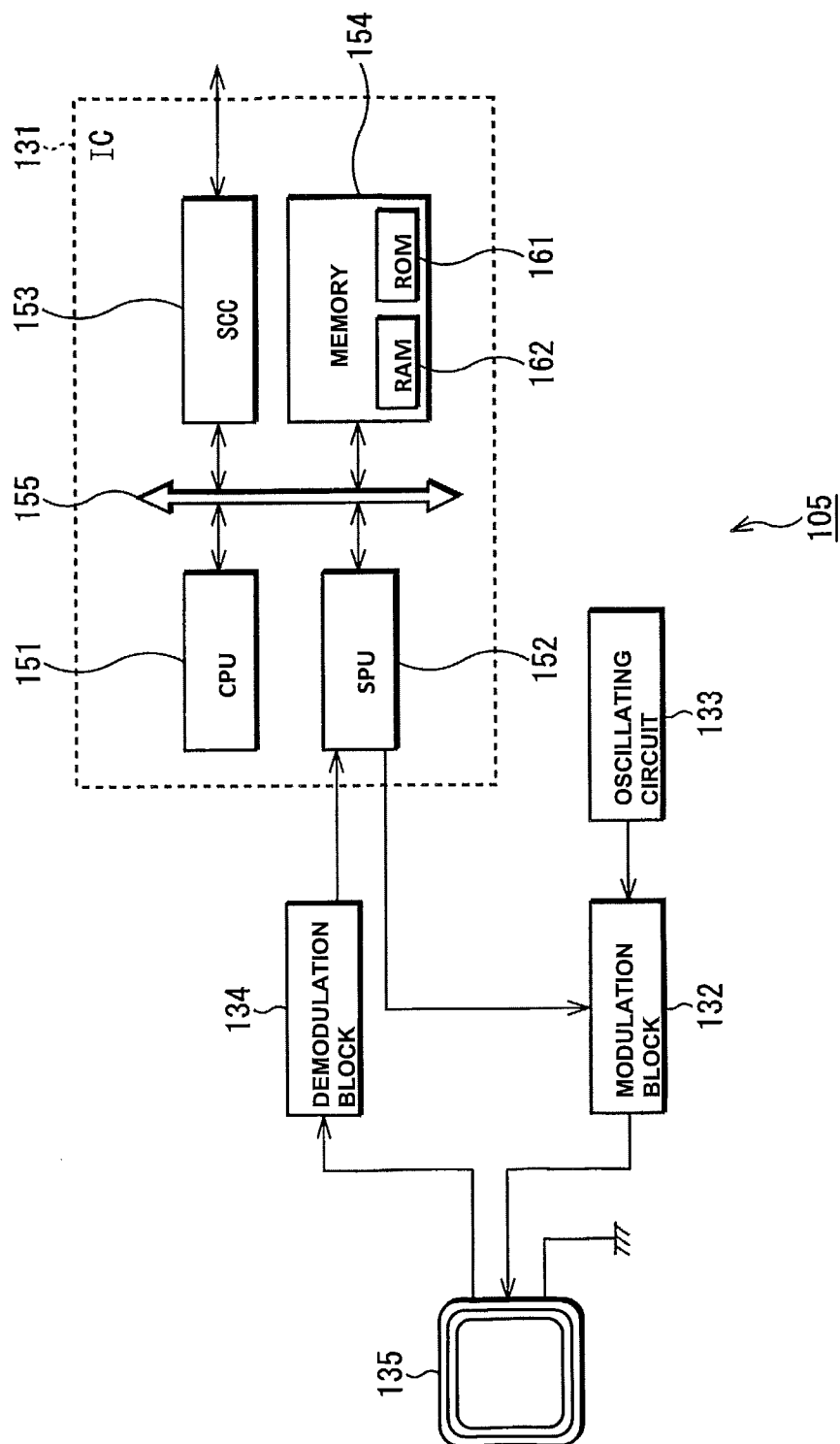


FIG. 12



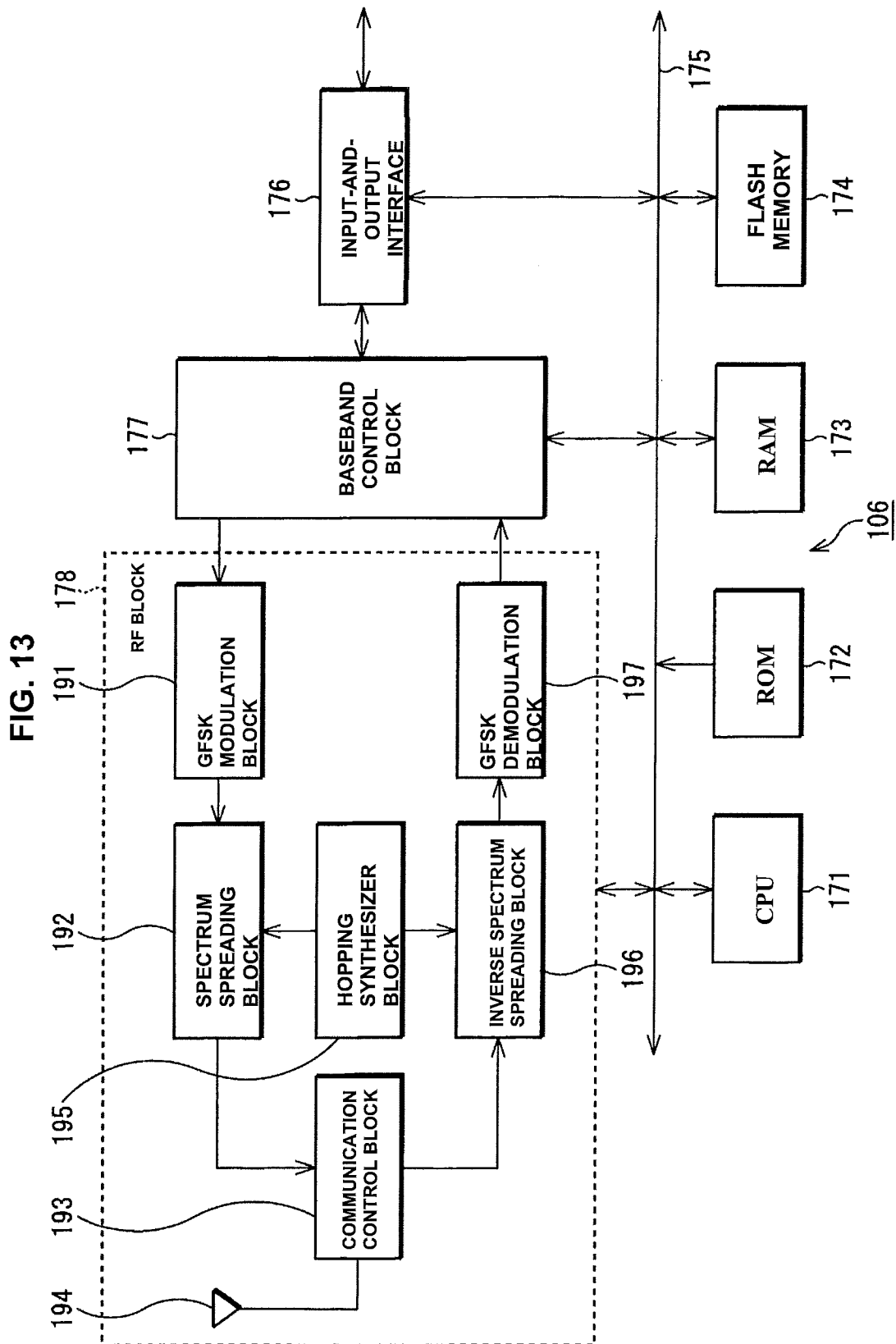


FIG. 14

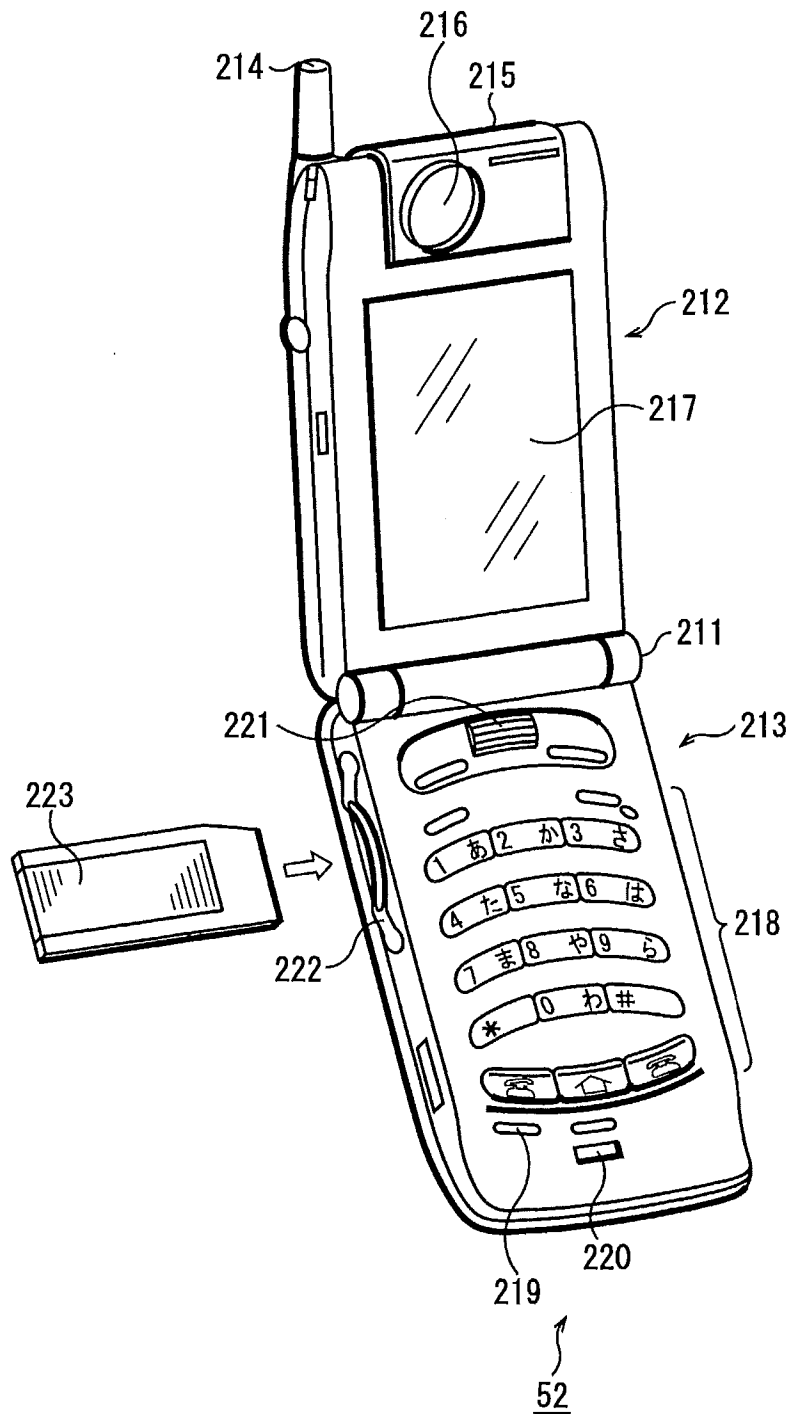


FIG. 15

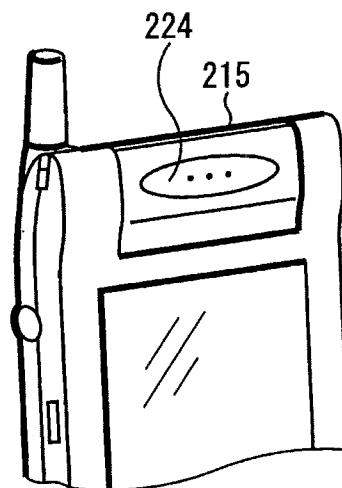


FIG. 16

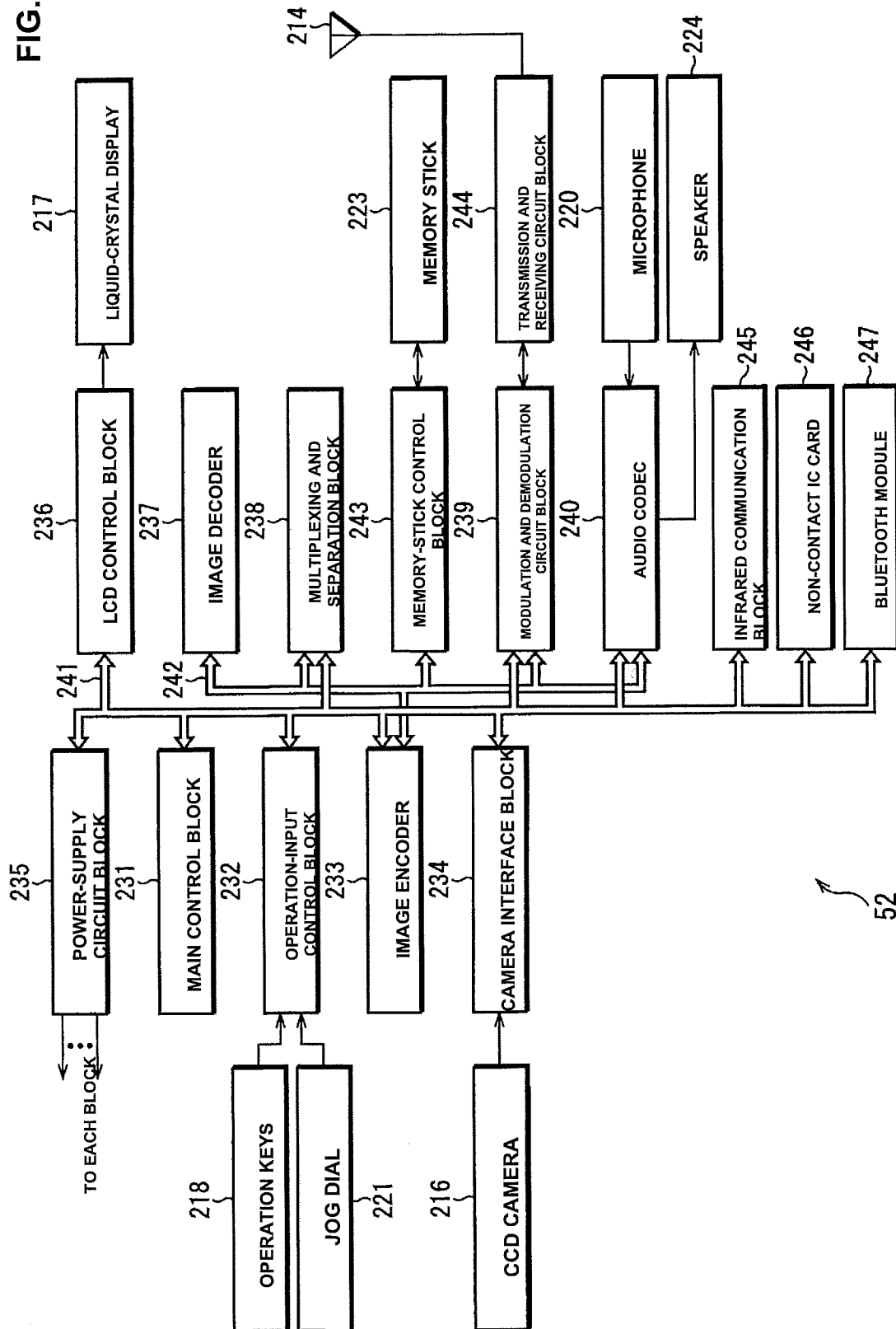


FIG. 17

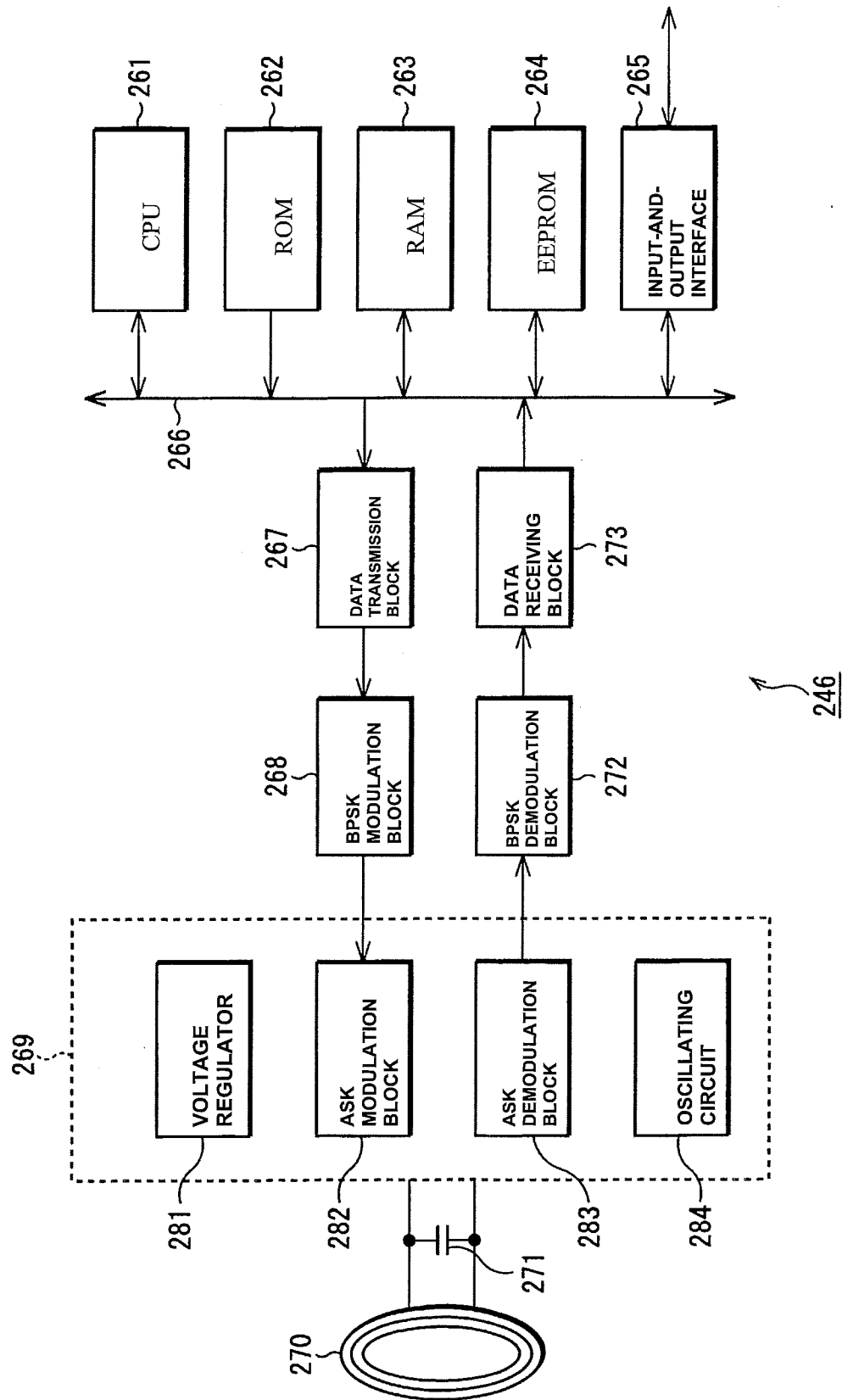


FIG. 18

ITEMS IN SPECIFICATIONS			
COMMUNICATION RATE			211.875 kbps
ELECTRIC POWER TRANSMISSION		CENTER FREQUENCY	13.56 MHz
		OUTPUT	350 mW
DATA TRANSFER	R/W → CARD	CENTER FREQUENCY	13.56 MHz
		MODULATION METHOD	ASK
	CARD → R/W	CENTER FREQUENCY	13.56 MHz
		MODULATION METHOD	LOAD SWITCHING

FIG. 19

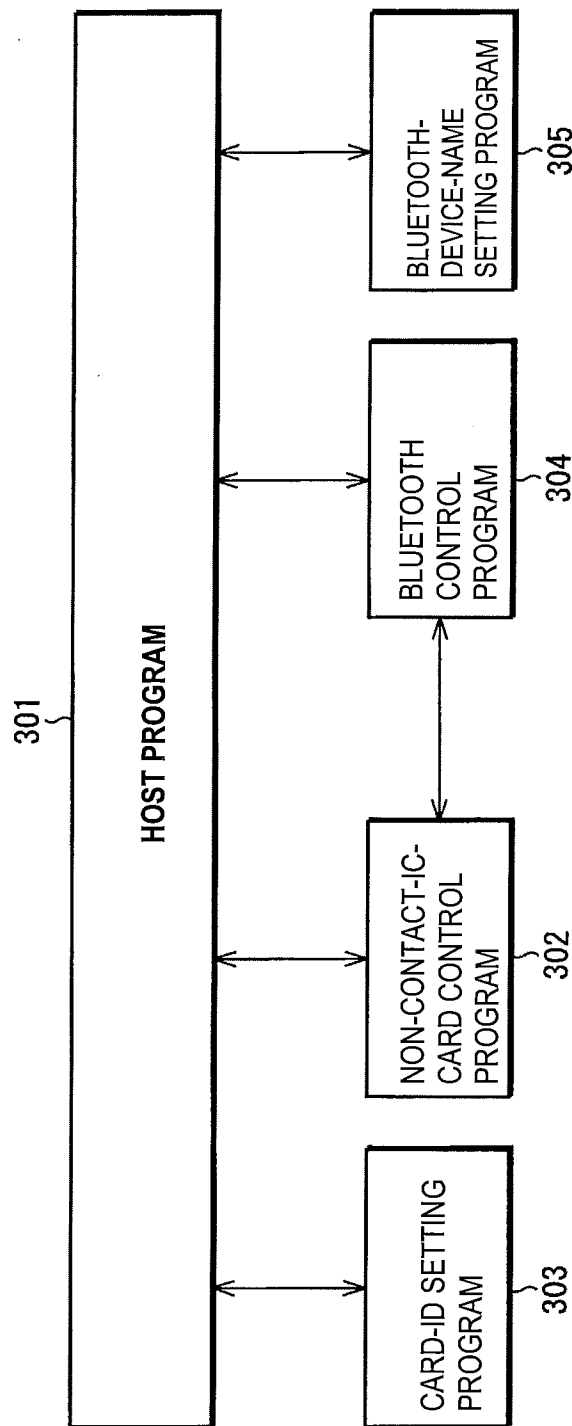


FIG. 20

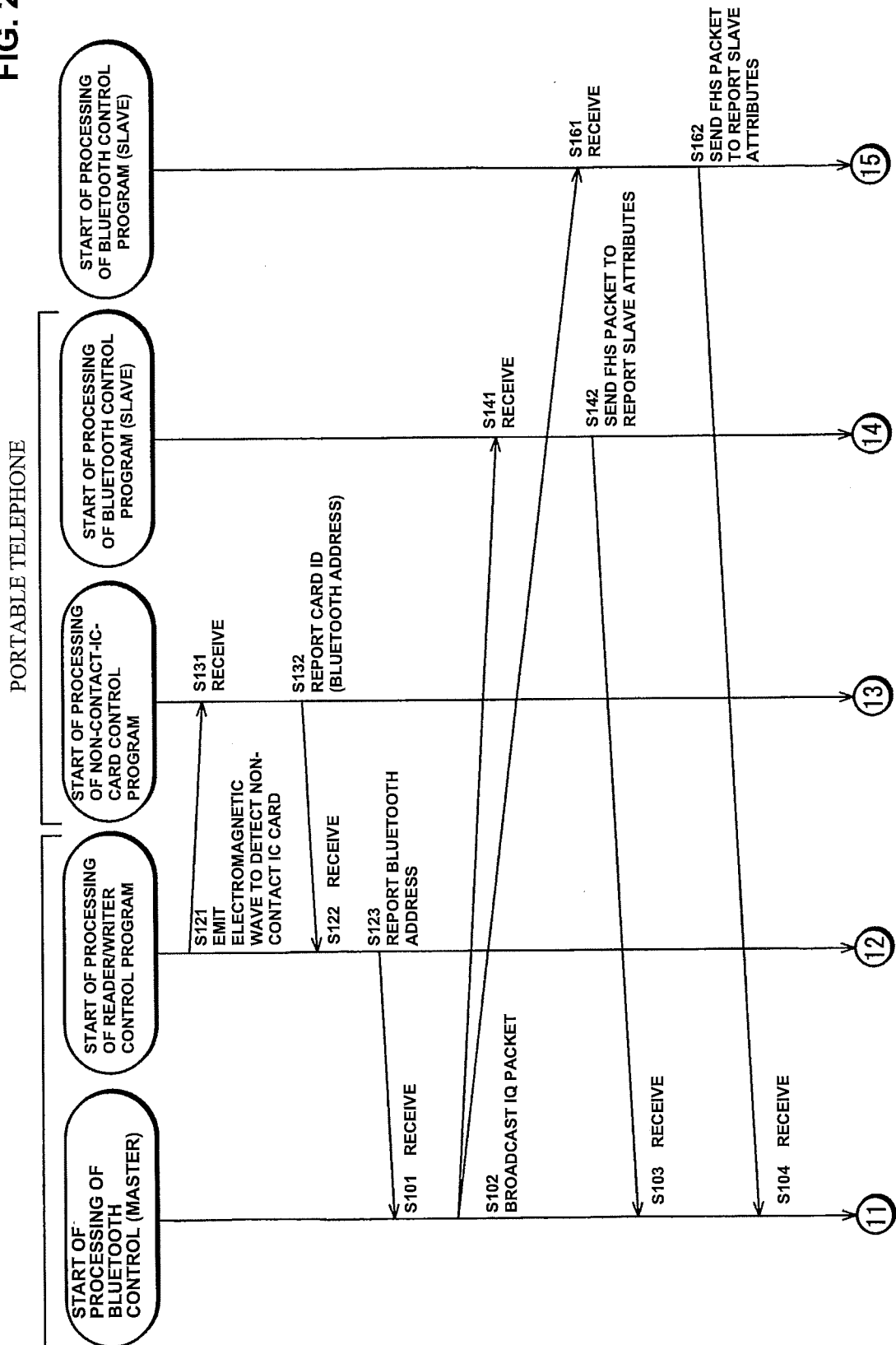
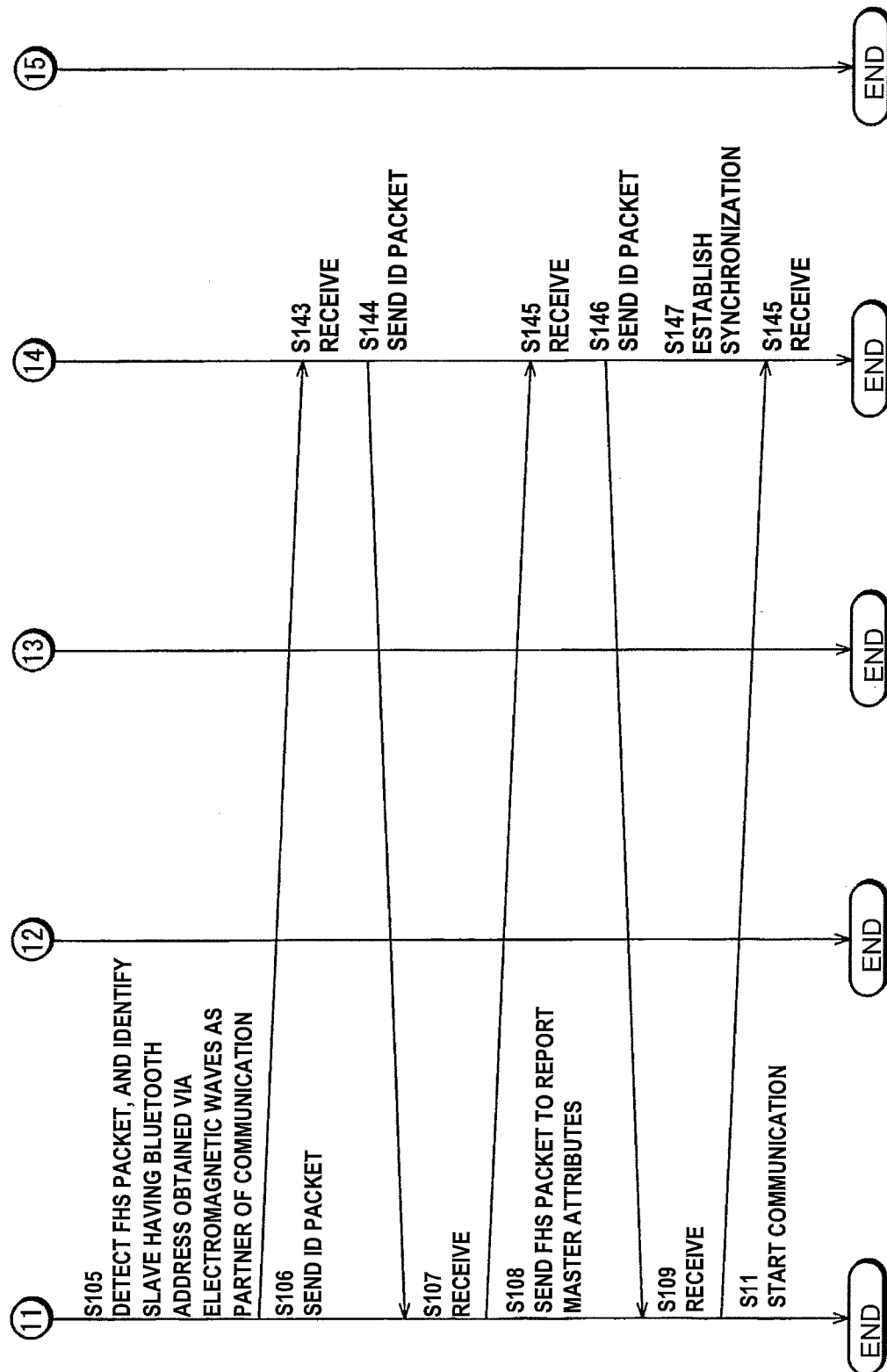


FIG. 21



PDA FIG. 22

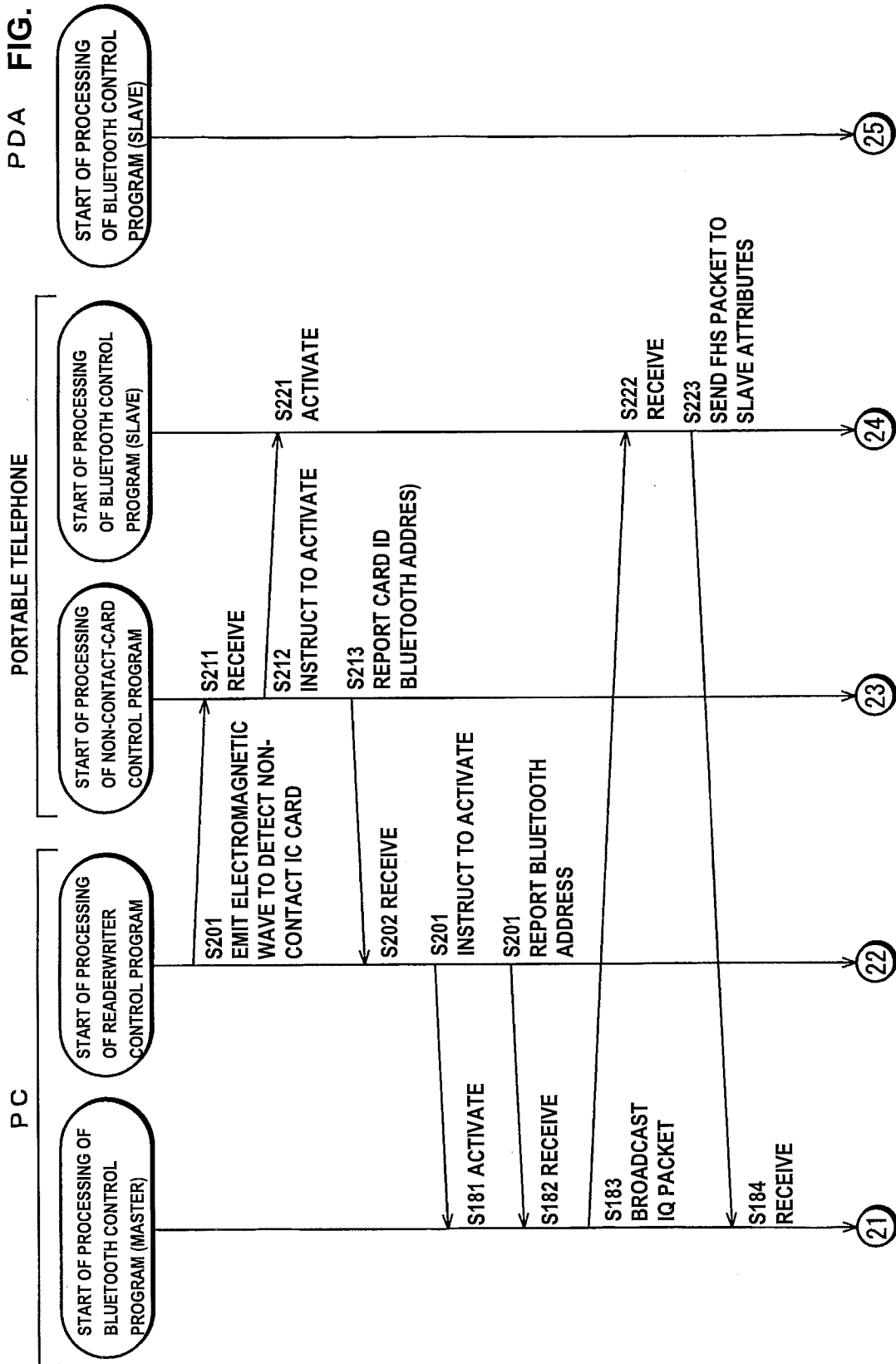


FIG. 23

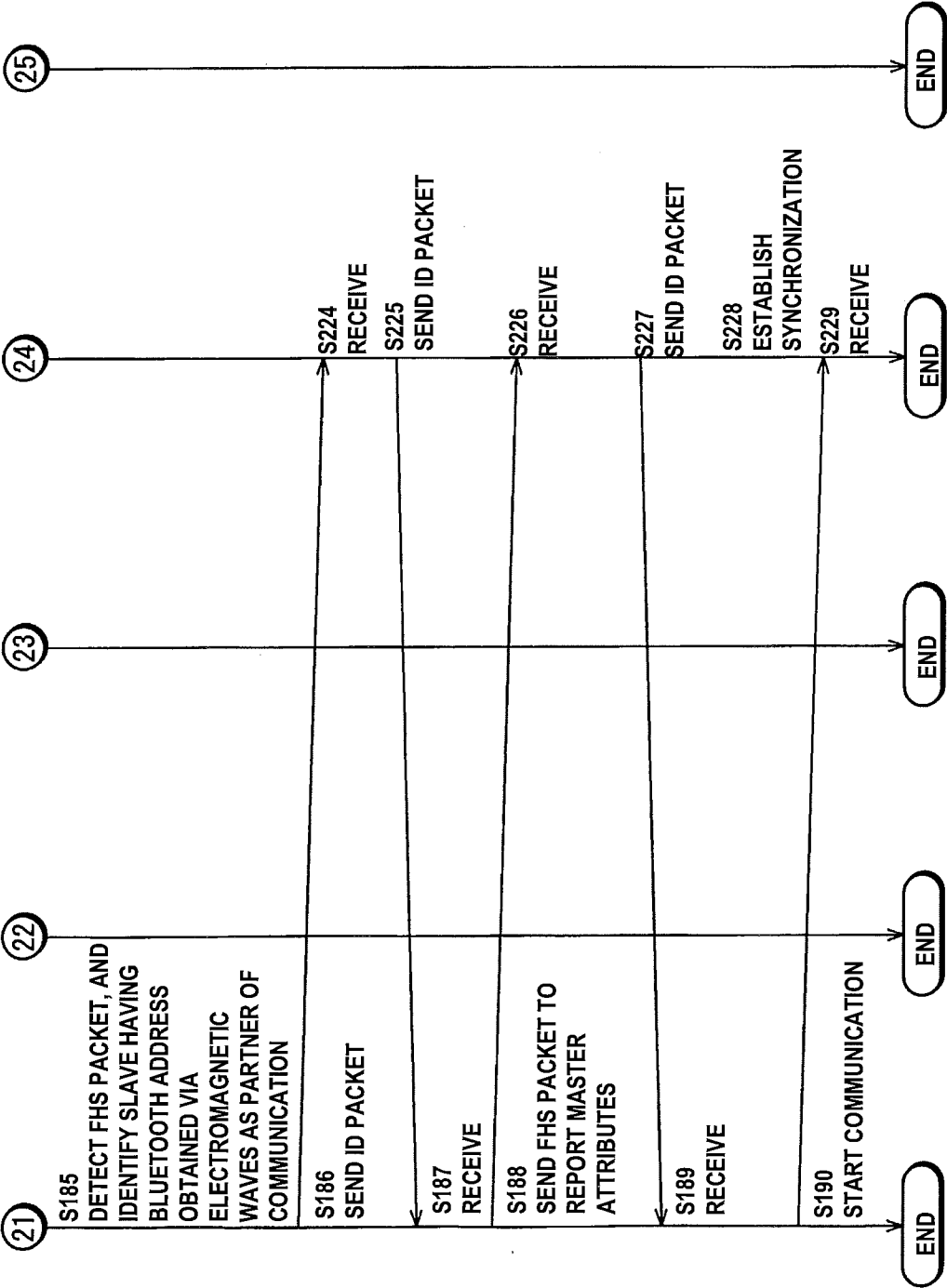


FIG. 24A

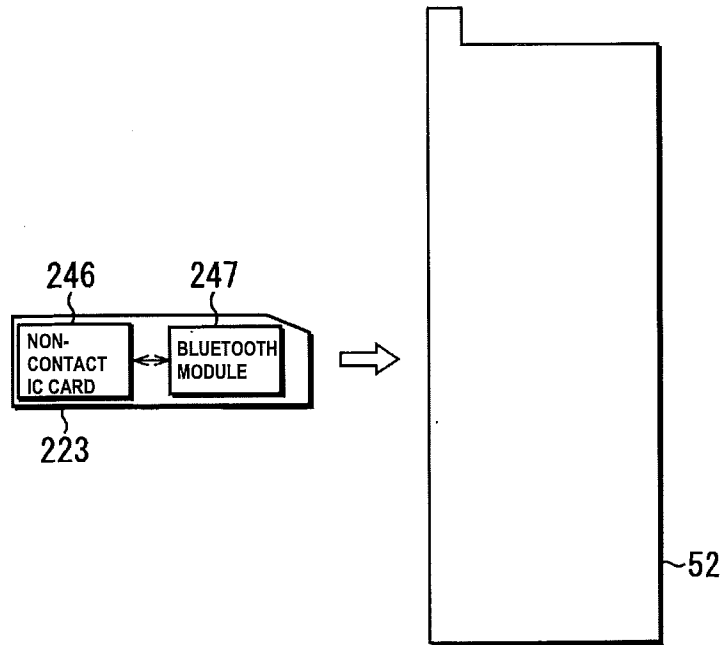


FIG. 24B

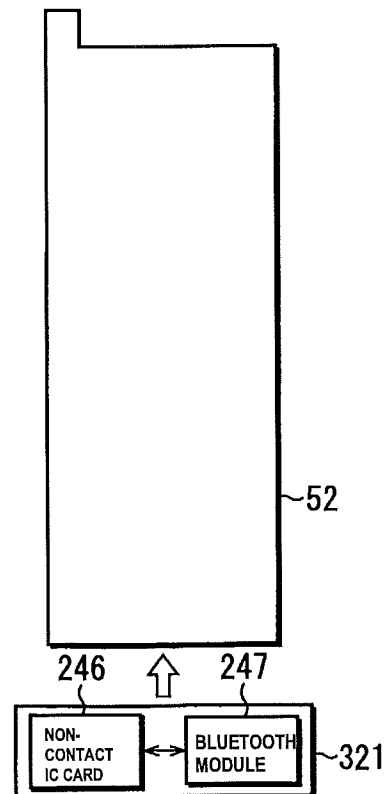


FIG. 25A

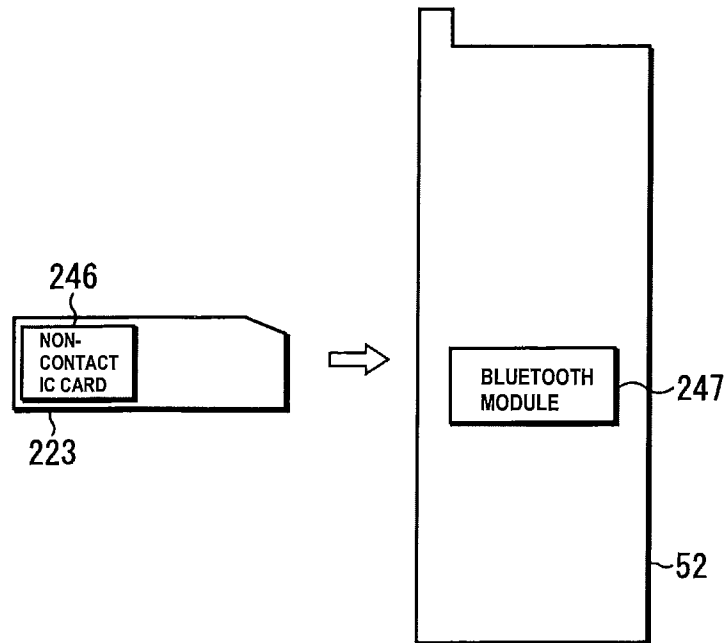


FIG. 25B

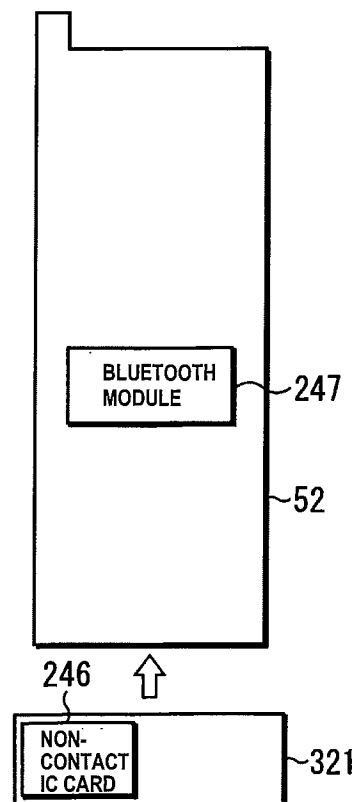


FIG. 26A

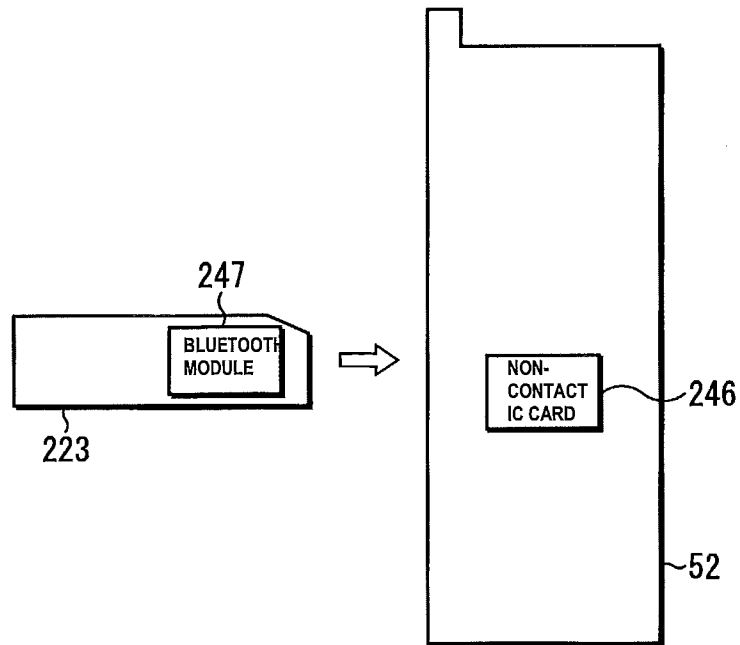
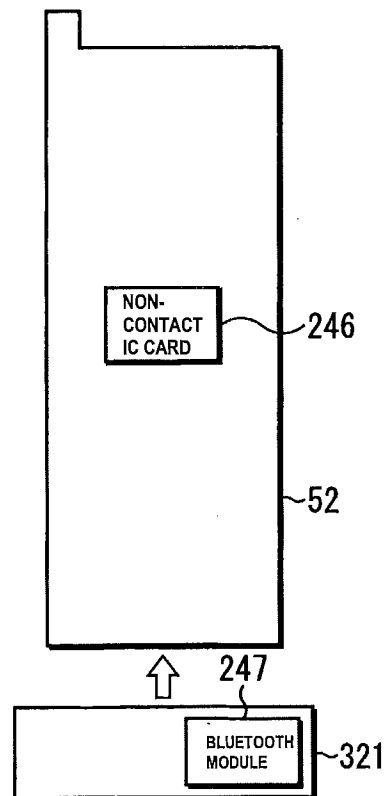
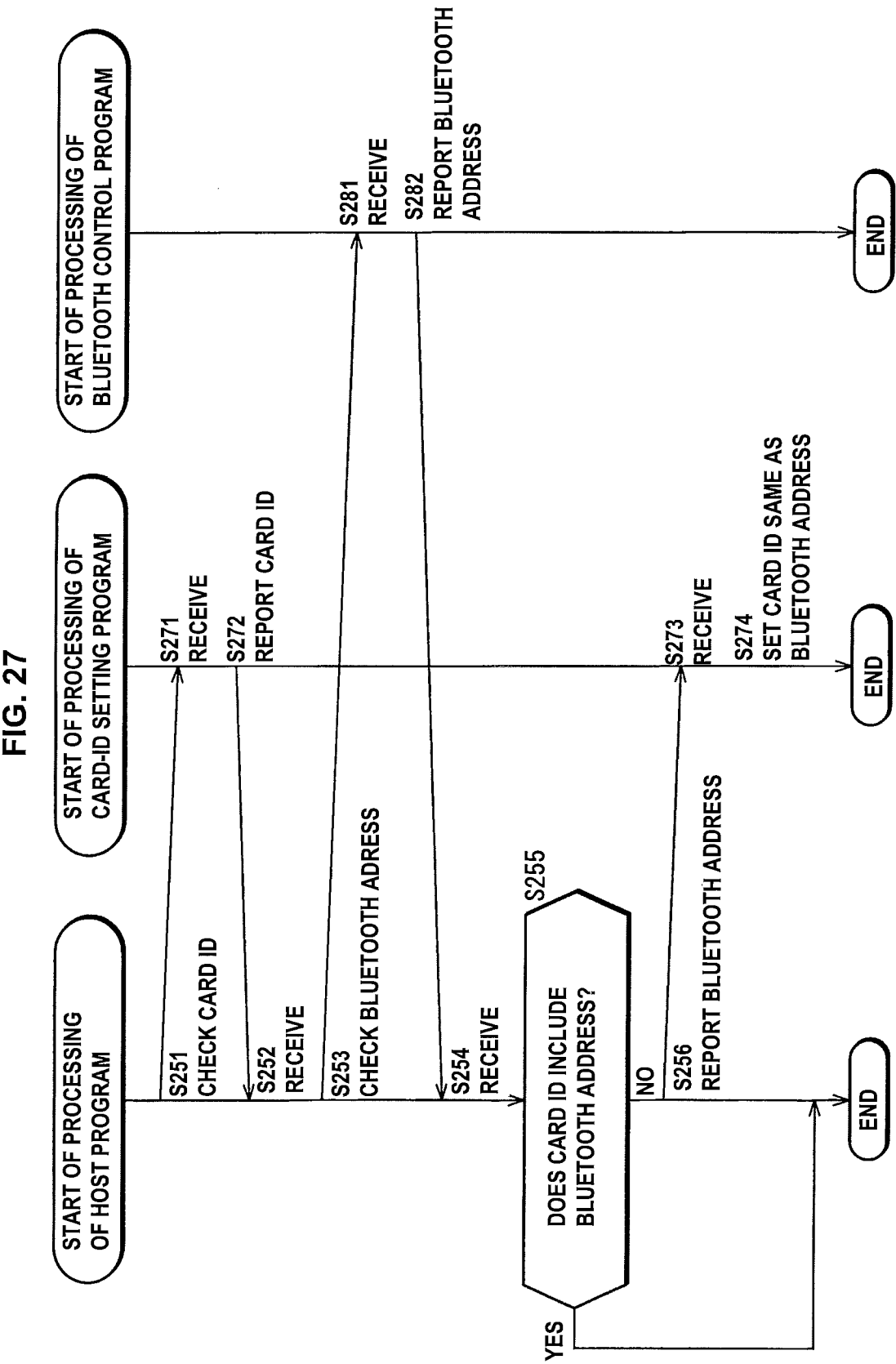
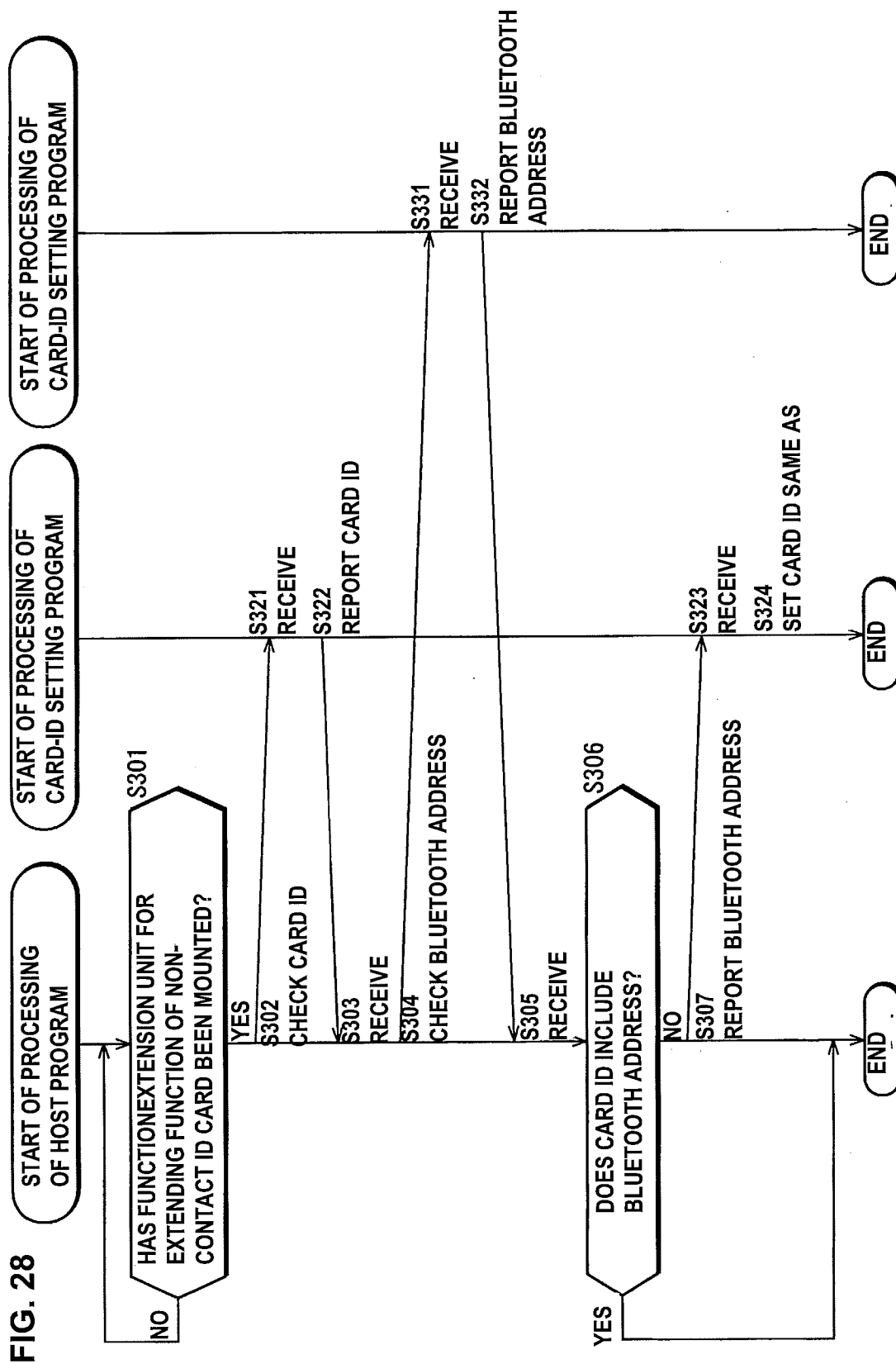


FIG. 26B







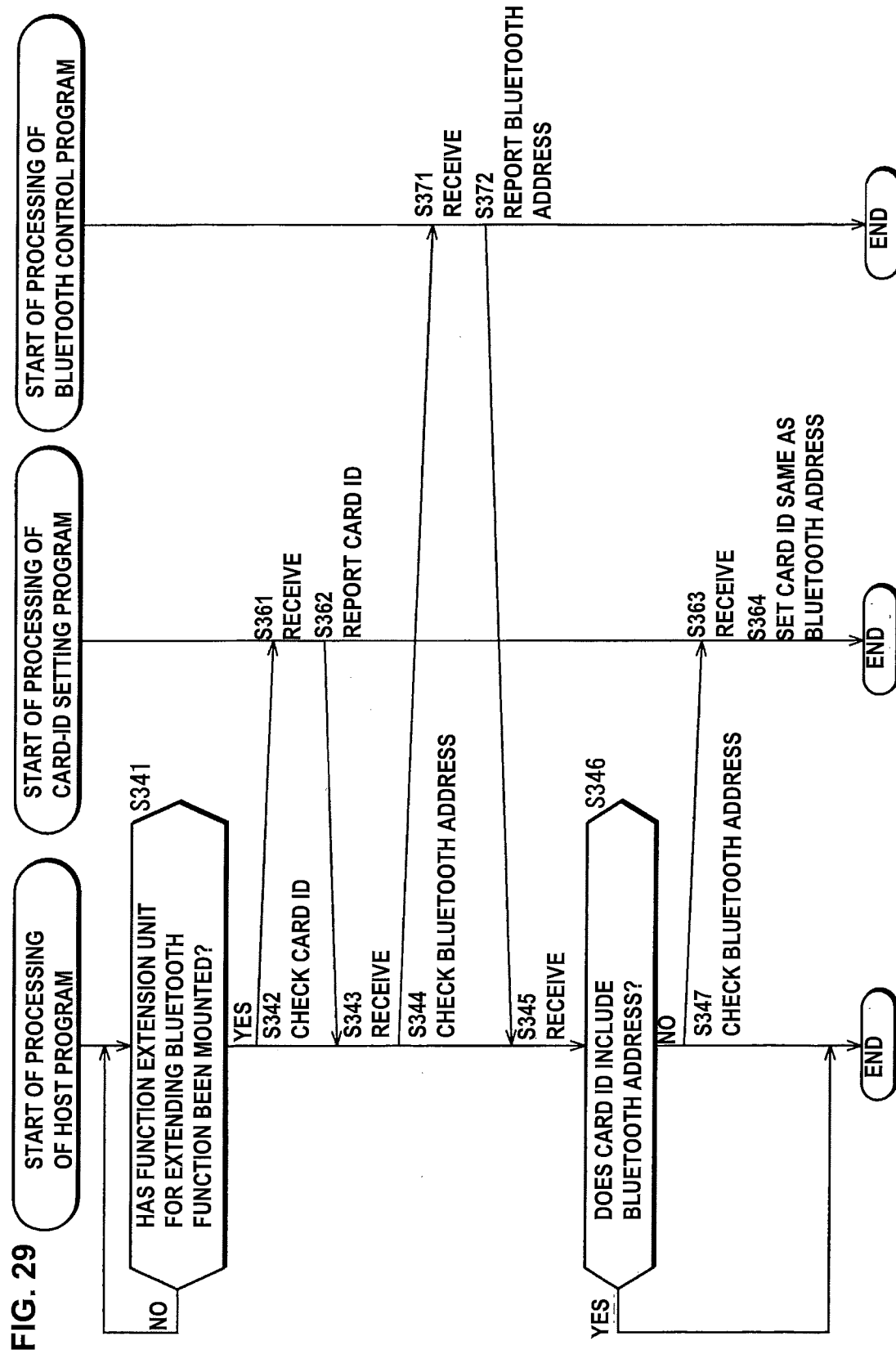
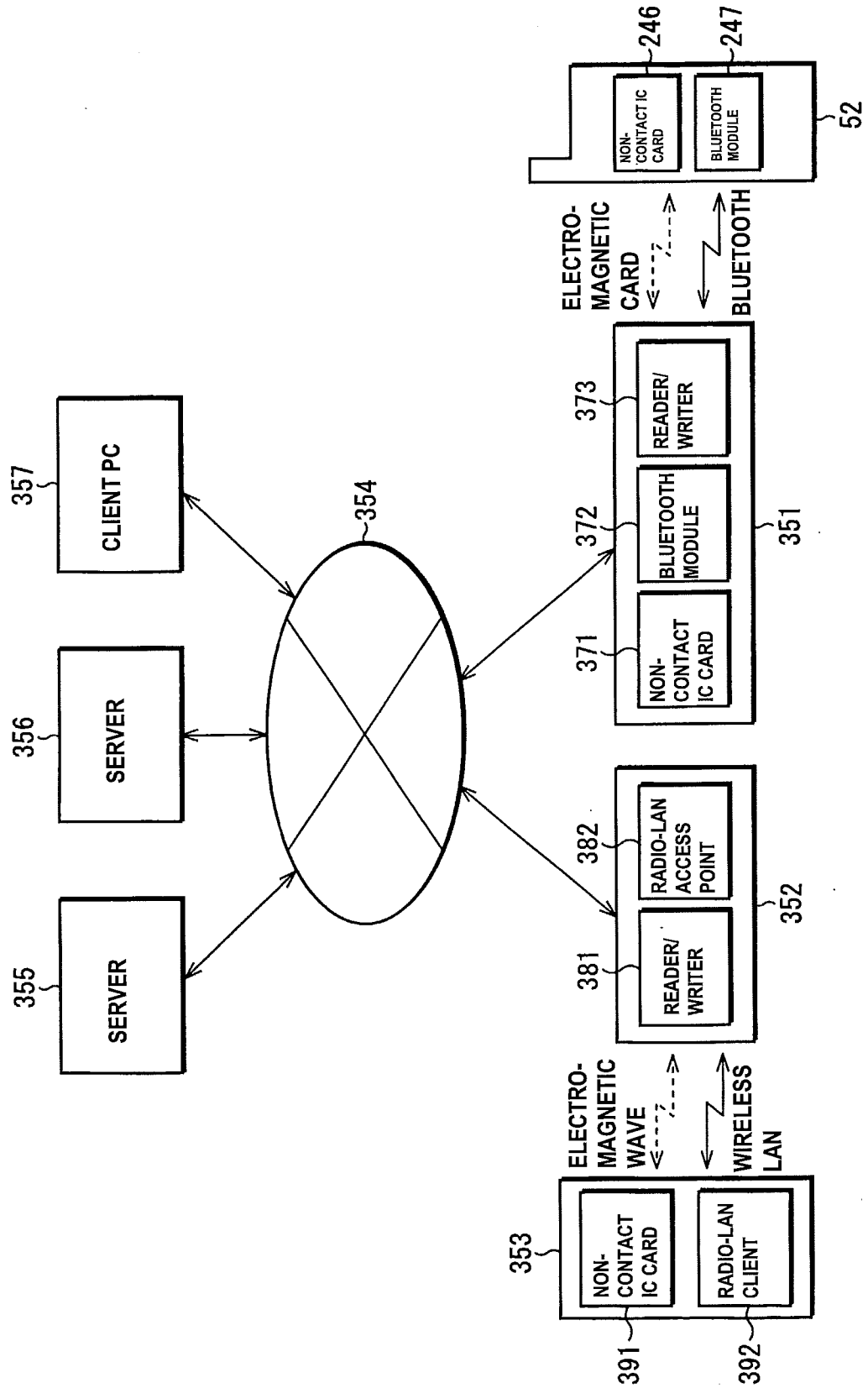


FIG. 30



(12)特許協力条約に基づいて公開された国際出願

(19) 世界知的所有権機関
国際事務局



(43) 国際公開日
2003 年1 月30 日 (30.01.2003)

PCT

(10) 国際公開番号
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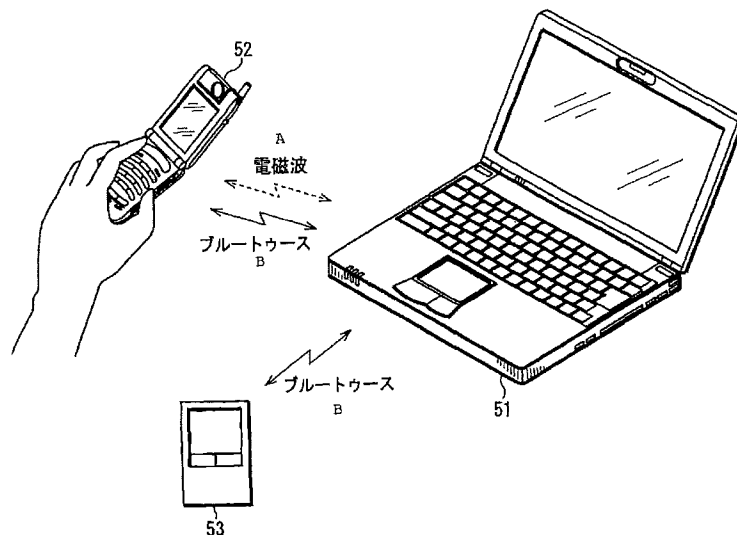
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- (30) 優先権データ:
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[続葉有]

(54) Title: COMMUNICATION SYSTEM AND METHOD

(54) 発明の名称: 通信システムおよび方法



A...ELECTROMAGNETIC WAVE
B...BLUETOOTH

(57) Abstract: A communication system and method capable of easily identifying a communication mate. A cellular telephone (52) has a non-contact IC card communicating with a reader/writer of a personal computer (51) by an electromagnetic wave. When an electromagnetic wave radiated from the reader-writer is received by the non-contact IC card, the cellular telephone (52) reports the card ID set in the

[続葉有]

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non-contact IC card to the personal computer (51). This card ID includes a Bluetooth address of the cellular telephone (52). When the personal computer (51) fetches the Bluetooth address of the cellular telephone (52) and a PDA (53) upon query, the personal computer (51) identifies the cellular telephone (52) as a Bluetooth device to establish synchronization according to the Bluetooth address reported in advance. The present invention can be applied to an information processing apparatus such as a personal computer and a cellular telephone.

- (57) 要約:

本発明は、通信相手を容易に特定できるようにする通信システムおよび方法に関する。携帯電話機 5 2 には、パーソナルコンピュータ 5 1 のリーダライタと電磁波により通信する非接触 IC カードが設けられている。リーダライタから輻射される電磁波が、その非接触 IC カードにおいて受信されたとき、携帯電話機 5 2 は、非接触 IC カードに設定されているカード ID をパーソナルコンピュータ 5 1 に通知する。このカード ID には、携帯電話機 5 2 のブルートゥースアドレスが含まれている。パーソナルコンピュータ 5 1 は、問い合わせ時において、携帯電話機 5 2 と PDA 5 3 のブルートゥースアドレスを取得したとき、予め通知されているブルートゥースアドレスに基づいて、携帯電話機 5 2 を、同期を確立するブルートゥースデバイスとして特定する。本発明は、パーソナルコンピュータや携帯電話機などの情報処理装置に適用できる。

明細書

通信システムおよび方法

技術分野

- 5 本発明は、特に、ブルートゥースにより通信を行う場合において、通信相手の端末を特定できるようにし、より簡単に、かつ迅速に通信を開始することができるようにする通信システムおよび方法に関する。

背景技術

- 10 近年、近距離間の無線通信手段として、ブルートゥース (Bluetooth (登録商標)) が注目されており、様々な対応機器が開発、販売されている。

- ブルートゥースは、BluetoothSIG(Special Interest Group)により標準化されている無線通信規格であり、2.4 GHz 帯 (IMS(Industrial Science Medical) 帯) を使用して、ブルートゥースモジュールが設けられている他のデバイスと通信する。
- 15

- そして、ブルートゥースによって形成されるネットワークは、その形態に応じて、ピコネット(piconet)、または複数のピコネットが相互接続されたスカッタネット(scatternet)と呼ばれ、そこには、マスタとスレーブと呼ばれる役割を有するブルートゥースデバイスが存在する。以下、適宜、マスタの役割を有するブルートゥースデバイスを単にマスタと、スレーブの役割を有するブルートゥースデバイスを単にスレーブとそれぞれ称する。
- 20

図1は、ピコネット、およびスカッタネットの概念を示す図である。

- 図1に示すように、それぞれのピコネットには、1つのマスタが存在し、その制御に基づいて、複数、または単数のスレーブが通信を行う。この例においては、マスタ1とスレーブ1-1、およびスレーブ1-2によりピコネット1が形成され、マスタ2とスレーブ2-1によりピコネット2が形成されている。
- 25

そして、ピコネット1とピコネット2が相互接続されることにより、スカッタ

ネットが形成される。なお、図1においては、ピコネット1とピコネット2の間の通信リンクは無効とされている。

このようなピコネットが形成され、各種の情報を送受信するためには、ピコネット内の全てのブルートゥースデバイスにより、周波数軸と時間軸の同期が確立
5 されている必要がある。

ここで、周波数軸の同期と時間軸の同期について説明する。

ブルートゥースでは、79 MHzの周波数幅を使って、例えば、マスタからスレーブに対して信号が送信されるが、このとき、マスタは、79 MHzの周波数幅を同時に占有して情報を送信するのではなく、情報の送信周波数を、1 MHz
10 の周波数幅でランダムに変化（ホッピング）させて送信する。

また、受信側のスレーブは、ランダムに変化されるマスタの送信周波数と同期をとり、適宜、受信周波数を変化させて、マスタから送信されてきた情報を受信する。

このマスタとスレーブにより変化される周波数のパターンが周波数ホッピングパターンと呼ばれ、周波数ホッピングパターンをマスタとスレーブとの間で共有
15 している状態が、周波数軸の同期が確立した状態とされる。

また、ブルートゥースでは、マスタと複数のスレーブが通信するために、マスタと各スレーブ間の通信路（チャンネル）が625 μ 秒単位で時分割多重されている。そして、この625 μ 秒単位の時間間隔が時間スロットと呼ばれ、時間スロットを共有している状態が、時間軸の同期が確立した状態とされる。
20

なお、後に詳述するように、全てのスレーブは、マスタのブルートゥースアドレスに基づいて、周波数軸の同期を確立するための周波数ホッピングパターンを算出し、マスタのブルートゥースクロックに基づいて、自分自身が管理するブルートゥースクロックにオフセットを加え、時間軸の同期を確立するための時間ス
25 ロットのタイミングをとる。

なお、このブルートゥースアドレスは、それぞれのブルートゥースデバイスに対して固有な48ビットで表され、それに基づいて、周波数ホッピングパターン

が一義的に算出される。また、ブルートゥースクロックは、全てのブルートゥースデバイスがそれぞれ管理するものである。

従って、ピコネットを形成する前には、周波数軸の同期、および時間軸の同期を確立させるためのブルートゥースアドレス、およびブルートゥースクロックを含む各種の情報が、マスタとスレーブ間で送受信される。

次に、周波数軸の同期、および時間軸の同期を確立し、ピコネットを形成する従来のブルートゥースデバイスの処理について、図 2、および図 3 のフローチャートを参照して説明する。

なお、図 1 に示したマスタ 1、スレーブ 1-1、およびスレーブ 1-2 により同期が確立され、ピコネット 1 が形成される処理について説明する。また、送受信されるパケット等に関しては、後に詳述するものとし、ここでは、全体の流れについて説明する。

ステップ S 1 において、マスタ 1 は、周囲に存在するスレーブを検出するための IQ (Inquiry) パケットをブロードキャストする。

例えば、図 1 に示すように、マスタ 1 の近傍にスレーブ 1-1 とスレーブ 1-2 が存在する場合、スレーブ 1-1 は、ステップ S 3 1 において、マスタ 1 から送信されてきた IQ パケットを受信し、ステップ S 3 2 に進み、自らの属性情報を示すパケット (FHS パケット) によりマスタに応答する。

また、スレーブ 1-2 も同様にして、ステップ S 5 1 で IQ パケットを受信したとき、ステップ S 5 2 に進み、FHS パケットによりマスタに応答する。

スレーブがマスタに対して送信する FHS パケットには、スレーブの属性情報として、それぞれのスレーブのブルートゥースアドレスと、ブルートゥースクロックが含まれている。

そして、マスタ 1 は、スレーブ 1-1 から送信されてきた FHS パケットをステップ S 2 において受信し、スレーブ 1-2 から送信されてきた FHS パケットをステップ S 3 において受信する。

なお、IQ パケットをブロードキャストし、それに応じて送信されてくる FHS

パケットを受信するマスタの一連の処理、および、送信されてくる IQ パケットを受信し、それに応じて FHS パケットを送信するスレーブの一連の処理は、「問い合わせ (Inquiry)」と呼ばれている。

ステップ S 4 において、マスタ 1 は、ステップ S 2 で受信した FHS パケット
5 に基づいて生成した ID パケットをスレーブ 1-1 に対して送信する。

スレーブ 1-1 は、ステップ S 3 3 で、この ID パケットを受信したとき、ステップ S 3 4 に進み、受信したものと同一の ID パケットをマスタ 1 に送信し、パケットの送受信が可能であることを通知する。

マスタ 1 は、ステップ S 5 でスレーブ 1-1 から送信されてきた ID パケット
10 を受信したとき、ステップ S 6 に進み、FHS パケットをスレーブ 1-1 に送信し、自らの属性情報としてのブルートゥースアドレス、およびブルートゥースクロックをスレーブ 1-1 に通知する。

ステップ S 3 5 において、マスタ 1 からの FHS パケットがスレーブ 1-1 により受信され、これにより、ピコネット内同期を確立するために必要なブルート
15 ウースアドレスとブルートゥースクロックが、マスタ 1 とスレーブ 1-1 との間で相互に交換された状態となる。

ステップ S 3 6 において、スレーブ 1-1 は、ID パケットをマスタ 1 に対して送信し、FHS パケットを受信できたことを通知する。

そして、ステップ S 3 7 において、スレーブ 1-1 は、マスタ 1 から通知されてきたブルートゥースアドレスとブルートゥースクロックに基づいて、マスタ 1
20 との同期を確立する。マスタから通知された情報に基づいて同期を確立するスレーブの処理については、後に詳述する。

ステップ S 7 において、スレーブ 1-1 からの通知を受けたマスタ 1 は、ステップ S 8 に進み、スレーブ 1-1 との間で FHS パケット、および ID パケット
25 を送受信することに続けて、スレーブ 1-2 との間で、それらの情報の送受信を行う。すなわち、マスタ 1 によるステップ S 8 乃至ステップ S 1 1 の処理、およびスレーブ 1-2 によるステップ S 5 3 乃至ステップ S 5 7 の処理は、上述した

ステップ S 4 乃至ステップ S 7 の処理、およびステップ S 3 3 乃至ステップ S 3 7 の処理とそれぞれ同様の処理である。

具体的には、ステップ S 8 において、マスタ 1 が ID パケットをスレーブ 1 - 2 に対して送信することに応じて、スレーブ 1 - 2 からは、その受信ができたこと
5 とを通知する ID パケットが送信されてくる。そして、マスタ 1 は、ステップ S 1 0 において、スレーブ 1 - 2 に対して FHS パケットを送信し、自らの属性情報を通知する。

ステップ S 5 5 において、マスタ 1 からの FHS パケットを受信したとき、スレーブ 1 - 2 は、ステップ S 5 6 に進み、ID パケットをマスタ 1 に送信する。
10 そして、ステップ S 5 7 において、スレーブ 1 - 2 は、マスタ 1 から通知されてきたブルートゥースアドレスとブルートゥースクロックに基づいて、マスタ 1 との同期を確立する。

なお、上述した「問い合わせ」から、同期が確立されるまでの一連の処理は、「呼び出し(page)」と呼ばれている。

15 ステップ S 1 2 において、マスタ 1 は、ブルートゥースデバイス名を通知することをスレーブ 1 - 1 に要求する。すなわち、ブルートゥースデバイスには、それぞれ、ブルートゥースデバイス名が設定されており、その設定は、ユーザにより変更可能とされている。

ブルートゥースデバイス名は、例えば、マスタを操作するユーザが通信相手
20 (スレーブ) を選択するときなどに使用される。すなわち、ブルートゥースアドレスに基づいて通信相手を選択しなければならないとすると、ユーザは、ピコネット内に存在する全てのブルートゥースデバイスのアドレスを 4 8 ビットで表される数字で覚えておく必要がある。

スレーブ 1 - 1 は、ステップ S 3 8 において、マスタ 1 からの要求を受けたとき、
25 ステップ S 3 9 に進み、設定されているブルートゥースデバイス名をマスタ 1 に通知する。

そして、ステップ S 1 3 において、マスタ 1 は、スレーブ 1 - 1 から通知され

てきたブルートゥースデバイス名を受信する。

また、マスタ 1 は、ステップ S 1 4 において、スレーブ 1-2 に対しても、ブルートゥースデバイス名の通知を要求する。

ステップ S 5 8 において、この要求を受けたスレーブ 1-2 は、ステップ S 5 9 に進み、設定されているブルートゥースデバイス名をマスタ 1 に通知する。

ステップ S 1 5 において、スレーブ 1-2 からの通知を受けたマスタ 1 は、ステップ S 1 6 に進み、通信するスレーブを選択する画面を表示部に表示する。この選択画面には、ステップ S 1 3、およびステップ S 1 5 において取得された、ブルートゥースデバイス名などが表示され、ユーザは、選択画面を確認し、その
10 後の通信を行うスレーブを選択することができる。

図 4 は、同期確立後に、ブルートゥースデバイス（マスタ）に表示される選択画面の例を示す図である。

図に示すように、選択ウインドウ 1 が表示され、その左方にはユーザが操作するマスタの情報が表示されるマスタ表示部 1 1 が設けられている。

15 マスタ表示部 1 1 は、デバイス名表示部 1 1 A とアドレス表示部 1 1 B とからなり、デバイス名表示部 1 1 A には、マスタのブルートゥースデバイス名が表示され、アドレス表示部 1 1 B には、マスタのブルートゥースアドレスが表示されている。

より詳細には、デバイス名表示部 1 1 A の上段には、マスタのブルートゥース
20 デバイスのカテゴリが表示され、その下段には、ユーザが好みに応じて変更可能なブルートゥースデバイス名が表示されている。なお、この例において、マスタのカテゴリは、「コンピュータ（パーソナルコンピュータ）」とされ、デバイス名は、「レッド用コンピュータ」とされている。

選択ウインドウ 1 のほぼ中央には、プロフィール選択ボタン 1 2 が縦列して表
25 示されており、ユーザは、スレーブに対するプロフィールを選択する。プロフィールは、スレーブとの通信方法を規定するものであり、図 4 においては、8 つのプロファイル選択ボタン 1 2 が表示されている。

選択ウインドウ 1 の右方には、スレーブ表示部 1 3 乃至 1 9 が表示されており、それぞれのスレーブ表示部には、マスタ表示部 1 1 と同様に、デバイス名表示部とアドレス表示部が設けられている。

そして、図 4 の例においては、現在、スレーブ表示部 1 6 に表示されているス
5 レーブとマスタの間で通信が行われている状態とされている。なお、スレーブ表示部 1 6 に表示されているブルートゥースデバイスのカテゴリは「携帯電話機」であり、そのブルートゥースデバイス名は、「レッド用携帯」とされている。

図 5 は、同期確立後に、ブルートゥースデバイスに表示される選択画面の他の例を示す図である

10 この選択ウインドウ 3 1 には、その左方にプロフィールが表示され、白抜き矢印を挟んで、スレーブのブルートゥースデバイス名がそれぞれ表示されている。そして、マスタから、例えば、選択ウインドウ 3 1 の 1 段目に表示されているスレーブ（ブラック用プレーヤ）に対しては、音楽ファイルを転送するためのプロフィールでブルートゥースによる通信が可能とされている。

15 しかしながら、以上のような処理によりピコネットを確立し、通信を開始する場合、通信可能なブルートゥースデバイスが図 4、および図 5 に示すように一覧表示されるものの、ユーザは、その相手をわざわざ選択する必要がある。

また、ユーザは、通信相手を選択した後、さらに、通信相手の機器に応じてプロフィールを選択する必要がある。

20 ブルートゥースを利用したシステムとして、例えば、ブルートゥースモジュールが内蔵された携帯電話機を利用して、自動販売機で購入した商品の代金を支払うことが提案されているが、程度の違いこそあれ、上述したような通信相手の選択などが必要とされることが予想される。

従って、実際に紙幣等を使用する場合に較べて、自動販売機における購入手続
25 きが、より煩雑なものとなるおそれがある。

発明の開示

本発明はこのような状況に鑑みてなされたものであり、ブルートゥースにより通信を行う場合において、通信相手の端末を特定できるようにし、より簡単に、かつ迅速に通信を開始することができるようにしたものである。

本発明の通信システムの情報処理装置は、近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、通信端末の識別情報を取得する第1の取得処理手段と、データの送受信を行う第2の無線通信部を用いて通信端末を含む複数の通信端末から各々の属性情報を取得する第2の取得処理手段と、第1の取得処理手段により取得された識別情報と、第2の取得処理手段により取得された属性情報とを用いて通信相手を特定する特定処理手段と、特定処理手段により特定された通信端末と第2の無線通信部を用いた無線通信を行うための同期を確立する第1の同期確立処理手段とを備えることを特徴とする。また、通信端末は、ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータの送受信を行う第3の無線通信部を用いて、情報処理装置に自身の識別情報を提供する第1の提供処理手段と、第2の無線通信部を介して送信された情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の属性情報を提供する第2の提供処理手段と、第2の無線通信部を用いた無線通信の同期の確立に伴い情報処理装置からの要求に応じて、第4の無線通信部を介して所定の信号の送受信を行い同期を確立する第2の同期確立処理手段とを備えることを特徴する。

本発明の通信方法を構成する情報処理装置の情報処理方法は、近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、通信端末の識別情報を取得する第1の取得処理ステップと、データの送受信を行う第2の無線通信部を用いて通信端末を含む複数の通信端末から各々の属性情報を取得する第2の取得処理ステップと、第1の取得処理ステップにより取得された識別情報と、第2の取得処理ステップにより取得された属性情報とを用いて通信相手を特定する特定処理ステップと、特定処理ステップにより特定された通信端末と第2の無線通信部を用いた無線通信を行うための同期を確

立する第 1 の同期確立処理ステップとを備えることを特徴とする。また、通信端末の情報処理方法は、ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータの送受信を行う第 3 の無線通信部を用いて、情報処理装置に自身の識別情報を提供する第 1 の提供処理ステップと、第 2 の無線通信部を介して
5 送信された情報処理装置からの要求に応じて、データの送受信を行う第 4 の無線通信部を用いて、自身の前記属性情報を提供する第 2 の提供処理ステップと、第 2 の無線通信部を用いた無線通信の同期の確立に伴い情報処理装置からの要求に応じて、第 4 の通信部を介して所定の信号の送受信を行い同期を確立する第 2 の同期確立処理ステップとを備えることを特徴する。

10 本発明の第 1 の情報処理装置は、所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報を取得する第 1 の取得処理手段と、所望のデータの送受信を行う第 2 の無線通信部を用いて、通信端末を含む複数の通信端末から各々の属性情報を取得する第 2 の取得処理手段と、第 1 の取得処理手段により取得された識別情報と、第 2 の取得処理手段により取得された属性情報とを用い
15 て通信相手を特定する特定処理手段と、特定処理手段により特定された通信端末と第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段とを備えることを特徴とする。

第 1 の無線通信部による無線通信可能な距離が、第 2 の無線通信部による無線通信可能な距離より短いようにすることができる。

20 第 1 の取得処理手段は、近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第 1 の無線通信部を用いて、通信端末の識別情報を取得するようにすることができる。

属性情報には、複数の通信端末を各々識別可能にするアドレス情報と通信端末が管理するクロック情報が含まれているようにすることができる。

25 第 1 の取得処理手段により識別情報が取得されたことに応じて、第 2 の無線通信部を起動させる起動処理手段を更に備えるようにすることができる。

識別情報には、通信端末のブルートゥースアドレスが少なくとも含まれており、

第2の取得処理手段では、第2の無線通信部を用いて送信したIQパケットに
答して複数の通信端末が各々返信した複数のFHSパケットを取得し、同期確立
処理手段では、特定処理手段により特定された通信端末に対し、第2の無線通信
部を用いてIDパケットの送信を行い、該IDパケットの送信に対する通信端末
5 からの応答があったときは自身のFHSパケットを更に送信するようにすること
ができる。

本発明の第1の情報処理装置の情報処理方法は、所定データの送受信を行う第
1の無線通信部を用いて、通信端末から識別情報を取得する第1の取得処理ステ
ップと、所望のデータの送受信を行う第2の無線通信部を用いて、通信端末を含
10 む複数の通信端末から各々の属性情報を取得する第2の取得処理ステップと、第
1の取得処理ステップにより取得された識別情報と、第2の取得処理ステップに
より取得された属性情報とを用いて通信相手を特定する特定処理ステップと、特
定処理ステップにより特定された通信端末と第2の無線通信部を用いた無線通信
を行うための同期を確立する同期確立処理ステップとを備えることを特徴とする。
15 第1の無線通信部による無線通信可能な距離が、第2の無線通信部による無線
通信可能な距離より短いようにすることができる。

第1の取得処理ステップは、近接された通信端末に対しループアンテナによる
電力伝送及びデータ送受信を行う第1の無線通信部を用いて、通信端末の識別情
報を取得するようにすることができる。

20 属性情報には、複数の通信端末を各々識別可能にするアドレス情報と通信端末
が管理するクロック情報が含まれているようにすることができる。

第2の取得処理ステップでは、第2の無線通信部を用いて送信したIQパケッ
トに応答して複数の通信端末が各々返信した複数のFHSパケットを取得し、同
期確立処理ステップでは、特定処理ステップにより特定された通信端末に対し、
25 第2の無線通信部を用いてIDパケットの送信を行い、該IDパケットの送信に
対する通信端末からの応答があったときは自身のFHSパケットを更に送信する
ようにすることができる。

本発明の通信端末は、所定のデータの送受信を行う第１の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供する第１の提供処理手段と、データの送受信を行う第２の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の属性情報を提供する第２の提供処理手段と、第２の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求に応じて、第２の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理手段とを備えることを特徴とする。

第１の無線通信部による無線通信可能な距離が、第２の無線通信部による無線通信可能な距離より短いようにすることができる。

第１の提供処理手段は、ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータ送受信を行う第１の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供するようにすることができる。

識別情報は、自身の端末を識別可能にするアドレス情報を少なくとも含んでいるようにすることができる。

属性情報には、アドレス情報と自身の端末が管理するクロック情報とが含まれているようにすることができる。

第１の提供処理手段により識別情報を提供したことに応じて、第２の無線通信部を起動させる起動処理手段を更に備えるようにすることができる。

識別情報は、ブルートゥースアドレス情報を少なくとも含んでおり、第２の提供処理手段では、第２の無線通信部を用いて受信した IQ パケットに応答して FHS パケットを返信し、同期確立処理手段では、第２の無線通信部を用いて受信した ID パケットに応答して ID パケットを返信し、更に FHS パケットを受信したときは再度 ID パケットを返信するようにすることができる。

本発明の通信端末の通信方法は、所定のデータの送受信を行う第１の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供する第１の提供処理ステップと、データの送受信を行う第２の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の属性情報を提供する第２の提供処

理ステップと、第2の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求に応じて、第2の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理ステップとを備えることを特徴とする。

第1の提供処理ステップは、ループアンテナを介して得られた誘起電力の少なくとも一部を利用してデータ送受信を行う第1の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供することができる。

識別情報は、自身の端末を識別するアドレス情報を少なくとも含んでいるようにすることができる。

属性情報には、アドレス情報と自身の端末が管理するクロック情報とが含まれているようにすることができる。

第1の提供処理ステップにより識別情報を提供したことに応じて、第2の無線通信部を起動させる起動処理ステップを更に備えるようにすることができる。

識別情報は、ブルートゥースアドレス情報を少なくとも含んでおり、第2の提供処理ステップでは、第2の無線通信部を用いて受信したIQパケットに応答してFHSパケットを返信し、同期確立処理ステップでは、第2の無線通信部を用いて受信したIDパケットに応答してIDパケットを返信し、更にFHSパケットを受信したときは再度IDパケットを返信するようにすることができる。

本発明の第1の拡張装置は、情報処理装置に電氣的に接続しデータの授受を行うための接続端子と、所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得する第1の取得処理手段と、所望のデータの送受信を行う第2の無線通信部を用いて、複数の通信端末から各々の属性情報を取得する第2の取得処理手段と、第1の取得処理手段により取得された識別情報と、前記複数の通信端末から取得した属性情報とを用いて通信相手を特定する特定処理手段と、特定処理手段により特定された通信端末と第2の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段とを備えることを特徴とする。

本発明の第2の拡張装置は、通信端末に電氣的に接続しデータの授受を行うための接続端子と、所定のデータの送受信を行う第1の無線通信部を用いて、情報

処理装置からの要求に応じて自身の識別情報を提供する第 1 の提供処理手段と、データの送受信を行う第 2 の無線通信部を用いて、情報処理装置からの要求に応じて自身の属性情報を提供する第 2 の提供処理手段と、第 2 の無線通信部を用いた無線通信の同期確立に伴い情報処理装置からの要求に応じて、第 2 の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理手段とを備えることを特徴とする。

本発明の第 1 のプログラムは、所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報を取得する第 1 の取得処理ステップと、所望のデータの送受信を行う第 2 の無線通信部を用いて、通信端末を含む複数の通信端末から各々の属性情報を取得する第 2 の取得処理ステップと、第 1 の取得処理ステップにより取得された識別情報と、第 2 の取得処理ステップにより取得された属性情報とを用いて通信相手を特定する特定処理ステップと、特定処理ステップにより特定された通信端末と第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理ステップとを情報処理装置に実行させることを特徴とする。

本発明の第 2 のプログラムは、所定のデータの送受信を行う第 1 の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供する第 1 の提供処理ステップと、データの送受信を行う第 2 の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の属性情報を提供する第 2 の提供処理ステップと、第 2 の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求に応じて、第 2 の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理ステップとを通信端末に実行させることを特徴とする。

本発明の第 2 の情報処理装置は、所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報を取得する第 1 の取得処理手段と、所望のデータの送受信を行う第 2 の無線通信部を用いて通信を行ったことのある複数の通信端末に関する情報を履歴情報として記憶する記憶処理手段と、第 1 の取得処理手段により取得された識別情報と履歴情報とを用いて通信相手を特定する特定処理

手段と、特定処理手段により特定された通信端末と第2の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段とを備えることを特徴とする。

- 履歴情報は、少なくともブルートゥースアドレス情報を含み、同期確立処理手段では、ブルートゥースアドレス情報に基づいて生成された ID パケットを特定処理手段により特定された通信端末に対して送信し、該 ID パケットに対する通信端末からの応答があったときは自身の FHS パケットを更に送信するようにすることができる。

- 本発明の通信システムおよび方法においては、近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、通信端末の識別情報が取得され、データの送受信を行う第2の無線通信部を用いて通信端末を含む複数の通信端末から各々の属性情報が取得され、識別情報と、属性情報とを用いて通信相手が特定される。そして、特定された通信端末と第2の無線通信部を用いた無線通信を行うための同期が確立される。また、ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータの送受信を行う第3の無線通信部を用いて、情報処理装置に自身の識別情報が提供され、第2の無線通信部を介して送信された情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の属性情報が提供され、第2の無線通信部を用いた無線通信の同期の確立に伴い情報処理装置からの要求に応じて、第4の無線通信部を介して所定の信号の送受信を行い同期が確立される。

- 本発明の第1の情報処理装置および方法、並びにプログラムにおいては、所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報が取得され、所望のデータの送受信を行う第2の無線通信部を用いて、通信端末を含む複数の通信端末から各々の属性情報が取得され、取得された識別情報と、取得された属性情報とを用いて通信相手が特定される。また、特定された通信端末と第2の無線通信部を用いた無線通信を行うための同期が確立される。

本発明の通信端末および方法、並びにプログラムにおいては、所定のデータの

送受信を行う第 1 の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報が提供され、データの送受信を行う第 2 の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の属性情報が提供される。また、第 2 の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求
5 に応じて、第 2 の無線通信部を介して所定の信号の送受信を行い同期が確立される。

本発明の第 1 の拡張装置においては、情報処理装置に電氣的に接続され、所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報が取得され、所望のデータの送受信を行う第 2 の無線通信部を用いて、複数の通信端末
10 から各々の属性情報が取得される。また、取得された識別情報と、前記複数の通信端末から取得された属性情報とを用いて通信相手が特定され、特定された通信端末と第 2 の無線通信部を用いた無線通信を行うための同期が確立される。

本発明の第 2 の拡張装置においては、通信端末に電氣的に接続され、データの授受を行うための接続端子と、所定のデータの送受信を行う第 1 の無線通信部を用いて、情報処理装置からの要求に応じて自身の識別情報が提供され、データの
15 送受信を行う第 2 の無線通信部を用いて、情報処理装置からの要求に応じて自身の属性情報が提供される。そして、第 2 の無線通信部を用いた無線通信の同期確立に伴い情報処理装置からの要求に応じて、第 2 の無線通信部を介して所定の信号の送受信を行い同期が確立される。

20 本発明の第 2 の情報処理装置においては、所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報が取得され、所望のデータの送受信を行う第 2 の無線通信部を用いて通信を行ったことのある複数の通信端末に関する情報を履歴情報として記憶され、取得された識別情報と履歴情報とを用いて通信相手が特定される。また、特定された通信端末と第 2 の無線通信部を用いた無線
25 通信を行うための同期が確立される。

図面の簡単な説明

図 1 は、ピコネットとスカッタネットの概念を示す図である。

図 2 は、ピコネット内同期を確立する従来の処理を説明するフローチャートである。

図 3 は、ピコネット内同期を確立する従来の処理を説明する、図 2 に続くフローチャートである。

図 4 は、通信端末を選択する画面の表示例を示す図である。

図 5 は、通信端末を選択する画面の他の表示例を示す図である。

図 6 は、本発明を適用した通信システムの構成例を示す図である。

図 7 は、図 6 のパーソナルコンピュータの外観の例を示す図である。

10 図 8 は、図 6 のパーソナルコンピュータの外観の他の例を示す図である。

図 9 は、図 6 のパーソナルコンピュータの外観のさらに他の例を示す図である。

図 10 は、図 6 のパーソナルコンピュータの側面の例を示す図である。

図 11 は、図 6 のパーソナルコンピュータの構成例を示すブロック図である。

15 図 12 は、図 11 の非接触 IC カードリーダーの構成例を示すブロック図である。

図 13 は、図 11 のブルートゥースモジュールの構成例を示すブロック図である。

図 14 は、図 6 の携帯電話機の外観の例を示す図である。

図 15 は、図 6 の携帯電話機の外観の他の例を示す図である。

20 図 16 は、図 6 の携帯電話機の構成例を示すブロック図である。

図 17 は、図 16 の非接触 IC カードの構成例を示すブロック図である。

図 18 は、図 17 の非接触 IC カードの仕様の例を示す図である。

図 19 は、図 6 の携帯電話機の機能構成の例を示すブロック図である。

図 20 は、図 6 の通信システムの処理を説明するフローチャートである。

25 図 21 は、図 6 の通信システムの処理を説明する図 19 に続くフローチャートである。

図 22 は、図 6 の通信システムの他の処理を説明するフローチャートである。

図 2 3 は、図 6 の通信システムの他の処理を説明する図 2 1 に続くフローチャートである。

図 2 4 A は、図 6 の携帯電話機の他の構成例を示す模式図である。

図 2 4 B は、図 6 の携帯電話機の他の構成例を示す模式図である。

5 図 2 5 A は、図 6 の携帯電話機のさらに他の構成例を示す模式図である。

図 2 5 B は、図 6 の携帯電話機のさらに他の構成例を示す模式図である。

図 2 6 A は、図 6 の携帯電話機の構成例を示す模式図である。

図 2 6 B は、図 6 の携帯電話機の構成例を示す模式図である。

図 2 7 は、図 6 の携帯電話機の処理を説明するフローチャートである。

10 図 2 8 は、図 6 の携帯電話機の他の処理を説明するフローチャートである。

図 2 9 は、図 6 の携帯電話機のさらに他の処理を説明するフローチャートである。

図 3 0 は、本発明を適用したユビキタス社会の概念を示す図である。

15 発明を実施するための最良の形態

図 6 は、本発明を適用した通信システムの構成例を示す図である。

図 6 に示す通信システムにおいて、パーソナルコンピュータ 5 1、携帯電話機 5 2、および PDA(Personal Digital Assistants) 5 3 には、それぞれブルートゥースモジュールが内蔵されており、ブルートゥースに準拠した近距離無線通信
20 により、各種の情報を送受信できるようになされている。

また、携帯電話機 5 2 には、非接触 IC カード (IC タグ) 2 4 6 (図 1 6 参照) が内蔵されており、パーソナルコンピュータ 5 1 には、その非接触 IC カード 2 4 6 に対して、各種の情報の書き込み、または読み出しが可能な非接触 IC カードリーダーライタ 1 0 5 (図 1 1 参照) が設けられている。従って、パーソナルコンピュータ 5 1 と携帯電話機 5 2 の間では、ブルートゥースによる通信だけでなく、非接触 IC カードリーダーライタ 1 0 5 から輻射される電磁波を介しても
25 通信を行うことができる。

そして、本発明を適用した通信システムにおいては、例えば、パーソナルコンピュータ 5 1 がピコネットのマスタである場合、パーソナルコンピュータ 5 1 は、電磁波を介して携帯電話機 5 2 から取得した情報に基づいて、携帯電話機 5 2 をブルートゥースにより通信するスレーブとして特定し、その後のピコネット内同期の確立処理（上述した呼び出しの処理）を行う。

詳細な処理に関しては、フローチャートを参照して後述するが、ユーザが携帯電話機 5 2 をパーソナルコンピュータ 5 1 に近付け、パーソナルコンピュータ 5 1 の非接触 IC カードリーダー 1 0 5 から輻射される電磁波を受信したとき、携帯電話機 5 2 に内蔵されている非接触 IC カード 2 4 6 は、設定されている識別情報（以下、カード ID と称する）をパーソナルコンピュータ 5 1 に提供する。

このカード ID は、例えば、携帯電話機 5 2 に対して設定されているブルートゥースアドレス（に関する情報）と同一の情報である。そして、パーソナルコンピュータ 5 1 は、上述した問い合わせにより、携帯電話機 5 2 と PDA 5 3 のブルートゥースアドレスが取得されたとき、既に通知されているブルートゥースアドレスを参照し、それに対応する携帯電話機 5 2 を識別し、通信相手として特定する。

従って、図 6 において、パーソナルコンピュータ 5 1 の問い合わせに対して、携帯電話機 5 2 と PDA 5 3 が、ともに応じることになるが、その後の呼び出しは、パーソナルコンピュータ 5 1 と携帯電話機 5 2 との間でのみ行われる。

このような処理により、携帯電話機 5 2 のユーザは、上述したような選択画面から通信相手を選択することなく、図のように携帯電話機 5 2 をパーソナルコンピュータ 5 1 に近付けるだけで、ブルートゥースによる通信を開始することができる。

例えば、ユーザが PDA 5 3 からパーソナルコンピュータ 5 1 にブルートゥースで所定のデータを送信する場合には、上述したような画面から通信相手のデバイスとしてパーソナルコンピュータ 5 1 を選択する必要があるが、携帯電話機 5 2 から送信する場合には、そのような煩雑な処理をすることなく、パーソナルコ

ンピュータ 5 1 に所定のデータを送信することができる。

次に、図 6 の通信システムの各構成について説明する。

図 7 乃至図 1 0 は、図 6 のパーソナルコンピュータ 5 1 の外観を示している。

このノート型のパーソナルコンピュータ 5 1 は、基本的に、本体 6 1 と、この本
5 体 6 1 に対して開閉自在とされる表示部 6 2 により構成されている。図 7 は表示
部 6 2 を本体 6 1 に対して開いた状態を示す外観斜視図である。図 8 は本体 6 1
の平面図、図 9 は本体 6 1 に設けられている、後述するジョグダイヤル 6 3 付近
の拡大図である。また、図 1 0 は本体 6 1 のジョグダイヤル 6 3 側の側面図であ
る。

10 本体 6 1 には、その上面に、各種の文字や記号などを入力するとき操作される
キーボード 6 4、ポインタ（マウスカーソル）を移動させるときなどに操作され
るポインティングデバイスとしてのタッチパッド 6 5、および電源スイッチ 6 7
が設けられており、また、側面側に、ジョグダイヤル 6 3、スロット 6 8、およ
び IEEE1394 ポート 7 0 等が設けられている。なお、タッチパッド 6 5 に代え
15 て、例えば、スティック式のポインティングデバイスを設けることも可能である。

また、表示部 6 2 の正面には、画像を表示する LCD（Liquid Crystal Displa
y） 6 6 が設けられている。表示部 6 2 の右上部には、電源ランプ PL、電池ラ
ンプ BL、必要に応じてメッセージランプ ML、その他の LED よりなるランプ
が設けられている。なお、電源ランプ PL や電池ランプ BL、メッセージランプ
20 ML 等は表示部 6 2 の下部に設けることも可能である。

次に、ジョグダイヤル 6 3 は、本体 6 1 上のキーボード 6 4 のキーの間に組み
込まれ、また、キーとほぼ同じ高さになるように取り付けられている。ジョグダ
イヤル 6 3 は、図 9 の矢印 a に示す回転操作に対応して所定の処理を実行し、か
つ、矢印 b に示す移動操作に対応した処理を実行する。なお、ジョグダイヤル 6
25 3 は、本体 6 1 の左側面に配置してもよく、LCD 6 6 が設けられた表示部 6 2
の左側面又は右側面、あるいは、キーボード 6 4 の G キーと H キーの間に縦方向
に配置してもよい。また、ジョグダイヤル 6 3 は、タッチパッド 6 5 を人差し指

で操作しながら親指で操作可能なように、前面の中央部に配置してもよく、あるいは、タッチパッド 6 5 の上端縁又は下端縁に沿って横方向に配置しても、また、タッチパッド 6 5 の右ボタンと左ボタンの間に縦方向に配置してもよい。更に、ジョグダイヤル 6 3 は、縦方向や横方向に限定せず、各指で操作し易い斜め方向へ、所定角度を付けて配置してもよい。その他、ジョグダイヤル 6 3 は、ポインティングデバイスであるマウスの側面の親指で操作可能な位置に配置することも可能である。

次に、図 1 1 は、パーソナルコンピュータ 5 1 の電氣的構成を示すブロック図である。

- 10 CPU (Central Processing Unit (中央処理装置)) 8 1 は、例えば、インテル (Intel) 社製のペンティアム (登録商標) (Pentium (R)) プロセッサ等で構成され、ホストバス 8 2 に接続されている。ホストバス 8 2 には、更に、ブリッジ 8 3 が接続されており、ブリッジ 8 3 は、AGP (Accelerated Graphics Port) 8 4 及び PCI バス 8 5 にも接続されている。ブリッジ 8 3 は、例えば、
- 15 インテル社製の 4 0 0 BX など構成されており、CPU 8 1 や RAM (Random Access Memory) 8 6 周辺の制御を行うようになされている。更に、ブリッジ 8 3 は、AGP 8 4 を介してビデオコントローラ 8 7 に接続されている。なお、このブリッジ 8 3 とブリッジ 1 0 7 とで、いわゆるチップセットが構成されている。
- 20 ブリッジ 8 3 は、更に、RAM 8 6 及びキャッシュメモリ 8 8 とも接続されている。キャッシュメモリ 8 8 は、CPU 8 1 が使用するデータをキャッシュするようになされている。なお、図示していないが、CPU 8 1 にも 1 次的なキャッシュメモリが内蔵されている。

- RAM 8 6 は、例えば、DRAM (Dynamic Random Access Memory) で構成
- 25 され、CPU 8 1 が実行するプログラムや、CPU 8 1 の行動上必要なデータを記憶するようになされている。具体的には、RAM 8 6 には、起動が完了した時点において、例えば、電子メールプログラム 8 6 A、オートパイロットプログラム

8 6 B、ジョグダイヤル状態監視プログラム 8 6 C、ジョグダイヤルドライバ 8 6 D、オペレーティングプログラム (OS) 8 6 E、リーダライタ制御プログラム 8 6 F、およびブルートゥース制御プログラム 8 6 G、その他のアプリケーションプログラム 8 6 H1 乃至 8 6 Hn が HDD 1 1 4 から転送され、記憶される。

- 5 電子メールプログラム 8 4 A は、モデム 9 2 を介して、電話回線 9 3 のような通信回線からネットワーク経由で通信文を授受するプログラムである。電子メールプログラム 8 4 A は、特定機能としての着信メール取得機能を有している。この着信メール取得機能は、インターネットサービスプロバイダ 9 4 が備えるメールサーバ 9 5 に対して、そのメールボックス 9 6 内に自分 (利用者) 宛のメール
10 が着信しているかどうかを確認して、自分宛のメールがあれば取得する処理を実行する。

オートパイロットプログラム 8 6 B は、予め設定された複数の処理 (またはプログラム) などを、予め設定された順序で順次起動して、処理するプログラムである。

- 15 ジョグダイヤル状態監視プログラム 8 6 C は、アプリケーションプログラム 8 6 H1 乃至 8 6 Hn からジョグダイヤル対応であるか否かの通知を受け取り、そのアプリケーションプログラムがジョグダイヤル対応であれば、ジョグダイヤル 6 3 を操作することで実行できる操作を、アプリケーションが有するユーザインターフェース機能を用いて、ユーザに対して表示するために行動する。ジョグダイヤル状態監視プログラム 8 6 C は、通常、ジョグダイヤル 6 3 のイベント待ち
20 になっており、アプリケーションプログラムからの通知を受け取るリストを有している。ジョグダイヤルドライバ 8 6 D は、ジョグダイヤル 6 3 の操作に対応して各種機能を実行する。

- OS (Operation System (基本プログラムソフトウェア)) 8 6 E は、例えば、
25 マイクロソフト社のウィンドウズ (登録商標) 9 5 (Windows (R) 95)、ウィンドウズ (登録商標) 9 8 (Windows (R) 98)、あるいは、アップルコンピュータ社のマック OS (商標) 等に代表される、コンピュータの基本的な行動

を制御するものである。

リーダライタ制御プログラム 86F は、非接触 IC カードリーダライタ 105 (以下、適宜、リーダライタ 105 と称する) を制御し、パーソナルコンピュータ 51 に対して近接されている、非接触 IC カードを内蔵する端末の存在を検出したり、その端末と電磁波を介して各種の情報を送受信するなどの処理を行う。

ブルートゥース制御プログラム 86G は、ブルートゥースモジュール 106 を制御し、例えば、近傍に存在するブルートゥースデバイスの検出や、そのブルートゥースデバイスと通信するための同期を確立するなどの処理を行う。

ビデオコントローラ 87 は、PCI バス 85 に接続されており、更に、AGP 84 を介してブリッジ 83 に接続されており、PCI バス 85、もしくは AGP 84 を介して供給されるデータに基づいて、LCD 66 の表示を制御する。

PCI バス 85 には、サウンドコントローラ 89 が接続され、スピーカ 90 とマイクロフォン 66 が接続されている。サウンドコントローラ 89 は、マイクロフォン 66 からの音声入力を取り込み、あるいはスピーカ 90 に対して音声信号を供給する。

また、PCI バス 85 には、モデム 92 および PC カードスロットインターフェース 98 も接続されている。

モデム 92 は、電話回線 93、インターネットサービスプロバイダ 94 を介して、インターネット 97 やメールサーバ 95 等に接続することができる。

また、オプション機能を追加する場合、PC カードスロットインターフェース 98 に接続されているスロット 68 に、インターフェースカード 99 が適宜装着されることにより、外部装置とのデータの授受ができるようになされている。例えば、インターフェースカード 99 には、ドライブ 100 を接続することができ、ドライブ 100 に挿入される磁気ディスク 101、光ディスク 102、光磁気ディスク 103、および半導体メモリ 104 などとデータの授受を行うことができる。

なお、磁気ディスク 101、光ディスク 102、光磁気ディスク 103、およ

び半導体メモリ 1 0 5 とデータの授受を行うドライブ 1 0 0 は、USB ポート 1 1 5 を介して接続することもできる。

更に、PCI バス 8 5 にはブリッジ 1 0 7 も接続されている。ブリッジ 1 0 7 は、例えば、インテル社製の PIIX 4 E など構成されており、各種の入出力を
5 制御するようになされている。すなわち、ブリッジ 1 0 7 は、IDE (Integrated Drive Electronics) コントローラ/コンフィギュレーションレジスタ 1 0 8、IDE インターフェース 1 0 9、タイマ回路 1 1 0、および USB (Universal Serial Bus) インターフェース 1 1 1 で構成され、IDE バス 1 1 3 に接続されるデバイス、USB ポート 1 1 5 に接続されるデバイス、もしくは、ISA/EIO (Industry Standard Architecture / Extended Input Output) バス 1 1 2 および I
10 /O インターフェース 1 1 7 を介して接続されるデバイスの制御等を行うようになされている。

例えば、USB ポート 1 1 5 に、GPS (Global Positioning System) アンテナ 1 1 6 が装着された場合、USB インターフェース 1 1 1 は、GPS アンテナ 1
15 1 6 から供給される位置データ、および時刻データを PCI バス 8 5、ブリッジ 8 3、およびホストバス 8 2 を介して CPU 8 1 へ送出する。

IDE コントローラ/コンフィギュレーションレジスタ 1 0 8 は、いわゆるプライマリ IDE コントローラとセカンダリ IDE コントローラとの 2 つの IDE コントローラ、およびコンフィギュレーションレジスタ (configuration register) 等から構成されている。
20

プライマリ IDE コントローラは、IDE バス 1 1 3 を介して、コネクタ (図示せず) に接続しており、コネクタには、HDD 1 1 4 が接続されている。また、セカンダリ IDE コントローラは、他の IDE バス (図示せず) を介して、外部装置と接続可能なようになされている。

25 なお、HDD 1 1 4 には、電子メールプログラム 1 1 4 A、オートパイロットプログラム 1 1 4 B、ジョグダイヤル状態監視プログラム 1 1 4 C、ジョグダイヤルドライバ 1 1 4 D、OS (基本プログラムソフトウェア) 1 1 4 E、リーダー

ライタ制御プログラム 1 1 4 F、およびブルートゥース制御プログラム 1 1 4 G、
その他の複数のアプリケーションプログラム 1 1 4 H 1 乃至 1 1 4 H n、さらに、
それらのプログラムで用いられるデータ等が記憶されている。HDD 1 1 4 に記
憶されているプログラム 1 1 4 A 乃至 1 1 4 H n は、起動（ブートアップ）処理
5 の過程で、RAM 8 6 内に順次転送され、格納される。

ISA/EIO バス 1 1 2 には、更に、I/O インターフェース 1 1 7 が接続されてい
る。この I/O インターフェース 1 1 7 と、ROM 1 1 8、RAM 1 1 9、および C
PU 1 2 0 とは、相互に接続されて構成されている。

ROM 1 1 8 には、例えば、IEEE1394I/F プログラム 1 1 8 A、LED 制御プ
ログラム 1 1 8 B、タッチパッド入力監視プログラム 1 1 8 C、キー入力監視プ
ログラム 1 1 8 D、ウェイクアッププログラム 1 1 8 E、ジョグダイヤル状態監
視プログラム 1 1 8 F が予め格納されている。

IEEE1394I/F プログラム 1 1 8 A は IEEE1394 入出力ポート 7 0 を介して送
受信される IEEE1394 準拠のデータの入出力を行うプログラムである。LED 制
御プログラム 1 1 8 B は、電源ランプ PL、電池ランプ BL、必要に応じてメッ
セージランプ ML、その他の LED よりなるランプの点灯の制御を行うプログラ
ムである。タッチパッド入力監視プログラム 1 1 8 C は、タッチパッド 6 5 を用
いたユーザによる入力を監視するプログラムである。キー入力監視プログラム 1
1 8 D は、キーボード 6 4 やその他のキースイッチを用いたユーザによる入力を
監視するプログラムである。ウェイクアッププログラム 1 1 8 E は、ブリッジ 1
0 8 内のタイマ回路 1 1 0 から供給される現在時刻データに基づいて、予め設定
された時刻になったかどうかをチェックして、設定された時刻になると、所定の
処理（またはプログラム）を起動するために各チップ電源の管理を行うプログラ
ムである。ジョグダイヤル状態監視プログラム 1 1 8 F は、ジョグダイヤル 6 3
25 の回転型エンコーダ部の回転、あるいは押下を常に監視するためのプログラムで
ある。

更に、ROM 1 1 8 には、BIOS (Basic Input/Output System) 1 1 8 G が

書き込まれている。BIOS とは、基本入出力システムのことをいい、OS やアプリケーションプログラムと周辺機器（ディスプレイ、キーボード、HDD 等）の間でのデータの入出力を制御するソフトウェアプログラムである。

RAM 1 1 9 は、LED 制御、タッチパッド入力ステータス、キー入力ステータス、5
設定時刻用の各レジスタや、ジョグダイヤル状態監視用の I/O レジスタ、IEEE1394I/F レジスタ等を、レジスタ 1 1 9 A 乃至 1 1 9 F として有している。
例えば、LED 制御レジスタは、ジョグダイヤル 6 3 が押下された場合、電子メー
ールの瞬時の立ち上げ状態を表示するメッセージランプ ML の点灯を制御する。
キー入力ステータスレジスタは、ジョグダイヤル 6 3 が押下されると、操作キー
10 フラグが格納されるようになっている。設定時刻レジスタは、ある時刻を任意に
設定することができる。

また、この I/O インターフェース 1 1 7 には、図示を省略したコネクタを介して、
ジョグダイヤル 6 3、キーボード 6 4、タッチパッド 6 5、IEEE1394 入
出力ポート 7 0 がそれぞれ接続されており、ジョグダイヤル 6 3、キーボード 6
15 4、タッチパッド 6 5 を用いて、ユーザが操作を行った場合、ジョグダイヤル 6
3、キーボード 6 4、タッチパッド 6 5 から、それぞれが受けた操作に対応する
信号を入力され、ISA/EIO バス 1 1 2 に出力するようになっている。更に、I/
O インターフェース 1 1 7 は、IEEE1394 入出力ポート 7 0 を介して外部との
間でデータの送受信を行う。更に、I/O インターフェース 1 1 7 には、電源ラン
20 プ PL、電池ランプ BL、メッセージランプ ML、電源制御回路 1 2 1、その他
の LED よりなるランプが接続されている。

電源制御回路 1 2 1 は、内蔵バッテリー 1 2 2 又は AC 電源に接続されており、
各ブロックに、必要な電源を供給するとともに、内蔵バッテリー 1 2 2 や、周辺装
置のセカンドバッテリーの充電のための制御を行うようになっている。また、C
25 PU 1 2 0 は、I/O インターフェース 1 1 7 を介して、電源をオン又はオフする
とき操作される電源スイッチ 6 7 を監視している。

CPU 1 2 0 は、電源がオフ状態の場合においても、常に内部電源により、IE

EE1394I/F プログラム 1 1 8 A 乃至 BIOS 1 1 8 G を実行することができる。
すなわち、IEEE1394I/F プログラム 1 1 8 A 乃至 BIOS 1 1 8 G は、表示部 6
2 の LCD 6 6 上にいずれかのウインドウが開いていない場合においても、常時
行動している。従って、CPU 1 2 0 は、電源スイッチ 6 7 がオフ状態で、OS 8
5 6 E が CPU 8 1 で起動されていなくても、常時、ジョグダイヤル状態監視プロ
グラム 1 1 8 E を実行しており、パーソナルコンピュータ 5 1 に専用のキーを設
けなくとも、プログラマブルパワーキー (PPK) 機能を有するようになされて
おり、ユーザは、例えば、省電力状態、あるいは電源オフ状態であっても、ジョ
グダイヤル 6 3 を押下するだけで、好みのソフトウェアやスクリプトファイルを
10 起動することができる。

図 1 2 は、図 1 1 の非接触 IC カードリーダーライタ 1 0 5 の詳細な構成例を示
すブロック図である。

IC 1 3 1 は、CPU 1 5 1、SPU (Signal Processing Unit) 1 5 2、SCC
(Serial Communication Controller) 1 5 3、並びにメモリ 1 5 4 により構成
15 され、さらに、メモリ 1 5 4 は、ROM 1 6 1、および RAM 1 6 1 から構成され
ている。これらの CPU 1 5 1 乃至メモリ 1 5 4 は、バス 1 5 5 を介して相互に
接続されている。

CPU 1 5 1 は、ROM 1 6 1 に格納されている制御プログラムを RAM 1 6 2
に展開し、非接触 IC カード 2 4 6 から送信されてきた応答データや、図 1 1 の
20 CPU 8 1 から供給されてきた制御信号に基づいて、各種の処理を実行する。例
えば、CPU 1 5 1 は、非接触 IC カード 2 4 6 に送信するコマンドを生成し、そ
れを、バス 1 5 5 を介して SPU 1 5 2 に出力したり、非接触 IC カード 2 4 6 か
ら送信されてきたデータの認証処理などを行う。

また、CPU 1 5 1 は、携帯電話機 5 2 が近接され、後述する各部の処理によ
25 りカード ID が通知されてきたとき、CPU 8 1 の指示に基づいて、それをブルー
トウースモジュール 1 0 6 に通知するなどの処理を行う。

SPU 1 5 2 は、非接触 IC カード 2 4 6 からの応答データが復調部 1 3 4 から

供給されてきたとき、そのデータに対して、例えば、BPSK (Binary Phase Shift Keying) 復調 (マンチェスターコードのデコード) などを実施し、取得したデータを CPU 151 に供給する。また、SPU 152 は、非接触 IC カード 246 に送信するコマンドがバス 155 を介して供給されてきたとき、そのコマンドに

5 BPSK 変調 (マンチェスターコードへのコーディング) を実施し、取得したデータを変調部 132 に出力する。

SCC 153 は、CPU 81 から供給されてきたデータを、バス 155 を介して CPU 151 に供給したり、CPU 151 から、バス 155 を介して供給されてきたデータを実部 81 に出力する。

10 変調部 132 は、発振回路 (OSC) 133 から供給される所定の周波数 (例えば、13.56 MHz) の搬送波を、SPU 152 より供給されるデータに基づいて、ASK (Amplitude Shift Keying) 変調し、生成された変調波を、電磁波として、アンテナ 135 から出力する。一方、復調部 134 は、アンテナ 135 を介して取得した変調波 (ASK 変調波) を復調し、復調されたデータを SPU 1

15 52 に出力する。

アンテナ 135 は、所定の電磁波を輻射し、それに対する負荷の変化に基づいて、非接触 IC カード 246 (携帯電話機 52) が近接されたか否かを検出する。そして、非接触 IC カード 246 が近接されたとき、アンテナ 135 は、非接触 IC カード 246 と各種のデータを送受信する。

20 図 13 は、図 11 のブルートゥースモジュール 106 の詳細な構成例を示すブロック図である。

CPU 171 は、ROM 172 に格納されている制御プログラムを RAM 173 に展開し、ブルートゥースモジュール 106 の全体の動作を制御する。これらの CPU 171 乃至 RAM 173 は、バス 175 を介して相互に接続されており、こ

25 のバス 175 には、また、フラッシュメモリ 174 が接続されている。

フラッシュメモリ 174 には、例えば、それぞれのブルートゥースデバイスに対して設定され、ユーザが好みに応じて変更することが可能なブルートゥースデ

バイス名、および、それぞれのブルートゥースデバイスに対して固有なブルートゥースアドレスなどが記憶されている。

- ブルートゥースアドレスは、48ビットの識別子であり、それぞれのブルートゥースデバイスに対して固有（一義的）であることから、ブルートゥースデバイスの管理に関する様々な処理に利用される。

例えば、上述したように、ピコネット内同期を確立するためには、全てのスレーブがマスタの周波数ホッピングパターンに関する情報を取得している必要があり、この周波数ホッピングパターンは、マスタのブルートゥースアドレスに基づいてスレーブにより算出されるようになされている。

- より詳細には、ブルートゥースアドレスは、その下位24ビットが LAP(Low Address Part)と、次の8ビットが UAP(Upper Address Part)と、そして残りの16ビットが NAP(Non-significant Address Part)とそれぞれ区分されており、周波数ホッピングパターンの算出には、LAP 全体の24ビットと UAP の下位4ビットからなる28ビットが用いられる。

- それぞれのスレーブは、ピコネット内同期を確立するための呼び出し時において取得した、マスタのブルートゥースアドレスの上述した28ビットの部分と、同様にマスタから通知された、ブルートゥースクロックに基づいて、周波数ホッピングパターンを算出することができる。

- なお、この周波数ホッピングパターンには、問い合わせ時において使用される問い合わせ周波数ホッピングパターンと、呼び出し時において使用される呼び出し周波数ホッピングパターンと、ピコネット内同期が確立された後に、スレーブとマスタの間で通信するときに使用されるチャネル周波数ホッピングパターンが規定されている。以下において、この3つの周波数ホッピングパターンを個々に区別する必要がない場合、単に、周波数ホッピングパターンと称する。

- 図13の説明に戻り、フラッシュメモリ174には、また、ピコネット内同期確立後に、通信相手のブルートゥースデバイスを認証したり、送信するデータを暗号化したりするためのリンクキーなどが記憶され、必要に応じて CPU 171

に提供される。

入出力インタフェース 176 は、CPU 171 からの指示に基づいて、図 11 の CPU 81 から供給されてきたデータ、およびベースバンド制御部 177 から供給されてきたデータの入出力を管理する。

- 5 ベースバンド制御部 177 は、入出力インタフェース 176 から供給されてきたデータを携帯電話機 52 に送信すべく、GFSK(Gaussian Frequency Shift Keying)変調部 191 に供給し、GFSK 復調部 197 からデータが供給されてきたとき、それをバス 175、または入出力インタフェース 176 に出力する。

- 10 GFSK 変調部 191 は、ベースバンド制御部 177 から供給されてきたデータの高速成分をフィルタにより制限し、1 次変調として周波数変調を行い、取得したデータをスペクトラム拡散部 192 に出力する。

- 15 スペクトラム拡散部 192 は、上述したようにして算出され、ホッピングシンセサイザ部 195 から通知される周波数ホッピングパターンに基づいて搬送周波数を切り替え、供給されてきたデータに対してスペクトラム拡散を施した後に得られた信号を通信制御部 193 に出力する。ブルートゥースにおいては、スペクトラム拡散部 192 は、625 μ 秒毎に周波数をホッピングさせて、データを送信するようになされている。

- 20 通信制御部 193 は、2.4 GHz 帯を使用して、スペクトラム拡散が施された信号をアンテナ 194 から送信する。また、通信制御部 193 は、アンテナ 194 からの受信信号を逆スペクトラム拡散部 196 に出力する。

- 25 逆スペクトラム拡散部 196 は、ホッピングシンセサイザ部 195 から通知される周波数ホッピングパターンに基づいて受信周波数をホッピングさせ、例えば、携帯電話機 52 からの信号を取得する。また、逆スペクトラム拡散部 196 は、取得した信号を逆スペクトラム拡散し、携帯電話機 52 からの信号を再生した後に得られた信号を GFSK 復調部 197 に出力する。GFSK 復調部 197 は、逆スペクトラム拡散部 196 から供給されてきた信号を GFSK 復調し、得られたデータをベースバンド制御部 177 に出力する。

次に、携帯電話機 5 2 の構成例について説明する。

図 1 4 は、図 6 の携帯電話機 5 2 の外観の構成例を示している。

図 1 4 に示されるように、携帯電話機 5 2 は、表示部 2 1 2 および本体 2 1 3 で構成され、中央のヒンジ部 2 1 1 により折り畳み可能に形成されている。

- 5 表示部 2 1 2 は、上端左部に、引出しまたは収納可能な送受信用のアンテナ 2 1 4 を有する。携帯電話機 5 2 は、アンテナ 2 1 4 を介して、固定無線端末である基地局との間で電波を送受信する。

- また、表示部 2 1 2 は、上端中央部にほぼ 1 8 0 度の角度範囲で回動自在なカメラ部 2 1 5 を有する。携帯電話機 5 2 は、カメラ部 2 1 5 の CCD(Charge Co
10 upled Device)カメラ 2 1 6 によって所望の撮像対象を撮像する。

カメラ部 2 1 5 がユーザによってほぼ 1 8 0 度回動されて位置決めされた場合、図 1 5 に示されるように、表示部 2 1 2 は、カメラ部 2 1 5 の背面側中央に設けられたスピーカ 2 2 4 が正面側に位置する状態となる。これにより、携帯電話機 5 2 は、通常の音声通話状態に切り換わる。

- 15 さらに、表示部 2 1 2 の中央に液晶ディスプレイ 2 1 7 が設けられている。液晶ディスプレイ 2 1 7 は、電波の受信状態、電池残量、電話帳として登録されている相手先名や電話番号、および発信履歴等の他、電子メールの内容、簡易ホームページ、カメラ部 2 1 5 の CCD カメラ 2 1 6 で撮像した画像などを表示する。

- 一方、本体 2 1 3 には、その表面に「0」乃至「9」の数字キー、発呼キー、
20 リダイヤルキー、終話及び電源キー、クリアキー及び電子メールキー等の操作キー 2 1 8 が設けられている。操作キー 2 1 8 の操作に対応した各種指示が、携帯電話機 5 2 に入力される。

- また、本体 2 1 3 の操作キー 2 1 8 の下部にメモボタン 2 1 9 およびマイクロフォン 2 2 0 が設けられている。携帯電話機 5 2 は、メモボタン 2 1 9 が操作さ
25 れたとき、通話中の相手の音声を録音する。携帯電話機 5 2 は、マイクロフォン 2 2 0 によって通話時のユーザの音声を集音する。

さらに、本体 2 1 3 の操作キー 2 1 8 の上部に回動自在なジョグダイヤル 2 2

1 が、本体 2 1 3 の表面から僅かに突出した状態で設けられている。携帯電話機
5 2 は、ジョグダイヤル 2 2 1 に対する回動操作に応じて、液晶ディスプレイ 2
1 7 に表示されている電話帳リストもしくは電子メールのスクロール動作、簡易
ホームページのページ捲り動作、または画像の送り動作等の種々の動作を実行す
5 る。

例えば、本体 2 1 3 は、ユーザによるジョグダイヤル 2 2 1 の回動操作に応じ
て液晶ディスプレイ 2 1 7 に表示された電話帳リストの複数の電話番号の中から
所望の電話番号を選択し、ジョグダイヤル 2 2 1 が本体 2 1 3 の内部方向に押圧
されたとき、選択されている電話番号を確定して、その電話番号に対して発呼処
10 理を行う。

なお、本体 2 1 3 は、背面側に図示せぬバッテリーパックが装着されており、終
話／電源キーがオン状態になると、バッテリーパックから各回路部に対して電力が
供給されて動作可能な状態に起動する。

ところで、本体 2 1 3 の左側面上部に抜差自在なメモリースティック（登録商
15 標）2 2 3 を装着するためのメモリースティックスロット 2 2 2 が設けられてい
る。携帯電話機 5 2 は、メモボタン 2 1 9 が押下されると、通話中の相手の音声
を装着されているメモリースティック 2 2 3 に記録する。携帯電話機 5 2 は、ユ
ーザの操作に応じて、電子メール、簡易ホームページ、CCD カメラ 2 1 6 で撮
像した画像を、装着されているメモリースティック 2 2 3 に記録する。

20 メモリースティック 2 2 3 は、本願出願人であるソニー株式会社によって開発
されたフラッシュメモリカードの一種である。このメモリースティック 2 2 3 は、
縦 2 1 . 5 × 横 5 0 × 厚さ 2 . 8 [mm] の小型薄型形状のプラスチックケース内
に電氣的に書換えや消去が可能な不揮発性メモリである EEPROM (Electricall
y Erasable and Programmable Read Only Memory) の一種であるフラッ
25 シュメモリ素子を格納したものであり、1 0 ピン端子を介して画像や音声、音楽
等の各種データの書き込み及び読み出しが可能となっている。

従って、携帯電話機 5 2 は、このようなメモリースティック 2 2 3 を装着可能

に構成されているために、メモリースティック 2 2 3 を介して、他の電子機器との間でデータの共有化を図ることができる。

また、所定の機能を拡張するためのモジュール（チップ）をメモリースティック 2 2 3 に組み込み、メモリースティックスロット 2 2 2 にそれを装着させることにより、携帯電話機 5 2 の機能をさらに拡張させることができる。

例えば、後述するように、ブルートゥースモジュールや非接触 IC カードが組み込まれたメモリースティック 2 2 3 を携帯電話機 5 2 に装着することにより、例えば、それらのモジュールが携帯電話機 5 2 に内蔵されていない場合であっても、パーソナルコンピュータ 5 1 とブルートゥースによる通信、および非接触 IC カードによる通信ができるように機能を拡張させることもできる。

図 1 6 は、携帯電話機 5 2 の内部の構成例を示している。

表示部 2 1 2 および本体 2 1 3 の各部を統括的に制御する主制御部 2 3 1 に対して、電源回路部 2 3 5、操作入力制御部 2 3 2、画像エンコーダ 2 3 3、カメラインターフェース（I/F）部 2 3 4、LCD 制御部 2 3 6、多重分離部 2 3 8、変復調回路部 2 3 9、音声コーデック 2 4 0、赤外線通信部 2 4 5、非接触 IC カード 2 4 6、およびブルートゥースモジュール 2 4 7 がメインバス 2 4 1 を介して互いに接続されるとともに、画像エンコーダ 2 3 3、画像デコーダ 2 3 7、多重分離部 2 3 8、メモリースティック制御部 2 4 3、変復調回路部 2 3 9、および音声コーデック 2 4 0 が同期バス 2 4 2 を介して互いに接続されている。

電源回路部 2 3 5 は、ユーザの操作により終話／電源キーがオン状態にされると、バッテリーパックから各部に対して電力を供給することにより携帯電話機 5 2 を動作可能な状態に起動する。また、電源回路部 2 3 5 は、後述するように、非接触 IC カード 2 4 6 から、ブルートゥースモジュール 2 4 7 を起動させることが指示された場合、ブルートゥースモジュール 2 4 7 に電源を供給し、起動させる。

なお、ブルートゥースモジュール 2 4 7 の電源がオフにされている状態において、非接触 IC カード 2 4 6 からの指示に基づいて、その電源を起動させるタイ

ミングは、例えば、携帯電話機 5 2 がパーソナルコンピュータ 5 1 に近接され、非接触 IC カードリーダーライタ 1 0 5 から輻射されている電磁波を非接触 IC カード 2 4 6 が受信したタイミングとされる。

携帯電話機 5 2 は、CPU、ROM、および RAM 等でなる主制御部 2 3 1 の制御に基づいて、音声通話モード時において、マイクロフォン 2 2 0 で集音した音声信号を音声コーデック 2 4 0 によってデジタル音声データに変換する。携帯電話機 5 2 は、デジタル音声データを変復調回路部 2 3 9 でスペクトラム拡散処理し、送受信回路部 2 4 4 でデジタルアナログ変換処理および周波数変換処理を施した後、アンテナ 2 1 4 を介して送信する。

また、携帯電話機 5 2 は、音声通話モード時において、アンテナ 2 1 4 で受信した受信信号を増幅して周波数変換処理およびアナログデジタル変換処理を施し、変復調回路部 2 3 9 でスペクトラム逆拡散処理し、音声コーデック 2 4 0 によってアナログ音声信号に変換する。携帯電話機 5 2 は、アナログ音声信号に対応する音声をつスピーカ 2 2 4 に出力させる。

さらに、携帯電話機 5 2 は、データ通信モード時において、電子メールを送信する場合、操作キー 2 1 8 およびジョグダイヤル 2 2 1 の操作によって入力されたテキストデータを、操作入力制御部 2 3 2 を介して主制御部 2 3 1 に送出する。

主制御部 2 3 1 は、テキストデータを変復調回路部 2 3 9 でスペクトラム拡散処理し、送受信回路部 2 4 4 でデジタルアナログ変換処理及び周波数変換処理を施した後、アンテナ 2 1 4 を介して基地局へ送信する。

これに対して、携帯電話機 5 2 は、データ通信モード時において、電子メールを受信する場合、アンテナ 2 1 4 を介して基地局から受信した受信信号を変復調回路部 2 3 9 で逆スペクトラム拡散処理して、元のテキストデータを復元した後、LCD 制御部 2 3 6 を介して液晶ディスプレイ 2 1 7 に電子メールとして表示する。

この後、携帯電話機 5 2 は、ユーザの操作に応じて受信した電子メールを、メモリースティック制御部 2 4 3 を介してメモリースティック 2 2 3 に記録するこ

とも可能である。

携帯電話機 5 2 は、データ通信モード時において画像データを送信する場合、CCD カメラ 2 1 6 で撮像された画像データを、カメラインターフェース部 2 3 4 を介して画像エンコーダ 2 3 3 に供給する。

- 5 因みに、携帯電話機 5 2 は、画像データを送信しない場合には、CCD カメラ 2 1 6 で撮像した画像データを、カメラインターフェース部 2 3 4 および LCD 制御部 2 3 6 を介して、液晶ディスプレイ 2 1 7 に直接表示することも可能である。

- 10 画像エンコーダ 2 3 3 は、CCD カメラ 2 1 6 から供給された画像データを、例えば、MPEG(Moving Picture Experts Group) 2 または MPEG 4 等の所定の符号化方式によって圧縮符号化することにより符号化画像データに変換し、これを多重分離部 2 3 8 に送出する。

- このとき同時に、携帯電話機 5 2 は、CCD カメラ 2 1 6 で撮像中にマイクロフォン 2 2 0 で集音した音声を、音声コーデック 2 4 0 を介してデジタルの音声
15 データとして多重分離部 2 3 8 に送出する。

- 多重分離部 2 3 8 は、画像エンコーダ 2 3 3 から供給された符号化画像データと音声コーデック 2 4 0 から供給された音声データとを所定の方式で多重化し、その結果得られる多重化データを変復調回路部 2 3 9 でスペクトラム拡散処理し、送受信回路部 2 4 4 でデジタルアナログ変換処理及び周波数変換処理を施した後、
20 アンテナ 2 1 4 を介して送信する。

- これに対して、携帯電話機 5 2 は、データ通信モード時において、例えば、簡易ホームページ等にリンクされた動画像ファイルのデータを受信する場合、アンテナ 2 1 4 を介して基地局から受信した受信信号を変復調回路部 2 3 9 で逆スペクトラム拡散処理し、その結果得られる多重化データを多重分離部 2 3 8 に送出
25 する。

多重分離部 2 3 8 は、多重化データを符号化画像データと音声データとに分離し、同期バス 2 4 2 を介して、符号化画像データを画像デコーダ 2 3 7 に供給す

るとともに、音声データを音声コーデック 240 に供給する。

画像デコーダ 237 は、符号化画像データを MPEG 2 または MPEG 4 等の所定の符号化方式に対応した復号方式でデコードすることにより再生動画像データを生成し、これを、LCD 制御部 236 を介して液晶ディスプレイ 217 に供給
5 する。これにより、携帯電話機 52 は、例えば、簡易ホームページにリンクされた動画像ファイルに含まれる動画データを表示する。

このとき同時に、音声コーデック 240 は、音声データをアナログ音声信号に変換した後、これをスピーカ 224 に供給する。これにより、携帯電話機 52 は、
10 例えば、簡易ホームページにリンクされた動画像ファイルに含まれる音声データを再生する。

この場合も電子メールの場合と同様に、携帯電話機 52 は、受信した簡易ホームページ等にリンクされたデータを、ユーザの操作により、メモリースティック制御部 243 を介してメモリースティック 223 に記録することが可能である。

非接触 IC カード 246 は、パーソナルコンピュータ 51 に近接され、リーダ
15 ライト 105 から輻射される電磁波を受信したとき、それに応じて、各種の情報をリーダライト 105 に提供する。

図 17 は、非接触 IC カード 246 の詳細な構成例を示すブロック図である。

非接触 IC カード 246 は、例えば、図に示すアンテナ（ループアンテナ） 270 およびコンデンサ 271 と、それ以外の構成が 1 チップに格納された IC から構成され、電磁誘導を利用してリーダライト 105 と各種のデータを半二重通
20 信するものであって、必ずしもカード状のものとして構成されるわけではない。
また、IC カードとは、説明の便宜上用いた名称であり、上述したような、または後述するような機能を意図するものである。この非接触 IC カード 246 と基本的に同様の機能を提供するものとして、例えば、Felica（登録商標）などがある。
25

CPU 261 は、ROM 262 に格納されている制御プログラムを RAM 263 に展開し、非接触 IC カード 246 の全体の動作を制御する。例えば、CPU 26

1 は、リーダライタ 105 から輻射されている電磁波がアンテナ 270 において受信されたとき、それに応じて、非接触 IC カード 246 に設定されている識別情報としてのカード ID をリーダライタ 105 に通知する。

このカード ID は、自由に設定を変更できるものであり、例えば、ブルートゥースモジュール 247（携帯電話機 52）に設定されているブルートゥースデバイス名と同一、またはブルートゥースデバイス名を含むものとされる。

インターフェース部 269 は、ASK 復調部 283 において、アンテナ 270 を介して受信した変調波（ASK 変調波）を包絡線検波して復調し、復調後のデータを BPSK 復調部 272 に出力する。アンテナ 270 とコンデンサ 271 に
10 より構成される LC 回路においては、リーダライタ 105 から輻射される所定の周波数の電磁波により共振が生じている。

また、インターフェース部 269 は、アンテナ 270 において励起された交流磁界を ASK 復調部 283 により整流し、それを電圧レギュレータ 281 において安定化し、各部に直流電源として供給する。リーダライタ 105 から輻射され
15 る電磁波の電力は、後述するように、非接触 IC カード 246 に必要な電力を賄う磁界を発生させるように調整されている。

また、インターフェース部 269 は、発振回路 284 においてデータのクロック周波数と同一の信号を発振し、それを図示せぬ PLL 部に出力する。

さらに、インターフェース部 269 は、例えば、カード ID などのデータをリーダライタ 105 に送信する場合、BPSK 変調部 268 から供給されるデータ
20 に対応して、例えば、所定のスイッチング素子をオン／オフさせ、スイッチング素子がオン状態であるときだけ、所定の負荷をアンテナ 270 に並列に接続させることにより、アンテナ 270 の負荷を変動させる。

ASK 変調部 282 は、アンテナ 270 の負荷の変動により、アンテナ 270
25 において受信されているリーダライタ 105 からの変調波を ASK 変調し、その変調成分をアンテナ 270 を介してリーダライタ 105 に送信する（リーダライタ 105 のアンテナ 135 の端子電圧を変動させる）（ロードスイッチング方

式)。

BPSK 復調部 2 7 2 は、ASK 復調部 2 8 3 で復調されたデータが BPSK 変調されている場合、図示せぬ PLL 部から供給されるクロック信号に基づいて、そのデータの復調 (マンチェスターコードのデコード) を行い、復調したデータを
5 データ受信部 2 7 3 に出力する。データ受信部 2 7 3 は、供給されてきたデータを CPU 2 6 1 等に適宜出力する。

BPSK 変調部 2 6 8 は、データ送信部 2 6 7 から供給されてきたデータに BPSK 変調 (マンチェスターコードへのコーディング) を行い、それを ASK 変調部 2 8 2 に出力する。

10 また、非接触 IC カード 2 4 6 においては、カード ID をパーソナルコンピュータ 5 1 に通知するだけでなく、例えば、リーダライタ 1 0 5 との間での認証処理や、送信するデータの暗号化処理など、様々な処理が行われる。

図 1 8 は、非接触 IC カード 2 4 6 の仕様の例を示す図である。

上述したように、リーダライタ 1 0 5 と非接触 IC カード 2 4 6 間の通信は、
15 半二重により行われ、その通信速度は、例えば、2 1 1 . 8 7 5 kbps である。

また、図に示すように、リーダライタ 1 0 5 から非接触 IC カード 2 4 6 に対する電力電送、およびデータ転送、並びに、非接触 IC カード 2 4 6 からリーダライタ 1 0 5 に対するデータ転送により使用される周波数帯域の中心周波数は、例えば、1 3 . 5 6 MHz である。

20 そして、電力電送のためにリーダライタ 1 0 5 から出力される電波の出力は、例えば、3 5 0 mW であり、アンテナの特性などの通信環境にもよるが、その通信距離は、例えば、1 0 cm 前後とされる。

リーダライタ 1 0 5 から非接触 IC カード 2 4 6 に対するデータ転送は、上述したように、マンチェスターコードにコード化されたデータを ASK 変調することにより行われ、その変調度 (データ信号の最大振幅 / 搬送波の最大振幅) は、
25 例えば、約 0 . 1 とされる。また、非接触 IC カード 2 4 6 からリーダライタ 1 0 5 に対するデータ転送は、上述したように、ロードスイッチング方式により出

力データを送信信号に変換する（出力データに応じてスイッチング素子をオン／オフさせることによりアンテナ 1 3 5 の負荷を変動させる）ことにより行われる。

図 1 6 の説明に戻り、ブルートゥースモジュール 2 4 7 は、例えば、パーソナルコンピュータ 5 1 のブルートゥースモジュール 1 0 6 とピコネットを形成し、

- 5 主制御部 2 3 1 からの指示に基づいて、各種のデータを送受信する。

なお、ブルートゥースモジュール 2 4 7 の構成は、図 1 3 に示したものと同様の構成であるため、その詳細な説明は省略する。以下において、例えば、ブルートゥースモジュール 1 0 6 の CPU は CPU 1 7 1 A とし、ブルートゥースモジュール 2 4 7 の CPU は CPU 1 7 1 B として適宜説明する。他の構成について

- 10 も同様に説明する。

以上においては、非接触 IC カード 2 4 6、およびブルートゥースモジュール 2 4 7 は、携帯電話機 5 2 に内蔵されたとしたが、例えば、メモリースティック 2 2 3 に組み込まれた状態で携帯電話機 5 2 に装着され、メモリースティック制御部 2 4 3 により制御されるようにしてもよい。

- 15 図 1 9 は、携帯電話機 5 2 の機能ブロックの例を示す図である。

ホストプログラム 3 0 1 は、携帯電話機 5 2 の基本的な機能を提供し、例えば、通話機能や、電子メールの送受信機能を提供する。非接触 IC カード制御プログラム 3 0 2 は、非接触 IC カード 2 4 6 の動作を制御するとともに、カード ID 設定プログラム 3 0 3、およびブルートゥース制御プログラム 3 0 4 等と連動し、

- 20 各種の処理を行う。

例えば、非接触 IC カード制御プログラム 3 0 2 は、携帯電話機 5 2 がパーソナルコンピュータ 5 1 に近接されたとき、ブルートゥースアドレスと対応するカード ID をリーダライタ 1 0 5 に提供したり、リーダライタ 1 0 5 からの電磁波を受信することに応じて、ブルートゥースモジュール 2 4 7（ブルートゥース制御プログラム 3 0 4）を起動させたりする。

- 25

カード ID 設定プログラム 3 0 3 は、EEPROM 2 6 4 に格納されているカード ID を管理し、ユーザから指示されたとき、適宜、それを書き換える。また、

カード ID 設定プログラム 303 は、ブルートゥースモジュール 247 に設定されているブルートゥースアドレスが含まれるように、カード ID を書き換えて設定する。

ブルートゥース制御プログラム 304 は、ブルートゥースモジュール 247 の
5 動作を制御し、他のブルートゥースデバイスとの通信を実現させる。ブルートゥースデバイス名設定プログラム 305 は、フラッシュメモリ 174B（ブルートゥースモジュール 247 のフラッシュメモリ）に設定されているブルートゥースデバイス名を管理する。

次に、図 6 の通信システムの動作について説明する。

10 始めに、図 20、および図 21 のフローチャートを参照して、パーソナルコンピュータ 51 が通信相手を特定し、そのブルートゥースデバイスに対してのみ、ピコネット内同期の確立処理を行う一連の処理について説明する。

なお、以下の処理においては、パーソナルコンピュータ 51 をマスタとし、その他のブルートゥースデバイス（携帯電話機 52、PDA 53）をスレーブとする。
15 また、以下のフローチャートの説明において、適宜、通信とはピコネット内同期を確立し、相手を特定した後に行われる、ブルートゥースによる通信を意味する。

ステップ S121 において、リーダライタ制御プログラム 86F は、非接触 IC カードが内蔵されている端末（携帯電話機 52）を検出するための電磁波を輻
20 射する。リーダライタ制御プログラム 86F は、所定の制御コマンドによりリーダライタ 105 を制御し、アンテナ 135 から所定の周期で電磁波を輻射させる。

非接触 IC カード制御プログラム 302 は、携帯電話機 52 がパーソナルコンピュータ 51 に近接され、ステップ S131 で、その電磁波を受信したとき、ステップ S132 に進み、ブルートゥースモジュール 247 に設定されているブル
25 ートゥースアドレスに対応するカード ID を EEPROM 264 から読み出させ、それをリーダライタ 105 に通知させる。

ステップ S122 において、リーダライタ制御プログラム 86F は、非接触 I

C カード 2 4 6 から通知されてきたブルートゥースアドレスを受信し、ステップ S 1 2 3 に進み、それをブルートゥース制御プログラム 8 6 G に通知する。

そして、ステップ S 1 0 1 において、ブルートゥース制御プログラム 8 6 G は、携帯電話機 5 2 (ブルートゥースモジュール 2 4 7) に設定されているブルート
5 ウースアドレスを取得する。

ステップ S 1 0 2 乃至ステップ S 1 0 9 において、ブルートゥース制御プログラム 8 6 G により実行される処理、ステップ S 1 4 1 以降においてブルートゥース制御プログラム 3 0 4 により実行される処理、およびステップ S 1 6 1 以降において PDA 5 3 のブルートゥース制御プログラムにより実行される処理は、図
10 2、および図 3 を参照して説明した問い合わせ、および呼び出しと同様の処理である。

すなわち、ステップ S 1 0 2 において、ブルートゥース制御プログラム 8 6 G は、ブルートゥースモジュール 1 0 6 を制御し、IQ パケットをブロードキャストする。

15 具体的には、ブルートゥース制御プログラム 8 6 G は、予め設定されている L AP の 2 4 ビット (9 E 8 B 3 3) と UAP の 4 ビット (全て 0)、およびブルートゥースクロックの全体の 2 8 ビットを用いて、問い合わせ周波数ホッピングパターンを生成する。

また、ブルートゥース制御プログラム 8 6 G は、予め設定されている 9 E 8 B
20 0 0 乃至 9 E 8 B 3 F の LAP から 1 つのアドレスブロックを用いて IAC(Inquiry Access Code)を生成し、そのアクセスコードからなる IQ パケットを、算出した問い合わせホッピングパターンでブロードキャストする。

なお、ブルートゥースにおいて送受信されるパケットは、送信パケットの宛先を示す基本となる 6 8 ビット、または 7 2 ビットのアクセスコードと、通信リンクを管理するためのパラメータを含む 5 4 ビットのパケットヘッダと、ユーザデータである 0 乃至 2 7 4 5 ビット (可変長) のペイロードから構成されている。
25

ブルートゥースモジュール 1 0 6 の各部の処理により、アンテナ 1 9 4 からブ

ロードキャストされた IQ パケットは、ステップ S 1 4 1 において、携帯電話機 5 2 のブルートゥース制御プログラム 3 0 4 により受信され、ステップ S 1 6 1 において、PDA 5 3 のブルートゥース制御プログラムにより受信される。

そして、ステップ S 1 4 2 において、ブルートゥース制御プログラム 3 0 4 は、
5 スレーブの属性を通知するための FHS パケットをパーソナルコンピュータ 5 1 に送信し、問い合わせに応答する。この FHS パケットには、ブルートゥースモジュール 2 4 7 のブルートゥースアドレスとブルートゥースクロックに関する情報が、そのペイロードに含まれている。

この FHS パケットは、ブルートゥース制御プログラム 8 6 G により、ステップ S 1 0 3 において受信され、携帯電話機 5 2 の属性情報が取得される。
10

また、ステップ S 1 6 2 において、同様に PDA 5 3 の属性を示す FHS パケットが送信されており、それがブルートゥース制御プログラム 8 6 G により、ステップ S 1 0 4 で受信される。

以上のような問い合わせの処理により、ブルートゥース制御プログラム 8 6 G
15 は、近傍に存在する全てのスレーブの属性情報を取得した状態となる。

ブルートゥース制御プログラム 8 6 G は、ステップ S 1 0 5 において、取得した FHS パケットの属性情報を検索し、電磁波を介して取得されたブルートゥースアドレスを有するスレーブを識別し、通信相手として特定する。すなわち、携帯電話機 5 2 のブルートゥースアドレスがリーダーライタ制御プログラム 8 6 F から
20 ら予め通知されているため、ブルートゥース制御プログラム 8 6 G は、そのブルートゥースアドレスを含む FHS パケットを送信してきた携帯電話機 5 2 を通信相手の端末として特定する。

そして、ブルートゥース制御プログラム 8 6 G は、その後、通信相手として特定した携帯電話機 5 2 に対してのみ、呼び出し（ピコネット内同期の確立処理）
25 を行う。すなわち、ブルートゥース制御プログラム 8 6 G と PDA 5 3 のブルートゥース制御プログラムとの間では、以降の処理が行われないことになる。

ステップ S 1 0 6 において、ブルートゥース制御プログラム 8 6 G は、携帯電

話機 5 2 から取得した FHS パケットに記述されている情報に基づいて ID パケットを生成し、それを携帯電話機 5 2 に対して送信する。

- 具体的には、ブルートゥース制御プログラム 8 6 G は、FHS パケットに含まれている、ブルートゥースモジュール 2 4 7 に設定されているブルートゥースアドレスの LAP の 2 4 ビットと UAP の下位 4 ビット、およびブルートゥースクロックの 2 8 ビットを用いて呼び出し周波数ホッピングパターンを算出する。

- また、ブルートゥース制御プログラム 8 6 G は、ブルートゥースモジュール 2 4 7 の LAP を用いて DAC(Device Access Code)を生成し、その DAC からなる ID パケットを、算出した呼び出し周波数ホッピングパターンを利用して携帯電話機 5 2 に送信する。

- ブルートゥース制御プログラム 3 0 4 は、その ID パケットをステップ S 1 4 3 において受信したとき、ステップ S 1 4 4 に進み、同一の ID パケットをパーソナルコンピュータ 5 1 に送信し、ID パケットを正常に受信できたことを通知する。

- ブルートゥース制御プログラム 8 6 G は、ステップ S 1 0 7 において、携帯電話機 5 2 から送信されてきた ID パケットを受信したとき、ステップ S 1 0 8 に進み、自分自身の属性を通知するための FHS パケットを携帯電話機 5 2 に送信する。

- ステップ S 1 4 5 において、ブルートゥース制御プログラム 3 0 4 は、パーソナルコンピュータ 5 1 から送信されてきた FHS パケットを受信し、マスタの属性情報を取得する。ブルートゥース制御プログラム 3 0 4 は、ステップ S 1 4 6 に進み、ID パケットをパーソナルコンピュータ 5 1 に送信し、FHS パケットを受信できたことを通知する。

- そして、ブルートゥース制御プログラム 3 0 4 は、ステップ S 1 4 7 に進み、パーソナルコンピュータ 5 1 とピコネット内同期を確立する。

具体的には、ブルートゥース制御プログラム 3 0 4 は、パーソナルコンピュータ 5 1 (ブルートゥースモジュール 1 0 6) に設定されているブルートゥースア

ドレスの LAP の 24 ビットと UAP の下位 4 ビット、およびブルートゥースクロックの 27 ビットを用いてチャンネル周波数ホッピングパターンを生成し、周波数軸の同期を確立する。

また、ブルートゥース制御プログラム 304 は、パーソナルコンピュータ 51
5 から通知されたブルートゥースクロックに基づいて、自らが管理するブルートゥースクロックにオフセット（差分）を加え、時間軸の同期を確立する。

ブルートゥース制御プログラム 86 G は、ステップ S109 において、携帯電話機 52 から送信されてきた ID パケットを受信する。

そして、携帯電話機 52 との間でピコネット内同期が確立された後、ブルート
10 ウース制御プログラム 86 G は、ステップ S110 に進み、ブルートゥースによる通信を開始する。

例えば、ブルートゥース制御プログラム 86 G は、携帯電話機 52 に対し、携帯電話機 52 が提供可能なプロファイル（サービス）の通知を要求する。ブルートゥースにおいては、搭載が想定される機器毎に、全てのプロトコルの仕様、およびユーザインタフェースが規定されており、使用するプロトコルによってプロ
15 ファイルが規定されている。このプロファイルは、ブルートゥースの各レイヤの機能と、そのレイヤとの連携についてアプリケーション毎に規定されている。

ブルートゥース制御プログラム 86 G は、携帯電話機 52 から通知されたプロファイルから所定のプロファイルを選択し、それに基づいて通信を行う。

20 なお、提供可能なプロファイルを取得する前に、またはプロファイルを選択し、通信を行う前に、互いの認証が必要とされることがある。パーソナルコンピュータ 51 と携帯電話機 52 は、それぞれのデータベースにリンクキーを設定しており、そのリンクキーを用いて認証を行う。

例えば、パーソナルコンピュータ 51 と携帯電話機 52 が初めて通信を行う場
25 合には、リンクキーの設定に際し、ユーザに対して、PIN(Personal Identification Number)コードの入力が要求され、入力された PIN コードと、発生した乱数に基づいて、そのリンクキーが設定される。設定されたリンクキーは、通信す

る相手のブルートゥースアドレスと対応付けて、それぞれのデータベースに登録される。

- リンクキーは、その用途に応じて、「初期化キー」、「単体キー」、「複合キー」、および「マスタキー」が規定されており、上述したように、初めて通信を行う際に PIN コードと乱数に基づいて設定されるリンクキーは、初期化キーである。そして、初期化キーを用いて行われる認証においては、初期化キーと、認証を要求してきた端末のブルートゥースアドレスと、認証判断する端末が発生した 128 ビットの乱数が用いられる。

- 10 以上のように、リーダライタ 105 における通信により、パーソナルコンピュータ 51 は、ピコネット内同期を確立すべきスレーブのブルートゥースアドレスを非接触 IC カード 246 から取得することができる。従って、図 6 に示すように、パーソナルコンピュータ 51 の近傍に PDA 53 が存在する場合であっても、パーソナルコンピュータ 51 と携帯電話機 52 との間でのみ、端末の選択等を行うことなく、ブルートゥースによる通信が開始される。

- 15 これにより、例えば、携帯電話機 52 のユーザは、パーソナルコンピュータ 51 とブルートゥースによる通信を行う場合、携帯電話機 52 をパーソナルコンピュータ 51 に近付けることで、その通信を開始させることができる。また、パーソナルコンピュータ 51 から携帯電話機 52 にデータを転送する場合も、ユーザは、同様にして携帯電話機 52 をパーソナルコンピュータ 51 に近付けるだけで
20 通信を開始させることができる。

- 以上においては、パーソナルコンピュータ 51 と携帯電話機 52、および PDA 53 のブルートゥースモジュールが予め起動している状態であるとしたが、それらのブルートゥースモジュールが起動していない場合、例えば、電磁波を受信するタイミングで起動し、その後にピコネット内同期を確立するようにしてもよい。
25

次に、図 22、および図 23 のフローチャートを参照して、それぞれのブルートゥースモジュールが起動していない状態において、ピコネット内同期を確立す

る通信システムの一連の処理について説明する。

図 2 2、および図 2 3 に示す処理は、図 2 0、および図 2 1 を参照して説明した同期確立処理と基本的に同様の処理である。そして、リーダライタ 1 0 5 から輻射された電磁波が受信されることに応じて携帯電話機 5 2 のブルートゥースモジュール 2 4 7 が起動され、非接触 IC カード 2 4 6 から送信されたカード ID がリーダライタ 1 0 5 において受信されることに応じてパーソナルコンピュータ 5 1 のブルートゥースモジュール 1 0 6 が起動されるようになされている点が相違している。

リーダライタ制御プログラム 8 6 F は、ステップ S 2 0 1 において、非接触 IC カードが内蔵されている端末を検出するための電磁波を輻射する。

そして、非接触 IC カード制御プログラム 3 0 2 は、ステップ S 2 1 1 で、その電磁波を受信したとき、ステップ S 2 1 2 に進み、ブルートゥース制御プログラム 3 0 4 (ブルートゥースモジュール 2 4 6) に対して起動を指示する。

例えば、非接触 IC カード制御プログラム 3 0 2 は、ホストプログラム 3 0 1 に対して電磁波を受信したことを通知する。そして、ホストプログラム 3 0 1 は、この通知に応じて、ブルートゥース制御プログラム 3 0 4 を起動させるとともに、電源回路部 2 3 5 を制御し、ブルートゥースモジュール 2 4 7 に電源を供給させる。

ブルートゥース制御プログラム 3 0 4 は、ステップ S 2 2 1 において起動し、例えば、マスタ (パーソナルコンピュータ 5 1) からの問い合わせ待ちの状態 (Inquiry Scan) となる。

一方、非接触 IC カード制御プログラム 3 0 2 は、ブルートゥース制御プログラム 3 0 4 を起動させた後、ステップ S 2 1 3 に進み、ブルートゥースアドレスに対応するカード ID をリーダライタ 1 0 5 に通知する。

リーダライタ制御プログラム 8 6 F は、ステップ S 2 0 2 において、カード ID を受信したとき、ステップ S 2 0 3 に進み、ブルートゥース制御プログラム 8 6 G を起動させるとともに、ブルートゥースモジュール 1 0 6 に電源を供給さ

せる。

ブルートゥース制御プログラム 8 6 G は、ステップ S 1 8 1 において起動し、ステップ S 1 8 2 に進み、リーダライタ制御プログラム 8 6 F が携帯電話機 5 2 から取得したブルートゥースアドレス（カード ID）を受信する。

- 5 すなわち、ステップ S 2 0 3 において、ブルートゥース制御プログラム 8 6 G を起動させた後、リーダライタ制御プログラム 8 6 F は、ステップ S 2 0 4 に進み、携帯電話機 5 2 から取得したカード ID をブルートゥース制御プログラム 8 6 G に対して通知している。

- 10 そして、以降の処理（ステップ S 1 8 3 乃至ステップ S 1 8 9 の処理、およびステップ S 2 2 2 乃至ステップ S 2 2 7 の処理）において、ブルートゥース制御プログラム 8 6 G は、図 2 0、および図 2 1 を参照して説明したような問い合わせ、および呼び出しをブルートゥースモジュール 2 4 6 との間で行う。

- 15 すなわち、ブルートゥース制御プログラム 8 6 G は、リーダライタ 1 0 5 から通知されたブルートゥースアドレスに基づいて、携帯電話機 5 2 を、ピコネット内同期を確立すべきスレーブとして特定し、その携帯電話機 5 2 との間でのみ、ピコネット内同期を確立する。

なお、PDA 5 3 は、リーダライタ 1 0 5 からの電磁波を受信していないため、起動されない状態のまま保持される。従って、より容易に通信相手を特定することができる。

- 20 このように、電磁波の受信をトリガとしてブルートゥースモジュール 2 4 6 を起動させるようにしたので、携帯電話機 5 2 のユーザは、例えば、ブルートゥース制御プログラム 3 0 4 を起動させるような操作をすることなく、パーソナルコンピュータ 5 1 に近付けるだけで、ブルートゥース制御プログラム 3 0 4 を起動させることができる。また、上述したものと同様に、非接触 IC カード 2 4 6 から通知されたカード ID に基づいて通信相手が特定されるため、いずれの操作も
- 25 することなく、パーソナルコンピュータ 5 1 とブルートゥースによる通信を行うことができる。

以上においては、リーダライタ 105 から輻射される電磁波が受信されることに応じて、携帯電話機 52 のブルートゥースモジュール 247 が起動され、携帯電話機 52 から送信されるカード ID が受信されることに応じて、パーソナルコンピュータ 51 のブルートゥースモジュール 106 が起動されることとしたが、
5 様々なタイミングで起動するようにしてもよい。

例えば、カード ID がパーソナルコンピュータ 51 に対して通知されたタイミング（ステップ S213 の直後のタイミング）で、携帯電話機 52 のブルートゥース制御プログラム 304 が起動されるようにしてもよい。

また、携帯電話機 52 の全体の電源がオフとされている状態において、電磁波
10 が受信されたことに応じて発生された起電力に基づいて、携帯電話機 52 の全体の電源をオンとし、続けて、ブルートゥース制御プログラム 304 を起動させるようにすることもできる。

以上においては、非接触 IC カード 246 とブルートゥースモジュール 247 が、ともに携帯電話機 52 に内蔵されているとしたが、例えば、それらのモジュールが組み込まれているメモリースティック 223 をメモリースティックスロット 222 に装着させ、上述したような処理を実行させるようにしてもよい。
15

図 24A は、非接触 IC カード 246 とブルートゥースモジュール 247 が組み込まれているメモリースティック 223 を装着することにより、その機能が拡張される携帯電話機 52 を示す模式図である。

20 このメモリースティック 223 を携帯電話機 52 に装着させることにより、例えば、携帯電話機 52 に非接触 IC カード 246 とブルートゥースモジュール 247 が内蔵されていない場合であっても、その機能を拡張させることができ、上述したようなピコネット内同期の確立処理を実行させることができる。

なお、拡張する新たな機能を制御するための制御プログラムも、メモリースティック 223 から読み出され、携帯電話機 52 にインストールされている。また、
25 その制御プログラムが、例えば、図 11 に示すような磁気ディスク 101 乃至半導体メモリ 104 などの記録媒体から、USB ケーブルを介してインストールさ

れるようにしてもよい。

また、メモリースティック 2 2 3 だけでなく、図 2 4 B に示すような、非接触 IC カード 2 4 6 とブルートゥースモジュール 2 4 7 が組み込まれた外付けユニット 3 2 1 により、携帯電話機 5 2 の機能を拡張させるようにしてもよい。外付けユニット 3 2 1 は、例えば、携帯電話機 5 2 の所定の位置に設けられている USB のコネクタや、充電ケーブルのコネクタなどに接続される。

図 2 5 A は、ブルートゥースモジュール 2 4 7 が内蔵されており、メモリースティック 2 2 3 により、非接触 IC カード 2 4 6 の機能だけを拡張させる携帯電話機 5 2 を示す模式図である。

10 このメモリースティック 2 2 3 を携帯電話機 5 2 に装着させ、非接触 IC カード 2 4 6 に設定されているカード ID を、ブルートゥースモジュール 2 4 7 に設定されているブルートゥースアドレスを含むものに設定することにより、上述したようなピコネット内同期の確立処理を実行させることができる。カード ID の書き換え処理については、フローチャートを参照して後述する。

15 また、図 2 5 B に示すように、携帯電話機 5 2 に外付けユニット 3 2 1 を装着させることにより、非接触 IC カード 2 4 6 の機能のみを拡張させることもできる。

図 2 6 A は、図 2 5 A に示したものと反対に、非接触 IC カード 2 4 6 が内蔵されており、メモリースティック 2 2 3 によりブルートゥースモジュール 2 4 7 の機能を拡張させる携帯電話機 5 2 を示す模式図である。また、図 2 6 B は、ブルートゥースモジュール 2 4 7 の機能を外付けユニット 3 2 1 により拡張させる携帯電話機 5 2 を示す模式図である。

以下において、非接触 IC カード 2 4 6 の機能、またはブルートゥースモジュール 2 4 7 の機能、或いはその両方の機能を拡張させる、メモリースティック 2 2 3 と外付けユニット 3 2 1 を区別する必要がない場合、まとめて機能拡張ユニットと称する。

次に、カード ID を必要に応じて書き換える携帯電話機 5 2 の処理について、

フローチャートを参照して説明する。

始めに、図 27 のフローチャートを参照して、ブルートゥースアドレスに基づいてカード ID を書き換える携帯電話機 52 の処理について説明する。

ステップ S 251 において、ホストプログラム 301 は、カード ID 設定プログラム 303 に問い合わせ、カード ID を確認する。カード ID 設定プログラム 303 は、ステップ S 271 において、その問い合わせを受信したとき、ステップ S 272 に進み、EEPROM 264 に設定されているカード ID を読み出し、ホストプログラム 301 に通知する。

ホストプログラム 301 は、ステップ S 252 においてカード ID を受信したとき、ステップ S 253 に進み、ブルートゥース制御プログラム 304 に問い合わせ、ブルートゥースアドレスを確認する。

ブルートゥース制御プログラム 304 は、ステップ S 281 において、その問い合わせを受信したとき、ステップ S 282 に進み、フラッシュメモリ 174 B に保存されているブルートゥースアドレスを読み出し、ホストプログラム 301 に通知する。

ステップ S 254 において、ホストプログラム 301 は、ブルートゥース制御プログラム 304 から通知されてきたブルートゥースアドレスを取得し、既に通知されているカード ID と比較する。そして、ホストプログラム 301 は、ステップ S 255 において、取得したカード ID に、少なくともブルートゥースアドレス（ブルートゥースアドレスに関する情報）が含まれているか否かを判定する。

ホストプログラム 301 は、ステップ S 255 において、カード ID とブルートゥースアドレスが同一である、またはカード ID にブルートゥースアドレスが含まれていると判定した場合、処理を終了させる。一方、ステップ S 255 において、カード ID にブルートゥースアドレスが含まれていないと判定した場合、ホストプログラム 301 は、ステップ S 256 に進み、カード ID 設定プログラム 303 に対して、取得したブルートゥースアドレスを通知する。

カード ID 設定プログラム 303 は、ステップ S 273 において、そのブルー

トウースアドレスを受信したとき、ステップ S 2 7 4 に進み、ブルートウースアドレスと同一のカード ID を設定する。すなわち、カード ID 設定プログラム 3 0 3 は、EEPROM 2 6 4 に設定されているカード ID をブルートウースアドレスと同一のものに書き換える。

- 5 これにより、カード ID にブルートウースアドレスが含まれることとなり、上述したように、携帯電話機 5 2 を近付けるだけで、マスタであるパーソナルコンピュータ 5 1 に、ピコネット内同期を確立すべきスレーブを識別させることができる。

- 10 以下に説明する処理も含めて、このようなカード ID を書き換える処理は、所定の周期で行われるようにしてもよい。非接触 IC カード 2 4 6 は、ブルートウースによる通信以外に、例えば、改札口の通行や、購入した商品の代金の支払いなどの、様々な用途に利用されるため、ユーザにより、必要に応じてその都度変更されることがある。従って、所定の周期毎にそのような書き換えが実行されることにより、ユーザは、ブルートウースにより通信を開始しようとする毎に、
15 カード ID を設定し直すといった手間を省くことができる。

また、リーダライタ 1 0 5 からの電磁波が受信されたタイミングで、このような書き換えが行われるようにしてもよい。これにより、リーダライタを有しているマスタは、より確実に通信相手を特定することができる。

- 20 次に、図 2 8 のフローチャートを参照して、非接触 IC カード 2 4 6 の機能を拡張する機能拡張ユニットを装着した場合の携帯電話機 5 2 の処理について説明する。

- 25 ステップ S 3 0 1 において、ホストプログラム 3 0 1 は、非接触 IC カード 2 4 6 の機能を拡張する機能拡張ユニットが装着されたか否かを判定し、装着されたと判定するまで待機する。ホストプログラム 3 0 1 は、ステップ S 3 0 1 において、例えば、図 2 5 A に示したようなメモリースティック 2 2 3、または図 2 5 B に示したような外付けユニット 3 2 1 が所定の位置に装着されたと判定した場合、ステップ S 3 0 2 に進む。

以降の処理は、図 27 を参照して説明した処理と同様の処理である。すなわち、ホストプログラム 301 は、カード ID とブルートゥースアドレスを取得し、ステップ S 306 において、少なくとも、カード ID にブルートゥースアドレスが含まれているか否かを判定する。

- 5 ホストプログラム 301 は、ステップ S 306 において、カード ID にブルートゥースアドレスが含まれていると判定した場合、処理を終了させ、含まれていないと判定した場合、ステップ S 307 に進み、カード ID 設定プログラム 303 にブルートゥースアドレスを通知する。

- 10 そして、カード ID 設定プログラム 303 は、例えば、設定されているカード ID を、受信したブルートゥースアドレスと同一のものに書き換える。

これにより、例えば、非接触 IC カード 246 の機能を拡張させるメモリースティック 223 を購入したユーザは、そのメモリースティック 223 を携帯電話機 52 に装着させるだけで、必要に応じて、非接触 IC カード 246 のカード ID を書き換えることができる。

- 15 従って、ユーザは、機能が拡張された携帯電話機 52 により、上述したようなピコネット内同期の確立処理を実行させることができ、通信相手を選択することなく、ブルートゥースによる通信を開始させることができる。

- 20 次に、図 29 のフローチャートを参照して、ブルートゥースモジュール 247 の機能を拡張する機能拡張ユニットを装着した場合の携帯電話機 52 の処理について説明する。

- 25 ステップ S 341 において、ホストプログラム 301 は、ブルートゥースモジュール 247 の機能を拡張する機能拡張ユニットが装着されたか否かを判定し、装着されたと判定するまで待機する。ホストプログラム 301 は、ステップ S 341 において、例えば、図 26A に示したようなメモリースティック 223、または図 26B に示したような外付けユニット 321 が所定の位置に装着されたと判定した場合、ステップ S 342 に進む。

以降の処理は、図 27 を参照して説明した処理と同様の処理である。すなわち、

ホストプログラム 301 は、カード ID とブルートゥースアドレスを取得し、ステップ S 346 において、少なくとも、カード ID にブルートゥースアドレスが含まれているか否かを判定する。

- 5 ホストプログラム 301 は、ステップ S 346 において、カード ID にブルートゥースアドレスが含まれていると判定した場合、処理を終了させ、含まれていないと判定した場合、ステップ S 347 に進み、カード ID 設定プログラム 303 にブルートゥースアドレスを通知する。

そして、カード ID 設定プログラム 303 は、例えば、設定されているカード ID を、受信したブルートゥースアドレスと同一のものに書き換える。

- 10 以上の処理により、ユーザは、例えば、ブルートゥースモジュール 247 の機能を拡張させるメモリースティック 223 を購入し、それを携帯電話機 52 に装着させるだけで、必要に応じて、カード ID を書き換えることができ、さらに、その携帯電話機を利用して、上述したようなピコネット内同期の確立処理を実行させることができる。

- 15 以上においては、カード ID とブルートゥースアドレスが記憶されるメモリがそれぞれ設けられるとしたが、非接触 IC カード 246 とブルートゥースモジュール 247 により共有される、物理的に 1 つのメモリに、これらの情報が記憶されるようにしてもよい。この共有されるメモリは、メモリースティック 223 に組み込まれていてもよいし、携帯電話機 52 に内蔵されていてもよい。

- 20 また、以上においては、パーソナルコンピュータ 51 をマスタとし、携帯電話機 52 をスレーブとした場合について説明したが、当然、双方が逆の役割を有するようにしてもよい。また、リーダライタが携帯電話機 52 にも設けられている場合、携帯電話機 52 がパーソナルコンピュータ 51 の存在を検出し、パーソナルコンピュータ 51 の非接触 IC カードから通知されたカード ID に基づいて、
25 ピコネット内同期を確立させるようにしてもよい。

なお、非接触 IC カードとリーダライタとの通信によりブルートゥースアドレスを取得し、それに基づいてピコネット内同期を確立する通信システムは、上述

したようなパーソナルコンピュータ 5 1 と携帯電話機 5 2 との間だけでなく、様々な機器間においても適用可能である。

例えば、携帯電話機 5 2 や PDA 5 3 などの携帯端末と、テレビジョン受像機、カーナビゲーション、自動販売機、ATM(automatic teller machine)などの装置
5 間でも、上述したような通信システムを構成することもできる。この場合、携帯電話機 5 2 や PDA 5 3 には、ブルートゥースモジュールと非接触 IC カードが少なくとも設けられていればよく、テレビジョン受像機、カーナビゲーション、自動販売機、ATM には、それぞれ、ブルートゥースモジュールと、非接触 IC カードのリーダライタが少なくとも設けられていればよい。

10 また、いずれか一方がリーダライタを有していれば、携帯電話機同士、または PDA 同士、PDA とデジタルカメラ、或いは PDA とデジタルビデオカメラなどによるピコネット内同期の確立処理にも、本発明は適用することができる。

さらに、単に機器と機器との接続だけに限らず、電磁誘導通信部（リーダライタ、および非接触 IC カード）とブルートゥースモジュールが、例えば、自動車、
15 電車、船、飛行機などの移動体や、建物内、或いは街中の至る所に設けられ、そのブルートゥースモジュールを介して、例えば、インターネットや、LAN(Local Area Network)、或いは WAN(Wide Area Network)などのネットワークに接続することにより、いわゆるユビキタス (Ubiquitous) 社会 (Ubiquitous Network 社会、または Ubiquitous Computing 社会) を構成するようにしてもよい。

20 図 3 0 は、本発明を適用した通信システムにより構成する、ユビキタス社会の概念を示す図である。

図においては、インターネット 3 5 4 には、アクセスポイント 3 5 1 および 3 5 2、サーバ 3 5 5 および 3 5 6、クライアント PC 3 5 7 が接続されており、各種の情報を送受信することが可能とされている。

25 アクセスポイント 3 5 1 には、非接触 IC カード 3 7 1、ブルートゥースモジュール 3 7 2、およびリーダライタ 3 7 3 が設けられており、携帯電話機 5 2 のユーザは、このアクセスポイント 3 5 1 に携帯電話機 5 2 を近接させるだけで、

上述したような通信相手を特定する処理が行われ、その後に、ブルートゥースを介してインターネット 354 にアクセスすることができる。

アクセスポイント 352 には、リーダライタ 381 と無線 LAN アクセスポイント 382 が設けられている。従って、非接触 IC カード 391 と無線 LAN ク
5 ライアント 392 が内蔵されている PDA 353 のユーザが PDA 353 をアクセスポイント 352 に近接させるだけで、上述したような通信相手を特定する処理が行われ、その後に、無線 LAN を介してインターネット 354 にアクセスすることができる。

例えば、携帯電話機 52 のユーザは、町中に設置されているアクセスポイント
10 351 に携帯電話機 52 を近接させるだけで、サーバ 355 から所望するコンテンツを取得したり、サーバ 356 に展開されているコミュニティに参加したり、或いは、遠隔にあるクライアント PC 357 を操作したりすることを、いつでも、かつ、容易に行うことができる。

また、個々のデバイスにブルートゥースアドレスと同様の固有のアドレスが設
15 定されている場合、図 33 のアクセスポイント 352 と PDA 353 との間で行われているような無線 LAN (IEEE(Institute of Electrical and Electronics Engineers)802.11b) などの、ブルートゥース以外の通信においても、本発明は適用することができる。

具体的には、PDA 353 に設定されている、例えば、128 ビットからなる I
20 Pv6(Internet Protocol version 6)をアクセスポイント 352 のリーダライタ 381 に通知させるようにすることにより、PDA 353 のユーザは、それをアクセスポイント 352 に近接させるだけで、無線 LAN を介してインターネット 354 にアクセスすることができる。

また、ブルートゥース以外の通信としては、例えば、IrDA、HomeRF(SWAP)、
25 Wireless1394 などがあり、これらの通信においても、本発明は適用することができる。

また、上述したような非接触 IC カードのようにループアンテナを用いて電力

伝送およびデータ伝送を行う通信方式に代えて、出力を抑え、ブルートゥースなどの通信方式より通信可能な距離が短くなるように予め設定されている通信方式であれば、いずれの通信方式を用いるようにしてもよい。

上述したように、通常、ブルートゥースによる通信においては、同期の確立が
5 なされ、その同期を確立した相手の端末が初めて通信を行う端末である場合、双方の機器に同一の PIN コードを入力する必要がある。しかしながら、本発明を適用し、例えば、電磁誘導を利用した通信により提供された識別情報等に基づいて、通信相手を特定し、ブルートゥース通信が行えるようになった場合においては、その PIN コードの入力を不要とするように予め設定されていてもよい。この
10 の場合、例えば、電磁誘導を利用した通信により、所定の PIN コードが双方の端末間で共有される。

また、例えば、電磁誘導を利用した通信により提供された識別情報等に基づいて、通信相手を特定し、ブルートゥース通信が行えるようになった場合においては、所定のプロファイルで通信が行われるように予め設定されていてもよい。この
15 の場合、例えば、電磁誘導を利用した通信により、自分自身が提供できるプロファイルが双方の端末間で共有され、その中から、所定のプロファイルが選択される。

さらに、上述したメモリースティック 2 2 3 に代えて、所定のスロットに挿入可能な形状であれば如何なるものであってもよい。例えば、メモリースティック
20 2 2 3 に代わるものとして、SD カード（登録商標）規格のものや、CF カード（登録商標）規格のものなどがある。

なお、上述した例においては、リーダライタ 1 0 5 と、非接触 IC カード 2 4 6 が個々に構成されとしたが、それらの双方の機能を有するものを、パーソナルコンピュータ 5 1 と携帯電話機 5 2 にそれぞれ設けるようにしてもよい。さら
25 に、この双方の機能を有するものを、例えば、上述したようなメモリースティック 2 2 3 などに格納し、パーソナルコンピュータ 5 1 と携帯電話機 5 2 の機能を拡張するようにしてもよい。

また、リーダライタを有する機器（例えば、上述したパーソナルコンピュータ 5 1）が、過去にブルートゥースによる通信を行ったことがある機器に関する情報を履歴情報として記憶しておくようにしてもよい。これにより、電磁誘導を用いた通信により、近接された機器のブルートゥースアドレス等が通知されたとき、

5 その履歴情報を参照することで、近接されている機器を特定することができる。

例えば、機器のブルートゥースアドレスやブルートゥースデバイス名、或いは、図 2 を参照して説明した、その機器のカテゴリ、機器が提供できるプロフィールなどが履歴情報として記憶される。

上述した一連の処理は、ハードウェアにより実行させることもできるが、ソフトウェアにより実行させることもできる。

一連の処理をソフトウェアにより実行させる場合には、そのソフトウェアを構成するプログラムが、専用のハードウェアに組み込まれているコンピュータ、または、各種のプログラムをインストールすることで、各種の機能を実行することが可能な、例えば、汎用のパーソナルコンピュータなどに、ネットワークや記録

15 媒体からインストールされる。

この記録媒体は、図 1 1 に示すように、装置本体とは別に、ユーザにプログラムを提供するために配布される、プログラムが記録されている磁気ディスク 1 0 1（フロッピディスクを含む）、光ディスク 1 0 2（CD-ROM(Compact Disk-Read Only Memory)、DVD(Digital Versatile Disk)を含む）、光磁気ディスク 1 0 3（MD（登録商標）(Mini-Disk)を含む）、もしくは半導体メモリ 1 0 4 などよりなるパッケージメディアにより構成されるだけでなく、装置本体に予め組み込まれた状態でユーザに提供される、プログラムが記録されている HDD 1 1 4 や ROM 1 1 8 などで構成される。

なお、本明細書において、記録媒体に記録されるプログラムを記述するステップは、記載された順序に従って時系列的に行われる処理はもちろん、必ずしも時系列的に処理されなくとも、並列的あるいは個別に実行される処理をも含むものである。

また、本明細書において、システムとは、複数の装置により構成される装置全体を表すものである。

産業上の利用可能性

- 5 以上のように、本発明の通信システムおよび方法によれば、近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、通信端末の識別情報を取得し、データの送受信を行う第2の無線通信部を用いて通信端末を含む複数の通信端末から各々の属性情報を取得し、識別情報と、属性情報とを用いて通信相手を特定する。そして、特定した通信端末と
- 10 第2の無線通信部を用いた無線通信を行うための同期を確立する。また、ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータの送受信を行う第3の無線通信部を用いて、情報処理装置に自身の識別情報を提供し、第2の無線通信部を介して送信された情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の属性情報を提供し、第2の無線通信部を用いた無線通信の同期の確立に伴い情報処理装置からの要求に応じて、第
- 15 4の無線通信部を介して所定の信号の送受信を行い同期を確立するようにしたので、通信相手の端末を特定でき、より簡単に、かつ迅速に通信を開始することができる。

- 20 本発明の第1の情報処理装置および方法、並びにプログラムによれば、所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得し、所望のデータの送受信を行う第2の無線通信部を用いて、通信端末を含む複数の通信端末から各々の属性情報を取得し、取得した識別情報と、属性情報とを用いて通信相手を特定する。また、特定した通信端末と第2の無線通信部を用いた無線通信を行うための同期を確立するようにしたので、通信相手の端末を特定でき、
- 25 より簡単に、かつ迅速に通信を開始することができる。

本発明の通信端末および方法、並びにプログラムによれば、所定のデータの送受信を行う第1の無線通信部を用いて、情報処理装置からの所定の要求に応じて

自身の識別情報を提供し、データの送受信を行う第2の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の属性情報を提供する。また、第2の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求に応じて、第2の無線通信部を介して所定の信号の送受信を行い同期を確立するようにしたので、より簡単に、かつ迅速に通信を開始することができる。

本発明の第1の拡張装置によれば、情報処理装置に電氣的に接続し所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得し、所望のデータの送受信を行う第2の無線通信部を用いて、複数の通信端末から各々の属性情報を取得する。また、取得した識別情報と、前記複数の通信端末から取得した属性情報とを用いて通信相手を特定し、特定した通信端末と第2の無線通信部を用いた無線通信を行うための同期を確立するようにしたので、第1、および第2の無線通信部が情報処理装置に設けられていない場合であっても、その機能を第1の拡張装置により拡張させることができ、より簡単に、かつ迅速に通信を開始することができる。

本発明の第2の拡張装置によれば、通信端末に電氣的に接続しデータの授受を行うための接続端子と、所定のデータの送受信を行う第1の無線通信部を用いて、情報処理装置からの要求に応じて自身の識別情報を提供し、データの送受信を行う第2の無線通信部を用いて、情報処理装置からの要求に応じて自身の属性情報を提供する。そして、第2の無線通信部を用いた無線通信の同期確立に伴い情報処理装置からの要求に応じて、第2の無線通信部を介して所定の信号の送受信を行い同期を確立するようにしたので、第1、および第2の無線通信部が通信端末に設けられていない場合であっても、第2の拡張装置によりその機能を拡張させることができ、より簡単に、かつ迅速に通信を開始することができる。

本発明の第2の情報処理装置によれば、所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得し、所望のデータの送受信を行う第2の無線通信部を用いて通信を行ったことのある複数の通信端末に関する情報を履歴情報として記憶し、取得した識別情報と履歴情報とを用いて通信相手を特

定する。また、特定した通信端末と第２の無線通信部を用いた無線通信を行うための同期を確立するようにしたので、第２の無線通信部を用いて通信を行う際に、過去に通信を行ったことのある通信機器に関する情報を取得するまでもなく、容易に通信を開始することができる。

請求の範囲

1. 情報処理装置と複数の通信端末からなるユビキタスネットワークにおける通信システムにおいて、

前記情報処理装置は、

- 5 近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、前記通信端末の識別情報を取得する第1の取得処理手段と、

データの送受信を行う第2の無線通信部を用いて前記通信端末を含む前記複数の通信端末から各々の属性情報を取得する第2の取得処理手段と、

- 10 前記第1の取得処理手段により取得された前記識別情報と、前記第2の取得処理手段により取得された前記属性情報とを用いて通信相手を特定する特定処理手段と、

前記特定処理手段により特定された前記通信端末と前記第2の無線通信部を用いた無線通信を行うための同期を確立する第1の同期確立処理手段と

- 15 を備え、

前記通信端末は、

ループアンテナを介して得られた誘起電力の少なくとも一部を利用してデータの送受信を行う第3の無線通信部を用いて、前記情報処理装置に自身の前記識別情報を提供する第1の提供処理手段と、

- 20 前記第2の無線通信部を介して送信された前記情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の前記属性情報を提供する第2の提供処理手段と、

前記第2の無線通信部を用いた無線通信の同期の確立に伴い前記情報処理装置からの要求に応じて、前記第4の無線通信部を介して所定の信号の送受信を行

- 25 い同期を確立する第2の同期確立処理手段と

を備えることを特徴する通信システム。

2. 情報処理装置と複数の通信端末からなるユビキタスネットワークにおける

通信システムの通信方法において、

前記情報処理装置の情報処理方法は、

近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、前記通信端末の識別情報を取得する第1の取得処理ステップと、

データの送受信を行う第2の無線通信部を用いて前記通信端末を含む前記複数の通信端末から各々の属性情報を取得する第2の取得処理ステップと、

前記第1の取得処理ステップにより取得された前記識別情報と、前記第2の取得処理ステップにより取得された前記属性情報とを用いて通信相手を特定する特定処理ステップと、

前記特定処理ステップにより特定された前記通信端末と前記第2の無線通信部を用いた無線通信を行うための同期を確立する第1の同期確立処理ステップとを備え、

前記通信端末の情報処理方法は、

ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータの送受信を行う第3の無線通信部を用いて、前記情報処理装置に自身の前記識別情報を提供する第1の提供処理ステップと、

前記第2の無線通信部を介して送信された前記情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の前記属性情報を提供する第2の提供処理ステップと、

前記第2の無線通信部を用いた無線通信の同期の確立に伴い前記情報処理装置からの要求に応じて、前記第4の通信部を介して所定の信号の送受信を行い同期を確立する第2の同期確立処理ステップと

を備えることを特徴する通信方法。

3. 所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得する第1の取得処理手段と、

所望のデータの送受信を行う第2の無線通信部を用いて、前記通信端末を含む

複数の通信端末から各々の属性情報を取得する第 2 の取得処理手段と、

前記第 1 の取得処理手段により取得された前記識別情報と、前記第 2 の取得処理手段により取得された前記属性情報とを用いて通信相手を特定する特定処理手段と、

- 5 前記特定処理手段により特定された前記通信端末と前記第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段と
を備えることを特徴とする情報処理装置。

4. 前記第 1 の無線通信部による無線通信可能な距離が、前記第 2 の無線通信部による無線通信可能な距離より短いこと

- 10 を特徴とする請求の範囲第 3 項に記載の情報処理装置。

5. 前記第 1 の取得処理手段は、近接された前記通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う前記第 1 の無線通信部を用いて、前記通信端末の前記識別情報を取得すること

を特徴とする請求の範囲第 3 項に記載の情報処理装置。

- 15 6. 前記属性情報には、前記複数の通信端末を各々識別可能にするアドレス情報と前記通信端末が管理するクロック情報が含まれていること

を特徴とする請求の範囲第 3 項に記載の情報処理装置。

7. 前記第 1 の取得処理手段により前記識別情報が取得されたことに応じて、前記第 2 の無線通信部を起動させる起動処理手段を更に備える

- 20 ことを特徴とする請求の範囲第 3 項に記載の情報処理装置。

8. 前記識別情報には、前記通信端末のブルートゥースアドレスが少なくとも含まれており、

前記第 2 の取得処理手段では、前記第 2 の無線通信部を用いて送信した IQ パケットに応答して前記複数の通信端末が各々返信した複数の FHS パケットを取
25 得し、

前記同期確立処理手段では、前記特定処理手段により特定された前記通信端末に対し、前記第 2 の無線通信部を用いて ID パケットの送信を行い、該 ID パケ

ットの送信に対する前記通信端末からの応答があったときは自身の FHS パケットを更に送信すること

を特徴とする請求の範囲第 3 項に記載の情報処理装置。

9. 所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別
5 情報を取得する第 1 の取得処理ステップと、

所望のデータの送受信を行う第 2 の無線通信部を用いて、前記通信端末を含む複数の通信端末から各々の属性情報を取得する第 2 の取得処理ステップと、

前記第 1 の取得処理ステップにより取得された前記識別情報と、前記第 2 の取得処理ステップにより取得された前記属性情報とを用いて通信相手を特定する特
10 定処理ステップと、

前記特定処理ステップにより特定された前記通信端末と前記第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理ステップと

を備えることを特徴とする情報処理方法。

10. 前記第 1 の無線通信部による無線通信可能な距離が、前記第 2 の無線通
15 信部による無線通信可能な距離より短いこと

を特徴とする請求の範囲第 9 項に記載の情報処理方法。

11. 前記第 1 の取得処理ステップは、近接された前記通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う前記第 1 の無線通信部を用いて、前記通信端末の前記識別情報を取得すること

20 を特徴とする請求の範囲第 9 項に記載の情報処理方法。

12. 前記属性情報には、前記複数の通信端末を各々識別可能にするアドレス情報と前記通信端末が管理するクロック情報が含まれていること

を特徴とする請求の範囲第 9 項に記載の情報処理方法。

13. 前記第 2 の取得処理ステップでは、前記第 2 の無線通信部を用いて送信
25 した IQ パケットに応答して前記複数の通信端末が各々返信した複数の FHS パケットを取得し、

前記同期確立処理ステップでは、前記特定処理ステップにより特定された前記

通信端末に対し、前記第 2 の無線通信部を用いて ID パケットの送信を行い、該 ID パケットの送信に対する前記通信端末からの応答があったときは自身の FHS パケットを更に送信すること

を特徴とする請求の範囲第 9 項に記載の情報処理方法。

- 5 1 4. 所定のデータの送受信を行う第 1 の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供する第 1 の提供処理手段と、

データの送受信を行う第 2 の無線通信部を用いて、前記情報処理装置からの所定の要求に応じて自身の属性情報を提供する第 2 の提供処理手段と、

- 10 前記第 2 の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求に応じて、前記第 2 の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理手段と

を備えることを特徴とする通信端末。

- 1 5. 前記第 1 の無線通信部による無線通信可能な距離が、前記第 2 の無線通信部による無線通信可能な距離より短いこと

- 15 を特徴とする請求の範囲第 1 4 項に記載の通信端末。

- 1 6. 前記第 1 の提供処理手段は、ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータ送受信を行う前記第 1 の無線通信部を用いて、前記情報処理装置からの所定の要求に応じて自身の前記識別情報を提供すること
を特徴とする請求の範囲第 1 4 項に記載の通信端末。

- 20 1 7. 前記識別情報は、自身の端末を識別可能にするアドレス情報を少なくともも含んでいること

を特徴とする請求の範囲第 1 4 項に記載の通信端末。

- 1 8. 前記属性情報には、前記アドレス情報と自身の端末が管理するクロック情報とが含まれていること

- 25 を特徴とする請求の範囲第 1 7 項に記載の通信端末。

- 1 9. 前記第 1 の提供処理手段により前記識別情報を提供したことに応じて、前記第 2 の無線通信部を起動させる起動処理手段を更に備える

ことを特徴とする請求の範囲第 1 4 項に記載の通信端末。

20. 前記識別情報は、ブルートゥースアドレス情報を少なくとも含んでおり、
前記第 2 の提供処理手段では、前記第 2 の無線通信部を用いて受信した IQ パ
ケットに応答して FHS パケットを返信し、

5 前記同期確立処理手段では、前記第 2 の無線通信部を用いて受信した ID パケ
ットに応答して前記 ID パケットを返信し、更に FHS パケットを受信したとき
は再度前記 ID パケットを返信すること

を特徴とする請求の範囲第 1 4 項に記載の通信端末。

21. 所定のデータの送受信を行う第 1 の無線通信部を用いて、情報処理装置
10 からの所定の要求に応じて自身の識別情報を提供する第 1 の提供処理ステップと、
データの送受信を行う第 2 の無線通信部を用いて、前記情報処理装置からの所
定の要求に応じて自身の属性情報を提供する第 2 の提供処理ステップと、

前記第 2 の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置か
らの要求に応じて、前記第 2 の無線通信部を介して所定の信号の送受信を行い同
15 期を確立する同期確立処理ステップと

を備えることを特徴とする通信方法。

22. 前記第 1 の提供処理ステップは、ループアンテナを介して得られた誘起
電力の少なくとも一部を利用しデータ送受信を行う前記第 1 の無線通信部を用い
て、情報処理装置からの所定の要求に応じて自身の前記識別情報を提供すること
20 を特徴とする請求の範囲第 2 1 項に記載の通信方法。

23. 前記識別情報は、自身の端末を識別するアドレス情報を少なくとも含ん
でいること

を特徴とする請求の範囲第 2 1 項に記載の通信方法。

24. 前記属性情報には、前記アドレス情報と自身の端末が管理するクロック
25 情報とが含まれていること

を特徴とする請求の範囲第 2 3 項に記載の通信方法。

25. 前記第 1 の提供処理ステップにより前記識別情報を提供したことに応じ

て、前記第 2 の無線通信部を起動させる起動処理ステップを更に備える

ことを特徴とする請求の範囲第 2 1 項に記載の通信方法。

2 6. 前記識別情報は、ブルートゥースアドレス情報を少なくとも含んでおり、
前記第 2 の提供処理ステップでは、前記第 2 の無線通信部を用いて受信した I

5 Q パケットに応答して FHS パケットを返信し、

前記同期確立処理ステップでは、前記第 2 の無線通信部を用いて受信した ID
パケットに応答して前記 ID パケットを返信し、更に FHS パケットを受信した
ときは再度前記 ID パケットを返信すること

を特徴とする請求の範囲第 2 1 項に記載の通信方法。

10 2 7. 情報処理装置に取付け可能な拡張装置において、

前記情報処理装置に電氣的に接続しデータの授受を行うための接続端子と、
所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報
を取得する第 1 の取得処理手段と、

所望のデータの送受信を行う第 2 の無線通信部を用いて、複数の通信端末から

15 各々の属性情報を取得する第 2 の取得処理手段と、

前記第 1 の取得処理手段により取得された前記識別情報と、前記複数の通信端
末から取得した前記属性情報とを用いて通信相手を特定する特定処理手段と、

前記特定処理手段により特定された前記通信端末と前記第 2 の無線通信部を用
いた無線通信を行うための同期を確立する同期確立処理手段と

20 を備えることを特徴とする拡張装置。

2 8. 通信端末に取付け可能な拡張装置において、

前記通信端末に電氣的に接続しデータの授受を行うための接続端子と、
所定のデータの送受信を行う第 1 の無線通信部を用いて、情報処理装置からの
要求に応じて自身の識別情報を提供する第 1 の提供処理手段と、

25 データの送受信を行う第 2 の無線通信部を用いて、前記情報処理装置からの要
求に応じて自身の属性情報を提供する第 2 の提供処理手段と、

前記第 2 の無線通信部を用いた無線通信の同期確立に伴い前記情報処理装置か

らの要求に応じて、前記第 2 の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理手段と

を備えることを特徴とする拡張装置。

29. 所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報を取得する第 1 の取得処理ステップと、

所望のデータの送受信を行う第 2 の無線通信部を用いて、前記通信端末を含む複数の通信端末から各々の属性情報を取得する第 2 の取得処理ステップと、

前記第 1 の取得処理ステップにより取得された前記識別情報と、前記第 2 の取得処理ステップにより取得された前記属性情報とを用いて通信相手を特定する特定処理ステップと、

前記特定処理ステップにより特定された前記通信端末と前記第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理ステップと

を情報処理装置に実行させるプログラム。

30. 所定のデータの送受信を行う第 1 の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供する第 1 の提供処理ステップと、

データの送受信を行う第 2 の無線通信部を用いて、前記情報処理装置からの所定の要求に応じて自身の属性情報を提供する第 2 の提供処理ステップと、

前記第 2 の無線通信部を用いた無線通信の同期確立に伴い前期情報処理装置からの要求に応じて、前記第 2 の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理ステップと

を通信端末に実行させるプログラム。

31. 所定データの送受信を行う第 1 の無線通信部を用いて、通信端末から識別情報を取得する第 1 の取得処理手段と、

所望のデータの送受信を行う第 2 の無線通信部を用いて通信を行ったことのある複数の通信端末に関する情報を履歴情報として記憶する記憶処理手段と、

前記第 1 の取得処理手段により取得された前記識別情報と前記履歴情報とを用いて通信相手を特定する特定処理手段と、

前記特定処理手段により特定された前記通信端末と前記第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段と
を備えることを特徴とする情報処理装置。

- 3 2. 前記履歴情報は、少なくともブルートゥースアドレス情報を含み、
- 5 前記同期確立処理手段では、前記ブルートゥースアドレス情報に基づいて生成された ID パケットを前記特定処理手段により特定された前記通信端末に対して送信し、該 ID パケットに対する前記通信端末からの応答があったときは自身の FHS パケットを更に送信すること
を特徴とする請求の範囲第 3 1 項に記載の情報処理装置。

補正書の請求の範囲

[2002年11月7日 (07.11.02) 国際事務局受理：出願当初の請求の範囲1,2,3,9,27,29,30
及び31は補正された；新しい請求の範囲33,
34が加えられた；他の請求の範囲は変更なし。(7頁)]

1. (補正後) 情報処理装置と複数の通信端末からなるユビキタスネットワークにおける通信システムにおいて、

前記情報処理装置は、

- 5 近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、前記通信端末の識別情報を取得する第1の取得処理手段と、

データの送受信を行う第2の無線通信部を用いて前記通信端末を含む前記複数の通信端末から各々の属性情報を取得する第2の取得処理手段と、

- 10 前記第2の取得処理手段により取得された前記属性情報を検索し、前記第1の取得処理手段により取得された前記識別情報をもつ通信端末を通信相手として特定する特定処理手段と、

前記特定処理手段により特定された前記通信端末と前記第2の無線通信部を用いた無線通信を行うための同期を確立する第1の同期確立処理手段と

- 15 を備え、

前記通信端末は、

ループアンテナを介して得られた誘起電力の少なくとも一部を利用しデータの送受信を行う第3の無線通信部を用いて、前記情報処理装置に自身の前記識別情報を提供する第1の提供処理手段と、

- 20 前記第2の無線通信部を介して送信された前記情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の前記属性情報を提供する第2の提供処理手段と、

前記第2の無線通信部を用いた無線通信の同期の確立に伴い前記情報処理装置からの要求に応じて、前記第4の無線通信部を介して所定の信号の送受信を行

- 25 い同期を確立する第2の同期確立処理手段と

を備えることを特徴する通信システム。

2. (補正後) 情報処理装置と複数の通信端末からなるユビキタスネットワー

補正された用紙 (条約第19条)

クにおける通信システムの通信方法において、

前記情報処理装置の情報処理方法は、

近接された通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う第1の無線通信部を用いて、前記通信端末の識別情報を取得する第1の取

5 得処理ステップと、

データの送受信を行う第2の無線通信部を用いて前記通信端末を含む前記複数の通信端末から各々の属性情報を取得する第2の取得処理ステップと、

前記第2の取得処理ステップにより取得された前記属性情報を検索し、前記第1の取得処理ステップにより取得された前記識別情報をもつ通信端末を通信相

10 手として特定する特定処理ステップと、

前記特定処理ステップにより特定された前記通信端末と前記第2の無線通信部を用いた無線通信を行うための同期を確立する第1の同期確立処理ステップとを備え、

前記通信端末の情報処理方法は、

15 ループアンテナを介して得られた誘起電力の少なくとも一部を利用してデータの送受信を行う第3の無線通信部を用いて、前記情報処理装置に自身の前記識別情報を提供する第1の提供処理ステップと、

前記第2の無線通信部を介して送信された前記情報処理装置からの要求に応じて、データの送受信を行う第4の無線通信部を用いて、自身の前記属性情報を

20 提供する第2の提供処理ステップと、

前記第2の無線通信部を用いた無線通信の同期の確立に伴い前記情報処理装置からの要求に応じて、前記第4の通信部を介して所定の信号の送受信を行い同期を確立する第2の同期確立処理ステップと

を備えることを特徴する通信方法。

25 3. (補正後) 所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得する第1の取得処理手段と、

所望のデータの送受信を行う第2の無線通信部を用いて、前記通信端末を含む

補正された用紙 (条約第19条)

複数の通信端末から各々の属性情報を取得する第2の取得処理手段と、

前記第2の取得処理手段により取得された前記属性情報を検索し、前記第1の取得処理手段により取得された前記識別情報をもつ通信端末を通信相手として特定する特定処理手段と、

- 5 前記特定処理手段により特定された前記通信端末と前記第2の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段と
- を備えることを特徴とする情報処理装置。

4. 前記第1の無線通信部による無線通信可能な距離が、前記第2の無線通信部による無線通信可能な距離より短いこと

- 10 を特徴とする請求の範囲第3項に記載の情報処理装置。

5. 前記第1の取得処理手段は、近接された前記通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う前記第1の無線通信部を用いて、前記通信端末の前記識別情報を取得すること

を特徴とする請求の範囲第3項に記載の情報処理装置。

- 15 6. 前記属性情報には、前記複数の通信端末を各々識別可能にするアドレス情報と前記通信端末が管理するクロック情報が含まれていること

を特徴とする請求の範囲第3項に記載の情報処理装置。

7. 前記第1の取得処理手段により前記識別情報が取得されたことに応じて、前記第2の無線通信部を起動させる起動処理手段を更に備える

- 20 ことを特徴とする請求の範囲第3項に記載の情報処理装置。

8. 前記識別情報には、前記通信端末のブルートゥースアドレスが少なくとも含まれており、

前記第2の取得処理手段では、前記第2の無線通信部を用いて送信したIQパケットに応答して前記複数の通信端末が各々返信した複数のFHSパケットを取得し、

- 25 前記同期確立処理手段では、前記特定処理手段により特定された前記通信端末に対し、前記第2の無線通信部を用いてIDパケットの送信を行い、該IDパケ

ットの送信に対する前記通信端末からの応答があったときは自身の FHS パケットを更に送信すること

を特徴とする請求の範囲第 3 項に記載の情報処理装置。

9. (補正後) 所定データの送受信を行う第 1 の無線通信部を用いて、通信端
- 5 末から識別情報を取得する第 1 の取得処理ステップと、
- 所望のデータの送受信を行う第 2 の無線通信部を用いて、前記通信端末を含む複数の通信端末から各々の属性情報を取得する第 2 の取得処理ステップと、
- 前記第 2 の取得処理ステップにより取得された前記属性情報を検索し、前記第 1 の取得処理ステップにより取得された前記識別情報をもつ通信端末を通信相手
- 10 として特定する特定処理ステップと、
- 前記特定処理ステップにより特定された前記通信端末と前記第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理ステップと
- を備えることを特徴とする情報処理方法。
10. 前記第 1 の無線通信部による無線通信可能な距離が、前記第 2 の無線通
- 15 信部による無線通信可能な距離より短いこと
- を特徴とする請求の範囲第 9 項に記載の情報処理方法。
11. 前記第 1 の取得処理ステップは、近接された前記通信端末に対しループアンテナによる電力伝送及びデータ送受信を行う前記第 1 の無線通信部を用いて、前記通信端末の前記識別情報を取得すること
- 20 を特徴とする請求の範囲第 9 項に記載の情報処理方法。
12. 前記属性情報には、前記複数の通信端末を各々識別可能にするアドレス情報と前記通信端末が管理するクロック情報が含まれていること
- を特徴とする請求の範囲第 9 項に記載の情報処理方法。
13. 前記第 2 の取得処理ステップでは、前記第 2 の無線通信部を用いて送信
- 25 した IQ パケットに応答して前記複数の通信端末が各々返信した複数の FHS パケットを取得し、
- 前記同期確立処理ステップでは、前記特定処理ステップにより特定された前記

て、前記第2の無線通信部を起動させる起動処理ステップを更に備える

ことを特徴とする請求の範囲第21項に記載の通信方法。

26. 前記識別情報は、ブルートゥースアドレス情報を少なくとも含んでおり、
前記第2の提供処理ステップでは、前記第2の無線通信部を用いて受信した I
5 Q パケットに応答して FHS パケットを返信し、

前記同期確立処理ステップでは、前記第2の無線通信部を用いて受信した ID
パケットに応答して前記 ID パケットを返信し、更に FHS パケットを受信した
ときは再度前記 ID パケットを返信すること

を特徴とする請求の範囲第21項に記載の通信方法。

- 10 27. (補正後) 情報処理装置に取付け可能な拡張装置において、
前記情報処理装置に電氣的に接続しデータの授受を行うための接続端子と、
所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報
を取得する第1の取得処理手段と、

- 15 所望のデータの送受信を行う第2の無線通信部を用いて、複数の通信端末から
各々の属性情報を取得する第2の取得処理手段と、

前記第2の取得処理手段により取得された前記属性情報を検索し、前記第1の
取得処理手段により取得された前記識別情報をもつ通信端末を通信相手として特
定する特定処理手段と、

- 20 前記特定処理手段により特定された前記通信端末と前記第2の無線通信部を用
いた無線通信を行うための同期を確立する同期確立処理手段と
を備えることを特徴とする拡張装置。

28. 通信端末に取付け可能な拡張装置において、
前記通信端末に電氣的に接続しデータの授受を行うための接続端子と、
所定のデータの送受信を行う第1の無線通信部を用いて、情報処理装置からの
25 要求に応じて自身の識別情報を提供する第1の提供処理手段と、

データの送受信を行う第2の無線通信部を用いて、前記情報処理装置からの要
求に応じて自身の属性情報を提供する第2の提供処理手段と、

前記第2の無線通信部を用いた無線通信の同期確立に伴い前記情報処理装置からの要求に応じて、前記第2の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理手段と

を備えることを特徴とする拡張装置。

- 5 29. (補正後) 所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得する第1の取得処理ステップと、

所望のデータの送受信を行う第2の無線通信部を用いて、前記通信端末を含む複数の通信端末から各々の属性情報を取得する第2の取得処理ステップと、

- 10 前記第2の取得処理ステップにより取得された前記属性情報を検索し、前記第1の取得処理ステップにより取得された前記識別情報をもつ通信端末を通信相手として特定する特定処理ステップと、

前記特定処理ステップにより特定された前記通信端末と前記第2の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理ステップと

を情報処理装置に実行させるプログラム。

- 15 30. (補正後) 所定のデータの送受信を行う第1の無線通信部を用いて、情報処理装置からの所定の要求に応じて自身の識別情報を提供する第1の提供処理ステップと、

データの送受信を行う第2の無線通信部を用いて、前記情報処理装置からの所定の要求に応じて自身の属性情報を提供する第2の提供処理ステップと、

- 20 前記第2の無線通信部を用いた無線通信の同期確立に伴い前記情報処理装置からの要求に応じて、前記第2の無線通信部を介して所定の信号の送受信を行い同期を確立する同期確立処理ステップと

を通信端末に実行させるプログラム。

- 25 31. (補正後) 所定データの送受信を行う第1の無線通信部を用いて、通信端末から識別情報を取得する第1の取得処理手段と、

所望のデータの送受信を行う第2の無線通信部を用いて通信を行ったことのあ
る複数の通信端末に関する情報を履歴情報として記憶する記憶処理手段と、

前記記憶処理手段により記憶された前記履歴情報を検索し、前記第 1 の取得処理手段により取得された前記識別情報をもつ通信端末を通信相手として特定する特定処理手段と、

- 5 前記特定処理手段により特定された前記通信端末と前記第 2 の無線通信部を用いた無線通信を行うための同期を確立する同期確立処理手段と
を備えることを特徴とする情報処理装置。

3 2. 前記履歴情報は、少なくともブルートゥースアドレス情報を含み、

- 前記同期確立処理手段では、前記ブルートゥースアドレス情報に基づいて生成された ID パケットを前記特定処理手段により特定された前記通信端末に対して
10 送信し、該 ID パケットに対する前記通信端末からの応答があったときは自身の FHS パケットを更に送信すること

を特徴とする請求の範囲第 3 1 項に記載の情報処理装置。

3 3. (追加) 前記第 1 の取得処理手段は、前記第 1 の無線通信部の負荷変化に基づき、通信端末が近接されたことが検出された場合に動作する

- 15 ことを特徴とする請求の範囲第 3 項に記載の情報処理装置。

3 4. (追加) 前記第 1 の取得処理ステップによる処理は、前記第 1 の無線通信部の負荷変化に基づき、通信端末が近接されたことが検出された場合に行われる

ことを特徴とする請求の範囲第 9 項に記載の情報処理方法。

20

条約第 19 条 (1) の規定に基づく説明書

請求の範囲第 1 項乃至第 3 項、第 9 項、第 27 項、第 29 項は、図 21 と、図 21 のステップ S105 の説明である明細書第 41 頁第 16 行目乃至第 22 行目の記載に基づき、第 2 の無線通信部を用いた通信により取得された属性情報を検索し、属性情報を提供してきた通信端末の中から、第 1 の無線通信部を用いた通信により取得された識別情報をもつ通信端末を通信相手として特定することを明確にした。

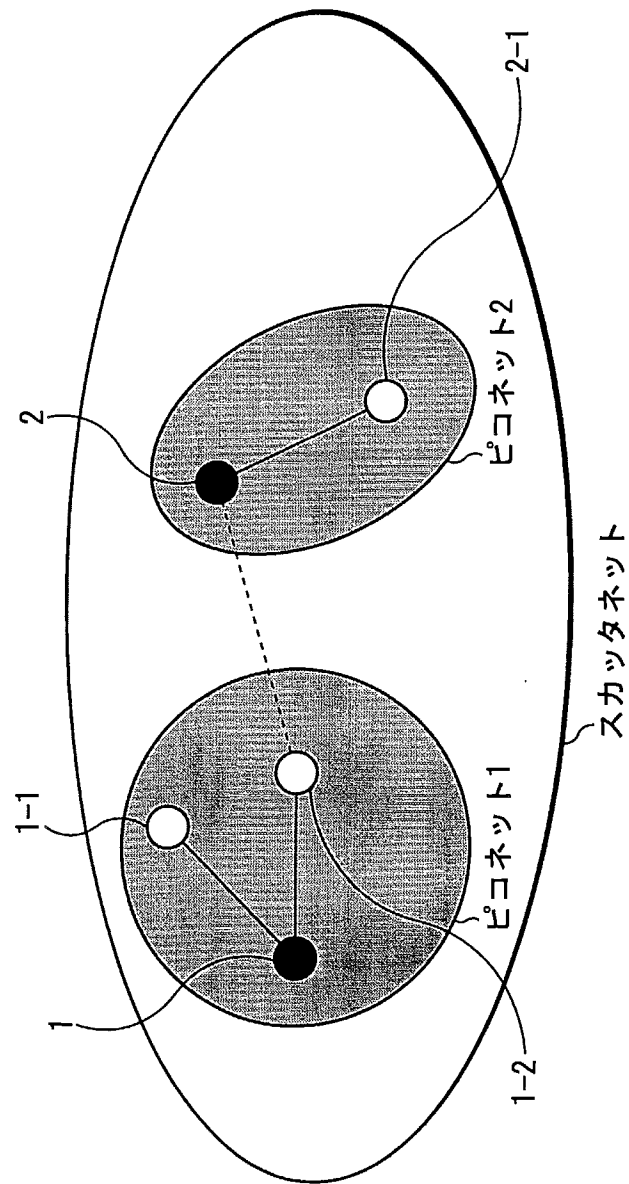
この特徴的な構成は、いずれの引用例にも開示されていない。例えば、特開 2001-156704 号公報には、通信可能な端末をリストアップし、接続することが選択された通信端末と無線通信を開始することが開示されており、通信を開始させるためには、ユーザは、リストアップされた通信端末の中から所定の端末を選択する必要がある ([0025]、[0039]、[0049]、[0060]、[0070] の段落の記載)。

本発明は、通信相手の端末を選択することなく、単に、近接させるだけで、その端末との間で通信を開始させることができる効果を得たものである。

なお、請求の範囲第 33 項、および第 34 項の追加は、明細書第 27 頁第 16 行目乃至第 19 行目の記載に基づくものである。

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図 1



- マスタ
- スレーブ
- (実線) 現在有効な通信リンク
- (点線) 現在無効な通信リンク

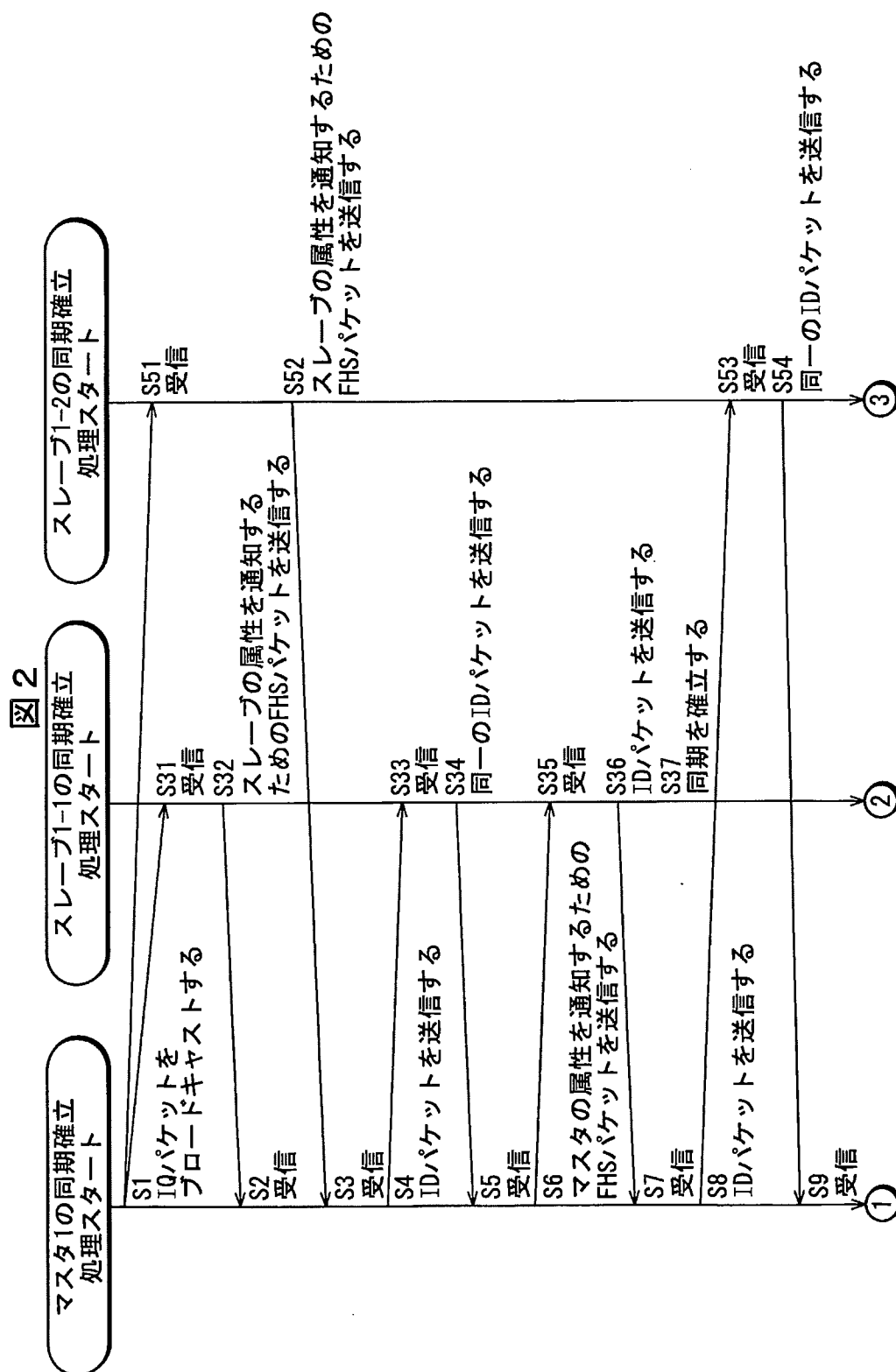
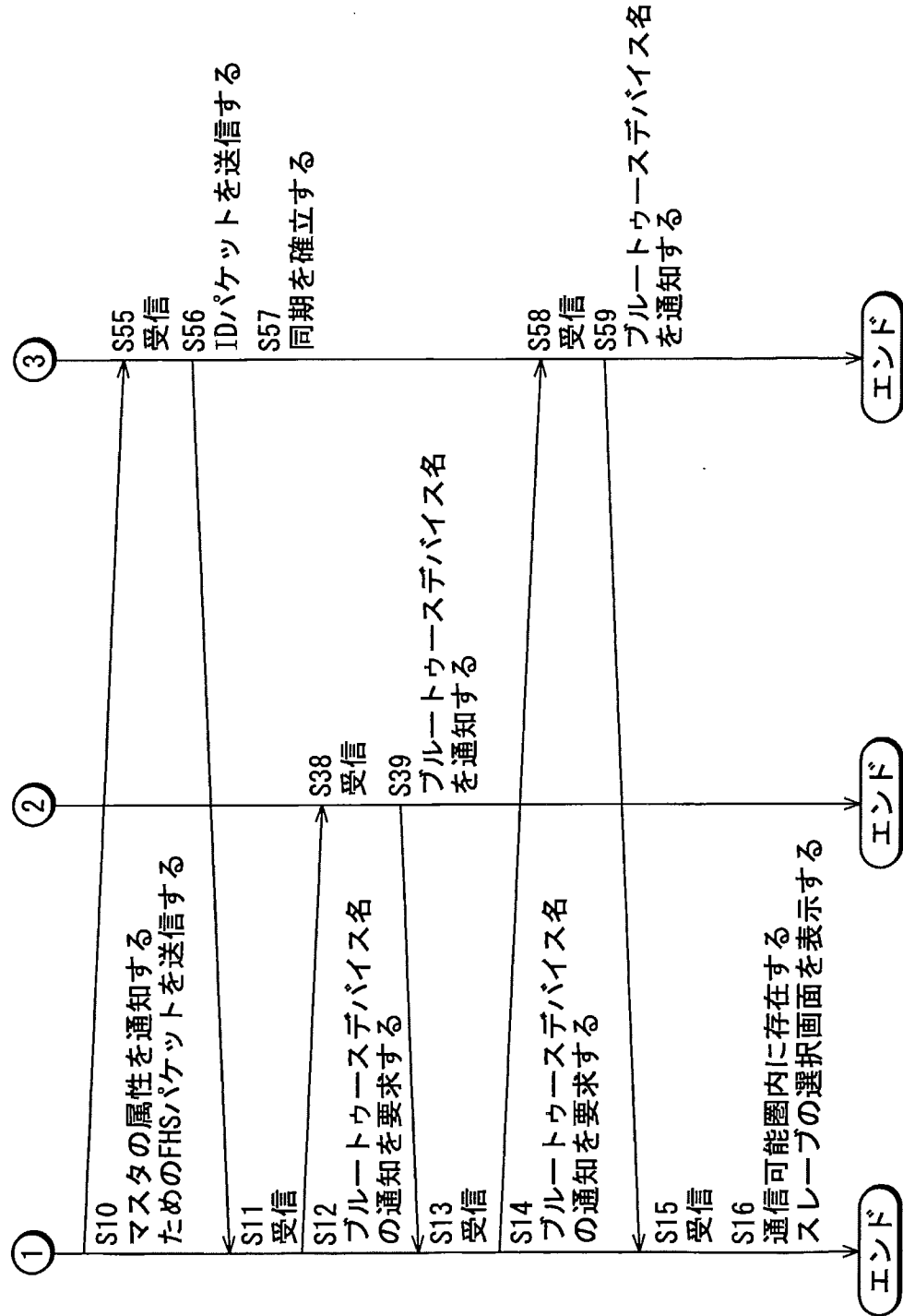


図 3



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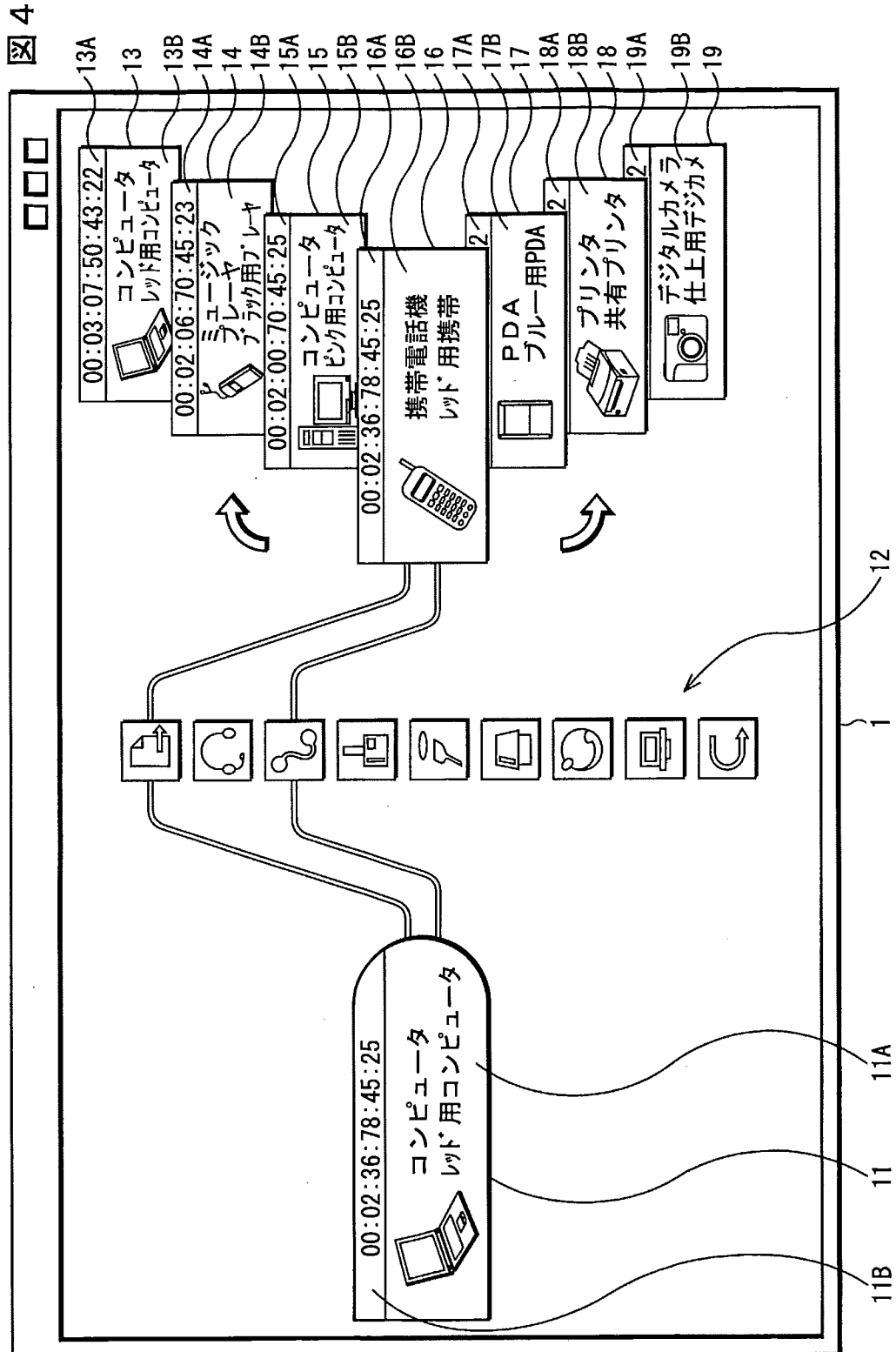
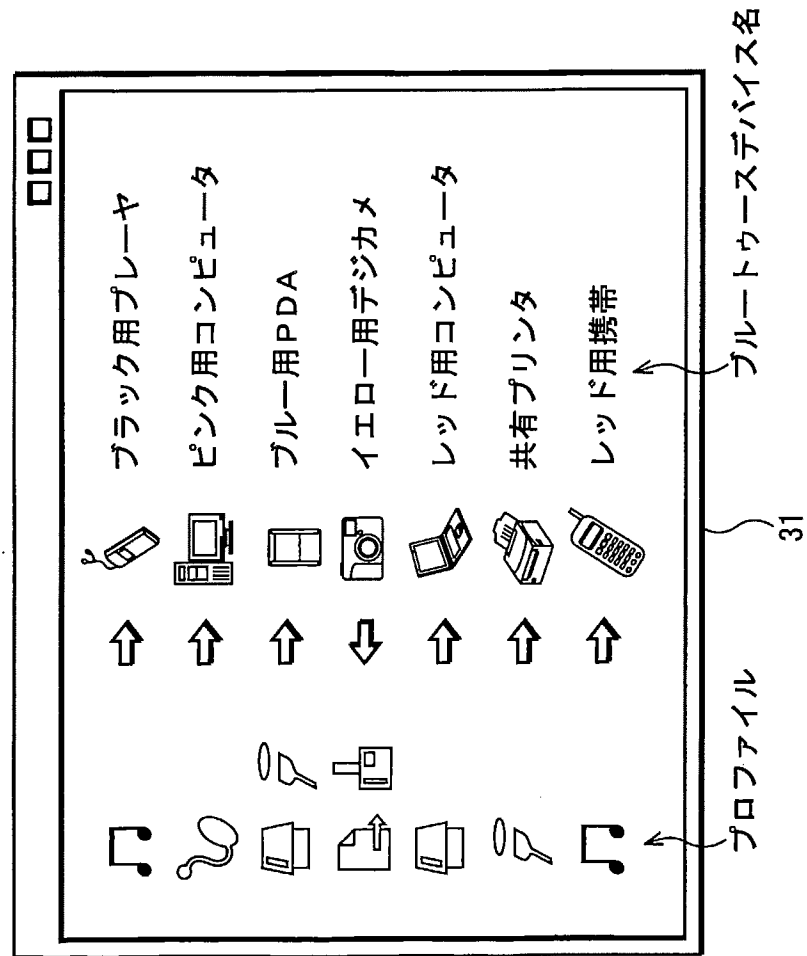
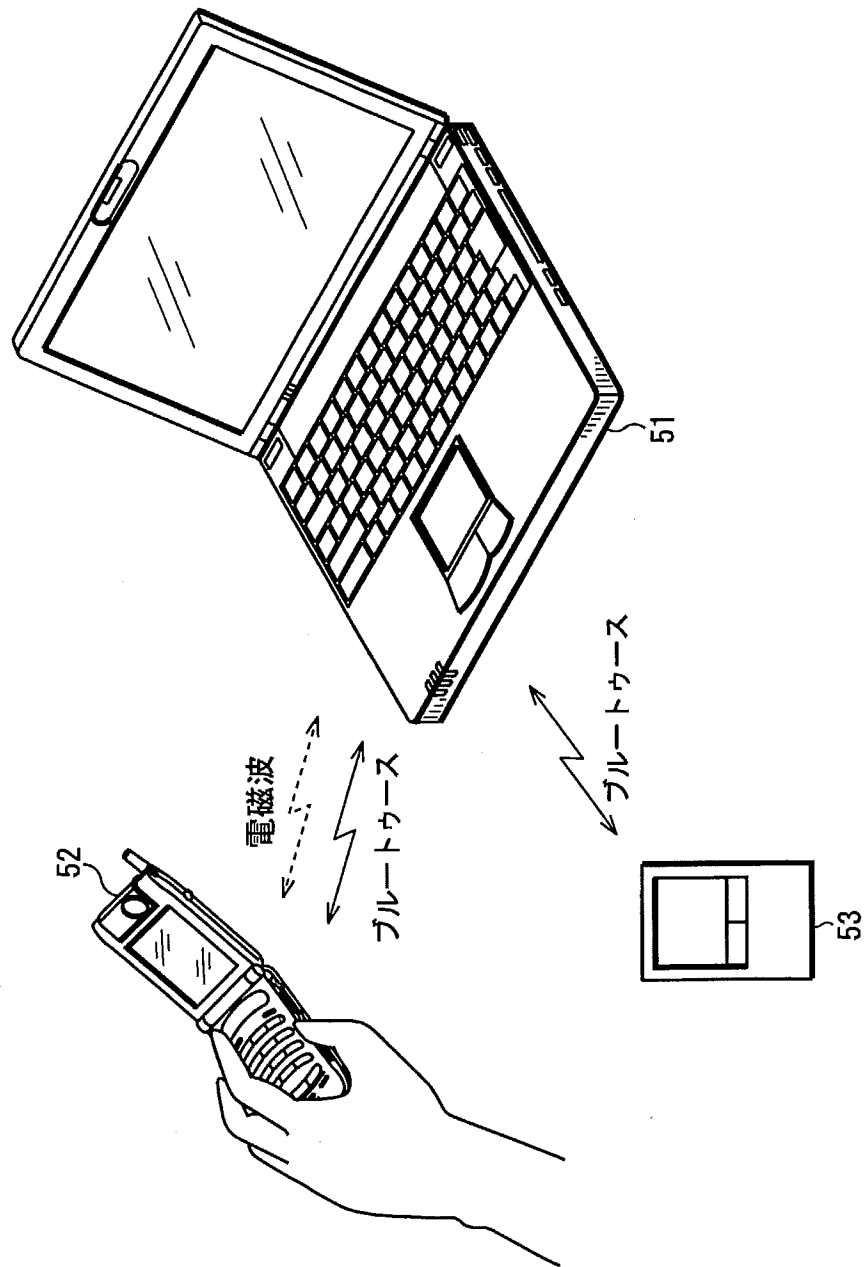


図5



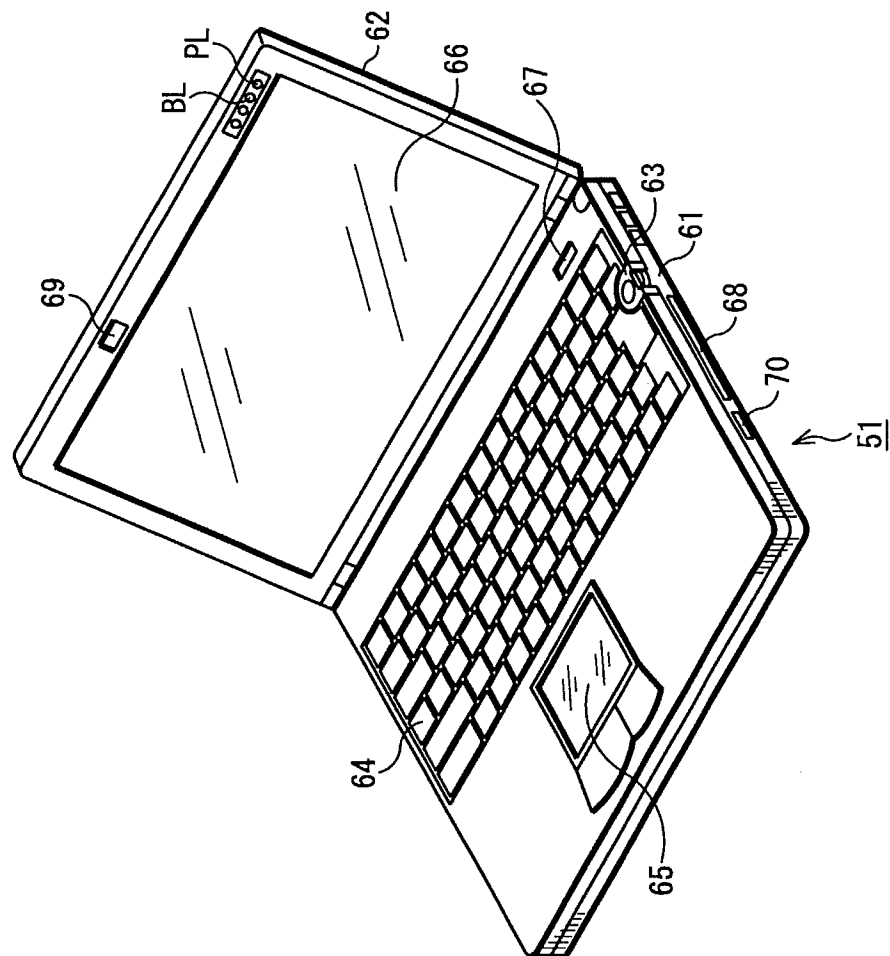
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図 6



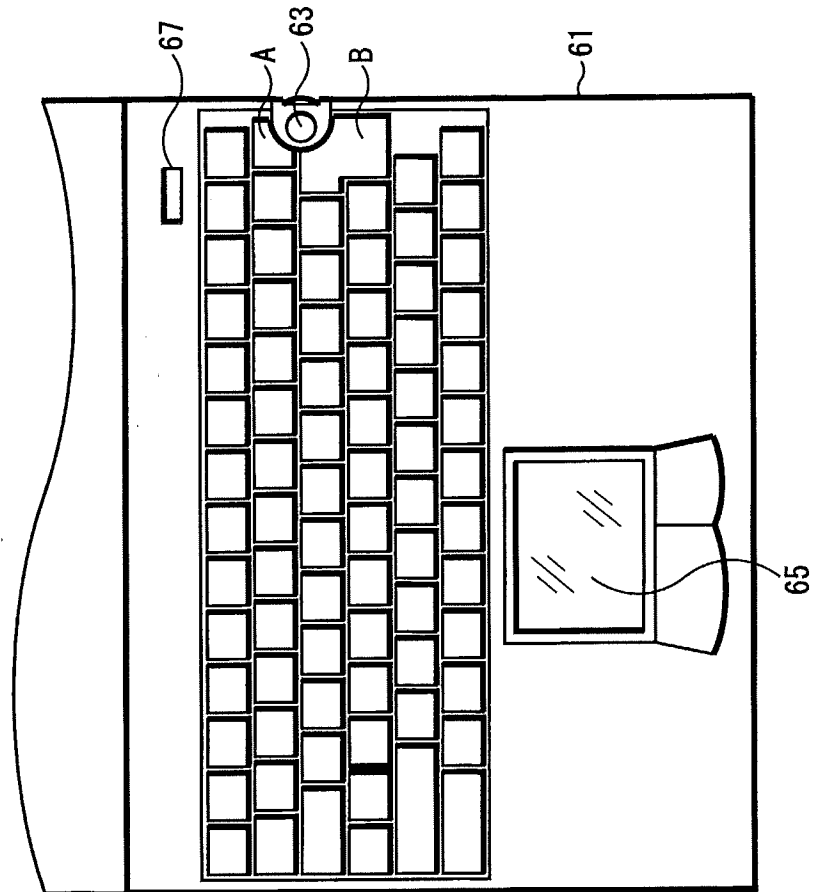
7/30

図 7



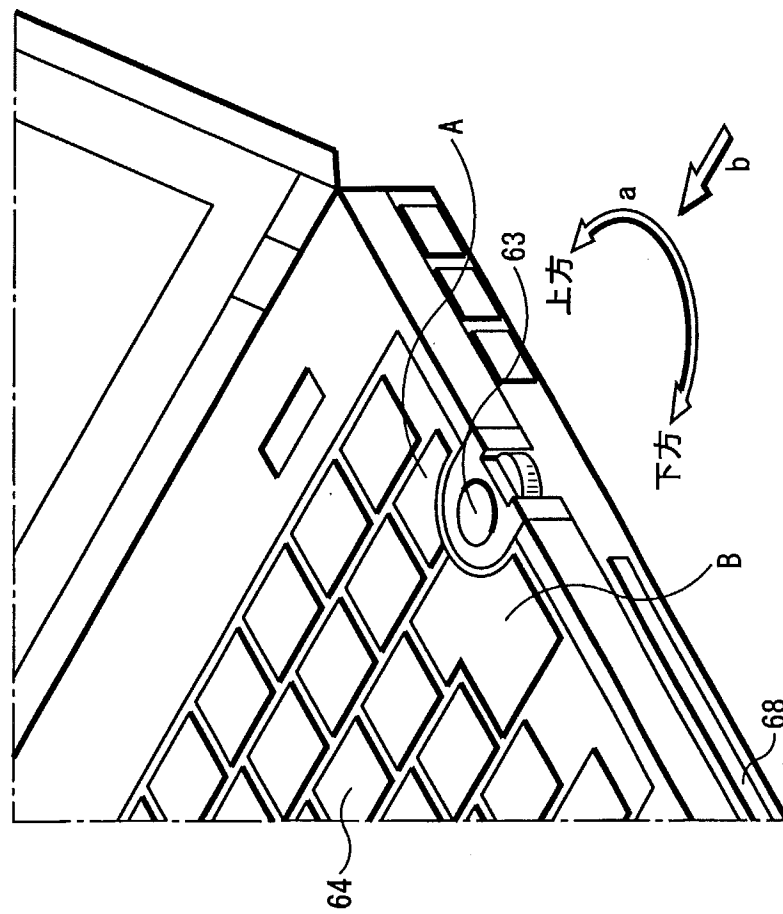
8/30

図 8



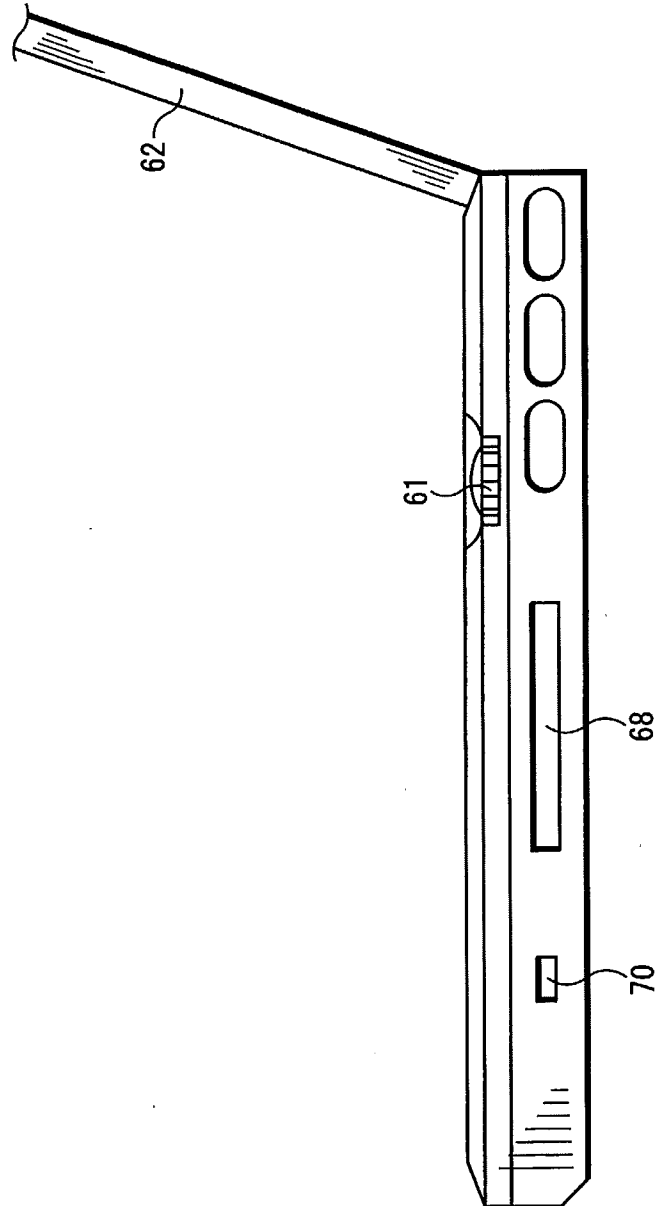
9/30

図 9

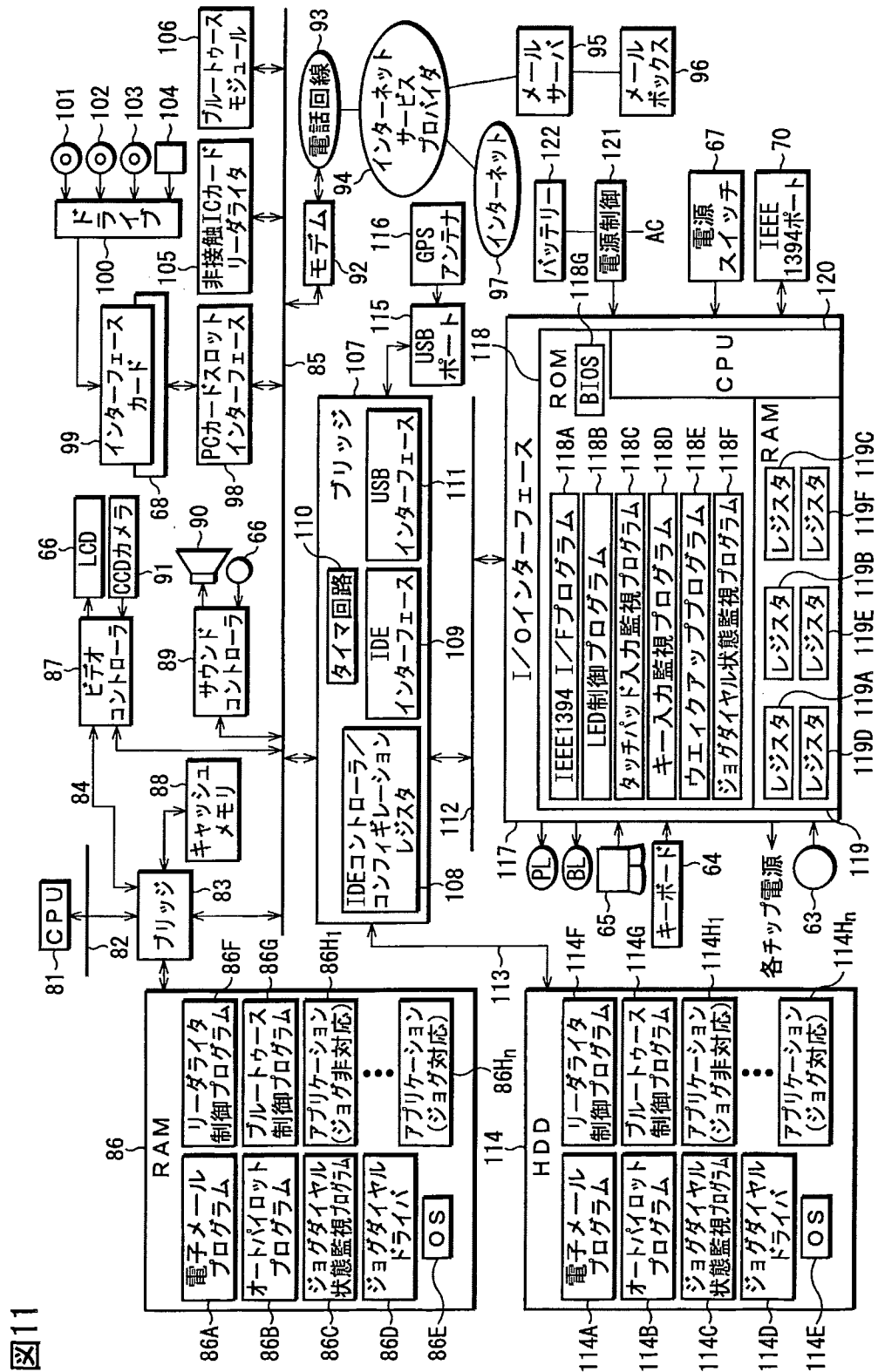


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図10



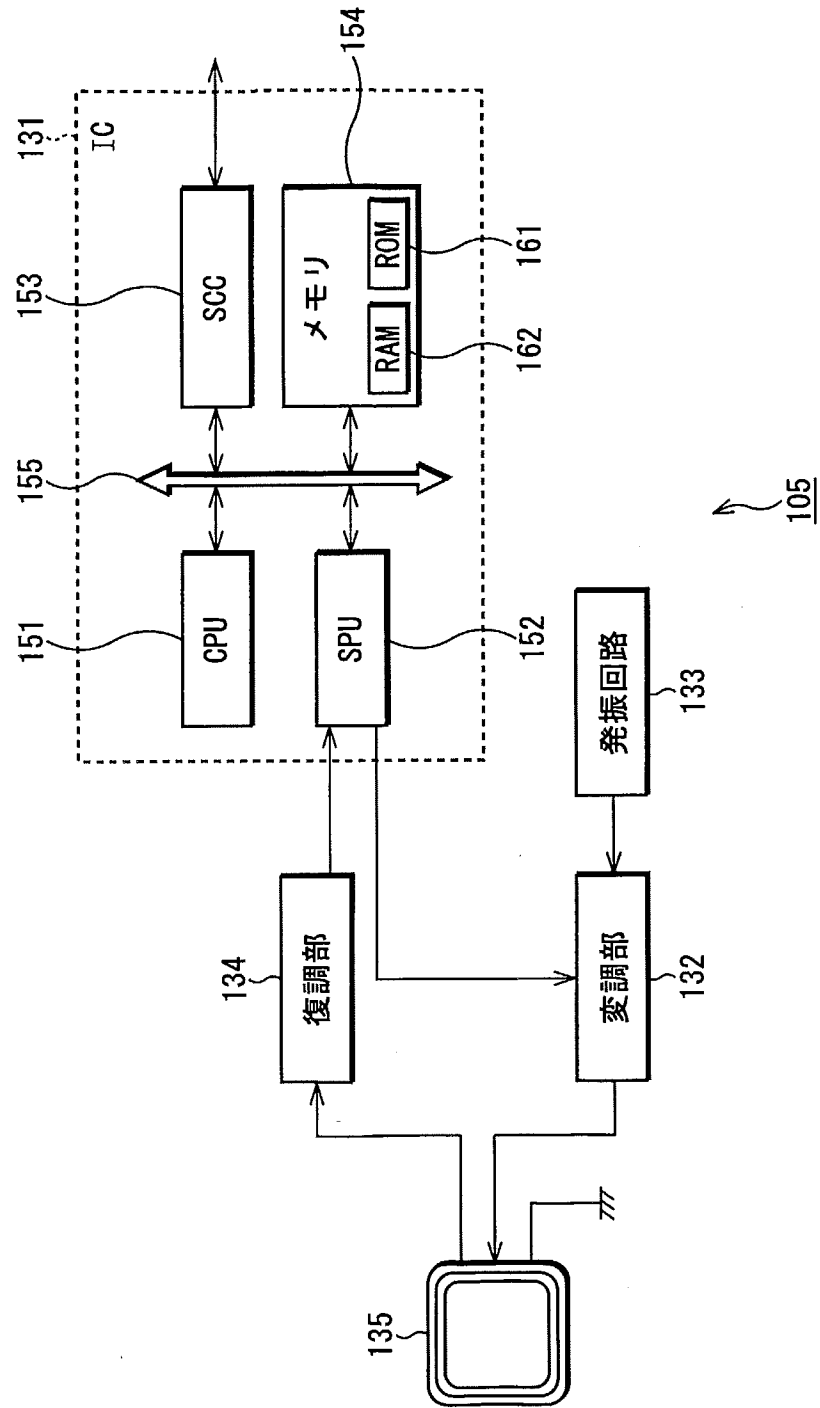
11/30



二
一
図

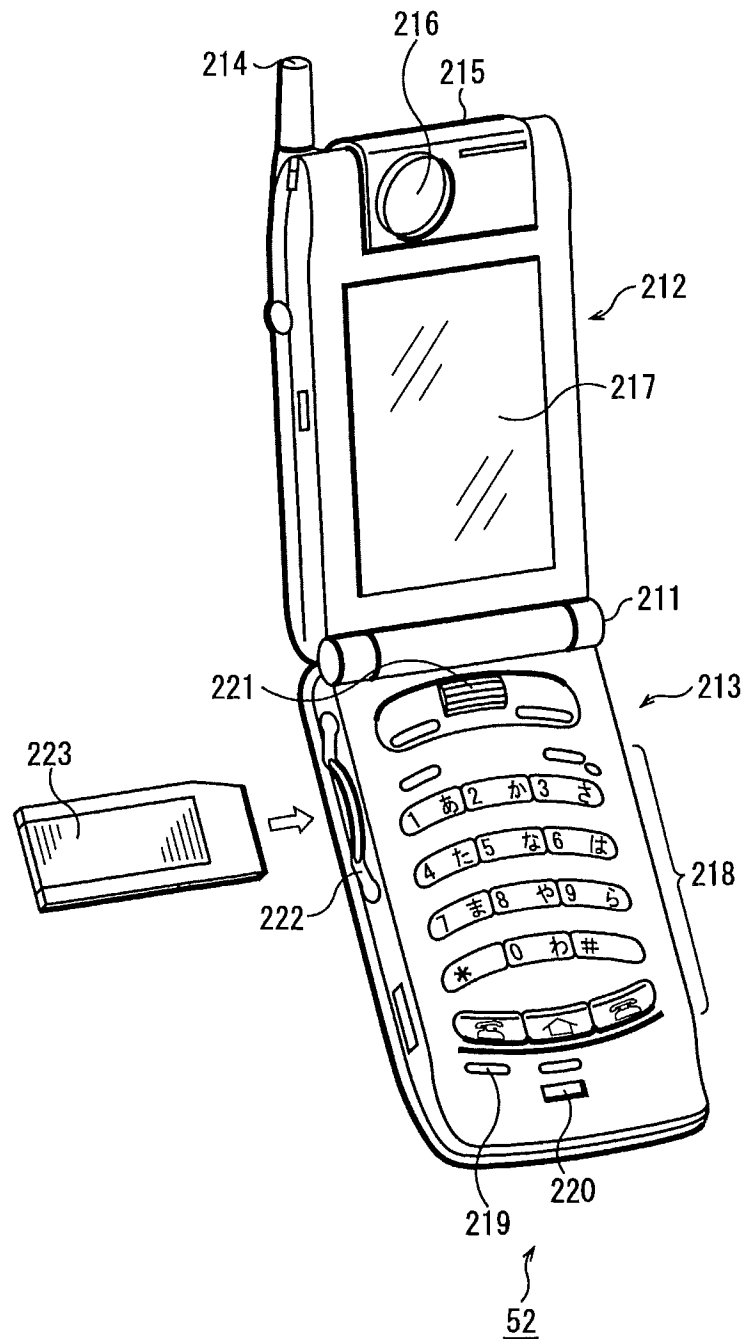
12/30

図12



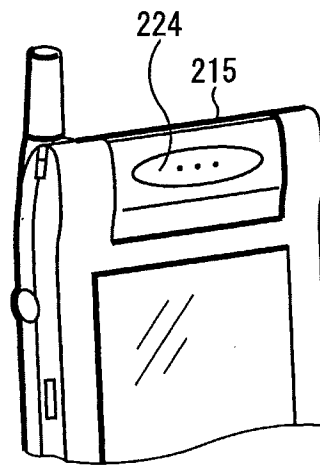
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図14



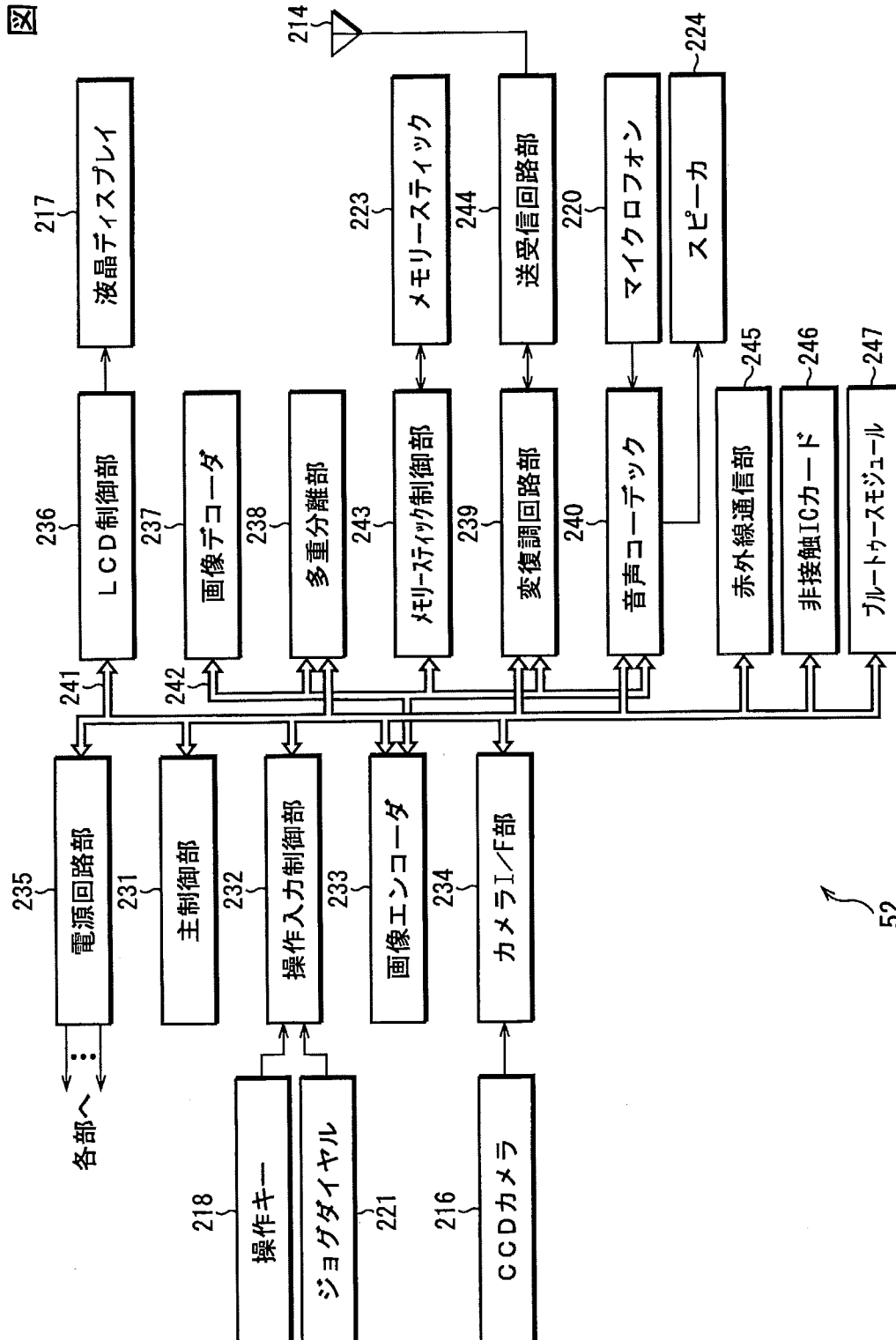
15/30

図15



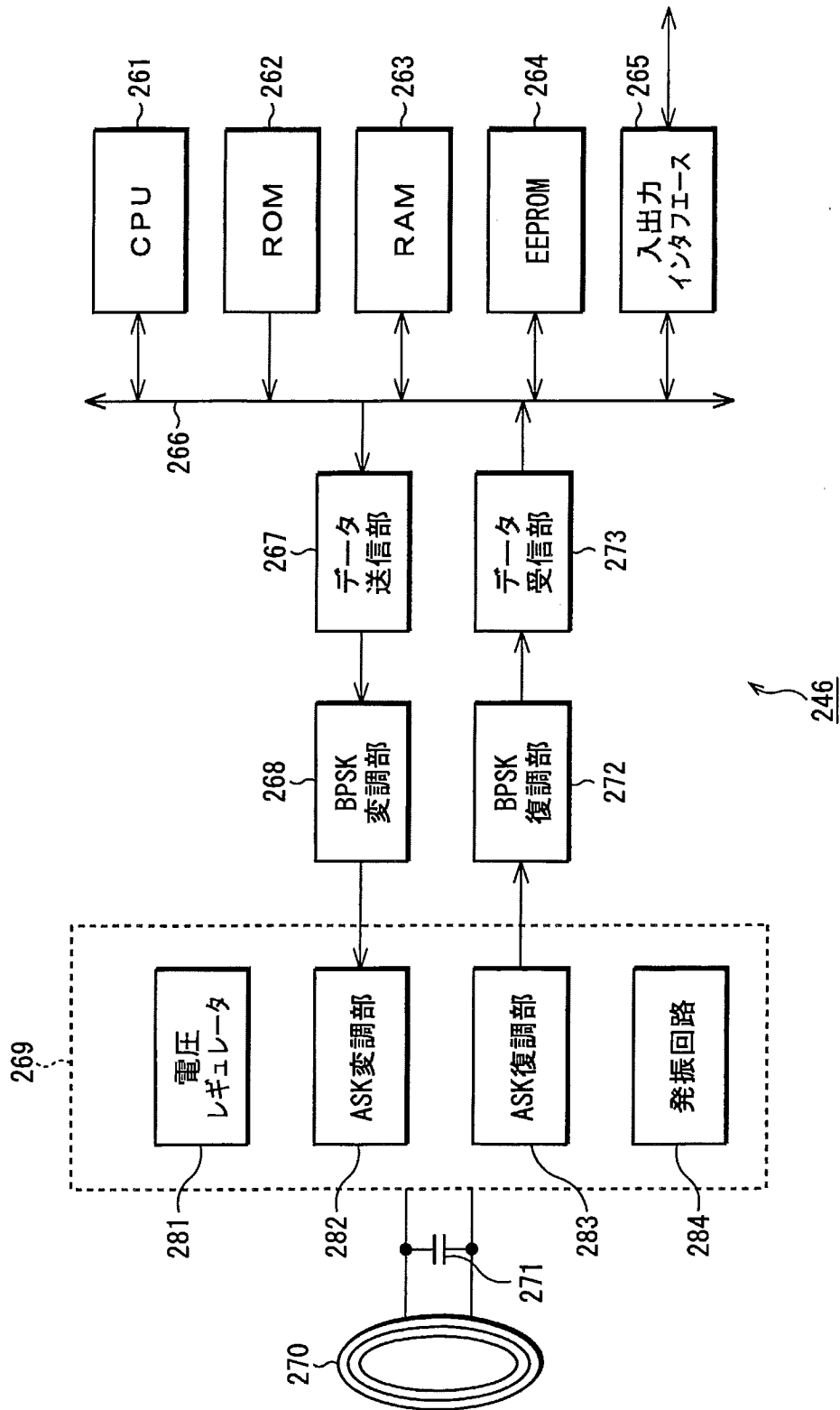
16/30

図16



17/30

図17



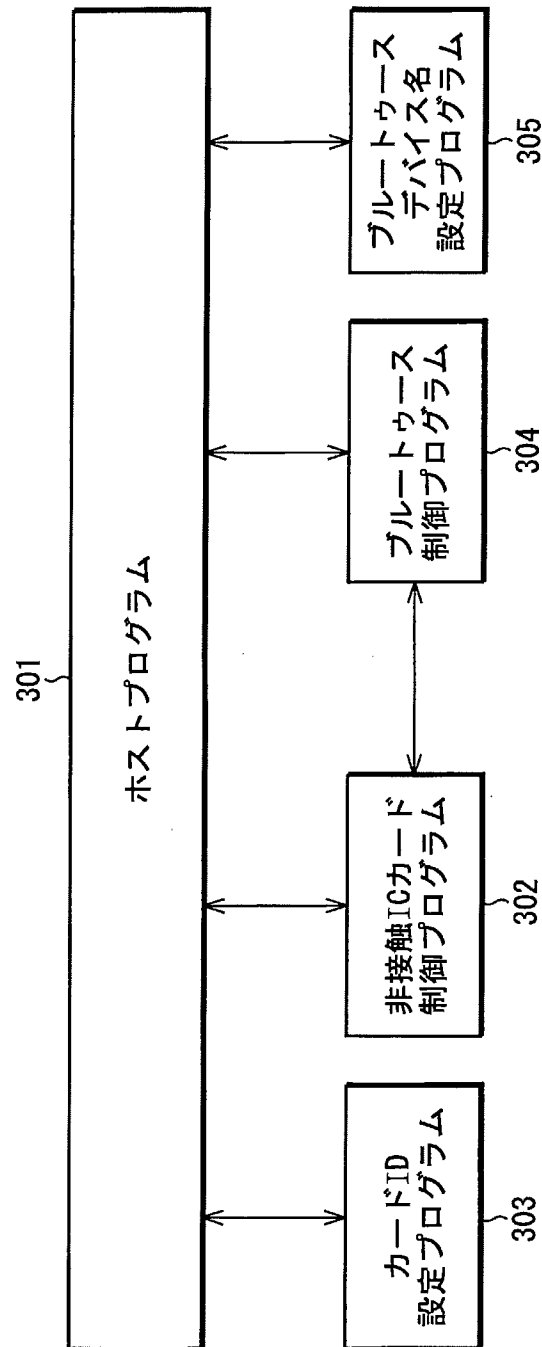
18/30

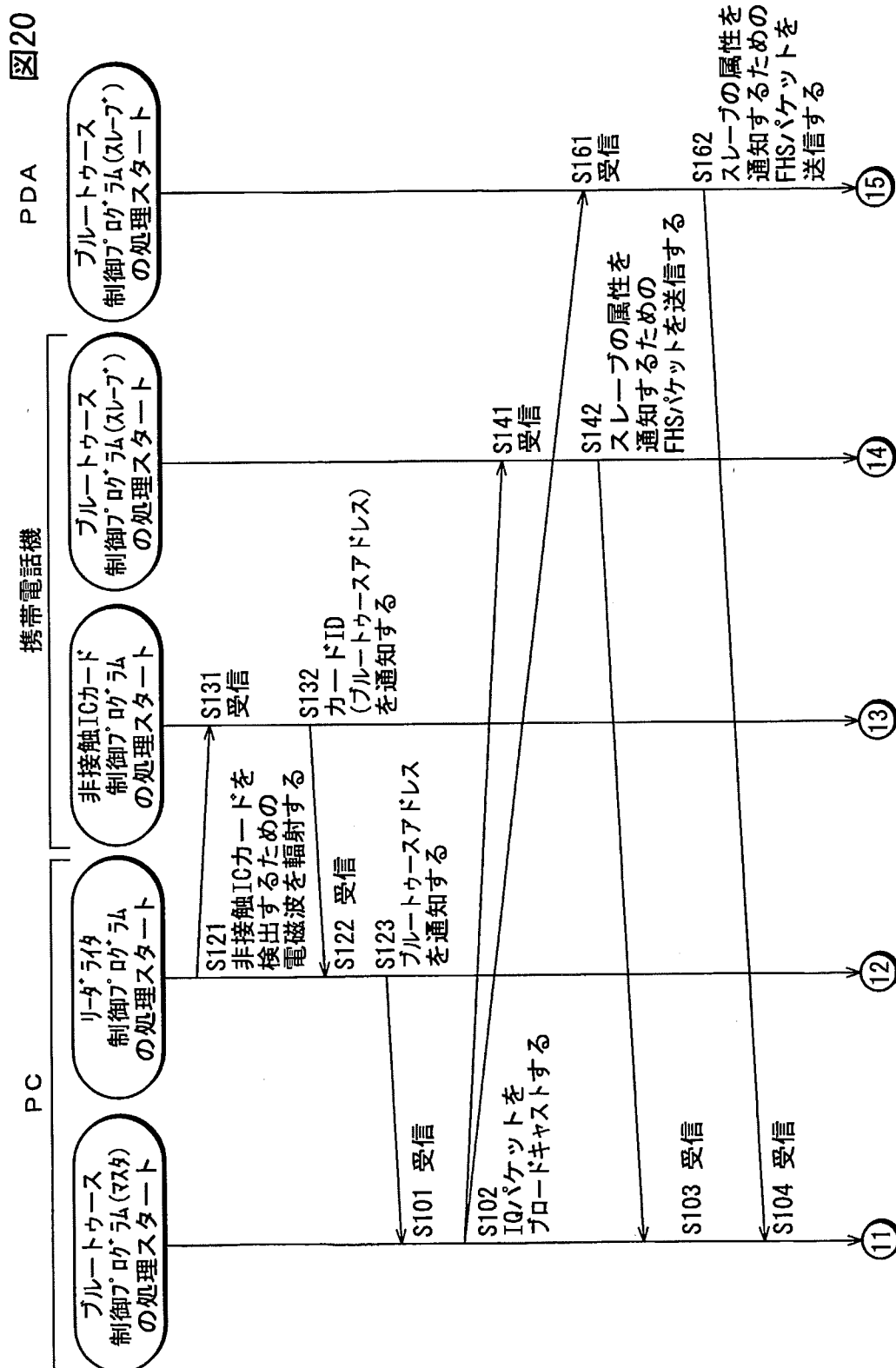
図18

仕様項目			
通信速度			211.875kbps
電力電送		中心周波数	13.56MHz
		出力	350mW
データ転送	R/W → Card	中心周波数	13.56MHz
		変調方式	ASK
	Card → R/W	中心周波数	13.56MHz
		変調方式	ロードスイッチング

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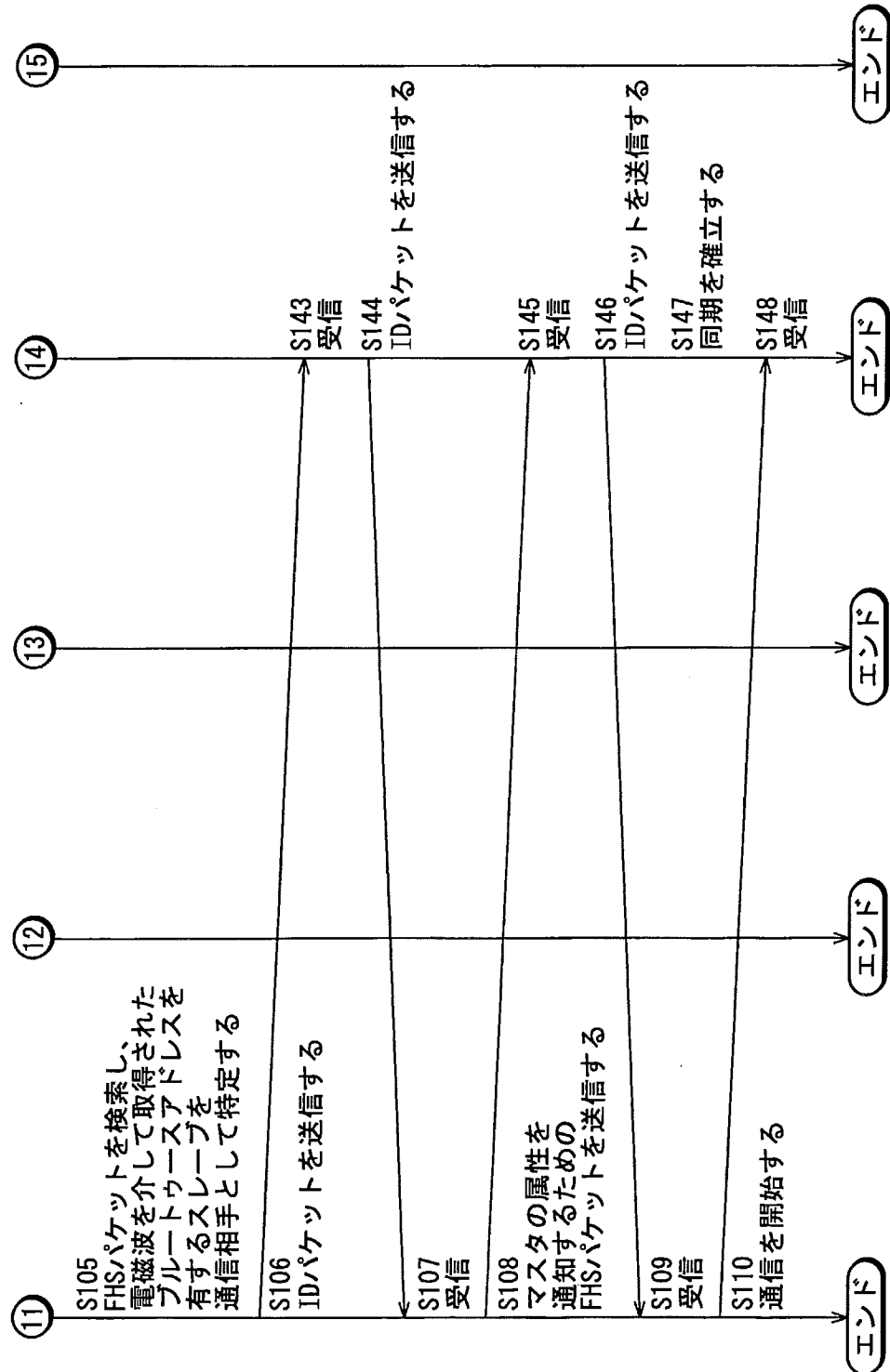
図19



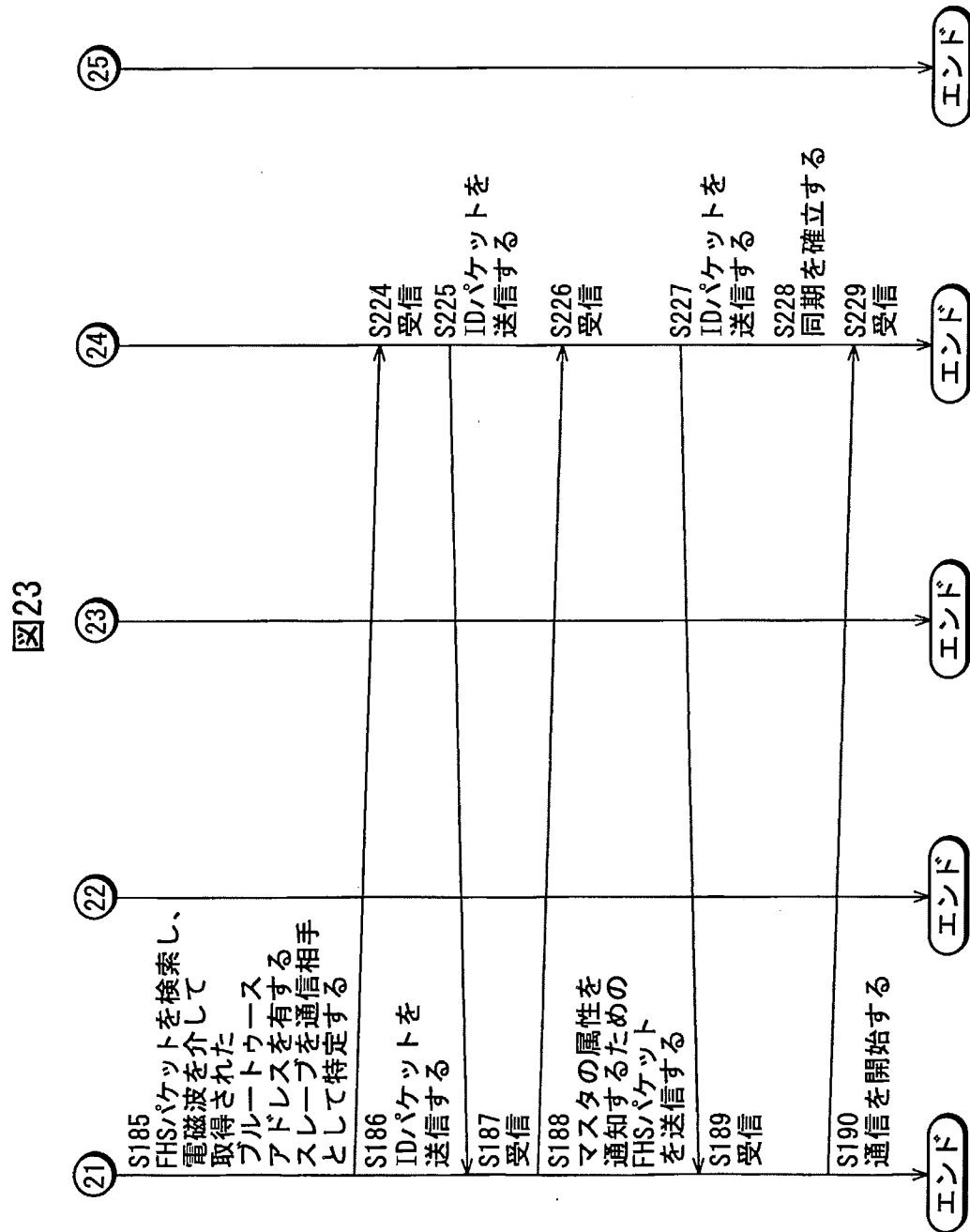


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図21



23/30



24/30
図24A

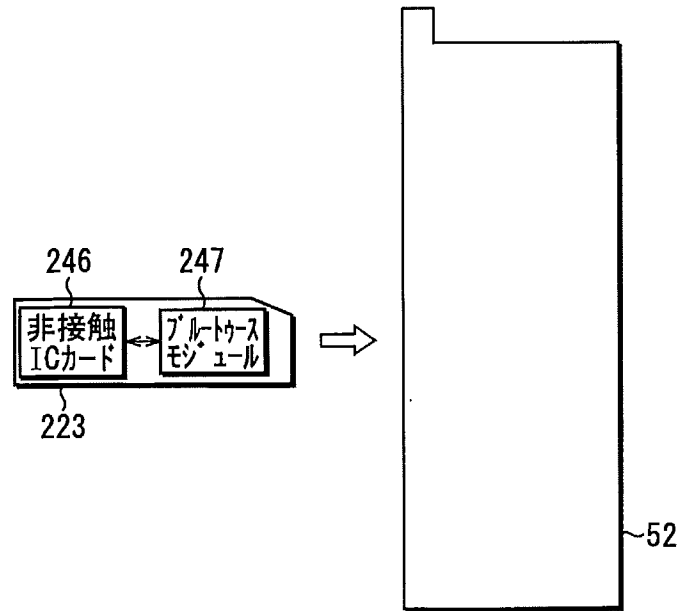
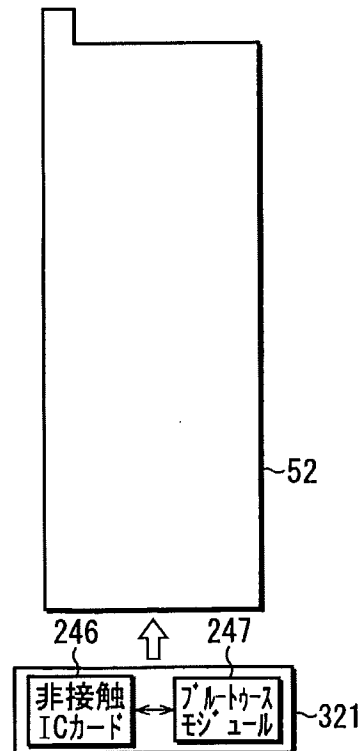


図24B



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図25A

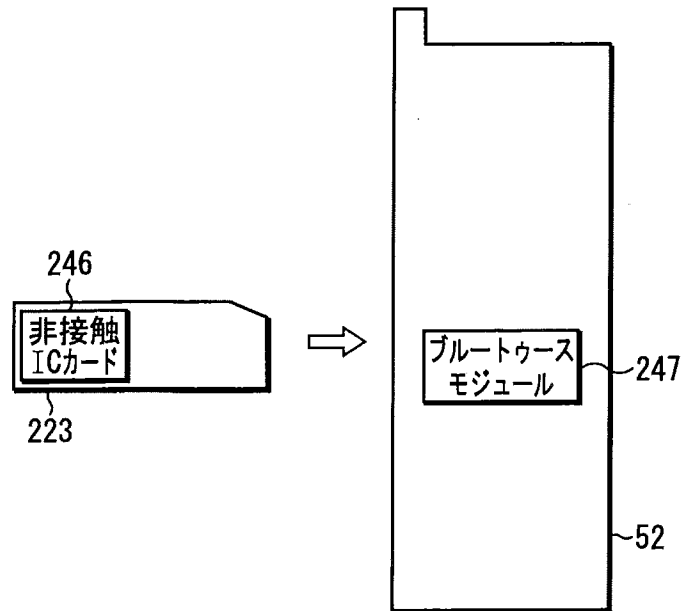
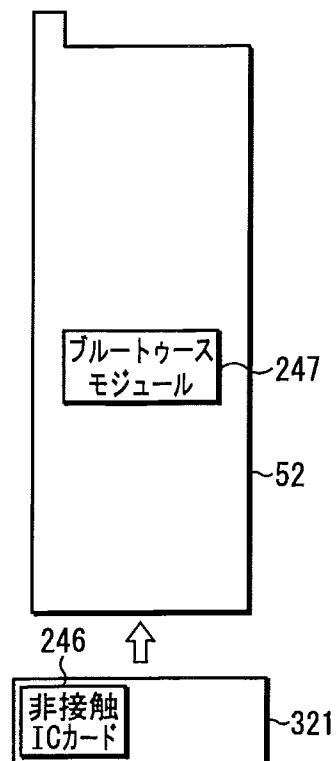


図25B



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図26A

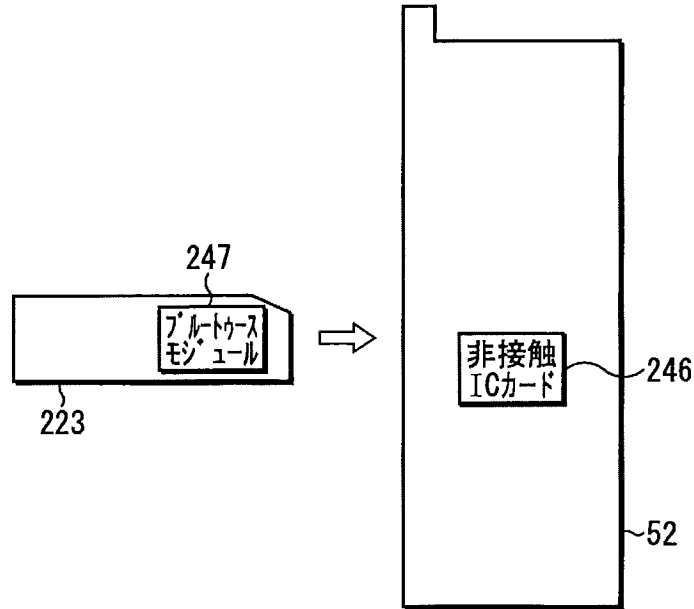
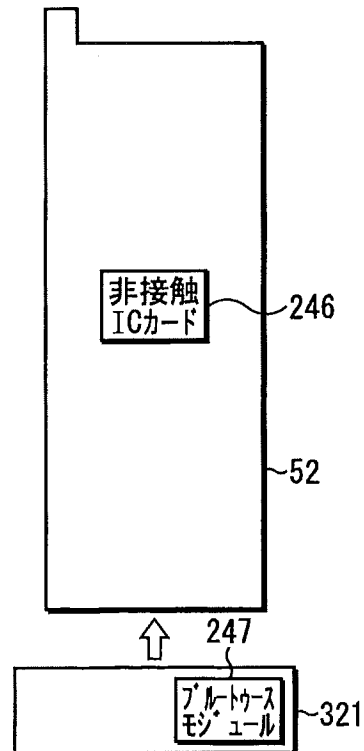
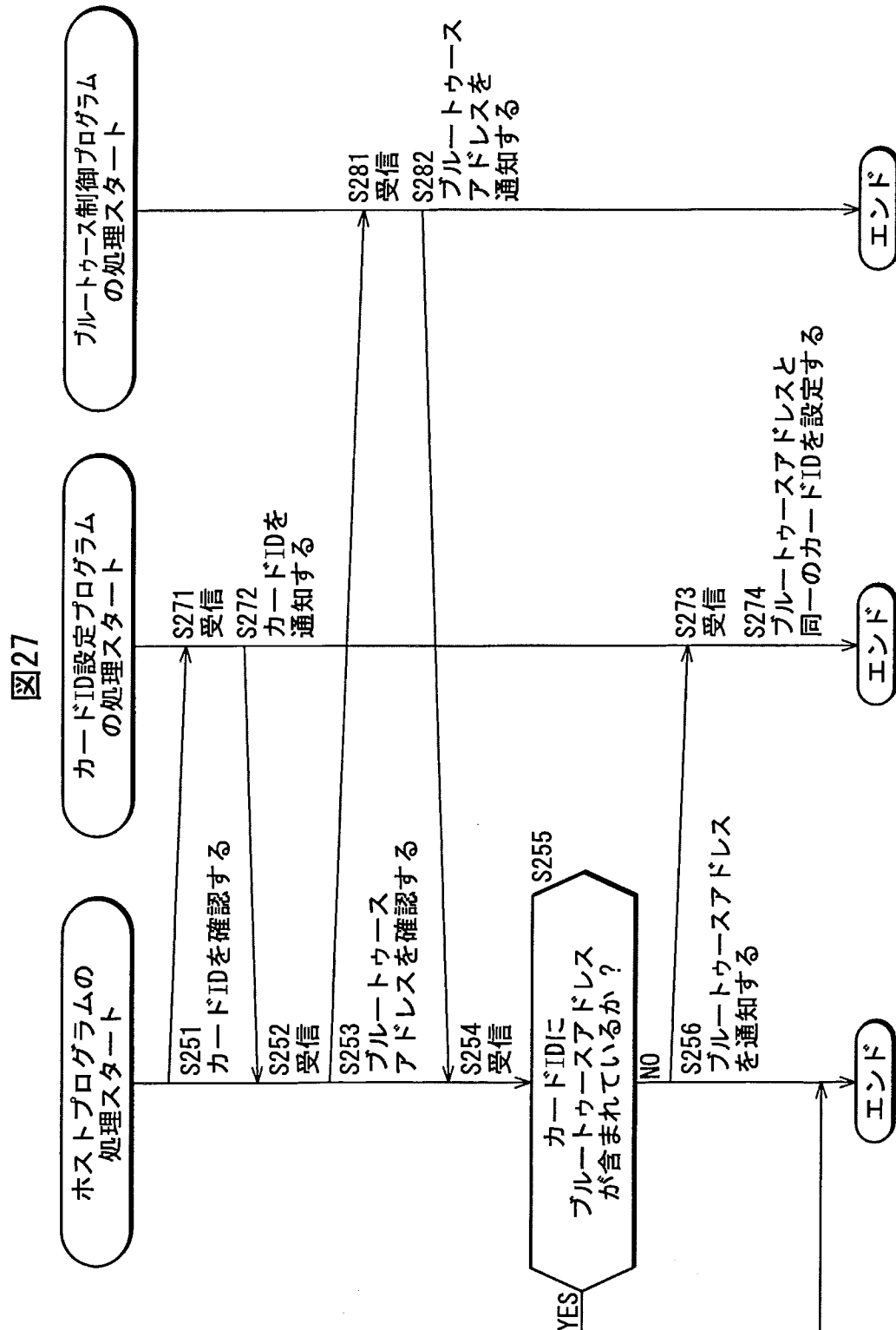


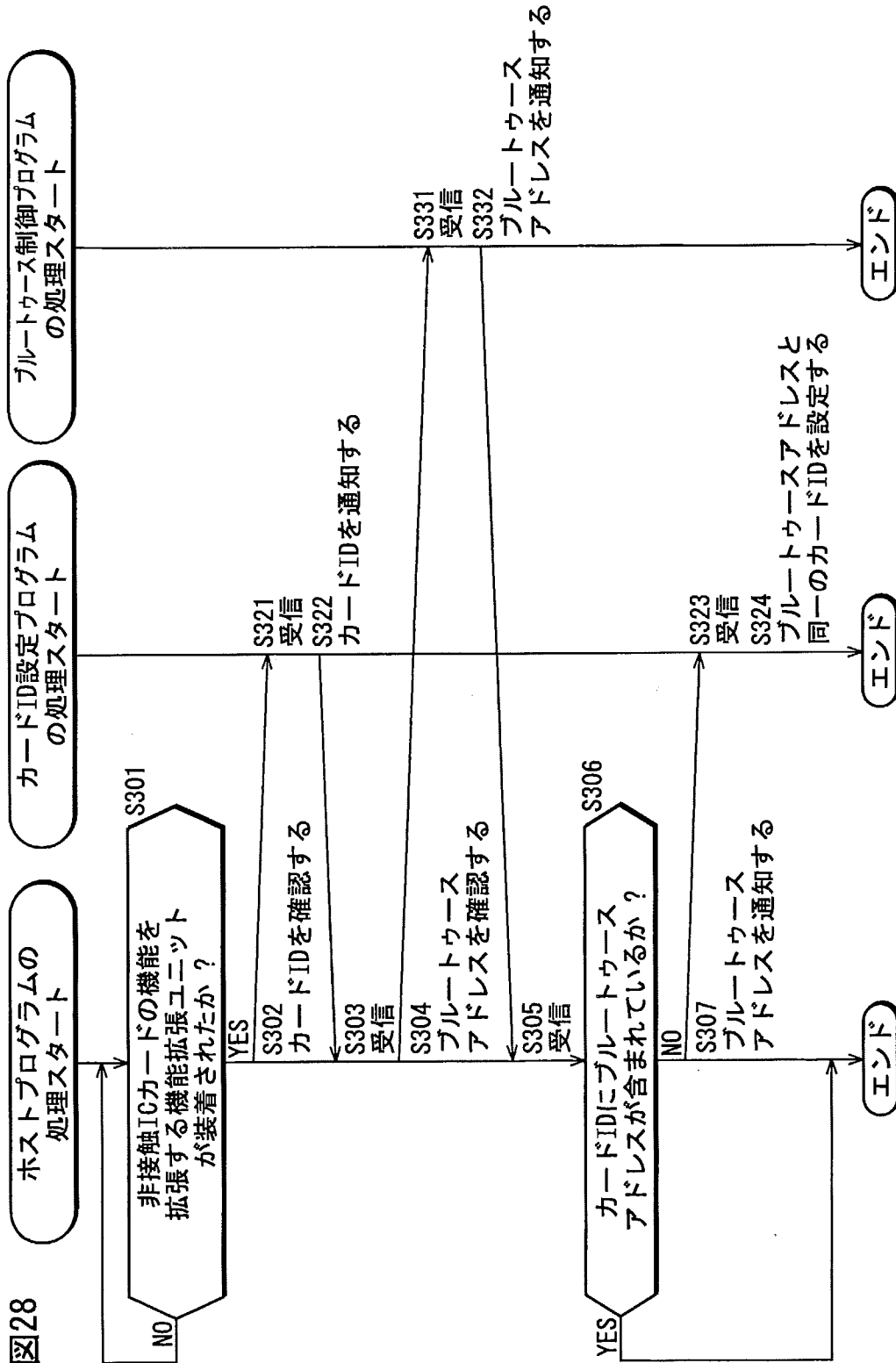
図26B



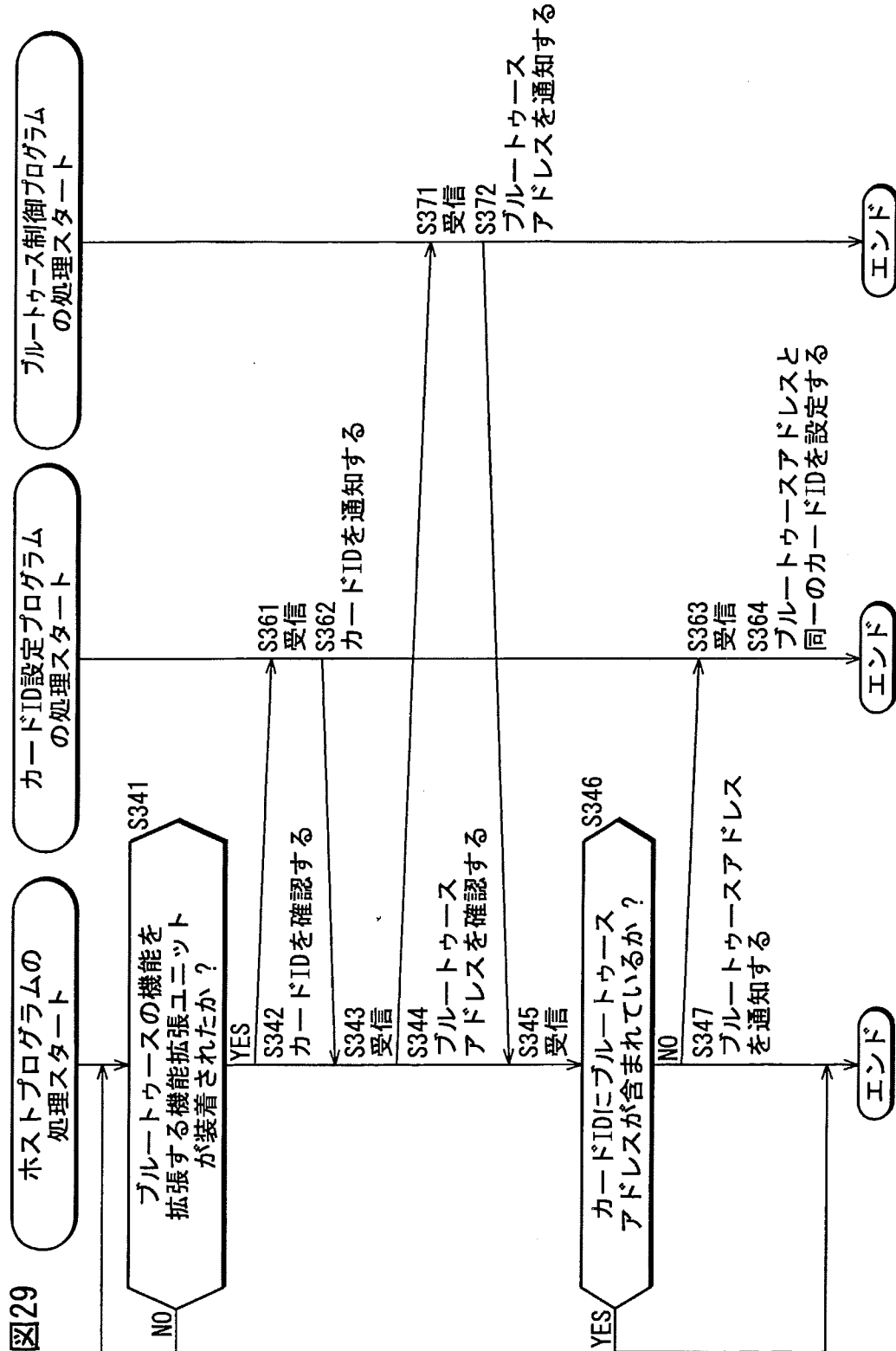
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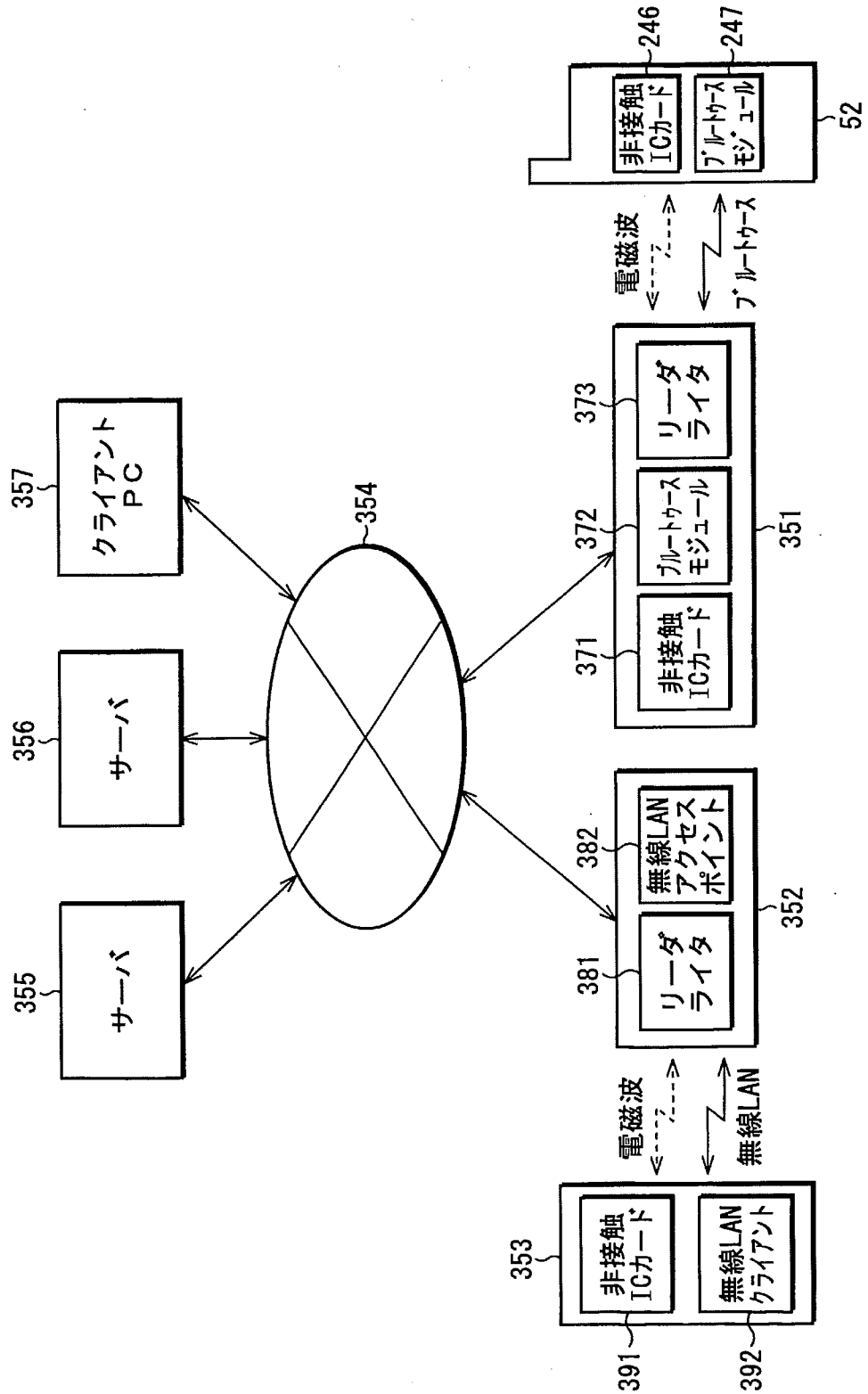


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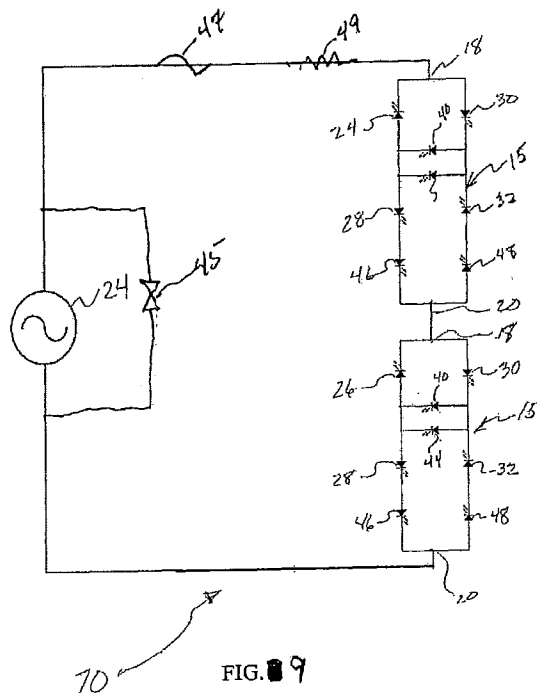




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- (72) Inventors; and
(75) Inventors/Applicants (for US only): **MISKIN, Michael** [US/US]; 2 Pinecone Lane, Sleepy Hollow, IL 60118 (US). **KOTTRISCH, Robert, L.** [GB/GB]; 10 The Hollies, Shefford, Bedfordshire SG175BX (GB).
- (74) Agent: **LAKE, Michael, D.**; Factor & Lake, LTD, 1327 W. Washington Blvd., Suite 5G/H, Chicago, IL 60607 (US).
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[Continued on next page]

(54) Title: LED CIRCUITS AND ASSEMBLIES



(57) Abstract: An AC-driven LED circuit includes a first circuit having a first branch and a second branch which connect at first and second common point. The common points provide input and output for an AC driving current from a driver of the circuit. The first branch has first LED and second LED, the first LED being connected to second LED in opposing series relationship with the inputs of the first and second LEDs defining a first branch junction. A second branch has a third LED and a fourth LED, the third LED is connected to the fourth LED in opposing series relationship with the outputs of the third and fourth LEDs defining a second branch junction. Improvement in performance and scalability is provided by adding n diodes to a given basic circuit and x cross connecting circuit branch diodes and providing one or more basic circuits in series and or basic.



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TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with information concerning one or more priority claims considered void (Rule 26bis.2(d))

LED CIRCUITS AND ASSEMBLIES

RELATED APPLICATIONS

[0001] The application is a continuation-in-part of U.S. Patent Application No. 12/287,267, filed October 6, 2008, which claims the priority to U.S. Provisional Application No. 60/997,771, filed October 6, 2007; this application also claims priority to U.S. Provisional Application No. 61/215,144, filed May 1, 2009; the contents of each of these applications are expressly incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to light-emitting diode ("LED") circuits and assemblies; and more specifically to scalable alternating current ("AC") driven LED circuits and assemblies.

SUMMARY OF THE INVENTION

[0003] While not intending to limit the scope of the claims or disclosure, in brief summary, the present disclosure and claims are directed to providing improved ease of designing and building lighting fixtures using AC-driven LEDs. Disclosed and claimed are LED circuits having scalable circuit configurations and LED package assembly configurations which can be used in an AC-drive platform to more easily match the voltage requirements of the lighting fixture(s) or systems in which the LED's are desired. Circuits and LED package assemblies are claimed and disclosed which reduce objectionable flicker produced from AC-driven LEDs and to produce more light per component. Packaged LED's are provided for lighting design according to the invention which address flicker at low frequencies (e.g. 50/60 Hz) while being scalable as desired for a particular lighting goal without resort to designing individual assemblies at the semiconductor die level. Circuits are also disclosed and claimed which provide for some of the LEDs in a circuit to be on during

both positive and negative phases of an AC source, to among other things, address flicker. Also, circuits are claimed and disclosed where a basic circuit design provides a voltage and current performance whereby scalability or matching a particular voltage requirement is achieved by configuring LEDs in the basic design and/or by joining one or more of the basic circuits together in series or basic to achieve the design requirement.

[0004] According to an embodiment of the invention an AC-driven LED circuit is proposed having at least a first [basic] circuit comprising LEDs. Each LED has an input and an output, and the circuit having at least first and second basic branches connecting at first and second common points, the common points providing input and output for an AC driving current for the circuit. This circuit as well as others described and claimed herein incorporating various numbers of LEDs may be referred to herein as a “circuit module,” a “basic LED circuit,” or a “subcircuit,” given the fact that according to an aspect of the invention such circuits themselves may be joined with other such circuits in either basic or series relationships to each other. The first branch of the basic LED circuit has a first and a second LED, and the second branch having a third and a fourth LED. The first LED is connected to the second LED in opposing series relationship with the inputs of the first and second LEDs defining a first branch junction. The third LED is connected to the fourth LED in opposing series with the outputs of the third and fourth LEDs defining a second branch junction. The first and second branches are connected to one another such that the output of the first LED is connected to the input of the third LED at the first common point and the output of the second LED is connected to the input of the fourth LED at the second common point. At least one (or a first) cross-connecting circuit branch having at least a fifth LED is provided in an embodiment of the invention, the first cross-connecting circuit being configured such that the input of the fifth LED is connected to second branch junction and its

output is connected to the first branch junction. It is important to note that according to an embodiment and aspect of the invention that circuits disclosed and claimed herein, result in an antibasic relationship of certain LEDs and further resulting in an imbalanced bridge effect in operation.

[0005] An AC LED bridge is an LED topology where the self rectifying property of anti basic LED strings is used to drive a set of 'bridge' LEDs with rectified current. An imbalanced bridge is the general implementation of this topology where one side of the input to the bridge has a different number of LEDs in series than the other side. A balanced bridge is a particular implementation of this topology where the input and output sides have equal numbers of LEDs in series. When used in a specific voltage drive regime, such as 12V AC, the advantage of an imbalanced bridge topology is that it can be constructed for example with standard GaN die so that the forward combined voltage of the die in one phase cycle is closely matched to the native supply voltage while the reverse voltage applied to the diodes in the opposing phase is kept to an acceptable level below the reverse breakdown voltage of the die.

[0006] According to another embodiment of the invention, an AC-driven LED circuit may comprise one or more additional basic circuits each being the same as the first basic circuit identified above. Each additional circuit being conductively connected to the first basic circuit and to one another at their common points for providing an input and an output for an AC driving current of the circuit. According to other embodiments, the additional basic circuits may be connected in series to the first basic circuit and to one another or the additional basic circuits may be connected in parallel to the first basic circuit and to one another.

[0007] According to another embodiment of the invention, n additional LEDs, in pairs, may be provided in the circuit wherein the pairs are configured among the first and second branch circuits of each of the respective basic circuits or modules, such that current flows through the respective fifth diode of each basic circuit upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

[0008] According to another embodiment the AC-driven LED circuit further comprises x cross-connecting circuit branches each having one or more LEDs and being configured such that current flows through each of the respective one or more LEDs upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

[0009] According to an embodiment and aspect of the invention, the basic LED circuit and more complex circuits derived therefrom include a one or more of a resistor, a transient or surge protector, and a microfuse; in any number or combination respecting the needed or desired impedance, resistance, and/or drive current/voltage protection.

[0010] According to another aspect and embodiment of the invention, the circuit embodiments described and claimed herein are formed on a single semiconductor chip. Another embodiment and aspect of the invention provides that the circuits described and claimed herein including the LED die are formed on a sapphire substrate.

[0011] According to another embodiment of the invention, an AC-driven LED assembly comprises at least a first and a second LED each discretely packaged, the LEDs being connected in an AC circuit and each LED package being mounted to a substrate at a distance from the other of preferably approximately 3 mm or less, and more preferably 2.0 mm or less. In an embodiment the packaged LEDs also each have a length of preferably approximately

2.5 mm or less, and more preferably 2.0 mm or less. In an embodiment the packaged LEDs also each have a width of preferably approximately 2.5 mm or less, and more preferably 2.0 mm or less. In an embodiment the LED packages are arranged with respect to each other in a linear spatial relationship while in another embodiment the LED packages are arranged with respect to each other in an XY rectilinear spatial relationship.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 2 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 3 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 4 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 5 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 6 is a schematic top view of an AC-driven LED assembly according to an embodiment of the invention;

FIG. 7 is a schematic top view of an AC-driven LED assembly according to an embodiment of the invention; and,

FIG. 8 is a schematic side view of an AC-driven LED assembly according to an embodiment of the invention.

FIG. 9 is a schematic view of a modification to AC-driven circuit 70 of Fig. 4.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0012] While this invention is susceptible to embodiments in many different forms, there are shown in the drawings and will herein be described in detail, preferred embodiments of the invention with the understanding that the present disclosures are to be considered as exemplifications of the principles of the invention and are not intended to limit the broad aspects of the invention to the embodiments illustrated. Like components in the various FIGS. will be given like reference numbers.

[0013] FIG. 1 discloses an AC-driven LED circuit 10 including a first basic circuit 12 having a first branch 14, and a second branch 16. Branches 14, 16 connect at first common point 18 and second common point 20. The common points 18, 20 provide input and output for an AC driving current from a driver 24 for the circuit.

[0014] The first branch 14 has a first LED 26 and a second LED 28, and the second branch 16 having a third LED 30 and a fourth LED 32. The first LED 26 is connected to the second LED 28 in opposing series relationship with the inputs of the first and second LEDs 26, 28 defining a first branch junction 34. The third LED 30 is connected to the fourth LED 32 in opposing series with the outputs of the third and fourth LEDs 30, 32 defining a second branch junction 36.

[0015] The first and second branches 34, 36 are connected to one another such that the output of the first LED 26 is connected to the input of the third LED 30 at the first common point 18 and the output of the second LED 28 is connected to the input of the fourth LED 32 at the second common point 20. A first cross-connecting circuit branch 38 has a fifth LED 40. The first cross-connecting circuit branch 38 being configured such that the input of the fifth LED 40 is connected to second branch junction 36 and the output is connected to the first branch junction 34.

[0016] As will be appreciated by those of skill in the art, the LED's 26 and 32 will provide light only upon one half of an AC wave, pulse or phase, while LEDs 28 and 30 will provide light only upon the opposite wave, pulse or phase. At lower frequencies, e.g. mains frequencies, if the LEDs are spaced pursuant to another aspect of the invention (disclosed below) at preferably approximately 3.0 mm or less preferably approximately 2.0 mm or less, then the amount of noticeable flicker may not be unacceptable. However, the cross connecting circuit 38 and diode 40 will be on (produce light) in both phases of the AC drive and hence mitigate flicker which may be evidenced in its surrounding LEDs 26, 28, 30 and 32.

[0017] Advantageously the LED circuit 10 provides an LED topology an imbalanced bridge effect as one side of the circuit has a different number of LEDs in series than the other side. This characteristic is also disclosed in all of the circuits in Figs. 1-9.

[0018] FIG. 2 discloses an AC-driven LED circuit 50 which is a modification of AC-driven LED circuit 10. Circuit 50 further mitigates flicker. Circuit 50 provides an additional cross-connecting circuit branch 42 having LED 44. The LEDs 40, 44 are configured such that current flows through each upon both a negative and positive phase of the AC driving source 24. It should be appreciated that according to the invention x number of such cross connecting circuit branches (such as 38, 42) may be added as desired, however, since the LEDs (such as LEDs 40, 44) are in basic with each other, their voltage demand will be divided while their current draw will not. Hence, a suitable driver need be provided for this circumstance.

[0019] To increase the light output of the circuit of the invention, it should be noted as disclosed in FIG. 3 that additional or n LEDs may be provided in the branches 14 and 16. Specifically FIG. 3 discloses an AC-driven circuit 60 which is a modification of circuit 50.

Circuit 60 provides for additional LEDs 46 and 48. The pair of LEDs are configured among the first and second branch circuits 14, 16 of the basic circuit 15 such that current flows through the respective diodes 40, 44 upon both a negative and positive phase of the AC driving source 24 and so that the current draw through basic circuit 15 during both AC phases is substantially the same.

[0020] It should be noted that according to the invention, n pairs of LEDs can be configured among first and second branch circuits of a respective basic circuit, such that current flows through the respective cross connecting circuit branch LEDs of a basic circuit upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same. More LEDs in the branch circuits divide the current from the higher current LEDs in cross connecting circuits 38, 42.

[0021] According to another aspect of the invention, to further mitigate the amount of flicker perceived, adding to the light provided and to scalability, additional basic circuits, each being the same as the first basic circuit, may be conductively connected to the first basic circuit in series or basic at the their common points 18, 20 for providing an input and an output for an AC driving current for the circuit:

[0022] For instance, FIG. 4 discloses an AC-driven LED circuit 70 which includes additional basic circuits 15 connected in series at common points 18, 20. Additionally, as seen in FIG. 5, an AC-driven LED circuit 80 includes additional basic circuits 15 connected in basic at common points 18, 20. This embodiment shows the utility of providing a scalable circuit that can be manufactured modularly and used to connect to match higher voltage requirements e.g. circuit 15 may draw drawing 12 V AC while two such circuits 15 in series would meet 24V AC requirements.

[0023] Preferably, the number and type of LEDs in the AC-driven LED circuit draws a combined current and combined voltage which is substantially equal to the nominal voltage capacity of the AC drive source.

[0024] As shown in FIG. 6, an AC-driven LED assembly 90 has a first and a second LED 82 each discretely packaged, the LEDs being connected in an AC circuit and each LED package 82 being mounted to a substrate 92 at a distance $d1$ from the other of preferably approximately 3 mm or less, and more preferably 2.0 mm or less. The AC-driven LED assembly 90 also has packaged LEDs 84 each having a width $d2$ and a length $d3$ of preferably approximately 2.5 mm or less, and more preferably 2.0 mm or less.

[0025] FIG. 6 discloses an AC-driven LED assembly 90 wherein the LED packages 84 are arranged with respect to each other in a linear spatial relationship, while FIG. 7 discloses an assembly 100 wherein the LED packages 84 are arranged with respect to each other in an XY rectilinear spatial relationship.

[0026] As can be seen in FIG. 8, when LED packages 84 are placed at 3 mm or less, the light produced therefrom intersects, thereby reducing or eliminating the effects of flicker.

[0027] Fig. 9 discloses a modification to AC-driven circuit 70 which according to the invention, whether embodied on a single chip, or to other another substrate or circuit board mounting, is provided with one or more at the option of the design criteria, to include one or more of a transient voltage suppressor 45 or like device, a micro-fuse 47, or like device (e.g. a PTC device) and a resistor 49. The resistor 49 may be unnecessary in a design where the resistance/impedance of the fusing and/or overvoltage devices are sufficient for the circuit performance.

[0028] According to the invention, the various embodiments of the basic LED circuits and larger circuits of serial and parallel arrangements of same are formed by forming the

die/and or other circuit elements on a single semiconductor chip or a substrate, or mounted to substrates, and assemblies may be produced, such as creating an AC-driven circuit where all circuits and LEDs are formed on a semiconductor, where the LED are discretely packaged apart from the circuits, and where each basic circuit is formed on a printed circuit board. Preferably according to an aspect of the invention the basic circuits and larger circuits combining them may be formed on a sapphire substrate for thermal management of the numerous LED die.

[0029] While in the preceding there has been set forth a preferred embodiment of the invention, it is to be understood that the present invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein. While specific embodiments have been illustrated and described, numerous modifications come to mind without significantly departing from the characteristics of the invention and the scope of protection is only limited by the scope of the accompanying Claims.

CLAIMS

I claim:

1. An AC-driven LED circuit comprising:
 - a first basic circuit having LEDs, each LED having an input and an output, and the circuit having at least first and second branches connecting at first and second common points, the common points providing input and output for an AC driving current for the circuit;
 - the first branch having a first and a second LED, and the second branch having a third and a fourth LED;
 - the first LED is connected to the second LED in opposing series relationship with the inputs of the first and second LEDs defining a first branch junction;
 - the third LED is connected to the fourth LED in opposing series with the outputs of the third and fourth LEDs defining a second branch junction,
 - the first and second branches are connected to one another such that the output of the first LED is connected to the input of the third LED at the first common point and the output of the second LED is connected to the input of the fourth LED at the second common point;
 - a first cross-connecting circuit branch having at least a fifth LED, the first cross-connecting circuit branch being configured such that the input of the fifth LED is connected to the second branch junction and the output is connected to the first branch junction; and,
 - wherein the arrangement of the LEDs provide an imbalance bridge effect to the basic AC-driven circuit.
2. The AC-driven LED circuit according to claim 1 further comprising one or more additional basic circuits each being the same as the first basic circuit, each additional circuit

being conductively connected to the first basic circuit and to one another at the their common points for providing an input and an output for an AC driving current for the circuit.

3. An AC-driven LED circuit according to claim 2 wherein the additional basic circuits are connected in series to the first basic circuit and to one another.

4. An AC-driven LED circuit according to claim 2 wherein the additional basic circuits are connected in basic to the first basic circuit and to one another.

5. The AC-driven LED circuit according to claim 1-4 further comprising n additional LEDs, in pairs, wherein the pairs are configured among the first and second branch circuits of each of the respective basic circuits, such that current flows through the respective fifth diode of each basic circuit upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

6. The AC-driven LED circuit according to claims 1-5 further comprising, for each basic circuit, x cross-connecting circuit branches each having one or more LEDs and being configured such that current flows through each of the respective one or more LEDs upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

7. The AC-driven LED circuit according to claims 1-6 wherein the number and type of LEDs of the AC-driven LED circuit draw a combined current which is substantially equal to the nominal current capacity of the AC-source.
8. The AC-driven LED circuit according to claims 1-7 wherein the number and type of LEDs of the AC-driven LED circuit drops a combined voltage which is substantially equal to the nominal voltage capacity of the AC-source.
9. The AC-driven LED circuit according to claims 1-3 and 5-7 wherein the first basic circuit and each other basic circuit has a voltage drop of twelve volts.
10. The AC-driven circuits of claims 1-9 being formed on a single semiconductor chip
11. The AC-driven LED circuits of claims 1-9 wherein the LEDs are discretely packaged apart from the circuits.
12. The AC-driven LED assemblies of claims 11-15 and 17 wherein each basic circuit is formed on a printed circuit board.
13. The AC-driven circuits of claims 1-13 further comprising one or more of a transient voltage suppressor device, a fuseable element, and a resistor.

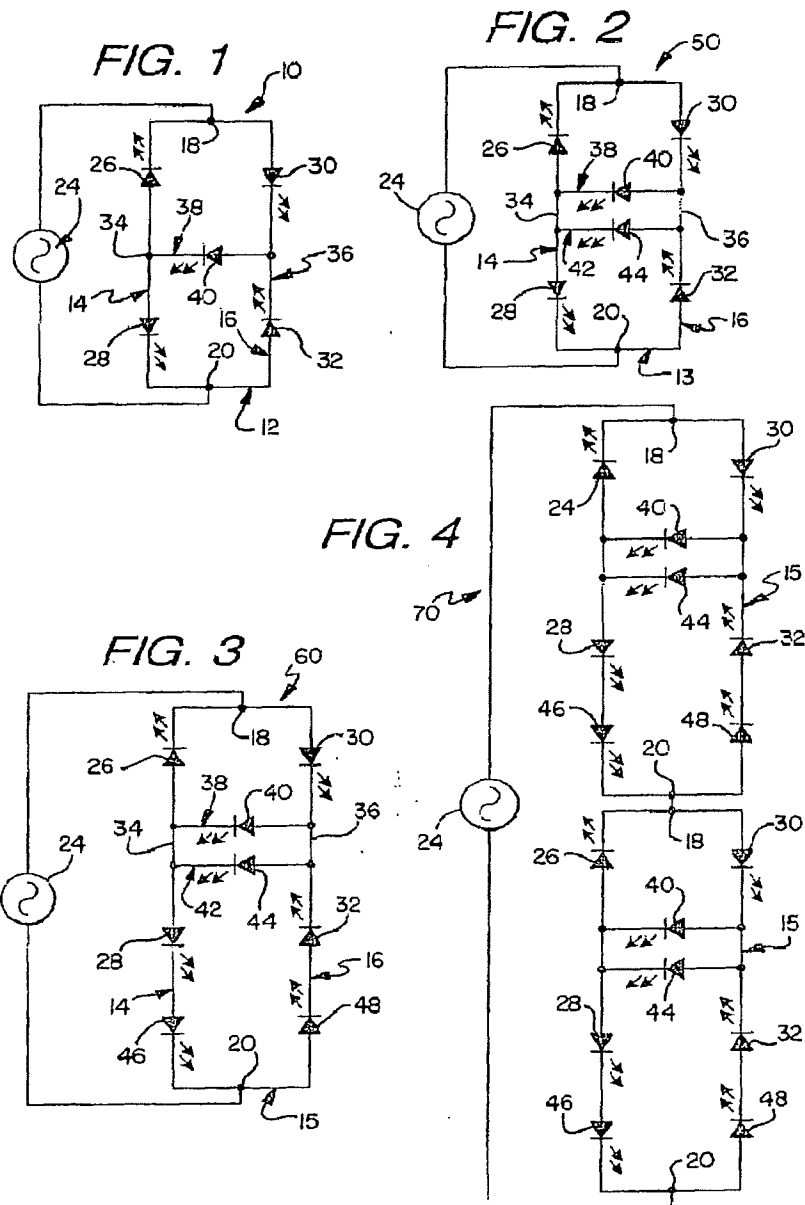


FIG. 5

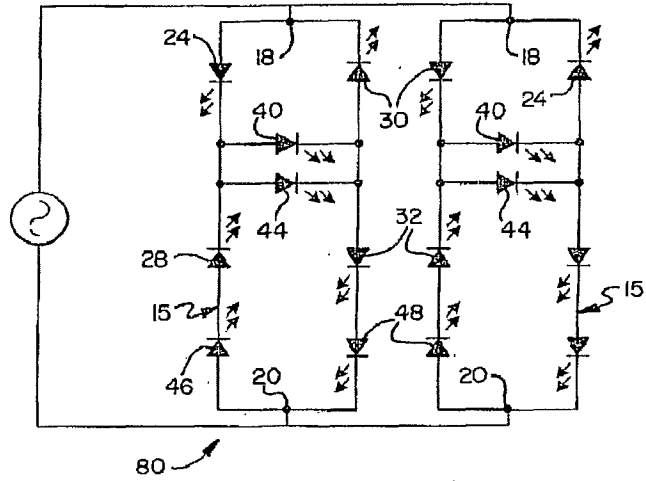


FIG. 6

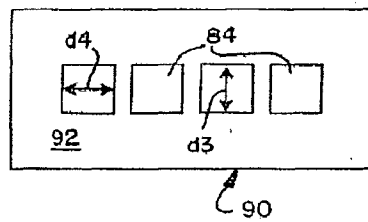


FIG. 7

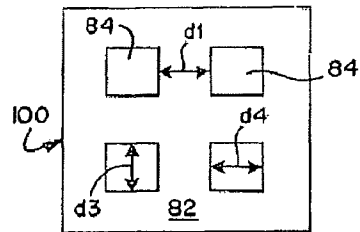
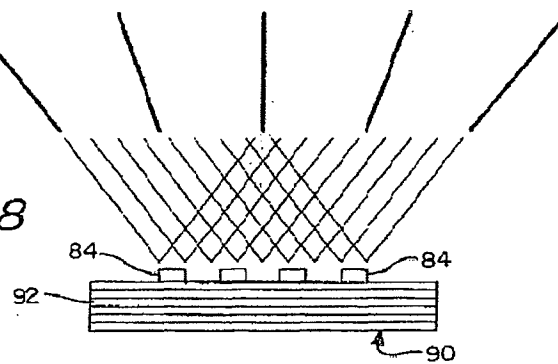


FIG. 8



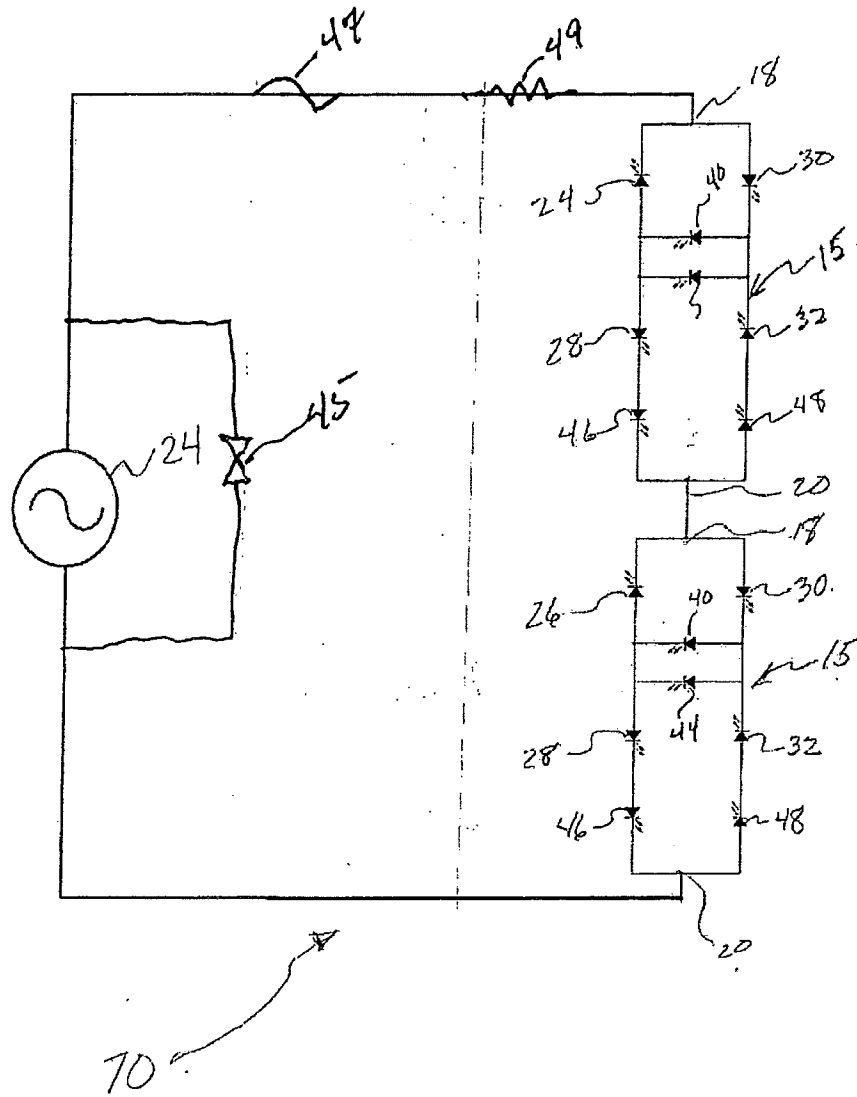


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/01269

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H05B 41/16 (2010.01) USPC - 315/250 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) USPC- 315/250 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC- 315/185S,185R,250; 257/88 (keyword limited--see terms below) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST (PGPB, USPT, EPAB, JPAB); Google Scholar Search Terms Used: LED AC imbalance unbalanced bridge current draw basic circuit positive negative phase stay on cross output input opposing series branch alternating current light emitting												
C. DOCUMENTS CONSIDERED TO BE RELEVANT												
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
Y	US 2008/0136347 A1 (LIN et al.) 12 June 2008 (12.06.2008), para [0017], [0036]-[0037], FIG. 8	1-5										
Y	US 2008/0211421 A1 (LEE et al.) 04 September 2008 (04.09.2008), para [0037]	1-5										
Y	US 2004/0080941 A1 (JIANG et al.) 29 April 2004 (29.04.2004), para [0014]	5										
☐ Further documents are listed in the continuation of Box C. ☐												
<p>* Special categories of cited documents:</p> <table border="0"><tr><td>"A" document defining the general state of the art which is not considered to be of particular relevance</td><td>"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</td></tr><tr><td>"E" earlier application or patent but published on or after the international filing date</td><td>"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</td></tr><tr><td>"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)</td><td>"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</td></tr><tr><td>"O" document referring to an oral disclosure, use, exhibition or other means</td><td>"G" document member of the same patent family</td></tr><tr><td>"P" document published prior to the international filing date but later than the priority date claimed</td><td></td></tr></table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"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	"E" earlier application or patent but published on or after the international filing date	"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	"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)	"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	"O" document referring to an oral disclosure, use, exhibition or other means	"G" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed	
"A" document defining the general state of the art which is not considered to be of particular relevance	"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											
"E" earlier application or patent but published on or after the international filing date	"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											
"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)	"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											
"O" document referring to an oral disclosure, use, exhibition or other means	"G" document member of the same patent family											
"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 June 2010 (12.06.2010)		Date of mailing of the international search report 28 JUN 2010										
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. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774										

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/01269

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 6-13
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
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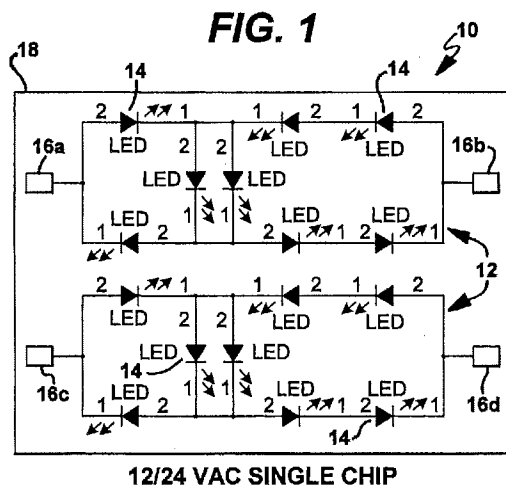
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(54) Title: **MULTI-VOLTAGE AND MULTI-BRIGHTNESS LED LIGHTING DEVICES AND METHODS OF USING SAME**



(57) Abstract: A single chip multi-voltage or multi-brightness LED lighting device having at least two LED circuits having at least two LEDs connected series, and electrically unconnected in a parallel relationship, a forward operating drive voltage of at least six volts and are monolithically integrated on a single substrate, configurable by means of connecting the circuits so as to provide optional operating voltage level and/or desired brightness level wherein the electrical connection at the LED packaging level when the single chips are integrated into the LED package. Alternatively, the LED package may have external electrical contacts that match the integrated chips within. Optionally allowable, the drive voltage level and/or the brightness level selectability may be passed on through to the exterior of the LED package and may be selected by the LED package user, the PCB assembly facility, or the end product manufacturer.

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**Multi-Voltage And Multi-Brightness LED Lighting Devices
And Methods Of Using Same**

RELATED APPLICATIONS

[Para 1] The application is a continuation-in-part of U.S. Patent Application No. 12/287,267, filed October 6, 2008, which claims the priority to U.S. Provisional Application No. 60/997,771, filed October 6, 2007; this application also claims priority to U.S. Provisional Application No. 61/217,215, filed May 28, 2009; the contents of each of these applications are expressly incorporated herein by reference.

TECHNICAL FIELD

[Para 2] The present invention generally relates to light emitting diodes ("LEDs") for AC operation. The present invention specifically relates to multiple voltage level and multiple brightness level LED devices, packages and lamps.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[Para 3] None.

BACKGROUND OF THE INVENTION

[Para 4] Field of the Invention

[Para 5] The present invention generally relates to light emitting diodes ("LEDs") for multi-voltage level and/or multi-brightness level operation. The present invention specifically relates to multiple voltage level and multiple brightness level light emitting diode circuits, single chips, packages and lamps "devices" for direct AC voltage power source operation, bridge rectified AC voltage power source operation or constant DC voltage power source operation.

[Para 6] Description of the Related Art

LEDs are semiconductor devices that produce light when a current is supplied to them. LEDs are intrinsically DC devices that only pass current in one polarity and historically have been driven by DC voltage sources using resistors, current regulators and voltage regulators

to limit the voltage and current delivered to the LED. Some LEDs have resistors built into the LED package providing a higher voltage LED typically driven with 5V DC or 12V DC.

[Para 7] With proper design considerations LEDs may be driven more efficiently with direct AC or rectified AC than with constant voltage or constant current DC drive schemes.

[Para 8] Some standard AC voltage in the world include 12VAC, 24VAC, 100VAC, 110VAC, 120VAC, 220VAC, 230VAC, 240VAC and 277VAC. Therefore, it would be advantageous to have a single chip LED or multi-chip single LED packages that could be easily configured to operate at multiple voltages by simply selecting a voltage and/or current level when packaging the multi-voltage and/or multi-current single chip LEDs or by selecting a specific voltage and/or current level when integrating the LED package onto a printed circuit board or within a finished lighting product. It would also be advantageous to have multi-current LED chips and/or packages for LED lamp applications in order to provide a means of increasing brightness in LED lamps by switching in additional circuits just as additional filaments are switched in for standard incandescent lamps.

[Para 9] US 7,525,248 discloses a *chip*-scale LED lamp including discrete LEDs capable of being built upon electrically insulative, electrically conductive, or electrically semi conductive substrates. Further, the construction of the LED lamp enables the lamp to be configured for high voltage AC or DC power operation. The LED based solid-state light emitting device or lamp is built upon an electrically insulating layer that has been formed onto a support surface of a substrate. Specifically, the insulating layer may be epitaxially grown onto the substrate, followed by an LED buildup of an n-type semiconductor layer, an optically active layer, and a p-type semiconductor layer, in succession. Isolated mesa structure of individual, discrete LEDs is formed by etching specific portions of the LED buildup down to the insulating layer, thereby forming trenches between adjacent LEDs. Thereafter, the individual LEDs are electrically coupled together through conductive elements or traces being deposited for connecting the n-type layer of one LED and the p-type layer of an adjacent LED, continuing across all of the LEDs to form the solid-state light emitting device. The device may therefore be formed as an integrated AC/DC light emitter with a positive and negative lead for supplied electrical power. For instance, the LED lamp may be configured for powering by high voltage DC power (e.g., 12V, 24V, etc.) or high voltage AC power (e.g., 110/120V, 220/240V, etc.).

[Para 10] US 7,213,942 discloses a single-*chip* LED device through the use of integrated circuit technology, which can be used for standard high AC voltage (110 volts for

North America, and 220 volts for Europe, Asia, etc.) operation. The single-*chip AC LED* device integrates many smaller LEDs, which are connected in series. The integration is done during the LED fabrication process and the final product is a single-*chip* device that can be plugged directly into house or building power outlets or directly screwed into incandescent lamp sockets that are powered by standard AC voltages. The series connected smaller LEDs are patterned by photolithography, etching (such as plasma dry etching), and metallization on a single *chip*. The electrical insulation between small LEDs within a single-*chip* is achieved by etching light emitting materials into the insulating substrate so that no light emitting material is present between small LEDs. The voltage crossing each one of the small LEDs is about the same as that in a conventional DC operating LED fabricated from the same type of material (e.g., about 3.5 volts for blue LEDs).

[Para 11] Accordingly, single chip LEDs have been limited and have not been integrated circuits beyond being fixed series or fixed parallel circuit configurations until the development of AC LEDs. The AC LEDs have still however been single circuit, fixed single voltage designs.

[Para 12] LED packages have historically not been integrated circuits beyond being fixed series or fixed parallel circuit configurations.

[Para 13] The art is deficient in that it does not provide a multi-voltage and/or multi-current circuit monolithically integrated on a single substrate which would be advantageous.

[Para 14] It would further be advantageous to have a multi-voltage and/or multi-brightness circuit that can provide options in voltage level, brightness level and/or AC or DC powering input power preference.

[Para 15] It would further be advantageous to provide multiple voltage level and/or multiple brightness level light emitting LED circuits, chips, packages and lamps "multi-voltage and/or multi-brightness LED devices" that can easily be electrically configured for at least two forward voltage drive levels with direct AC voltage coupling, bridge rectified AC voltage coupling or constant voltage DC power source coupling. This invention comprises circuits and devices that can be driven with more than one AC or DC forward voltage "multi-voltage" at 6V or greater based on a selectable desired operating voltage level that is achieved by electrically connecting the LED circuits in a series or parallel circuit configuration and/or more than one level of brightness "multi-brightness" based on a switching means that connects and/or disconnects at least one additional LED circuit to and/or from a first LED circuit. The desired operating voltage level and/or the desired

brightness level electrical connection may be achieved and/or completed at the LED packaging level when the multi-voltage and/or multi-brightness circuits and/or single chips are integrated into the LED package, or the LED package may have external electrical contacts that match the integrated multi-voltage and/or multi-brightness circuits and/or single chips within, thus allowing the drive voltage level and/or the brightness level select-ability to be passed on through to the exterior of the LED package and allowing the voltage level or brightness level to be selected at the LED package user, or the PCB assembly facility, or the end product manufacturer.

[Para 16] It would further be advantageous to provide at least two integrated circuits having a forward voltage of at least 12VAC or 12VDC or greater on a single chip or within a single LED package that provide a means of selecting a forward voltage when packaging a multi-voltage and/or multi-brightness circuit using discrete die (one LED chip at a time) and wire bonding them into a circuit at the packaging level or when packaging one or more multi-voltage and/or multi-brightness level single chips within a LED package.

[Para 17] It would further be advantageous to provide multi-voltage and/or multi-brightness level devices that can provide electrical connection options for either AC or DC voltage operation at preset forward voltage levels of 6V or greater.

[Para 18] It would further be advantageous to provide multi-brightness LED devices that can be switched to different levels of brightness by simply switching additional circuits on or off in addition to a first operating circuit within a single chip and or LED package. This would allow LED lamps to switch to higher brightness levels just like 2-way or 3-way incandescent lamps do today.

[Para 19] The benefits of providing multi-voltage circuits of 6V or greater on a single chip is that an LED packager can use this single chip as a platform to offer more than one LED packaged product with a single chip that addresses multiple voltage levels for various end customer design requirements. This also increase production on a single product for the chip maker and improves inventory control. This also improves buying power and inventory control for the LED packager when using one chip.

[Para 20] The present invention provides for these advantages and solves the deficiencies in the art.

SUMMARY OF THE INVENTION

[Para 21] According to one aspect of the invention at least two single voltage AC LED circuits are formed on a single chip or on a substrate providing a multi-voltage AC LED device for direct AC power operation. Each single voltage AC LED circuit has at least two LEDs connected to each other in opposing parallel relation.

[Para 22] According to another aspect of the invention, each single voltage AC LED circuit is designed to be driven with a predetermined forward voltage of at least 6VAC and preferably each single voltage AC LED circuit has a matching forward voltage of 6VAC, 12VAC, 24VAC, 120VAC, or other AC voltage levels for each single voltage AC LED circuit.

[Para 23] According to another aspect of the invention, each multi-voltage AC LED device would be able to be driven with at least two different AC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage AC LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level AC LED circuits in series. By way of example, the second forward voltage drive level of the serially connected AC LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected AC LED circuits. The at least two parallel connected AC LED circuits would be twice the current of the at least two serially connected AC LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage LED device.

[Para 24] According to another aspect of the invention, at least two single voltage series LED circuits, each of which have at least two serially connected LEDs, are formed on a single chip or on a substrate providing a multi-voltage AC or DC operable LED device.

[Para 25] According to another aspect of the invention, each single voltage series LED circuit is designed to be driven with a predetermined forward voltage of at least 6V AC or DC and preferably each single voltage series LED circuit has a matching forward voltage of 6V, 12V, 24V, 120V, or other AC or DC voltage levels. By way of example, each multi-voltage AC or DC LED device would be able to be driven with at least two different AC or DC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage series LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level series LED circuits in series.

The second forward voltage drive level of the serially connected series LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected series LED circuits. The at least two parallel connected series LED circuits would be twice the current of the at least two serially connected series LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage series LED device.

[Para 26] According to another aspect of the invention, at least two single voltage AC LED circuits are formed on a single chip or on a substrate providing a multi-voltage and/or multi-brightness AC LED device for direct AC power operation.

[Para 27] According to another aspect of the invention, each single voltage AC LED circuit has at least two LEDs connected to each other in opposing parallel relation. Each single voltage AC LED circuit is designed to be driven with a predetermined forward voltage of at least 6VAC and preferably each single voltage AC LED circuit has a matching forward voltage of 6VAC, 12VAC, 24VAC, 120VAC, or other AC voltage levels for each single voltage AC LED circuit. The at least two AC LED circuits within each multi-voltage and/or multi current AC LED device would be left able to be driven with at least two different AC forward voltages resulting in a first forward voltage drive level by electrically connecting the two single voltage AC LED circuits in parallel and a second forward voltage drive level by electrically connecting the at least two single voltage level AC LED circuits in series. The second forward voltage drive level of the serially connected AC LED circuits would be approximately twice the level of the first forward voltage drive level of the parallel connected AC LED circuits. The at least two parallel connected AC LED circuits would be twice the current of the at least two serially connected AC LED circuits. In either circuit configuration, the brightness would be approximately the same with either forward voltage drive selection of the multi-voltage LED device.

[Para 28] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate, and at least one bridge circuit made of LEDs is formed on the same single chip or substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VDC, 24VDC, 120VDC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device

would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 29] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VAC, 24VAC, 120VAC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 30] According to another aspect of the invention at least two single voltage LED circuits are formed on a single chip or on a substrate, and at least one bridge circuit made of LEDs is formed on the same single chip or substrate providing a multi-voltage and/or multi-brightness LED device for direct DC power operation. Each single voltage LED circuit has at least two LEDs connected to each other in series. Each single voltage LED circuit is designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each circuit such as 12VDC, 24VDC, 120VDC, or other DC voltage levels for each single voltage LED circuit. Each multi-voltage and/or multi-brightness LED device would be able to be driven with at least two different DC forward voltages resulting in a first forward voltage drive level when the two single voltage LED circuits are connected in parallel and a second forward voltage drive level that is twice the level of the first forward voltage drive level when the at least two LED circuits are connected in series.

[Para 31] According to another aspect of the invention a multi-voltage and/or multi-current AC LED circuit is integrated within a single chip LED. Each multi-voltage and/or multi-current single chip AC LED LED comprises at least two single voltage AC LED circuits. Each single voltage AC LED circuit has at least two LEDs in anti-parallel configuration to accommodate direct AC voltage operation. Each single voltage AC LED circuit may have may have at least one voltage input electrical contact at each opposing end

of the circuit or the at least two single voltage AC LED circuits may be electrically connected together in series on the single chip and have at least one voltage input electrical contact at each opposing end of the two series connected single voltage AC LED circuits and one voltage input electrical contact at the center junction of the at least two single voltage AC LED circuits connected in series. The at least two single voltage AC LED circuits are integrated within a single chip to form a multi-voltage and/or multi-current single chip AC LED.

[Para 32] According to another aspect of the invention, at least one multi-voltage and/or multi-brightness LED devices may be integrated within a LED lamp. The at least two individual LED circuits within the multi-voltage and/or multi-brightness LED device(s) may be wired in a series or parallel circuit configuration by the LED packager during the LED packaging process thus providing for at least two forward voltage drive options, for example 12VAC and 24VAC or 120VAC and 240VAC that can be selected by the LED packager.

[Para 33] According to another aspect of the invention a multi-voltage and/or multi-current AC LED package is provided, comprising at least one multi-voltage and/or multi-current single chip AC LED integrated within a LED package. The multi-voltage and/or multi-current AC LED package provides matching electrical connectivity pads on the exterior of the LED package to the electrical connectivity pads of the at least one multi-voltage and/or multi-current single chip AC LED integrated within the LED package thus allowing the LED package user to wire the multi-voltage and/or multi-current AC LED package into a series or parallel circuit configuration during the PCB assembly process or final product integration process and further providing a AC LED package with at least two forward voltage drive options.

[Para 34] According to another aspect of the invention multiple individual discrete LED chips are used to form at least one multi-voltage and/or multi-current AC LED circuit within a LED package thus providing a multi-voltage and/or multi current AC LED package. Each multi-voltage and/or multi-current AC LED circuit within the package comprises at least two single voltage AC LED circuits. Each single voltage AC LED circuit has at least two LEDs in anti-parallel configuration to accommodate direct AC voltage operation. The LED package provides electrical connectivity pads on the exterior of the LED package that match the electrical connectivity pads of the at least two single voltage AC LED circuits integrated within the multi-voltage and/or multi-current AC LED package thus allowing the LED package to be wired into a series or parallel circuit configuration during the PCB assembly

process and further providing a LED package with at least two forward voltage drive options.

[Para 35] According to another aspect of the invention a multi-voltage and/or multi-current single chip AC LED and/or multi-voltage and/or multi current AC LED package is integrated within an LED lamp. The LED lamp having a structure that comprises a heat sink, a lens cover and a standard lamp electrical base. The multi-voltage and/or multi-current single chip AC LED and/or package is configured to provide a means of switching on at least one additional single voltage AC LED circuit within multi-voltage and/or multi-current AC LED circuit to provide increased brightness from the LED lamp.

[Para 36] According to another broad aspect of the invention at least one multi-current AC LED single chip is integrated within a LED package.

[Para 37] According to another aspect of the invention, at least one single chip multi-current LED bridge circuit is integrated within a LED lamp having a standard lamp base. The single chip multi-current LED bridge circuit may be electrically connected together in parallel configuration but left open to accommodate switching on a switch to the more than one on the single chip and have at least one accessible electrical contact at each opposing end of the two series connected circuits and one accessible electrical contact at the center junction of the at least two individual serially connected LED circuits. The at least two individual circuits are integrated within a single chip.

[Para 38] According to another aspect of the invention When the at least two circuits are left unconnected on the single chip and provide electrical pads for connectivity during the packaging process, the LED packager may wire them into series or parallel connection based on the desired voltage level specification of the end LED package product offering.

BRIEF DESCRIPTION OF THE DRAWINGS

[Para 39] Figure 1 shows a schematic view of a preferred embodiment of the invention;

[Para 40] Figure 2 shows a schematic view of a preferred embodiment of the invention;

[Para 41] Figure 3 shows a schematic view of a preferred embodiment of the invention;

[Para 42] Figure 4 shows a schematic view of a preferred embodiment of the invention;

[Para 43] Figure 5 shows a schematic view of a preferred embodiment of the invention;

[Para 44] Figure 6 shows a schematic view of a preferred embodiment of the invention;

[Para 45] Figure 7 shows a schematic view of a preferred embodiment of the invention;

[Para 46] Figure 8 shows a schematic view of a preferred embodiment of the invention;

[Para 47] Figure 9 shows a schematic view of a preferred embodiment of the invention;

- [Para 48] Figure 10 shows a schematic view of a preferred embodiment of the invention;
- [Para 49] Figure 11 shows a schematic view of a preferred embodiment of the invention;
- and,
- [Para 50] Figure 12 shows a schematic view of a preferred embodiment of the invention;

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[Para 51] Figure 1 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 10. The multi-voltage and/or multi-brightness LED lighting device 10 comprises at least two AC LED circuits 12 configured in a imbalanced bridge circuit, each of which have at least two LEDs 14. The at least two AC LED circuits have electrical contacts 16a, 16b, 16c, and 16d at opposing ends to provide various connectivity options for an AC voltage source input. For example, if 16a and 16c are electrically connected together and 16b and 16d are electrically connected together and one side of the AC voltage input is applied to 16a and 16c and the other side of the AC voltage input is applied to 16b and 16d, the circuit becomes a parallel circuit with a first operating forward voltage. If only 16a and 16c are electrically connected and the AC voltage inputs are applied to electrical contacts 16b and 16d, a second operating forward voltage is required to drive the single chip 18. The single chip 18 may also be configured to operate at more than one brightness level "multi-brightness" by electrically connecting for example 16a and 16b and applying one side of the line of an AC voltage source to 16a and 16b and individually applying the other side of the line from the AC voltage source a second voltage to 16c and 16d.

[Para 52] Figure 2 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 20 similar to the multi-voltage and/or multi-brightness LED lighting device 10 described above in figure 1. The at least two AC LED circuits 12 are integrated onto a substrate 22. The at least two AC LED circuits 12 configured in a imbalanced bridge circuit, each of which have at least two LEDs 14. The at least two AC LED circuits have electrical contacts 16a, 16b, 16c, and 16d on the exterior of the substrate 22 and can be used to electrically configure and/or control the operating voltage and/or brightness level of the multi-voltage and/or multi-brightness LED lighting device.

[Para 53] Figure 3 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 30 similar to the multi-voltage and/or multi-brightness LED lighting device 10 and 20 described in figures 1 and 2. The multi-voltage and/or multi-brightness LED lighting device 30 comprises at least two AC LED circuits 32 having at least

two LEDs 34 connected in series and anti-parallel configuration. The at least two AC LED circuits 32 have electrical contacts 36a, 36b, 36c, and 36d at opposing ends to provide various connectivity options for an AC voltage source input. For example, if 36a and 36c are electrically connected together and 36b and 36d are electrically connected together and one side of the AC voltage input is applied to 36a and 36c and the other side of the AC voltage input is applied to 36b and 36d, the circuit becomes a parallel circuit with a first operating forward voltage. If only 36a and 36c are electrically connected and the AC voltage inputs are applied to electrical contacts 36b and 36d, a second operating forward voltage is required to drive the multi-voltage and/or multi-brightness lighting device 30. The multi-voltage and/or multi-brightness lighting device 30 may be a monolithically integrated single chip 38, a monolithically integrated single chip integrated within a LED package 38 or a number of individual discrete die integrated onto a substrate 38 to form a multi-voltage and/or multi-brightness lighting device 30.

[Para 54] Figure 4 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED device 30 as described in figure 3 having the at least two AC LED circuits 32 connected in parallel configuration to an AC voltage source and operating at a first forward voltage. A resistor 40 may be used to limit current to the multi-voltage and/or multi-brightness LED lighting device 30.

[Para 55] Figure 5 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED device 30 as described in figure 3 having the at least two AC LED circuits 32 connected in series configuration to an AC voltage source and operating at a second forward voltage that is approximately two times greater than the first forward voltage of the parallel circuit as described in figure 4. A resistor may be used to limit current to the multi-voltage and/or multi-brightness LED lighting device.

[Para 56] Figure 6 discloses a schematic diagram of a multi-voltage and/or multi-brightness LED lighting device 50. The multi-voltage and/or multi-brightness LED lighting device 50 comprises at least two AC LED circuits 52, each of which have at least two LEDs 54 in series and anti-parallel relation. The at least two AC LED circuits 52 have at least three electrical contacts 56a, 56b and 56c. The at least two AC LED circuits 52 are electrically connected together in parallel at one end 56a and left unconnected at the opposing ends of the electrical contacts 56b and 56c. One side of an AC voltage source line is electrically connected to 56a and the other side of an AC voltage source line is individually electrically connected to 56b and 56c with either a fixed connection or a switched connection thereby

providing a first brightness when AC voltage is applied to 56a and 56b and a second brightness when an AC voltage is applied to 56a, 56b and 56c. It is contemplated that the multi-voltage and/or multi-brightness LED lighting device 50 is a single chip, an LED package, an LED assembly or an LED lamp. The multi-brightness switching capability

[Para 57] Figure 7 discloses a schematic diagram similar to the multi-voltage and/or multi-brightness LED device 50 shown in figure 6 integrated within a lamp 58 and connected to a switch 60 to control the brightness level of the multi-voltage and/or multi-brightness LED lighting device 50.

[Para 58] Figure 8 discloses a schematic diagram a multi-brightness LED lighting device 62 having at least two bridge rectified 68 series LED circuits 69. Each of the at least two bridge rectified 68 series LED circuits 69 that are connected to and rectified with an LED bridge circuit 68 comprising four LEDs 70 configured in a bridge circuit 68. The at least two bridge rectified 68 series LED circuits 69 have at least two LEDs 71 connected in series and electrical contacts 72a, 72b and 72c. When one side of an AC voltage is applied to 72a and the other side of an AC voltage line is applied to 72b and 72c individually, the brightness level of the multi-brightness LED lighting device 62 can be increased and/or decreased in a fixed manner or a switching process.

[Para 59] Figure 9 discloses a schematic diagram the multi-brightness LED lighting device 62 as shown above in figure 8 with a switch 74 electrically connected between the multi-brightness LED lighting device 62 and the AC voltage source 78.

[Para 60] Figure 9 discloses a schematic diagram of at least two single voltage LED circuits integrated with a single chip or within a substrate and forming a multi-voltage and/or multi-brightness LED device.

[Para 61] Figure 10 discloses a schematic diagram of a single chip LED bridge circuit 80 having four LEDs 81 configured into a bridge circuit and monolithically integrated on a substrate 82. The full wave LED bridge circuit has electrical contacts 86 to provide for AC voltage input connectivity and DC voltage output connectivity.

[Para 62] Figure 11 discloses a schematic diagram of another embodiment of a single chip multi-voltage and/or multi-brightness LED lighting device 90. The multi-voltage and/or multi-brightness LED lighting device 90 has at least two series LED circuits 92 each of which have at least two LEDs 94 connected in series. The at least two series LED circuits 92 have electrical contacts 96 at opposing ends to provide a means of electrical connectivity. The at least two series LED circuits are monolithically integrated into a single chip 98. The

electrical contacts 96 are used to wire the at least two series LEDs circuit 92 into a series circuit, a parallel circuit or an AC LED circuit all within a single chip.

[Para 63] Figure 12 discloses a schematic diagram of the same multi-voltage and/or multi-brightness LED lighting device 90 as shown above in figure 11. The multi-voltage and/or multi-brightness LED lighting device 90 has at least two series LED circuits 92 each of which have at least two LEDs 94 connected in series. The at least two series LED circuits can be monolithically integrated within a single chip or discrete individual die can be integrated within a substrate to form an LED package 100. The LED package 100 has electrical contacts 102 that are used to wire the at least two series LEDs circuit into a series circuit, a parallel circuit or in anti-parallel to form an AC LED circuit all within a single LED package.

CLAIMS

What is claimed is:

1. A single chip multi-voltage or multi-brightness led lighting device comprising:
 - a. at least two LED circuits;
 - b. each of the at least two LED circuits having at least two LEDs connected together in series;
 - c. each of the at least two LED circuits being electrically unconnected to each other in a parallel relationship;
 - d. the at least two LED circuits having a forward operating drive voltage of at least 6 volts; and,
 - e. the at least two LED circuits being monolithically integrated on a single substrate
2. The single chip multi-voltage or multi-brightness led lighting device of claim 1 wherein the at least two LED circuits having at least two LEDs connected to each other in opposing parallel relation.
3. A single chip multi-voltage or multi-brightness LED lighting device comprising:
 - a. at least two LED circuits;
 - b. each of the at least two LED circuits having at least two LEDs connected together in series;
 - c. each of the at least two LED circuits being electrically unconnected to each other in a parallel relationship;
 - d. the at least two LED circuits having a forward operating drive voltage of at least 6 volts; and,
 - e. the at least two LED circuits being integrated within a substrate.
4. The single chip multi-voltage or multi-brightness LED lighting device of claim 3 wherein each of the at least two LED circuits having at least two LEDs connected to each other in opposing parallel relation.

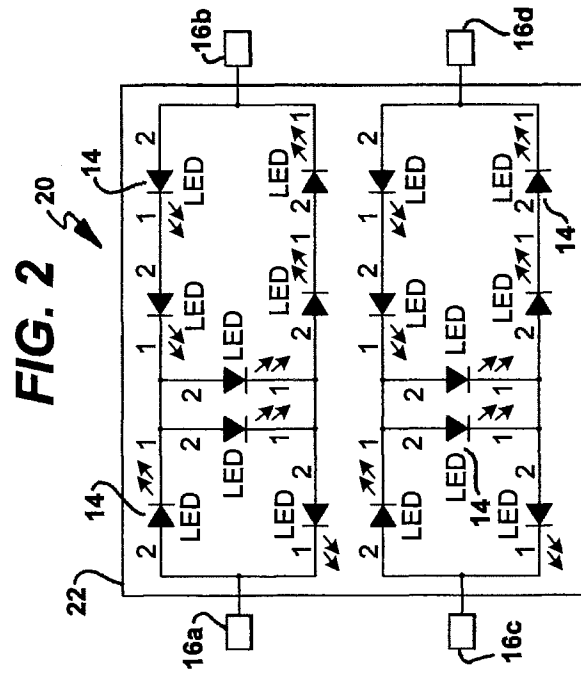
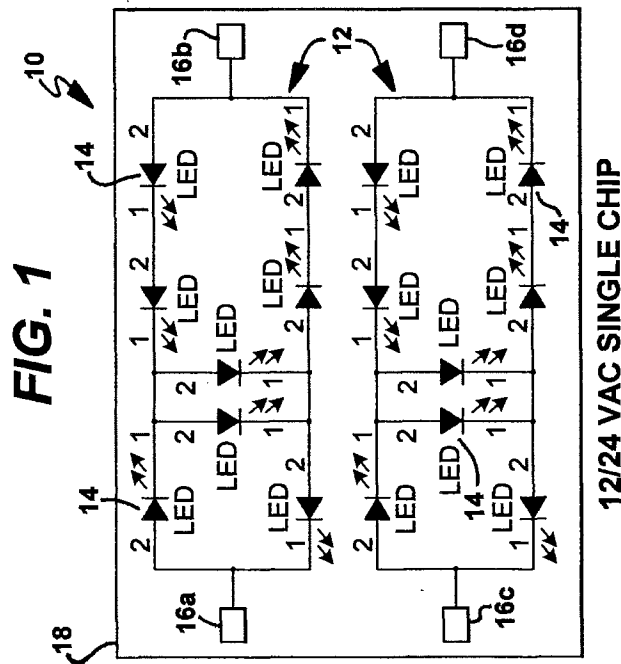
5. A single chip multi-voltage LED lighting device comprising:
 - a. at least two LED circuits;
 - b. each of the at least two LED circuits having at least two LEDs electrically connected together in series configuration;
 - c. the at least two LED circuits having voltage input electrical contacts at the opposing ends of each LED circuit;
 - d. the at least two LED circuits having a forward operating drive voltage of at least 6 volts; and,
 - e. the at least two LED circuits being monolithically integrated on a single substrate.
6. A single chip multi-voltage LED lighting device comprising:
 - a. at least one series LED circuit;
 - b. the at least one series LED circuit having at least four LEDs connected together electrically in series;
 - c. the at least one series LED circuit having voltage input electrical contacts at the opposing ends of the series circuit and at least one voltage input electrical contact at the electrically connected anode and cathode junction of at least two LEDs within the series circuit; and,
 - d. the at least one series LED circuit having a forward operating drive voltage of at least 12 volts.

7. A single chip multi-voltage LED lighting device comprising:
 - a. at least two LED circuits;
 - b. each of the at least two LED circuits having at least two LEDs electrically connected together in opposing parallel relation;
 - c. the at least two LED circuits having voltage input electrical contacts at the opposing ends of each LED circuit;
 - d. the at least two LED circuits having a forward operating drive voltage of at least 6 volts; and,
 - e. the at least two LED circuits being monolithically integrated on a single substrate.
8. The single chip multi-voltage LED lighting devices of claims 1-7 being driven by a frequency higher than mains AC frequency.
9. The single chip multi-voltage LED lighting devices of claims 1-7 being driven by a frequency lower than mains AC frequency.
10. A lamp comprising at least one device made according to any one of claims 1-9.
11. A luminaire comprising at least one lamp made according to claim 10.

12. A method of manufacturing comprising:

providing a single chip device with two or more LED circuits configurable by means of connecting the circuits so as to provide optional operating voltage level and/or desired brightness level wherein the electrical connection between the LED circuits may be achieved and/or completed at the LED packaging level when the multi-voltage and/or multi-brightness circuits and/or single chips are integrated into the LED package, or the LED package may have external electrical contacts that match the integrated multi-voltage and/or multi-brightness circuits and/or single chips within; and,

optionally allowing the drive voltage level and/or the brightness level selectability to be passed on through to the exterior of the LED package and allowing the voltage level or brightness level to be selected at the LED package user, or the PCB assembly facility, or the end product manufacturer.



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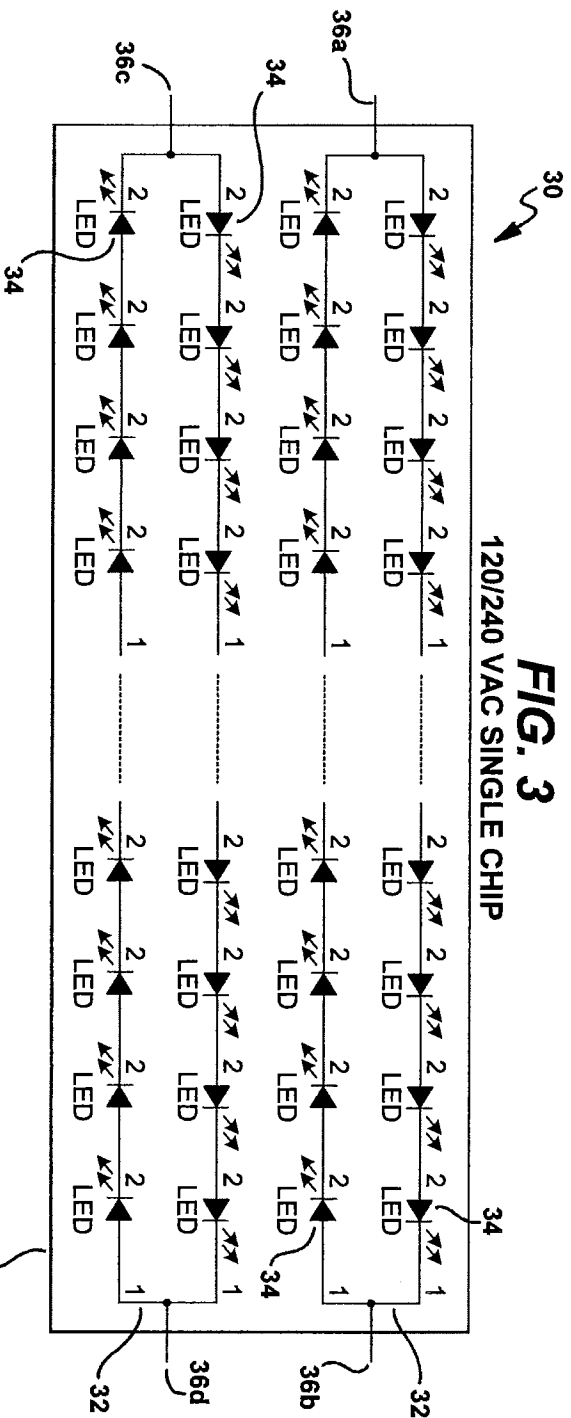
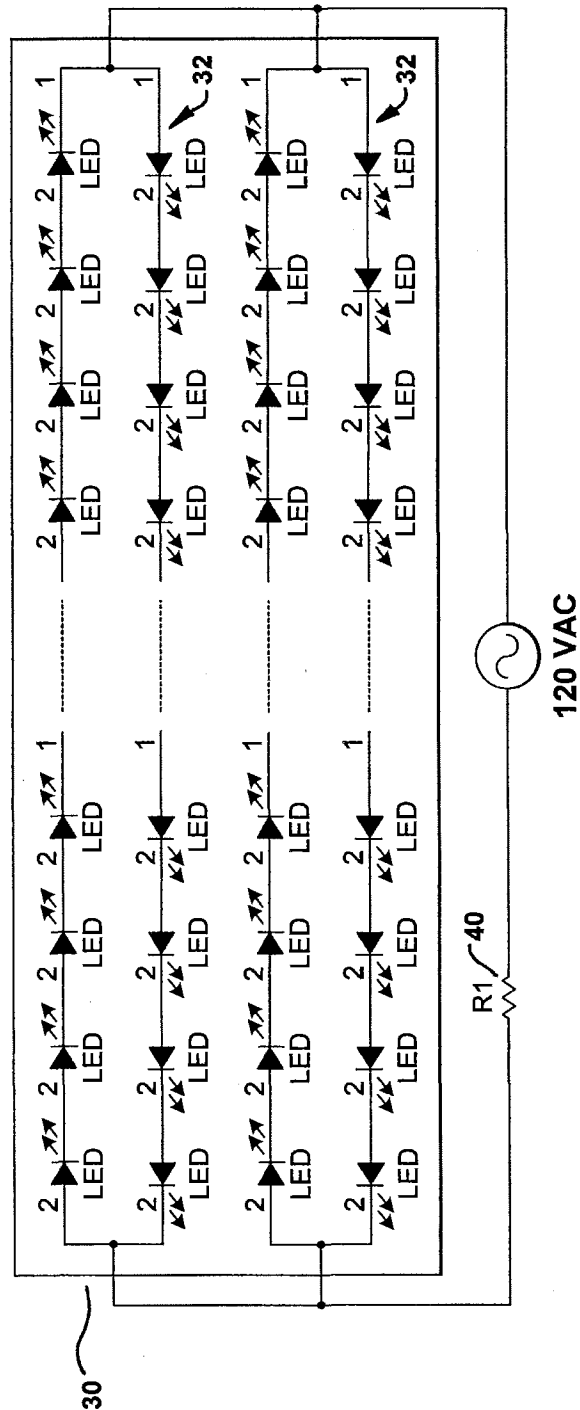
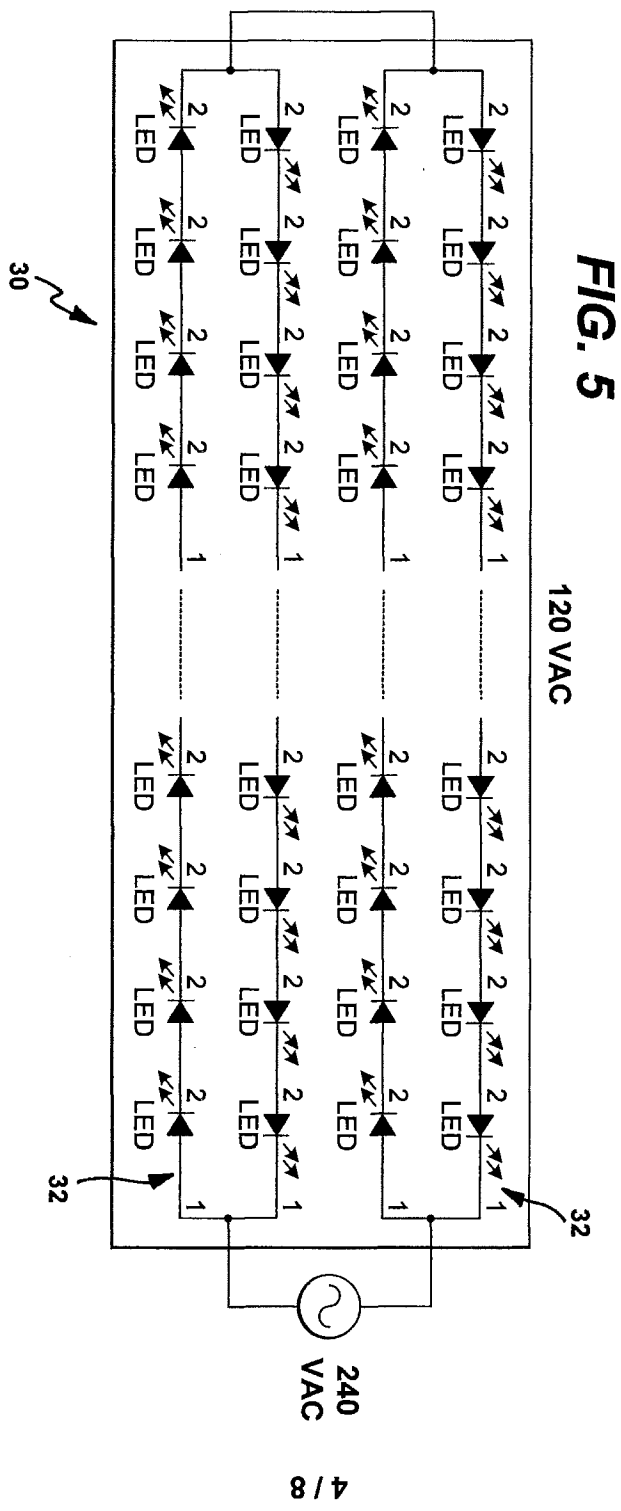
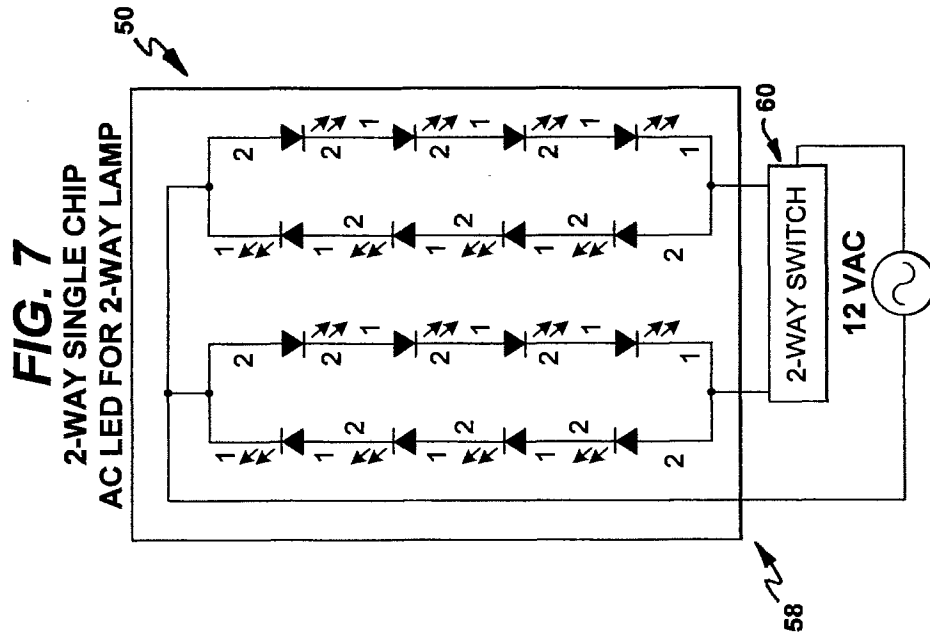
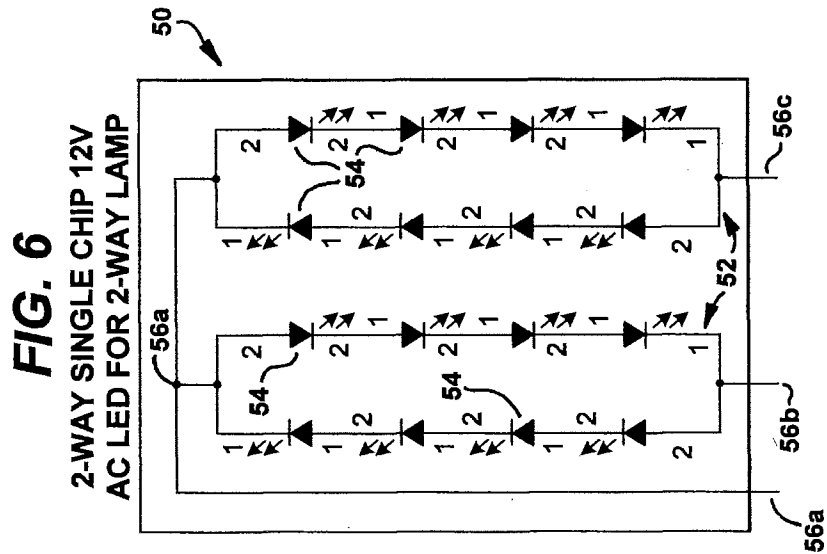


FIG. 4



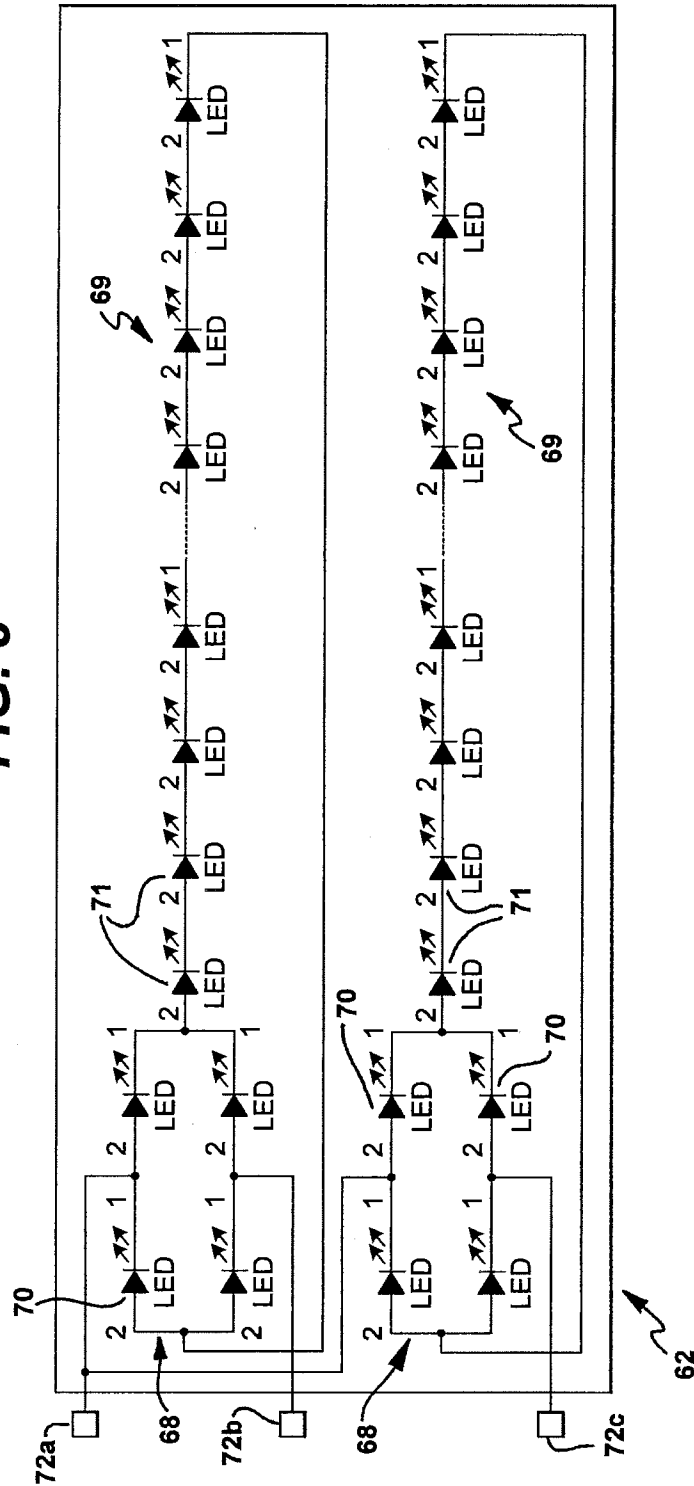
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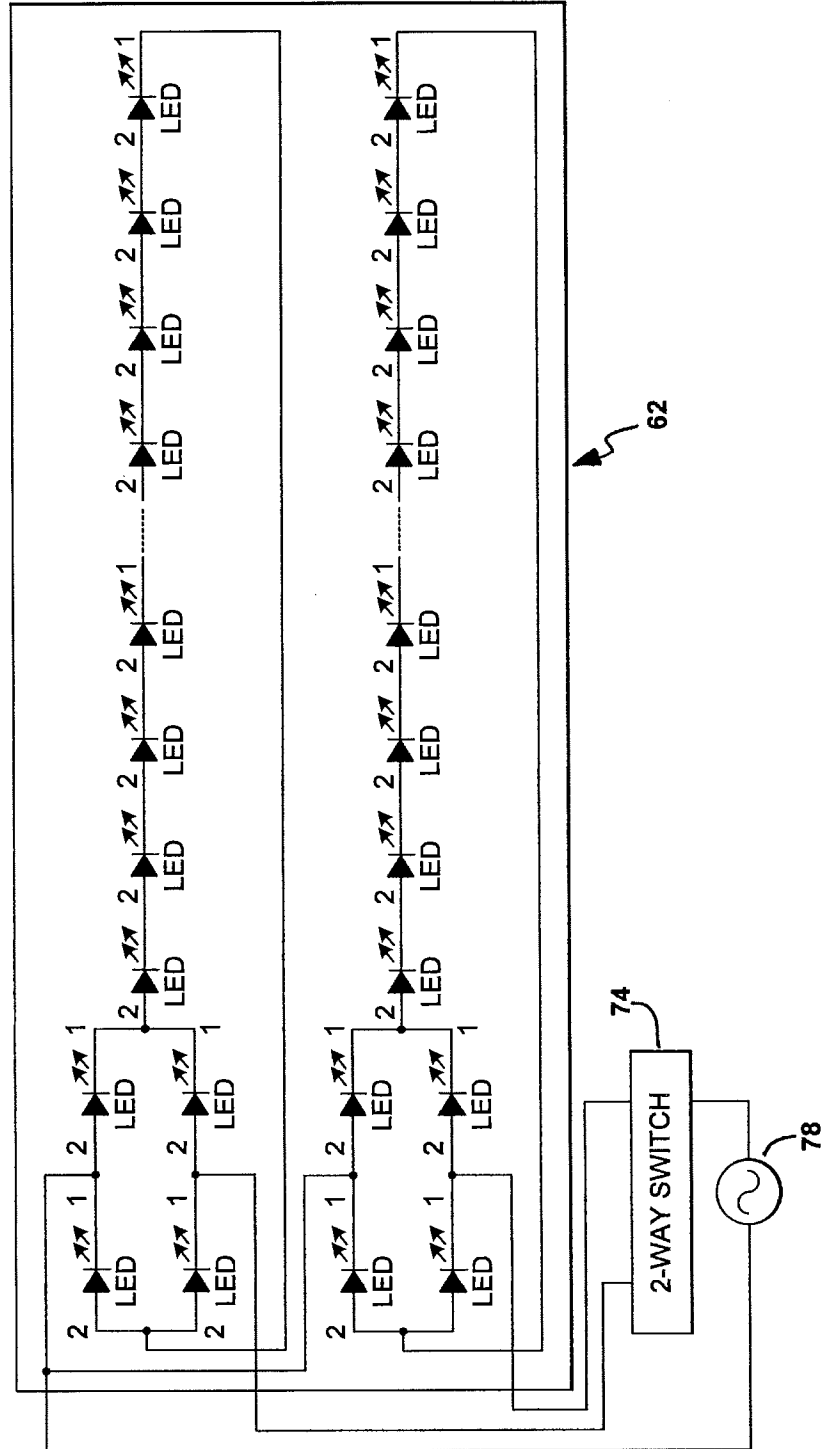
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FIG. 8



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FIG. 9



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FIG. 10

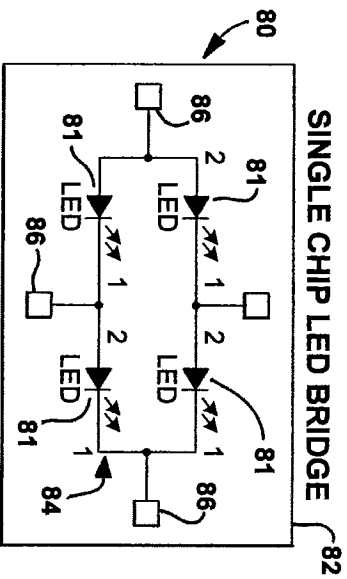


FIG. 11

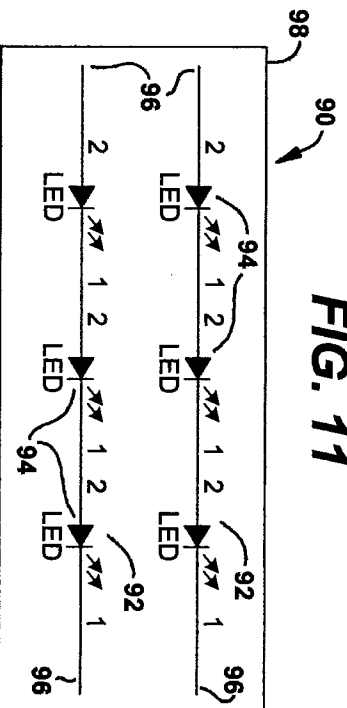
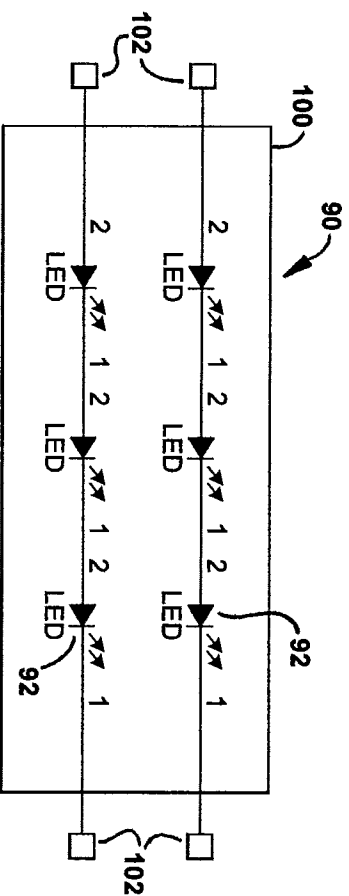


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/01597

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H05B 37/00 (2010.01) USPC - 315/185R 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) IPC(8): H05B 37/00 (2010.01) USPC: 315/185R Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched IPC(8): H05B 37/00 (2010.01) USPC: 315/185R, 210, 291; 362/545, 800, 249.02, 249.06 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST; PGPB, USPT, EPAB, JPAB; Google Scholar; Google Patents; Search Terms: LED OLED light emitting diode series opposite opposing parallel voltage drive monolithic integrated chip package substrate AC alternating circuit IC														
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 2007/0273299 A1 (Miskin et al.) 29 November 2007 (29.11.2007) para. [0013] through [0093], Fig. 1-26</td> <td>1-7 and 12</td> </tr> <tr> <td>A</td> <td>US 2005/0173990 A1 (Anderson et al.) 11 August 2005 (11.08.2005) entire document</td> <td>1-7 and 12</td> </tr> <tr> <td>A</td> <td>US 2004/0201988 A1 (Allen) 14 October 2004 (14.10.2004) entire document</td> <td>1-7 and 12</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 2007/0273299 A1 (Miskin et al.) 29 November 2007 (29.11.2007) para. [0013] through [0093], Fig. 1-26	1-7 and 12	A	US 2005/0173990 A1 (Anderson et al.) 11 August 2005 (11.08.2005) entire document	1-7 and 12	A	US 2004/0201988 A1 (Allen) 14 October 2004 (14.10.2004) entire document	1-7 and 12
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X	US 2007/0273299 A1 (Miskin et al.) 29 November 2007 (29.11.2007) para. [0013] through [0093], Fig. 1-26	1-7 and 12												
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☐ Further documents are listed in the continuation of Box C. ☐														
* 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 but 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 08 July 2010 (08.07.2010)		Date of mailing of the international search report 30 JUL 2010												
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. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774												

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/01597

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 8-11
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

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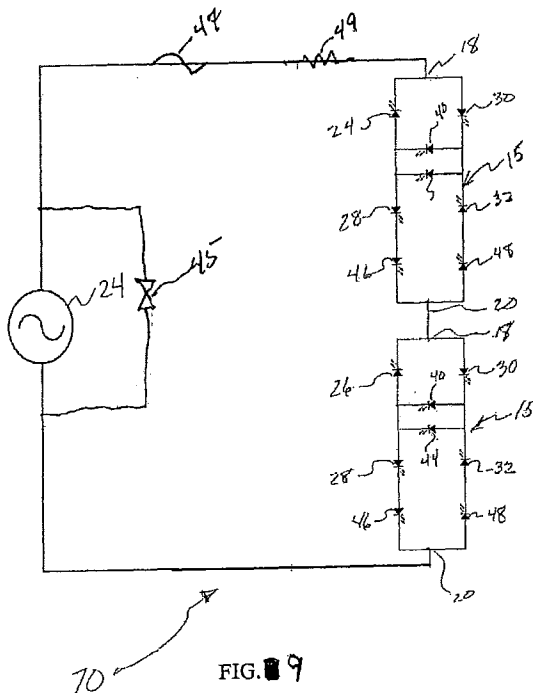


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- (72) Inventors; and
(75) Inventors/Applicants (for US only): **MISKIN, Michael** [US/US]; 2 Pinecone Lane, Sleepy Hollow, IL 60118 (US). **KOTTRISCH, Robert, L.** [GB/GB]; 10 The Hollies, Shefford, Bedfordshire SG175BX (GB).
- (74) Agent: **LAKE, Michael, D.**; Factor & Lake, LTD, 1327 W. Washington Blvd., Suite 5G/H, Chicago, IL 60607 (US).
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[Continued on next page]

(54) Title: LED CIRCUITS AND ASSEMBLIES



(57) Abstract: An AC-driven LED circuit includes a first circuit having a first branch and a second branch which connect at first and second common point. The common points provide input and output for an AC driving current from a driver of the circuit. The first branch has first LED and second LED, the first LED being connected to second LED in opposing series relationship with the inputs of the first and second LEDs defining a first branch junction. A second branch has a third LED and a fourth LED, the third LED is connected to the fourth LED in opposing series relationship with the outputs of the third and fourth LEDs defining a second branch junction. Improvement in performance and scalability is provided by adding n diodes to a given basic circuit and x cross connecting circuit branch diodes and providing one or more basic circuits in series and or basic.

WO 2010/126601 A1



(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM,

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with information concerning one or more priority claims considered void (Rule 26bis.2(d))

LED CIRCUITS AND ASSEMBLIES

RELATED APPLICATIONS

[0001] The application is a continuation-in-part of U.S. Patent Application No. 12/287,267, filed October 6, 2008, which claims the priority to U.S. Provisional Application No. 60/997,771, filed October 6, 2007; this application also claims priority to U.S. Provisional Application No. 61/215,144, filed May 1, 2009; the contents of each of these applications are expressly incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to light-emitting diode ("LED") circuits and assemblies; and more specifically to scalable alternating current ("AC") driven LED circuits and assemblies.

SUMMARY OF THE INVENTION

[0003] While not intending to limit the scope of the claims or disclosure, in brief summary, the present disclosure and claims are directed to providing improved ease of designing and building lighting fixtures using AC-driven LEDs. Disclosed and claimed are LED circuits having scalable circuit configurations and LED package assembly configurations which can be used in an AC-drive platform to more easily match the voltage requirements of the lighting fixture(s) or systems in which the LED's are desired. Circuits and LED package assemblies are claimed and disclosed which reduce objectionable flicker produced from AC-driven LEDs and to produce more light per component. Packaged LED's are provided for lighting design according to the invention which address flicker at low frequencies (e.g. 50/60 Hz) while being scalable as desired for a particular lighting goal without resort to designing individual assemblies at the semiconductor die level. Circuits are also disclosed and claimed which provide for some of the LEDs in a circuit to be on during

both positive and negative phases of an AC source, to among other things, address flicker. Also, circuits are claimed and disclosed where a basic circuit design provides a voltage and current performance whereby scalability or matching a particular voltage requirement is achieved by configuring LEDs in the basic design and/or by joining one or more of the basic circuits together in series or basic to achieve the design requirement.

[0004] According to an embodiment of the invention an AC-driven LED circuit is proposed having at least a first [basic] circuit comprising LEDs. Each LED has an input and an output, and the circuit having at least first and second basic branches connecting at first and second common points, the common points providing input and output for an AC driving current for the circuit. This circuit as well as others described and claimed herein incorporating various numbers of LEDs may be referred to herein as a “circuit module,” a “basic LED circuit,” or a “subcircuit,” given the fact that according to an aspect of the invention such circuits themselves may be joined with other such circuits in either basic or series relationships to each other. The first branch of the basic LED circuit has a first and a second LED, and the second branch having a third and a fourth LED. The first LED is connected to the second LED in opposing series relationship with the inputs of the first and second LEDs defining a first branch junction. The third LED is connected to the fourth LED in opposing series with the outputs of the third and fourth LEDs defining a second branch junction. The first and second branches are connected to one another such that the output of the first LED is connected to the input of the third LED at the first common point and the output of the second LED is connected to the input of the fourth LED at the second common point. At least one (or a first) cross-connecting circuit branch having at least a fifth LED is provided in an embodiment of the invention, the first cross-connecting circuit being configured such that the input of the fifth LED is connected to second branch junction and its

output is connected to the first branch junction. It is important to note that according to an embodiment and aspect of the invention that circuits disclosed and claimed herein, result in an antibasic relationship of certain LEDs and further resulting in an imbalanced bridge effect in operation.

[0005] An AC LED bridge is an LED topology where the self rectifying property of anti basic LED strings is used to drive a set of 'bridge' LEDs with rectified current. An imbalanced bridge is the general implementation of this topology where one side of the input to the bridge has a different number of LEDs in series than the other side. A balanced bridge is a particular implementation of this topology where the input and output sides have equal numbers of LEDs in series. When used in a specific voltage drive regime, such as 12V AC, the advantage of an imbalanced bridge topology is that it can be constructed for example with standard GaN die so that the forward combined voltage of the die in one phase cycle is closely matched to the native supply voltage while the reverse voltage applied to the diodes in the opposing phase is kept to an acceptable level below the reverse breakdown voltage of the die.

[0006] According to another embodiment of the invention, an AC-driven LED circuit may comprise one or more additional basic circuits each being the same as the first basic circuit identified above. Each additional circuit being conductively connected to the first basic circuit and to one another at their common points for providing an input and an output for an AC driving current of the circuit. According to other embodiments, the additional basic circuits may be connected in series to the first basic circuit and to one another or the additional basic circuits may be connected in parallel to the first basic circuit and to one another.

[0007] According to another embodiment of the invention, n additional LEDs, in pairs, may be provided in the circuit wherein the pairs are configured among the first and second branch circuits of each of the respective basic circuits or modules, such that current flows through the respective fifth diode of each basic circuit upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

[0008] According to another embodiment the AC-driven LED circuit further comprises x cross-connecting circuit branches each having one or more LEDs and being configured such that current flows through each of the respective one or more LEDs upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

[0009] According to an embodiment and aspect of the invention, the basic LED circuit and more complex circuits derived therefrom include a one or more of a resistor, a transient or surge protector, and a microfuse; in any number or combination respecting the needed or desired impedance, resistance, and/or drive current/voltage protection.

[0010] According to another aspect and embodiment of the invention, the circuit embodiments described and claimed herein are formed on a single semiconductor chip. Another embodiment and aspect of the invention provides that the circuits described and claimed herein including the LED die are formed on a sapphire substrate.

[0011] According to another embodiment of the invention, an AC-driven LED assembly comprises at least a first and a second LED each discretely packaged, the LEDs being connected in an AC circuit and each LED package being mounted to a substrate at a distance from the other of preferably approximately 3 mm or less, and more preferably 2.0 mm or less. In an embodiment the packaged LEDs also each have a length of preferably approximately

2.5 mm or less, and more preferably 2.0 mm or less. In an embodiment the packaged LEDs also each have a width of preferably approximately 2.5 mm or less, and more preferably 2.0 mm or less. In an embodiment the LED packages are arranged with respect to each other in a linear spatial relationship while in another embodiment the LED packages are arranged with respect to each other in an XY rectilinear spatial relationship.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 2 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 3 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 4 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 5 is a schematic view of an AC-driven LED circuit according to an embodiment of the invention;

FIG. 6 is a schematic top view of an AC-driven LED assembly according to an embodiment of the invention;

FIG. 7 is a schematic top view of an AC-driven LED assembly according to an embodiment of the invention; and,

FIG. 8 is a schematic side view of an AC-driven LED assembly according to an embodiment of the invention.

FIG. 9 is a schematic view of a modification to AC-driven circuit 70 of Fig. 4.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0012] While this invention is susceptible to embodiments in many different forms, there are shown in the drawings and will herein be described in detail, preferred embodiments of the invention with the understanding that the present disclosures are to be considered as exemplifications of the principles of the invention and are not intended to limit the broad aspects of the invention to the embodiments illustrated. Like components in the various FIGS. will be given like reference numbers.

[0013] FIG. 1 discloses an AC-driven LED circuit 10 including a first basic circuit 12 having a first branch 14, and a second branch 16. Branches 14, 16 connect at first common point 18 and second common point 20. The common points 18, 20 provide input and output for an AC driving current from a driver 24 for the circuit.

[0014] The first branch 14 has a first LED 26 and a second LED 28, and the second branch 16 having a third LED 30 and a fourth LED 32. The first LED 26 is connected to the second LED 28 in opposing series relationship with the inputs of the first and second LEDs 26, 28 defining a first branch junction 34. The third LED 30 is connected to the fourth LED 32 in opposing series with the outputs of the third and fourth LEDs 30, 32 defining a second branch junction 36.

[0015] The first and second branches 34, 36 are connected to one another such that the output of the first LED 26 is connected to the input of the third LED 30 at the first common point 18 and the output of the second LED 28 is connected to the input of the fourth LED 32 at the second common point 20. A first cross-connecting circuit branch 38 has a fifth LED 40. The first cross-connecting circuit branch 38 being configured such that the input of the fifth LED 40 is connected to second branch junction 36 and the output is connected to the first branch junction 34.

[0016] As will be appreciated by those of skill in the art, the LED's 26 and 32 will provide light only upon one half of an AC wave, pulse or phase, while LEDs 28 and 30 will provide light only upon the opposite wave, pulse or phase. At lower frequencies, e.g. mains frequencies, if the LEDs are spaced pursuant to another aspect of the invention (disclosed below) at preferably approximately 3.0 mm or less preferably approximately 2.0 mm or less, then the amount of noticeable flicker may not be unacceptable. However, the cross connecting circuit 38 and diode 40 will be on (produce light) in both phases of the AC drive and hence mitigate flicker which may be evidenced in its surrounding LEDs 26, 28, 30 and 32.

[0017] Advantageously the LED circuit 10 provides an LED topology an imbalanced bridge effect as one side of the circuit has a different number of LEDs in series than the other side. This characteristic is also disclosed in all of the circuits in Figs. 1-9.

[0018] FIG. 2 discloses an AC-driven LED circuit 50 which is a modification of AC-driven LED circuit 10. Circuit 50 further mitigates flicker. Circuit 50 provides an additional cross-connecting circuit branch 42 having LED 44. The LEDs 40, 44 are configured such that current flows through each upon both a negative and positive phase of the AC driving source 24. It should be appreciated that according to the invention x number of such cross connecting circuit branches (such as 38, 42) may be added as desired, however, since the LEDs (such as LEDs 40, 44) are in basic with each other, their voltage demand will be divided while their current draw will not. Hence a suitable driver need be provided for this circumstance.

[0019] To increase the light output of the circuit of the invention, it should be noted as disclosed in FIG. 3 that additional or n LEDs may be provided in the branches 14 and 16. Specifically FIG. 3 discloses an AC-driven circuit 60 which is a modification of circuit 50.

Circuit 60 provides for additional LEDs 46 and 48. The pair of LEDs are configured among the first and second branch circuits 14, 16 of the basic circuit 15 such that current flows through the respective diodes 40, 44 upon both a negative and positive phase of the AC driving source 24 and so that the current draw through basic circuit 15 during both AC phases is substantially the same.

[0020] It should be noted that according to the invention, n pairs of LEDs can be configured among first and second branch circuits of a respective basic circuit, such that current flows through the respective cross connecting circuit branch LEDs of a basic circuit upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same. More LEDs in the branch circuits divide the current from the higher current LEDs in cross connecting circuits 38, 42.

[0021] According to another aspect of the invention, to further mitigate the amount of flicker perceived, adding to the light provided and to scalability, additional basic circuits, each being the same as the first basic circuit, may be conductively connected to the first basic circuit in series or basic at the their common points 18, 20 for providing an input and an output for an AC driving current for the circuit:

[0022] For instance, FIG. 4 discloses an AC-driven LED circuit 70 which includes additional basic circuits 15 connected in series at common points 18, 20. Additionally, as seen in FIG. 5, an AC-driven LED circuit 80 includes additional basic circuits 15 connected in basic at common points 18, 20. This embodiment shows the utility of providing a scalable circuit that can be manufactured modularly and used to connect to match higher voltage requirements e.g. circuit 15 may draw drawing 12 V AC while two such circuits 15 in series would meet 24V AC requirements.

[0023] Preferably, the number and type of LEDs in the AC-driven LED circuit draws a combined current and combined voltage which is substantially equal to the nominal voltage capacity of the AC drive source.

[0024] As shown in FIG. 6, an AC-driven LED assembly 90 has a first and a second LED 82 each discretely packaged, the LEDs being connected in an AC circuit and each LED package 82 being mounted to a substrate 92 at a distance d1 from the other of preferably approximately 3 mm or less, and more preferably 2.0 mm or less. The AC-driven LED assembly 90 also has packaged LEDs 84 each having a width d2 and a length d3 of preferably approximately 2.5 mm or less, and more preferably 2.0 mm or less.

[0025] FIG. 6 discloses an AC-driven LED assembly 90 wherein the LED packages 84 are arranged with respect to each other in a linear spatial relationship, while FIG. 7 discloses an assembly 100 wherein the LED packages 84 are arranged with respect to each other in an XY rectilinear spatial relationship.

[0026] As can be seen in FIG. 8, when LED packages 84 are placed at 3 mm or less, the light produced therefrom intersects, thereby reducing or eliminating the effects of flicker.

[0027] Fig. 9 discloses a modification to AC-driven circuit 70 which according to the invention, whether embodied on a single chip, or to other another substrate or circuit board mounting, is provided with one or more at the option of the design criteria, to include one or more of a transient voltage suppressor 45 or like device, a micro-fuse 47, or like device (e.g. a PTC device) and a resistor 49. The resistor 49 may be unnecessary in a design where the resistance/impedance of the fusing and/or overvoltage devices are sufficient for the circuit performance.

[0028] According to the invention, the various embodiments of the basic LED circuits and larger circuits of serial and parallel arrangements of same are formed by forming the

die/and or other circuit elements on a single semiconductor chip or a substrate, or mounted to substrates, and assemblies may be produced, such as creating an AC-driven circuit where all circuits and LEDs are formed on a semiconductor, where the LED are discretely packaged apart from the circuits, and where each basic circuit is formed on a printed circuit board. Preferably according to an aspect of the invention the basic circuits and larger circuits combining them may be formed on a sapphire substrate for thermal management of the numerous LED die.

[0029] While in the preceding there has been set forth a preferred embodiment of the invention, it is to be understood that the present invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein. While specific embodiments have been illustrated and described, numerous modifications come to mind without significantly departing from the characteristics of the invention and the scope of protection is only limited by the scope of the accompanying Claims.

CLAIMS

I claim:

1. An AC-driven LED circuit comprising:

a first basic circuit having LEDs, each LED having an input and an output, and the circuit having at least first and second branches connecting at first and second common points, the common points providing input and output for an AC driving current for the circuit;

the first branch having a first and a second LED, and the second branch having a third and a fourth LED;

the first LED is connected to the second LED in opposing series relationship with the inputs of the first and second LEDs defining a first branch junction;

the third LED is connected to the fourth LED in opposing series with the outputs of the third and fourth LEDs defining a second branch junction,

the first and second branches are connected to one another such that the output of the first LED is connected to the input of the third LED at the first common point and the output of the second LED is connected to the input of the fourth LED at the second common point;

a first cross-connecting circuit branch having at least a fifth LED, the first cross-connecting circuit branch being configured such that the input of the fifth LED is connected to the second branch junction and the output is connected to the first branch junction; and,

wherein the arrangement of the LEDs provide an imbalance bridge effect to the basic AC-driven circuit.

2. The AC-driven LED circuit according to claim 1 further comprising one or more additional basic circuits each being the same as the first basic circuit, each additional circuit

being conductively connected to the first basic circuit and to one another at their common points for providing an input and an output for an AC driving current for the circuit.

3. An AC-driven LED circuit according to claim 2 wherein the additional basic circuits are connected in series to the first basic circuit and to one another.

4. An AC-driven LED circuit according to claim 2 wherein the additional basic circuits are connected in parallel to the first basic circuit and to one another.

5. The AC-driven LED circuit according to claim 1-4 further comprising n additional LEDs, in pairs, wherein the pairs are configured among the first and second branch circuits of each of the respective basic circuits, such that current flows through the respective first diode of each basic circuit upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

6. The AC-driven LED circuit according to claims 1-5 further comprising, for each basic circuit, x cross-connecting circuit branches each having one or more LEDs and being configured such that current flows through each of the respective one or more LEDs upon both a negative and positive phase of the AC driving source and so that the current draw through each of the respective basic circuits during both AC phases is substantially the same.

7. The AC-driven LED circuit according to claims 1-6 wherein the number and type of LEDs of the AC-driven LED circuit draw a combined current which is substantially equal to the nominal current capacity of the AC-source.
8. The AC-driven LED circuit according to claims 1-7 wherein the number and type of LEDs of the AC-driven LED circuit drops a combined voltage which is substantially equal to the nominal voltage capacity of the AC-source.
9. The AC-driven LED circuit according to claims 1-3 and 5-7 wherein the first basic circuit and each other basic circuit has a voltage drop of twelve volts.
10. The AC-driven circuits of claims 1-9 being formed on a single semiconductor chip
11. The AC-driven LED circuits of claims 1-9 wherein the LEDs are discretely packaged apart from the circuits.
12. The AC-driven LED assemblies of claims 11-15 and 17 wherein each basic circuit is formed on a printed circuit board.
13. The AC-driven circuits of claims 1-13 further comprising one or more of a transient voltage suppressor device, a fuseable element, and a resistor.

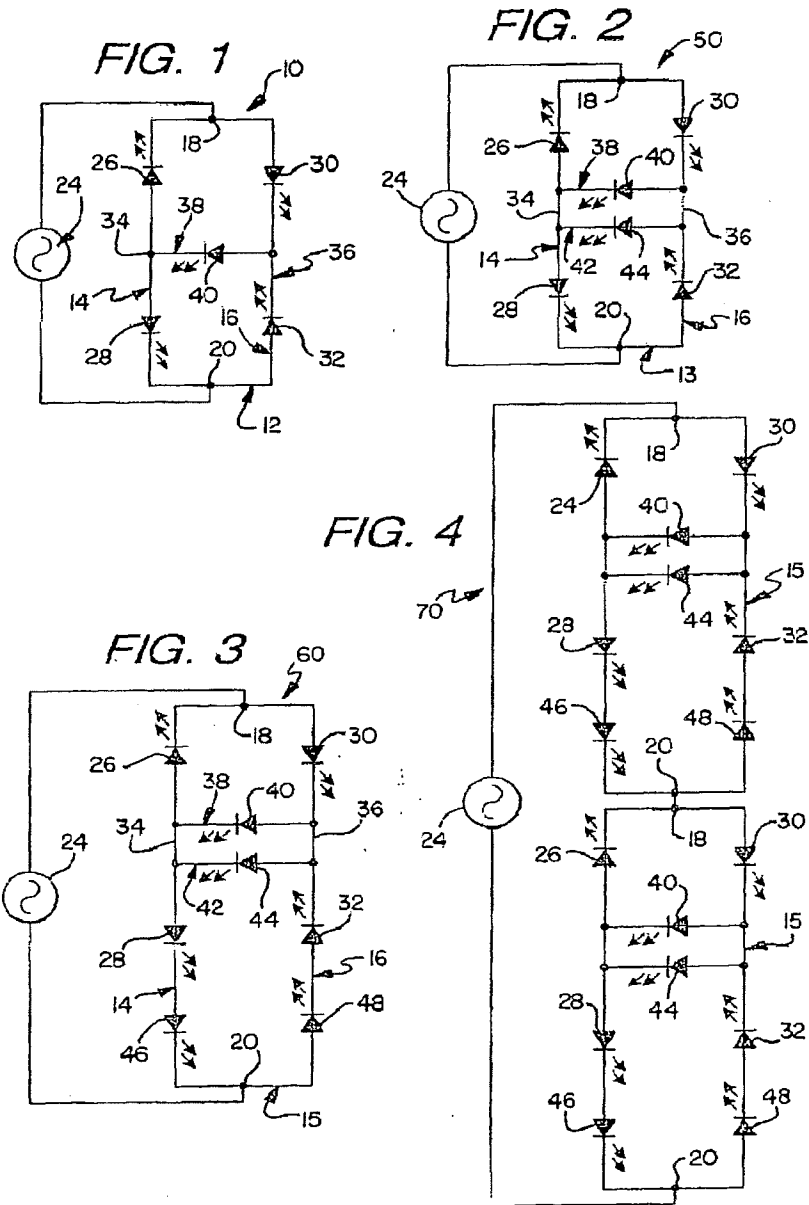


FIG. 5

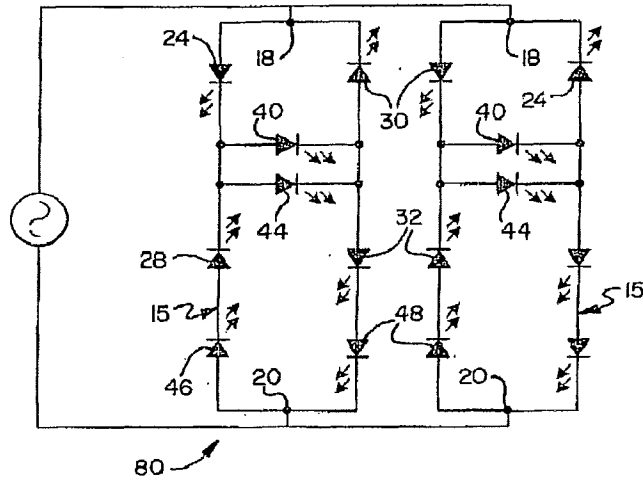


FIG. 6

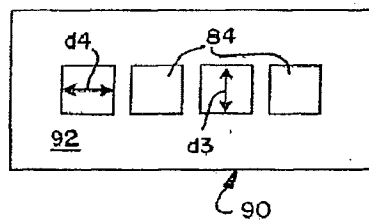


FIG. 7

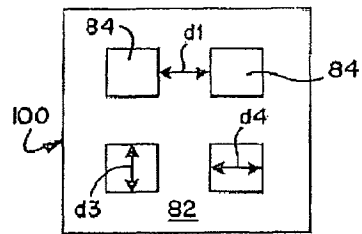
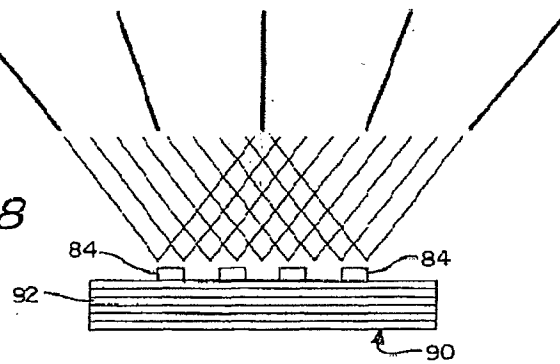


FIG. 8



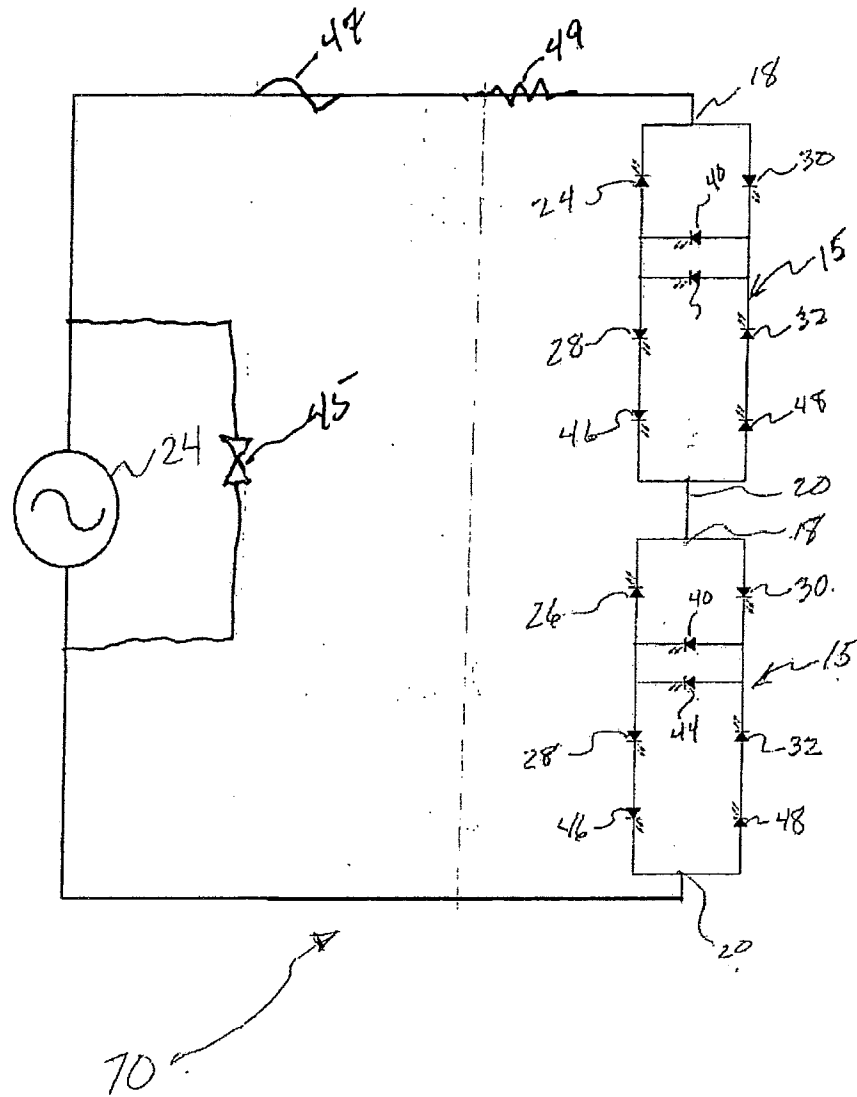


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/01269

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H05B 41/16 (2010.01) USPC - 315/250 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) USPC- 315/250 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC- 315/185S, 185R, 250; 257/88 (keyword limited--see terms below) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST (PGPB, USPT, EPAB, JPAB); Google Scholar Search Terms Used: LED AC imbalance unbalanced bridge current draw basic circuit positive negative phase stay on cross output input opposing series branch alternating current light emitting		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2008/0136347 A1 (LIN et al.) 12 June 2008 (12.06.2008), para [0017], [0036]-[0037], FIG. 8	1-5
Y	US 2008/0211421 A1 (LEE et al.) 04 September 2008 (04.09.2008), para [0037]	1-5
Y	US 2004/0080941 A1 (JIANG et al.) 29 April 2004 (29.04.2004), para [0014]	5
☐ Further documents are listed in the continuation of Box C. ☐		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>		
Date of the actual completion of the international search 12 June 2010 (12.06.2010)		Date of mailing of the international search report 28 JUN 2010
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. 571-273-3201		Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 10/01269

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 6-13
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)



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VERIFIED STATEMENT OF TRANSLATION

I, Randi Simons, have reviewed Patent publication WO/2003/009535 A1 and U.S. Patent No. 8,326,225. In my opinion, the English version of the specification, Abstract, and figures of U.S. Patent No. 8,326,225 are substantially the same as the Japanese version of the specification, Abstract, and drawings of WO/2003/009535 A1. I understand that willful false statements and the like are punishable by fine or imprisonment, or both, pursuant to 18 U.S.C. § 1001.

I certify under penalty of perjury under the laws of the United States that the foregoing is true and correct.

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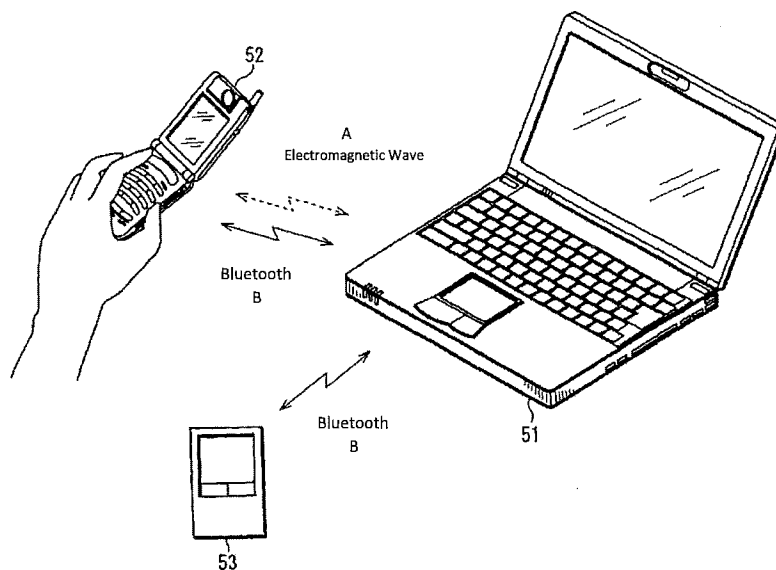
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Patent Application 2001-218521 July 18, 2001 JP
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(continued)

(54) Title: COMMUNICATION SYSTEM AND METHOD



WO 03/009535 A1



(57) Abstract: A communication system and method capable of easily identifying a communication mate. A cellular telephone (52) has a non-contact IC card communicating with a reader/writer of a personal computer (51) by an electromagnetic wave. When an electromagnetic wave radiated from the reader-writer is received by the non-contact IC card, the cellular telephone (52) reports the card ID set in the

(continued)



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Attached Publications:
— International Search Report
— Amendment, Specification

(81) Designated countries (national): CN, KR, US

(84) Designated countries (regional): European patents (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR).

Regarding two-character codes and other abbreviations, see "Guidance Note on Codes and Abbreviations" at the beginning of each volume of the regularly published PCT Gazette.

non-contact IC card to the personal computer (51). This card ID includes a Bluetooth address of the cellular telephone (52). When the personal computer (51) fetches the Bluetooth address of the cellular telephone (52) and a PDA (53) upon query, the personal computer (51) identifies the cellular telephone (52) as a Bluetooth device to establish synchronization according to the Bluetooth address reported in advance. The present invention can be applied to an information processing apparatus such as a personal computer and a cellular telephone.

(57) Abstract:

The present invention pertains to a communication system and method capable of easily identifying a communication partner. A portable telephone 52 is provided with a non-contact IC card for communicating by means of electromagnetic waves with the reader/writer of a personal computer 51. When the non-contact IC card receives an electromagnetic wave emitted from the reader/writer, the portable telephone 52 reports a card ID set in the non-contact IC card to the personal computer 51. This card ID includes a Bluetooth address for the portable telephone 52. When the personal computer 51 has obtained the Bluetooth address of the portable telephone and a PDA 53 during an inquiry, based on a Bluetooth address previously reported it identifies the portable telephone 52 as a Bluetooth device with which to establish synchronization. The present invention can be applied to an information processing device such as a personal computer or a portable telephone.

Specification

COMMUNICATION SYSTEM AND METHOD

TECHNICAL FIELD

- 5 The present invention relates to communication systems and methods capable of specifying a terminal serving as partner of communication, and of starting communication more easily and quickly, especially when Bluetooth® is used for communication.

BACKGROUND ART

- 10 Bluetooth has attracted attention recently as a wireless communication means for short distances, and various devices conforming thereto have been developed and marketed.

Bluetooth is a wireless communication standard standardized by a Bluetooth SIG (special interest group), and uses the 2.4 GHz band (ISM (industrial science medical) band) for communication with other devices having Bluetooth modules.

- 15 Networks employing Bluetooth are called Piconets or Scatternets according to their forms. A Scatternet is formed by connecting a plurality of Piconets mutually. In each network, there are Bluetooth devices which play roles called a master and a slave. Hereinafter, a Bluetooth device which plays the role of a master may be called a master, and a Bluetooth device which plays the role of a slave may be called a slave.

- 20 FIG. 1 is a view showing the concept of Piconets and a Scatternet.

As shown in FIG. 1, in each Piconet, there is one master, and a slave or a plurality of slaves perform communication under the control of the master. In this example case, Piconet 1 is formed of a master 1, a slave 1-1, and a slave 1-2, and Piconet 2 is formed of a master 2 and a slave 2-1.

A Scatternet is formed when Piconet 1 and Piconet 2 are mutually connected. In FIG. 1, a

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communication link between Piconet 1 and Piconet 2 is disabled.

To form such Piconets to transmit and receive various pieces of information, it is necessary for all Bluetooth devices in the Piconets to establish synchronization in a frequency domain and a time domain.

Synchronization in frequency and time domains will be described.

In Bluetooth, a master, for example, sends a signal to a slave at a frequency width of 79 MHz. The master does not occupy the entire frequency width of 79 MHz at the same time to send information, but sends information by changing (hopping) the transmission frequency of the information at random at a frequency-width interval of 1 MHz.

The receiving slave establishes synchronization with the transmission frequency of the master, hopped at random, to change the receiving frequency, if necessary, to receive the information sent from the master.

These patterns of the frequencies changed by the master and the slave are called frequency-hopping patterns. When the master and the slave share a frequency-hopping pattern, synchronization in the frequency domain is established.

In Bluetooth, time-division multiplexing is applied to a communication path (channel) between the master and each slave at a time interval of 625 μ s in order to allow communication between the master and a plurality of slaves. This time interval of 625 μ s is called a time slot. When the time slot is shared, synchronization in the time domain is established.

As described later in detail, each slave calculates a frequency-hopping pattern for establishing synchronization in the frequency domain, according to the Bluetooth address of the master, and adds an offset to the Bluetooth clock managed by the slave, according to the Bluetooth clock of the master to obtain the timing of the timeslot to establish synchronization in the time domain.

Each Bluetooth device has a unique 48-bit Bluetooth address, and a frequency-hopping pattern is

uniquely calculated according to the address. Each Bluetooth device manages its own Bluetooth clock.

Therefore, before a Piconet is formed, various pieces of information, including the Bluetooth address and the Bluetooth clock used for establishing synchronization in the frequency domain and the time domain, are transmitted and received between the master and slaves.

Conventional processing of a Bluetooth device for establishing synchronization in the frequency domain and the time domain and for forming a Piconet will be described next by referring to flowcharts shown in FIG. 2 and FIG. 3.

Processing for establishing synchronization among the master 1, the slave 1-1, and the slave 1-2 shown in FIG. 1, and for forming Piconet 1, will be explained. Packets to be transmitted and received will be described later in detail. The entire flow will be described here.

In step S1, the master 1 broadcasts an IQ (inquiry) packet to detect a slave(s) existing therearound.

As shown in FIG. 1, for example, when there exists a slave 1-1 and a slave 1-2 in a vicinity of the master 1, the slave 1-1 receives in step S31 an IQ packet sent from the master 1, the processing proceeds to step S32, and the slave 1-1 sends a packet (FHS packet) indicating its own attribute information to the master.

In the same way, when the slave 1-2 receives an IQ packet in step S51, the processing proceeds to step S52, and the slave 1-2 sends an FHS packet to the master.

FHS packets sent from slaves to the master include the Bluetooth address and the Bluetooth clock of each slave, as slave attribute information.

The master 1 receives in step S2 the FHS packet sent from the slave 1-1, and receives in step S3 the FHS packet sent from the slave 1-2.

The series of processes from broadcasting an IQ packet to receiving an FHS packet sent in response to the IQ packet, performed by the master, and the series of processes from receiving a sent IQ packet to sending an FHS packet in response to the IQ packet, performed by slaves, are called an "inquiry".

In step S4, the master 1 sends an ID packet generated according to the FHS packet received in step S2, to the slave 1-1.

5 When the slave 1-1 receives the ID packet in step S33, the processing proceeds to step S34, and the slave 1-1 sends the same ID packet as that received, to the master 1 to report that packet transmission and receiving are possible.

10 When the master 1 receives in step S5 the ID packet sent from the slave 1-1, the processing proceeds to step S6, and the master 1 sends an FHS packet to the slave 1-1 to report the Bluetooth address and the Bluetooth clock of the master 1 as attribute information to the slave 1-1.

In step S35, the slave 1-1 receives the FHS packet from the master 1. With this, the master 1 and the slave 1-1 have mutually exchanged their Bluetooth addresses and Bluetooth clocks, which are required to establish synchronization in the Piconet.

15 In step S36, the slave 1-1 sends an ID packet to the master 1 to report that the FHS packet has been received.

In step S37, the slave 1-1 establishes synchronization with the master 1 according to the Bluetooth address and the Bluetooth clock sent from the master 1. Processing of a slave for establishing synchronization according to information reported by the master will be described later in detail.

20 When the master 1 receives the report from the slave 1-1 in step S7, the processing proceeds to step S8, and, after the master 1 has transmitted and received the FHS packets and the ID packets to and from the slave 1-1, the master 1 transmits and receives FHS packets and ID packets to and from the slave 1-2. In other words, the processes of step S8 to step S11 performed by the master 1 and the processes of step S53 to step S57 performed by the slave 1-2 are the same as the processes of step S4 to step S7 and the processes of step S33 to step S37, described above.

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More specifically, the master 1 sends an ID packet to the slave 1-2 in step S8, and in response to this transmission, the slave 1-2 sends an ID packet to report that the ID packet sent by the master 1 has been received. Then, the master 1 sends an FHS packet to the slave 1-2 in step S10 to report its own attribute information.

When the slave 1-2 receives the FHS packet from the master 1 in step S55, the processing proceeds to step S56, and the slave 1-2 sends an ID packet to the master 1. In step S57, the slave 1-2 establishes synchronization with the master 1 according to the Bluetooth address and Bluetooth clock reported by the master 1.

The series of processes from the "inquiry", described above, to the establishment of synchronization is called "paging".

In step S12, the master 1 requests the slave 1-1 to report the Bluetooth device name. A Bluetooth device name is assigned to each Bluetooth device, and the user can change the assignment.

A Bluetooth device name is used, for example, when the user who is operating the master selects a partner of communication. If a partner of communication needed to be selected by its Bluetooth address, the user would need to memorize the 48-bit numerals indicating the addresses of all Bluetooth devices existing in the Piconet.

When the slave 1-1 receives the request from the master 1 in step S38, the processing proceeds to step S39, and the slave 1-1 reports its assigned Bluetooth device name to the master 1.

In step S13, the master 1 receives the Bluetooth device name reported by the slave 1-1.

In step S14, the master 1 also requests the slave 1-2 to report the Bluetooth device name.

When the slave 1-2 receives the request from the master 1 in step S58, the processing proceeds to step S59, and the slave 1-2 reports its assigned Bluetooth device name to the master 1.

5 When the master 1 receives the report from the slave 1-2 in step S15, the processing proceeds to step S16, and the master 1 displays a screen for selecting a slave to be communicated with, on a display block. On this selection screen, the Bluetooth device names obtained in step S13 and step S15 are displayed. The user can use the selection screen to select a slave to be communicated with.

10 FIG. 4 is a view showing an example selection screen to be displayed on the Bluetooth device (master) after the establishment of synchronization.

As shown in the figure, a selection window 1 is shown, and a master display block 11 in which information of the master operated by the user is indicated is provided at the left-hand side.

15 The master display block 11 is formed of a device-name display block 11A and an address display block 11B. The device-name display block 11A shows the Bluetooth device name of the master, and the address display block 11B shows the Bluetooth address of the master.

More specifically, the upper row of the device-name display block 11A indicates the category of the Bluetooth device of the master, and the lower row indicates the Bluetooth device name, which can be changed according to the user's desire. In this example case, the category of the master is set to "Computer (personal computer)", and the device name is set to "Computer for Red".

20 Almost at the center of the selection window 1, profile selection buttons 12 are shown vertically. The user selects a profile for a slave. A profile specifies the communication method for a slave. In FIG. 4, eight profile selection buttons 12 are shown.

At the right-hand side of the selection window 1, slave display blocks 13 to 19 are shown. Each slave display block has a device-name display block and an address display block in the same way as for the master display block 11.

- 5 In the example case shown in FIG. 4, communication is currently being performed between the master and the slave indicated by the slave display block 16. In the slave display block 16, the category of the Bluetooth device is set to "Portable telephone" and the Bluetooth device name is set to "Portable telephone for Red".

- 10 FIG. 5 is a view showing another example selection screen to be displayed on the Bluetooth device after the establishment of synchronization.

On a selection window 31, profiles are shown at the left-hand side, and the Bluetooth device names of slaves are shown with white arrows sandwiched between the profiles and the names. In this example case, the master can communicate by Bluetooth, for example, with the slave (player for Black) indicated at the first row of the selection window 31 using a profile for transmission of a music file.

- 15 However, when the Piconet has been established by the processes described above and communication is started, the Bluetooth devices with which communication can be made are listed as shown in FIG. 4 and FIG. 5, but the user needs to specify the partner of communication.

After the user selects the partner of communication, the user further needs to select a profile according to the device of the partner.

- 20 As a system using Bluetooth, for example, a system has been proposed in which the charges for goods purchased at vending machines are paid by the use of portable telephones having a built-in a Bluetooth module. As a general rule it is expected that a partner of communication will need to be selected, as described above.

- 25 Therefore, compared with cases in which bills are actually used for payment, purchase procedures for vending machines may become more troublesome.

DISCLOSURE OF INVENTION

Taking the above situations into consideration, the present invention makes it possible, when communicating with Bluetooth, to identify a terminal as a partner of communication, and for communication to be started more easily and quickly.

5 An information processing apparatus of a communication system according to the present invention is characterized by including a first acquisition processing means for acquiring the identification information of a communication terminal located close by using a first wireless communication block for transmitting electric power and for transmitting and receiving data by a loop antenna for the communication terminal, second acquisition processing means for acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from
10 the plurality of communication terminals by using a second wireless communication block for transmitting and receiving data, an identification processing means for identifying a partner of communication by using the identification information acquired by the first acquisition processing means and the attribute information acquired by the second acquisition processing means, and a first synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the identification
15 processing means and the second wireless communication block. The communication terminal is characterized by including a first providing processing means for providing the information processing apparatus with the identification information of the communication terminal by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, a second providing processing means for providing the
20 attribute information of the communication terminal by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and a second synchronization establishment processing means for establishing synchronization by transmitting and receiving a predetermined signal through the fourth wireless communication block, in response to a request sent
25 from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

An information processing method for an information processing apparatus, constituting a communication method according to the present invention is characterized by including a first
30 acquisition processing step of acquiring the identification information of a nearby communication terminal by using a first wireless communication block for transferring electric power and for transmitting and receiving data by a loop antenna for the communication terminal, a second acquisition processing step of acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of
35 communication terminals by using a second wireless communication block for transmitting and receiving data, an identification processing step of identifying a partner of communication by using the identification information acquired in the first acquisition processing step and the attribute information acquired in the second acquisition processing step, and a first synchronization establishment

processing step of establishing synchronization for wireless communication performed by using the communication terminal identified in the identification processing step and the second wireless communication block. An information processing method for the communication terminal is characterized by including a first providing processing step of providing the information processing apparatus with the identification information of the communication terminal by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, a second providing processing step of providing the attribute information of the communication terminal by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and a second synchronization establishment processing step of establishing synchronization by transmitting and receiving a predetermined signal through the fourth communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

A first information processing apparatus according to the present invention is characterized by including a first acquisition processing means for acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing means for acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, an identification processing means for identifying the partner of communication by using the identification information acquired by the first acquisition processing means and the attribute information acquired by the second acquisition processing means, and a synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the identification processing means and the second wireless communication block.

The wireless communication distance of the first wireless communication block may be made shorter than the wireless communication distance of the second wireless communication block.

The first acquisition processing means may acquire the identification information of a nearby communication terminal by using the first wireless communication block for transmitting electric power and transmitting and receiving data by a loop antenna vis-à-vis the communication terminal.

The attribute information may include address information making it possible to identify each of the plurality of communication terminals and clock information managed by the communication terminals.

The information processing apparatus may further include an activation processing means for activating the second wireless communication block in response to the acquisition of the identification information by the first acquisition processing means.

The information processing apparatus may be configured such that the identification information

includes at least the Bluetooth address of the communication terminal, the second acquisition processing means acquires a plurality of FHS packets returned respectively by the plurality of communication terminals in response to IQ packets sent by using the second wireless communication block, and the synchronization establishment processing means sends an ID packet to the communication terminal identified by the identifying processing means, by using the second wireless communication block, and further sends an FHS packet of the information processing apparatus when the communication terminal responds to the transmission of the ID packet.

An information processing method for the first information processing apparatus, according to the present invention is characterized by including a first acquisition processing step of acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing step of acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, a specifying processing step of identifying a partner of communication by using the identification information acquired in the first acquisition processing step and the attribute information acquired by the second acquisition processing step, and a synchronization establishment processing step of establishing synchronization for wireless communication performed by using the communication terminal identified in the identification processing step and the second wireless communication block.

The wireless communication distance of the first wireless communication block may be made shorter than the wireless communication distance of the second wireless communication block.

In the first acquisition processing step, the identification information of a nearby communication terminal may be acquired by using the first wireless communication block for transmitting electric power and for transmitting and receiving data by a loop antenna vis-à-vis the communication terminal.

The attribute information may include address information which can identify each of the plurality of communication terminals and information for clocks managed by the communication terminals.

The information processing method may be configured such that, in the second acquisition processing step, a plurality of FHS packets returned respectively by the plurality of communication terminals in response to IQ packets sent by using the second wireless communication block are obtained, and, in the synchronization establishment processing step, an ID packet is sent to the communication terminal identified in the identification processing step, by using the second wireless communication block, and an FHS packet of the information processing apparatus is further sent when the communication terminal responds to the transmission of the ID packet.

A communication terminal according to the present invention is characterized by including a first providing processing means for providing its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, a second providing processing means for providing its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus, and a synchronization establishment processing means for establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

The wireless communication distance of the first wireless communication block may be made shorter than the wireless communication distance of the second wireless communication block.

The first providing processing means may provide the identification information of the communication terminal by using the first wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, in response to a predetermined request sent from the information processing apparatus.

The identification information may include at least address information which can identify the communication terminal.

The attribute information may include the address information and clock information managed by the communication terminal.

The information processing apparatus may further include an activation processing means for activating the second wireless communication block in response to the provision of the identification information by the first providing processing means.

The information processing apparatus may be configured such that the identification information includes at least Bluetooth address information, the second providing processing means sends an FHS packet in response to an IQ packet received by using the second wireless communication block, and the synchronization establishment processing means returns, in response to an ID packet received by using the second wireless communication block, the ID packet, and returns the ID packet again when an FHS packet is further received.

A communication method for a communication terminal, according to the present invention is characterized by including a first providing processing step of a communication terminal providing its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, a second providing processing step of the communication terminal providing its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing

apparatus, and a synchronization establishment processing step of establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

5 In the first providing processing step, the communication terminal may provide its own identification information by using the first wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, in response to a predetermined request sent from the information processing apparatus.

10 The identification information may include at least address information which identifies its own terminal.

The attribute information may include the address information and clock information managed by its own terminal.

15 The communication method may further include an activation processing step of activating the second wireless communication block in response to the provision of the identification information in the first providing processing step.

20 The communication method may be configured such that the identification information includes at least Bluetooth address information; in the second providing processing step, an FHS packet is sent in response to an IQ packet received by using the second wireless communication block; and, in the synchronization establishment processing step, in response to an ID packet received by using the second wireless communication block, the ID packet is returned, and the ID packet is returned again when an FHS packet is further received.

25 A first extension apparatus according to the present invention is characterized by including a connection terminal for transmitting and receiving data electrically connected to an information processing apparatus, a first acquisition processing means for acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing means for acquiring the attribute information of each of a plurality of communication terminals from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, an identification processing means for identifying a partner of communication by using the identification information acquired by the first acquisition processing means and the attribute information acquired from the plurality of communication terminals, and a synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the identification processing means and the second wireless communication block.

35 A second extension apparatus according to the present invention is characterized by including a connection terminal electrically connected to the communication terminal, for transmitting and receiving data, a first providing processing means for the connection terminal to provide its own

identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a request sent from an information processing apparatus, a second providing processing means for the connection terminal to provide its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus, and a synchronization establishment processing means for establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

A first program according to the present invention is characterized by making an information processing apparatus execute a first acquisition processing step of acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a second acquisition processing step of acquiring the attribute information of each of a plurality of communication terminals, which include the communication terminal, from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, an identification processing step of identifying a partner of communication by using the identification information acquired in the first acquisition processing step and the attribute information acquired in the second acquisition processing step, and a synchronization establishment processing step of establishing synchronization for wireless communication performed by using the communication terminal identified in the identification processing step and the second wireless communication block.

A second program according to the present invention is characterized by a first providing processing step of a communication terminal providing its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, a second providing processing step of the communication terminal providing its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus, and a synchronization establishment processing step of establishing synchronization by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

A second information processing apparatus according to the present invention is characterized by including a first acquisition processing means for acquiring identification information from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, a storage processing means for storing, as history information, information related to a plurality of communication terminals with which communication were performed by using a second wireless communication block for transmitting and receiving desired data, an identification

processing means for identifying a partner of communication by using the identification information acquired by the first acquisition processing means and the history information, and a synchronization establishment processing means for establishing synchronization for wireless communication performed by using the communication terminal identified by the specifying processing means and the second wireless communication block.

The information processing apparatus may be configured such that the history information includes at least Bluetooth address information, and the synchronization establishment processing means sends an ID packet generated according to the Bluetooth address information to the communication terminal identified by the identification processing means and, when a response to the ID packet is made by the communication terminal, further sends its own FHS packet.

In a communication system and a communication method according to the present invention, the identification information of a nearby communication terminal is acquired by using a first wireless communication block for transmitting electric power and for transmitting and receiving data vis-a-vis the communication terminal by a loop antenna, the attribute information of each of a plurality of communication terminals, which include the communication terminal, is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving data, and a partner of communication is identified by using the identification information and the attribute information. Then, synchronization is established for wireless communication performed by using the identified communication terminal and the second wireless communication block. The identification information of the communication terminal is provided to an information processing apparatus by using a third wireless communication block for transmitting and receiving data and using at least part of induced electric power obtained through a loop antenna, the attribute information of the communication terminal is provided by using a fourth wireless communication block for transmitting and receiving data, in response to a request sent from the information processing apparatus through the second wireless communication block, and synchronization is established by transmitting and receiving a predetermined signal through the fourth communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

In a first information processing apparatus, an information processing method, and a program according to the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, the attribute information of each of a plurality of communication terminals, which include the communication terminal, is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data, and a partner of communication is identified by using the acquired identification information and the acquired attribute information. Synchronization is also established for wireless communication performed by using the identified communication terminal and the second wireless communication block.

In a communication terminal, a communication method, and a program according to the present

invention, a communication terminal provides its own identification information by using a first wireless communication block for transmitting and receiving predetermined data, in response to a predetermined request sent from an information processing apparatus, and provides its own attribute information by using a second wireless communication block for transmitting and receiving data, in response to a predetermined request sent from the information processing apparatus. Synchronization is also established by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus when synchronization is established for wireless communication performed by the second wireless communication block.

In a first extension apparatus according to the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, electrically connected to an information processing apparatus, and the attribute information of each of a plurality of communication terminals is acquired from the plurality of communication terminals by using a second wireless communication block for transmitting and receiving desired data. A partner of communication is identified by using the acquired identification information and the attribute information acquired from the plurality of communication terminals, and synchronization is established for wireless communication performed by using the identified communication terminal and the second wireless communication block.

In a second extension apparatus according to the present invention, a communication terminal provides its own identification information. in response to a request sent from an information processing apparatus. by using a connection terminal for transmitting and receiving data, electrically connected to the communication terminal, and a first wireless communication block for transmitting and receiving predetermined data, and provides its own attribute information, in response to a request sent from an information processing apparatus, by using a second wireless communication block for transmitting and receiving data. Then, synchronization is established by transmitting and receiving a predetermined signal through the second wireless communication block, in response to a request sent from the information processing apparatus, when synchronization is established for wireless communication performed by the second wireless communication block.

In a second information processing apparatus according to the present invention, identification information is acquired from a communication terminal by using a first wireless communication block for transmitting and receiving predetermined data, information related to a plurality of communication terminals with which communication has been performed by using a second wireless communication block for transmitting and receiving desired data is stored as history information, and a partner of communication is identified by using the acquired identification information and history information. Synchronization is also established for wireless communication performed by using the identified communication terminal and the second wireless communication block.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view showing the concept of Piconets and a Scatternet.

FIG. 2 is a flowchart describing conventional processes for establishing synchronization in a Piconet.

FIG. 3 is a flowchart following that shown in FIG. 2, describing the conventional processes for establishing synchronization in a Piconet.

5 FIG. 4 is a view showing an example display on a screen for selecting a communication terminal.

FIG. 5 is a view showing another example display on the screen for selecting a communication terminal.

FIG. 6 is a view showing an example structure of a communication system to which the present invention is applied.

10 FIG. 7 is a view showing an example appearance of the personal computer shown in FIG. 6.

FIG. 8 is a view showing another example appearance of the personal computer shown in FIG. 6.

FIG. 9 is a view showing still another example appearance of the personal computer shown in FIG. 6.

FIG. 10 is a view showing a side face of the personal computer shown in FIG. 6.

FIG. 11 is a block diagram showing an example structure of the personal computer shown in FIG. 6.

15 FIG. 12 is a block diagram showing an example structure of the non-contact-IC-card reader/writer shown in FIG. 11.

FIG. 13 is a block diagram showing an example structure of the Bluetooth module shown in FIG. 11.

FIG. 14 is a view showing an example appearance of a portable telephone shown in FIG. 6.

FIG. 15 is a view showing another example appearance of the portable telephone shown in FIG. 6.

20 FIG. 16 is a block diagram showing an example structure of the portable telephone shown in FIG. 6.

FIG. 17 is a block diagram showing an example structure of the non-contact IC card shown in FIG. 16.

FIG. 18 is a view showing example specifications of the non-contact IC card shown in FIG. 17.

FIG. 19 is a block diagram showing an example function structure of the portable telephone shown in FIG. 6.

25 FIG. 20 is a flowchart describing processes of the communication system shown in FIG. 6.

FIG. 21 is a flowchart following that shown in FIG. 20, describing the processes of the communication system shown in FIG. 6.

FIG. 22 is a flowchart describing other processes of the communication system shown in FIG. 6.

FIG. 23 is a flowchart following that shown in FIG. 21, describing the other processes of the communication system shown in FIG. 6.

FIG. 24A is a view showing another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

5 FIG. 24B is a view showing another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

FIG. 25A is a view showing still another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

10 FIG. 25B is a view showing still another example structure of the portable telephone shown in FIG. 6, in a sketch manner.

FIG. 26A is a view showing an example structure of the portable telephone shown in FIG. 6, in a sketch manner.

FIG. 26B. is a view showing an example structure of the portable telephone shown in FIG. 6, in a sketch manner.

15 FIG. 27 is a flowchart describing processes of the portable telephone shown in FIG. 6.

FIG. 28 is a flowchart describing other processes of the portable telephone shown in FIG. 6.

FIG. 29 is a flowchart describing still other processes of the portable telephone shown in FIG. 6.

FIG. 30 is a view showing the concept of a ubiquitous society to which the present invention is applied.

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BEST MODES FOR CARRYING OUT THE INVENTION

FIG. 6 is a view showing an example structure of a communication system to which the present invention is applied.

25 In the communication system shown in FIG. 6, a personal computer 51, a portable telephone 52, and a PDA (personal digital assistant) 53 each have a Bluetooth module therein, and can transmit and receive various pieces of information by short-distance wireless communication conforming to Bluetooth.

30 The portable telephone 52 also has a non-contact IC card (IC tag) 246 (see FIG. 16) therein. The personal computer 51 is provided with a non-contact-IC-card reader/writer 105 (see FIG. 11) for reading and writing various pieces of information to and from the non-contact IC card 246. Therefore, communication can be performed between the personal computer 51 and the portable telephone 52 not only by Bluetooth communication but also through electromagnetic waves emitted from the non-

contact-IC-card reader/writer 105.

In the communication system to which the present invention is applied, when the personal computer 51 serves as the master of a Piconet, for example, the personal computer 51 identifies the portable telephone 52 as a slave for performing communication by Bluetooth, according to information
5 obtained from the portable telephone 52 through electromagnetic waves, and performs processing (the above-described inquiry processing) for establishing synchronization in the Piconet.

The processing will be described later in detail by referring to a flowchart. When the user brings the portable telephone 52 closer to the personal computer 51 and the portable telephone 52 receives electromagnetic waves emitted by the non-con- tact-IC-card reader/writer 105 of the personal
10 computer 51, the built-in non-contact IC card 246 of the portable telephone 52 sends identification information (hereinafter called a card ID) that has been set, to the personal computer 51.

The card ID is the same information, for example, as the Bluetooth address (information pertaining thereto) specified for the portable telephone 52. When the personal computer 51 obtains the Bluetooth addresses of the portable telephone 52 and the PDA 53 by the above-described inquiry, the
15 personal computer 51 refers to the Bluetooth address already reported to identify the portable telephone 52 corresponding thereto, and identifies it as a partner of communication.

Therefore, in FIG. 6, both the portable telephone 52 and the PDA 53 respond to the inquiry of the personal computer 51, but paging performed thereafter is performed only between the personal computer 51 and the portable telephone 52.

20 With these processes, the user can start Bluetooth communication just by bringing the portable telephone 52 closer to the personal computer 51 as shown in the figure without selecting a partner of communication on the selection screen described above.

When the user sends predetermined data from the PDA 53 to the personal computer 51 by Bluetooth, for example, the user needs to select the personal computer 51 as a partner of
25 communication on the above-described screen. When the user sends data from the portable telephone 52, the user can send predetermined data to the personal computer 51 without performing such a troublesome process.

The structure of the communication system shown in FIG. 6 will be described next.

FIG. 7 to FIG. 10 show appearances of the personal computer 51 shown in FIG. 6. This notebook-type personal computer 51 is basically formed of a body 61 and a display block 62 which can be opened and closed against the body 61. FIG. 7 is a perspective appearance view showing a state in which the display block 62 is opened against the body 61. FIG. 8 is a plan of the body 61. FIG. 9 is an enlarged view of a portion around a jog dial 63, described later, provided to the body 61. FIG. 10 is a side view of the body 61, viewed from the jog dial 63 side.

The body 61 is provided at its upper surface with a keyboard 64 operated when various characters and symbols are input, a touch sensitive pad 65 serving as a pointing device operated when a pointer (mouse cursor) is moved, and a power switch 67, and is also provided at a side face with the jog dial 63, a slot 68, an IEEE-1394 port 70, and others. Instead of the touch sensitive pad 65, a stick-type pointing device, for example, can be provided.

At the front surface of the display block 62, an LCD (liquid-crystal display) 66 for displaying images is provided. At an upper right portion of the display block 62, a power lamp PL, a battery lamp BL, and, if necessary, other LED lamps such as a message lamp ML, are provided. The power lamp PL, the battery lamp BL, the message lamp ML, and others can also be provided at a lower portion of the display block 62.

The jog dial 63 is incorporated between keys of the keyboard 64 in the body 61 so as to have roughly the same height as the keys. The jog dial 63 is used for executing predetermined processes when rotated in directions indicated by the arrow "a" in FIG. 9, and for executing a process when pressed in a direction indicated by the arrow "b". The jog dial 63 may be located at the left-hand side of the body 61. Alternatively, the jog dial 63 may be located at the left-hand side or the right-hand side of the display block 62 provided with the LCD 66, or may be located between the "G" key and the "H" key of the keyboard 64 in the vertical direction. The jog dial 63 may also be located at a center portion of the front part so as to be able to be operated by a thumb while the touch sensitive pad 65 is operated by a forefinger. Alternatively, the jog dial 63 may be located in the horizontal direction along the upper

edge or the lower edge of the touch sensitive pad 65, or may be located in the vertical direction between the right button and the left button of the touch sensitive pad 65. Further, the jog dial 63
5 may be located at a predetermined angle in a tilted direction where it is easier to operate the jog dial 63 by fingers without limiting the direction to the vertical direction or the horizontal direction. Furthermore, the jog dial 63 may be located at a side of a mouse serving as a pointing device, where the jog dial 63 can be operated by a thumb.

FIG. 11 is a block diagram showing the electrical structure of the personal computer 51.

10 A CPU (central processing unit) 81 is, for example, formed of a Pentium (registered trademark) processor manufactured by Intel Corporation, and is connected to a host bus 82. The host bus 82 is further connected to a bridge 83, and the bridge 83 is also connected to an AGP (accelerated graphics port) 84 and to a PCI bus 85. The bridge 83 is, for example, formed of 400BX manufactured by Intel Corporation, and controls devices around the CPU 81 and a RAM 86 (random access memory). Further,
15 the bridge 83 is connected to a video controller 87 through the AGP 84. The bridge 83 and a bridge 107 form a so-called chip set.

The bridge 83 is also connected to the RAM 86 and to a cache memory 88. The cache memory 88 caches data used by the CPU 81. Although not shown in the figure, a primary cache memory is built into the CPU 81.

20 The RAM 86 is, for example, formed of DRAM (dynamic random access memory), and stores a program executed by the CPU 81 and data required for the operations of the CPU 81. More specifically, when the RAM 86 has been activated, an electronic mail program 86A, an auto-pilot program 86B, a jog-dial-state monitoring program 86C, a jog-dial driver 86D, an operating program (OS) 86E, a

reader/writer control program 86F, a Bluetooth control program 86G, and other application programs 86H1 to 86Hn are transferred from an HDD 114 to the RAM 86, and stored in the RAM 86.

5 The electronic mail program 84A sends and receives correspondence via a modem 92 from a communication line such as a telephone line 93 through a network. The electronic mail program 84A has a new mail acquisition function as a special function. The new mail acquisition function determines whether mail addressed to the user has arrived in a mail box 96 on a mail server 95 provided by an Internet service provider 94, and, when mail addressed to the user has arrived, acquires the mail.

10 The auto-pilot program 86B sequentially activates a plurality of processes (or programs) specified in advance, in the order specified in advance.

15 The jog-dial-state monitoring program 86C receives from the application programs 86H1 to 86Hn notifications as to whether they can be operated with the jog dial. When an application program can be operated with the jog dial, the jog-dial-state monitoring program 86C performs a process to display operations which can be executed by operating the jog dial 63 to the user by the use of the user interface function of the application program. The jog-dial-state monitoring program 86C waits for an event for the jog dial 63, and has a list for receiving reports from the application programs. A jog-dial driver 86D executes various functions corresponding to operations on the jog dial 63.

20 The OS (operating system) 86E controls the basic operations of the computer. Typical operating systems include Windows (registered trademark) 95 and Windows (registered trademark) 98 of Microsoft, Inc., and MAC OS (registered trademark) of Apple Computer, Inc.

5 The reader/writer control program 86F controls a non-contact-IC-card reader/writer 105 (hereinafter sometimes called a reader/writer 105) to detect a terminal having a non-contact IC card therein and located close to the personal computer 51, and transmits and receives various pieces of information to and from the terminal via electromagnetic waves.

The Bluetooth control program 86G controls a Bluetooth module 106 to detect a Bluetooth device existing in the vicinity, to establish synchronization in order to communicate with the Bluetooth device, and to perform other processes.

10 The video controller 87 is connected to the PCI bus 85, is further connected to the bridge 83 through the AGP 84, and controls the display of the LCD 66 according to data sent through the PCI bus 85 or the AGP 84.

The PCI bus 85 is connected to a sound controller 89, and it is connected to a speaker 90 and a microphone 66. The sound controller 89 receives audio input at the microphone 66, and sends audio signals to the speaker 90.

15 The PCI bus 85 is also connected to the modem 92 and to a PC-card-slot interface 98.

The modem 92 can connect to the Internet 97 or to the mail server 95 through the telephone line 93 or the Internet service provider 94.

20 To add an optional function, an interface card 99 is mounted to the slot 68 connected to the PC-card-slot interface 98, which allows data to be sent and received to and from an external apparatus. For example, the interface card 99 can be connected to a drive 100, and can send and receive data to and from a magnetic disk 101, an optical disk 102, an magnetooptical disk 103, semiconductor memory 104, and other devices inserted into the drive 100.

The drive 100, which sends and receives data to and from the magnetic disk 101, the optical disk 102,

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the magneto-optical disk 103, and the semiconductor memory 105 can also be connected through a USB port 115.

5 The PCI bus 85 is further connected to the bridge 107. The bridge 107 is, for example, formed of PIIX4E manufactured by Intel Corporation, and controls various input-and-output operations. More specifically, the bridge 107 is formed of an IDE (integrated drive electronics) controller/configuration register 108, an IDE interface 109, a timer circuit 110, and a USB (universal serial bus) interface 111, and controls a device connected to an IDE bus 113, a device connected to a USB port 115, or a device connected through an ISA/EIO (industry standard architecture/extended input output) bus 112 and
10 I/O interface 117.

When a GPS (global positioning system) antenna 116 is mounted to the USB port 115, for example, the USB interface 111 sends position data and time data sent from the GPS antenna 116, to the CPU 81 through the PCI bus 85, the bridge 83, and the host bus 82.

15 The IDE controller/configuration register 108 is formed of two IDE controllers, so-called primary IDE and secondary IDE controllers, a configuration register, etc.

The primary IDE controller is connected to a connector (not shown) through the IDE bus 113, and the connector is connected to the HDD 114. The secondary IDE controller can be connected to an external apparatus through another IDE bus (not shown).

20 The HDD 114 stores an electronic mail program 114A, an auto-pilot program 114B, a jog-dial-state monitoring program 114C, a jog-dial driver 114D, an OS (operating program) 114E, a reader/writer control program 114F, a Bluetooth control program 114G, and other application programs 114H1 to 114Hn, and data used in these programs. The programs 114A to 114Hn stored in the HDD 114 are

sequentially transferred to the RAM 86 and stored therein during activation (booting-up) processing.

5 The ISA/EIO bus 112 is further connected to the I/O interface 117. The I/O interface 117, a ROM 118, a RAM 119, and a CPU 120 are mutually connected.

The ROM 118 stores, for example, an IEEE-1394 interface program 118A, a LED control program 118B, a touch-sensitive-pad-input monitoring program 118C, a key-input monitoring program 118D, a wake-up program 118E, and a jog-dial-state monitoring program 118F in advance.

10 The IEEE-1394 interface program 118A inputs and outputs through an IEEE-1394 input-and-output port 70 data conforming to IEEE 1394. The LED control program 118B controls the turning-on of the power lamp PL, the battery lamp BL, and, if necessary, other LED lamps such as the message lamp ML. The touch-sensitive-pad-input monitoring program 118C monitors an input made by the user with the use of the touch sensitive pad 65. The key-input monitoring program 118D monitors an input made by the user with the use of the keyboard 64 or other key switches. The wake-up program 118E determines
15 based on current-time data sent from the timer circuit 110 in the bridge 108 whether a time specified in advance has arrived. When the specified time has arrived, the wake-up program 118E manages each chip power supply in order to activate a predetermined process (or program). The jog-dial-state monitoring program 118F always monitors the rotation of the rotation-type encoder block of the jog dial 63 or the pressing of the jog dial 63.

20 A BIOS (basic input/output system) 118G is further written into the ROM 118. The BIOS is a basic

input and output system, and is a software program which controls data input and output between the OS and the application programs, and peripheral units (such as the display, the keyboard, and the HDD).

The RAM 119 has a LED-control register, a touch-sensitive-panel input-status register, a key input status register, a time setting register, an I/O register for monitoring a jog-dial state, an IEEE-1394 interface register, etc., as registers 119A to 119F. When the jog dial 63 is pressed, the LED-control register controls the turning-on of the message lamp ML, which displays the startup state of electronic mail at that moment. When the jog dial 63 is pressed, the key-input status register stores an operation key flag. The time setting register can be set to any time.

The I/O interface 117 is also connected to the jog dial 63, the keyboard 64, the touch sensitive pad 65, and the IEEE-1394 input-and-output port 70 through connectors not shown. When the user performs an operation by using the jog dial 63, the keyboard 64, or the touch sensitive panel 65, the I/O interface 117 receives a signal corresponding to the operation from the jog dial 63, the keyboard 64, or the touch sensitive panel 65, and outputs the signal to the ISA/EIO bus 112. Further, the I/O interface 117 sends and receives data to and from the outside through the IEEE-1394 input-and-output port 70. The I/O interface 117 is also connected to the power lamp PL, the battery lamp BL, the message lamp ML, a power-supply control circuit 121, and other lamps formed of LEDs.

The power-supply control circuit 121 is connected to a built-in battery 122 or to AC power, supplying necessary power to each block, and controlling charging of the built-in battery 122 and a secondary battery for a peripheral apparatus. The CPU 120 monitors through the I/O interface 117 a power switch 67 operated to turn on or off the power.

Even when the power is off, the CPU 120 can always execute the IEEE-1394 interface program 118A to the BIOS 118G by the use of an internal power supply. More specifically, even when no windows are

opened on the LCD 66 of the display block 62, the IEEE-1394 interface program 118A to the BIOS 118G are always operating. Therefore, even when the power switch is turned off and the OS 86E is not activated by the CPU 81, the CPU 120 is always executing the jog-dial-state monitoring program 118E to have a programmable-power-key (PPK) function without providing a special key for the personal computer 51. When the personal computer 51 is in a power-save state or in a powered off state, for example, the user can activate desired software or a desired script file just by pressing the jog dial 63.

FIG. 12 is a block diagram showing an example detailed structure of the non-contact-IC-card reader/writer 105 shown in FIG. 11.

An IC 131 is formed of a CPU 151, a SPU (signal processing unit) 152, a SCC (serial communication controller) 153, and a memory 154. The memory 154 is formed of a ROM 161 and a RAM 161. The CPU 151 and the memory 154 are mutually connected through a bus 155.

The CPU 151 deploys to the RAM 162 a control program stored in the ROM 161 to execute various processes according to response data sent from the non-contact IC card 246 and a control signal sent from the CPU 81 shown in FIG. 11. For example, the CPU 151 generates a command to be sent to the non-contact IC card 246, outputs the command to the SPU 152 through the bus 155, and applies an authentication process to data sent from the non-contact IC card 246.

When a portable telephone 52 is located close to the CPU 151 and the card ID is reported by a process performed by each block, described later, the CPU 151 reports the card ID to the Bluetooth module 106 and performs other processes under the control of the CPU 81.

When response data sent from the non-contact IC card 246 is sent from a demodulation block 134 to the SPU 152, the SPU 152 applies, for example, BPSK (binary phase shift keying) modulation

(decoding of Manchester code) to the data and sends obtained data to the CPU 151. When a command to be sent to the non-contact IC card 246 is sent through the bus 155 to the SPU 152, the SPU 152 applies BPSK modulation (encoding to form Manchester code) to the command and outputs obtained data to a modulation block 132.

The SCC 153 sends data sent from the CPU 81 through the bus 155 to the CPU 151, and outputs data sent from the CPU 151 through the bus 155 to the CPU 81.

The modulation block 132 applies ASK (amplitude shift keying) modulation to a carrier wave having a predetermined frequency (for example, 13.56 MHz) sent from an oscillating circuit (OSC) 133, according to data sent from the SPU 152, and outputs the generated modulated wave from an antenna 135 as an electromagnetic wave. The demodulation block 134 demodulates a modulated wave (ASK-modulated wave) obtained through the antenna 135, and outputs demodulated data to the SPU 152.

The antenna 135 emits a predetermined electromagnetic wave, and determines based on a change in the load thereof whether a non-contact IC card 246 (portable telephone 52) is located nearby. When it is determined that a non-contact IC card 246 is located nearby, the antenna 135 sends and receives various types of data to and from the non-contact IC card 246.

FIG. 13 is a block diagram showing an example detailed structure of the Bluetooth module 106 shown in FIG. 11.

A CPU 171 deploys to a RAM 173 a control program stored in a ROM 172 to control the operation of the entire Bluetooth module 106. The CPU 171 to the RAM 173 are mutually connected through a bus 175. A flash memory 174 is also connected to the bus 175.

The flash memory 174 stores information set for each Bluetooth device, such as a Bluetooth device name, which can be changed according to the user's desire, and the Bluetooth address unique to each

Bluetooth device.

5 Since the Bluetooth address is a 48-bit identifier and is unique to each Bluetooth device, it is used in various processes related to the management of Bluetooth devices.

As described above, to establish synchronization in a Piconet, for example, it is necessary for all slaves to obtain information related to the frequency hopping pattern of the master. The frequency hopping pattern is calculated by the slaves according to the Bluetooth address of the master.

10 More specifically, the Bluetooth address is divided into lower-order 24 bits of LAP (low address part), the next higher-order 8 bits of UAP (upper address part), and the remaining 16 bits of NAP (non-significant address part). To calculate the frequency hopping pattern, 28 bits formed of the entire LAP, 24 bits, and lower-order four bits of the UAP are used.

15 Each slave can calculate the frequency hopping pattern according to the Bluetooth clock reported from the master and the above-described 28 bits of the Bluetooth address of the master obtained during paging for establishing synchronization in the Piconet.

20 The frequency hopping pattern includes an inquiry frequency hopping pattern used during an inquiry, a paging frequency hopping pattern used during paging, and a channel frequency hopping pattern used in communication between a slave and the master after synchronization is established in the Piconet. When these three frequency hopping patterns do not need to be individually distinguished, they are hereinafter collectively called a frequency hopping pattern.

Back to FIG. 13, the flash memory 174 stores a link key used to authenticate the Bluetooth device serving as the other part of communication and used to encrypt data to be transmitted, after synchronization is established in the Piconet, which is provided to the CPU 171 if necessary.

5 An input-and-output interface 176 manages the input and output of data sent from the CPU 81 shown in FIG. 11 and data sent from a baseband control block 177, based on instructions from the CPU 171.

The baseband control block 177 sends data sent from the input-and-output interface 176 to a GFSK (Gaussian frequency shift keying) modulation block 191 in order to send the data to the portable telephone 52, and outputs data sent from a GFSK demodulation block 197 to the bus 175 or to the input-and-output interface 176.

10 The GFSK modulation block 191 limits, with a filter, a high-frequency component of data sent from the baseband control block 177, performs frequency modulation as first modulation, and outputs obtained data to a spectrum spreading block 192.

15 The spectrum spreading block 192 switches the carrier frequency according to the frequency hopping pattern calculated as described above and reported from a hopping synthesizer block 195, applies spectrum spreading to received data, and outputs an obtained signal to a communication control block 193. In Bluetooth, the spectrum spreading block 192 hops the frequency at an interval of 625 μ s to send data.

20 The communication control block 193 uses the 2.4 GHz band to send a signal to which spectrum spreading has been applied, from an antenna 194. The communication control block 193 outputs a signal received by the antenna 194 to an inverse spectrum spreading block 196.

25 The inverse spectrum spreading block 196 hops the receiving frequency according to the frequency hopping pattern reported from the hopping synthesizer block 195 to, for example, obtain a signal sent from the portable telephone 52. The inverse spectrum spreading block 196 also applies inverse spectrum spreading to the obtained signal to reproduce the original signal of the portable telephone 52, and outputs the signal to the GFSK demodulation block 197. The GFSK demodulation block 197 applies GFSK demodulation to a signal sent from the inverse spectrum spreading block 196, and outputs obtained data to the baseband control block 177.

An example structure of the portable telephone 52 will be described next.

FIG. 14 shows an example appearance structure of the portable telephone 52 shown in FIG. 6.

5 As shown in FIG. 14, the portable telephone 52 is formed of a display block 212 and a body 213, and is foldable at a center hinge block 211.

The display block 212 has a transmission and receiving antenna 214 which can be extended and retracted. The portable telephone 52 sends and receives radio waves to and from a base station, which is a fixed wireless terminal, through the antenna 214.

10 The display block 212 also has a camera block 215 which can swivel at an angle range of roughly 180 degrees, at an upper center block. The portable telephone 52 takes pictures of a desired object by a CCD (charge coupled device) camera 216 of the camera block 215.

When the user swivels the camera block 215 at an angle of roughly 180 degrees, the display block 212 has a speaker 224 provided at the center of the rear surface side of the camera block 215, at the front side, as shown in FIG. 15. This switches the portable telephone 52 into a normal voice communication state.

15 The display block 212 is also provided at the center with a liquid-crystal display 217. The liquid-crystal display 217 displays a radio-wave receiving state, the remaining amount of battery, the names and telephone numbers of destinations input into a telephone directory, a transmission history, the contents of electronic mail, simplified home pages, images taken by the CCD camera 216 of the camera block 215, and so on.

20 The body 213 is provided at the surface with operation keys 218, such as numeral keys "0" to "9", a call key, a redial key, an end-of-call and power key, a clear key, and an electronic mail key. Various instructions corresponding to the operations of the operation keys 218 are input to the portable telephone 52.

At a lower part of the operation keys 218, the body 213 is also provided with a memo button 219 and a microphone 220. When the memo button 219 is operated, the portable telephone 52 records the sound of the other party during a call. The portable telephone 52 collects the sound of the user during a call by the microphone 220.

5 At an upper part of the operation keys 218, the body 213 is provided with a jog dial 221 which can be swiveled, with its surface slightly protruding from the surface of the body 213. The portable telephone 52 executes various operations, such as a scroll operation for the telephone directory or electronic mail, a page roll operation for a simplified home page, and an image drive operation, according to swivel operations of the jog dial 221.

10 For example, the body 213 selects a desired telephone number from a plurality of telephone numbers listed in the telephone directory displayed on the liquid-crystal display 217, according to a swivel operation of the jog dial 221 performed by the user, fixes the selected telephone number when the jog dial 221 is pressed toward the inside direction of the body 213, and makes a call to the telephone number.

15 A battery pack is mounted to the body 213 at its rear surface side. When the end-of-call and power key is turned on, the battery pack supplies electric power to each circuit block to make it ready for operation.

The body 213 is provided with a memory stick slot 222 for mounting a detachable memory stick (registered trademark), at the upper left side. When the memo button 219 is pressed, the portable
20 telephone 52 records the sound of the other party during a call in a mounted memory stick 223. The portable telephone 52 also records electronic mail, simplified home pages, and images taken by the CCD camera 216 in the mounted memory stick 223, according to the user's operations.

The memory stick 223 is a flash memory card developed by the Sony Corporation, who is the applicant of the present invention. The memory stick 223 has a flash memory device, which is an
25 EEPROM (electrically erasable and programmable read only memory), a non-volatile memory electrically rewritable and erasable, in a compact and thin plastic case 21.5 mm long, 50 mm wide, and 2.8 mm deep. Various types of data, such as images, sound, and music, can be written into and read

from the memory stick 223 through its 10-pin terminal.

Therefore, since the memory stick 223 can be mounted to the portable telephone 52, the portable telephone 52 can share data with other electronic units through the memory stick 223.

When a module (chip) for adding a predetermined function is incorporated into the memory stick 223, and the memory stick 223 is mounted to the memory stick slot 222, the functions of the portable telephone 52 are further extended.

For example, when a memory stick 223 in which a Bluetooth module and a non-contact IC card are incorporated is mounted to the portable telephone 52, as described later, even if those modules are not built into the portable telephone 52, the functions of the portable telephone 52 are extended to allow Bluetooth communication with the personal computer 51 and communication with the use of the non-contact IC card.

FIG. 16 shows an example inside structure of the portable telephone 52.

To a main control block 231 for controlling each block of the display block 212 and the body 213 synthetically, a power-supply circuit block 235, an operation-input control block 232, an image encoder 233, a camera interface (I/F) block 234, an LCD control block 236, a multiplexing and separation block 238, a modulation and demodulation circuit block 239, an audio codec 240, an infrared communication block 245, a non-contact IC card 246, and a Bluetooth module 247 are mutually connected through a main bus 241, and an image encoder 233, an image decoder 237, a multiplexing and separation block 238, a memory stick control block 243, a modulation and demodulation circuit block 239, and an audio codec 240 are mutually connected through a synchronization bus 242.

When the end-of-call and power key is turned on by a user's operation, the power-supply circuit block 235 supplies electric power to each block from the battery pack to make the portable telephone 52 ready for operation. When, as described later, the noncontact IC card 246 instructs the power-supply circuit block 235 to activate the Bluetooth module 247, it supplies electric power to the Bluetooth module 247 and activates it.

When the Bluetooth module 247 is powered off, the timing for turning power on based on an instruction from the noncontact IC card 246 is when, for example, a portable telephone is located close

to the personal computer 51 and the non-contact IC card receives electromagnetic waves emitted from the non-contact-IC-card reader/writer 105.

5 In the portable telephone 52, under the control of the main control block 231 formed of a CPU, a ROM, a RAM, etc., an audio signal collected by the microphone 220 is converted to digital audio data by the audio codec 240 during telephone-call mode. The modulation and demodulation circuit block 239 applies spectrum spreading processing to the digital audio data, and the transmission and receiving block 244 applies digital-to-analog conversion processing and frequency conversion processing, and transmits through the antenna 214 in the portable telephone 52.

10 During the telephone-call mode in the portable telephone 52, a signal received by the antenna 214 is amplified, frequency conversion processing and analog-to-digital conversion processing are applied to the amplified signal, the modulation and demodulation circuit block 239 applies inverse spectrum spreading processing, and the audio codec 240 converts to an analog audio signal. The portable telephone 52 outputs the sound corresponding to the analog audio signal from the speaker 224.

15 When electronic mail is to be sent from the portable telephone 52 during data communication mode, text data input by operations of the operation keys 218 and the jog dial 221 is sent to the main control block 231 through the operation-input control block 232.

20 Under the control of the main control block 231, the modulation and demodulation circuit block 239 applies spectrum spreading processing to the text data, the transmitting and receiving circuit block 244 applies digital-to-analog conversion processing and frequency conversion processing, and the obtained signal is sent to the base station through the antenna 214.

25 When electronic mail is received by the portable telephone 52 during data communication mode, the modulation and demodulation circuit block 239 applies the inverse spectrum spreading processing to a signal received from the base station through the antenna 214 to recover the original text data, and it is displayed as electronic mail on the liquid-crystal display 217 through the LCD control block 236.

Then, the portable telephone 52 can store the electronic mail received according to the user's operation in the memory stick through the memory-stick control block 243.

When image data is to be sent from the portable telephone 52 during the data communication mode, image data captured by the CCD camera 216 is sent to the image encoder 233 through the camera interface block 234.

5 When image data captured by the CCD camera 216 is not sent, the portable telephone 52 can display the image data through the camera interface block 234 and the LCD control block 236 directly on the liquid-crystal display 217.

The image encoder 233 applies compression encoding to the image data sent from the CCD camera 216 by a predetermined encoding method, such as MPEG (Moving Picture Experts Group) 2 or MPEG 4 to convert to encoded image data, and sends it to the multiplexing and separation block 238.

10 At the same time, the portable telephone 52 sends sound collected by the microphone 220 during image capturing performed by the CCD camera 216, to the multiplexing and separation block 238 as digital audio data through the audio codec 240.

15 The multiplexing and separation block 238 multiplexes the encoded image data sent from the image encoder 233 and the audio data sent from the audio codec 240 by a predetermined method, the modulation and demodulation circuit block 239 applies the spectrum spreading processing to the multiplexed data obtained as a result, the transmission and receiving circuit block 244 applies the digital-to-analog conversion processing and the frequency conversion processing, and then the data is sent through the antenna 214.

20 When the portable telephone 52 receives the data of a moving-picture file linked to a simplified home page during data communication mode, for example, the modulation and demodulation circuit block 239 applies the inverse spectrum spreading processing to a signal received from the base station through the antenna 214, and the multiplexed data obtained as a result is sent to the multiplexing and separation block 238.

25 The multiplexing and separation block 238 separates the multiplexed data into encoded image data and audio data, sends the encoded image data to the image decoder 237 through the synchronization

bus 242, and sends the audio data to the audio codec 240 through the synchronization bus 242.

5 The image decoder 237 decodes the encoded image data by the decoding method corresponding to the predetermined encoding method, such as MPEG2 or MPEG4, to generate reproduced moving-picture data, and sends it to the liquid-crystal display 217 through the LCD control block 236. With this, the portable telephone 52 displays moving-picture data included, for example, in a moving-picture file linked to a simplified home page.

10 At the same time, the audio codec 240 converts the audio data into an analog audio signal, and sends it to the speaker 242. With this, the portable telephone 52 reproduces audio data included, for example, in a moving-picture file linked to a simplified home page.

In the same way as for electronic mail, the portable telephone 52 can record data linked to a received simplified home page into the memory stick 223 through the memory-stick control block 243 by a user's operation.

15 When the non-contact IC card 246 is located close to the personal computer 51 and receives electromagnetic waves emitted from the reader/writer 105, the non-contact IC card 246 sends various pieces of information to the reader/writer 105.

FIG. 17 is a block diagram showing an example detailed structure of the non-contact IC card 246.

20 The non-contact IC card 246 is formed, for example, of an antenna (loop antenna) 270 and a capacitor 271 both shown in the figure, and an IC which incorporates any other structures in one chip, and performs half duplex communication of various pieces of data with the reader/writer 105 by using electromagnetic induction. The non-contact IC card 246 does not necessarily have to be shaped as a card. The IC card is a name used for convenience of description, and means that it has functions described above or described later. As a unit which basically provides the same function as the non-contact IC card 246, Felica (registered trademark), for example, has been available.

25 A CPU 261 develops in a RAM 263 a control program stored in a ROM 262 to control the operation of the entire non-contact IC card 246. When the antenna 270 receives electromagnetic waves emitted

from the reader/writer 105, for example, the CPU 261 reports the card ID thereof as identification information assigned to the non-contact IC card 246, to the reader/writer 105.

The card ID can be changed in a desired way. For example, the card ID may either be or include the same name as the Bluetooth device name assigned to the Bluetooth module 247 (portable telephone
5 52).

In an interface block 269, the envelope of a modulated wave (ASK modulated wave) received through the antenna 270 is detected to demodulate the wave by an ASK demodulation block 283, and data obtained by the demodulation is output to a BPSK demodulation block 272. An LC circuit formed of the antenna 270 and the capacitor 271 generates resonance by an electromagnetic wave having a
10 predetermined frequency emitted from the reader/writer 105.

In the interface block 269, an AC magnetic field excited at the antenna 270 is rectified by the ASK demodulation block 283, stabilized by a voltage regulator 281, and supplied to each block as DC power. The electric power of the electromagnetic wave emitted from the reader/writer 105 is adjusted, as described later, so as to generate a magnetic field sufficient for the electric power required by the non-
15 contact IC card 246.

In the interface block 269, an oscillating circuit 284 generates a signal having the same frequency as the clock frequency of data, and outputs the signal to a PLL block not shown.

When data such as the card ID is sent to the reader/writer 105, for example, a predetermined switching device, for example, is turned on/off according to data sent from a BPSK modulation block
20 268, and, only when the switching device is on, a predetermined load is connected in parallel to the antenna 270 to change the load of the antenna 270 in the interface block 269.

An ASK modulation block 282 applies ASK modulation to the modulated wave sent from the reader/writer 105 and received by the antenna 270, by the use of the change of the load of the antenna 270, and sends the modulation component to the reader/writer 105 through the antenna 270 (to
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change the terminal voltage of the antenna 135 of the reader/writer 105) (load switching method).

When data demodulated by the ASK demodulation block 283 is BPSK modulated, the BPSK demodulation block 272 demodulates the data (decoding of Manchester code) according to a clock signal sent from the PLL block not shown, and outputs the demodulated data to a data receiving block 273. The data receiving block 273 outputs the received data, if necessary, to the CPU 261 and others.

The BPSK modulation block 268 applies BPSK modulation (encoding to form Manchester code) to data sent from a data transmission block 267, and outputs the modulated data to the ASK modulation block 282.

The non-contact IC card 246 not only reports the card ID to the personal computer 51, but also performs various processes, such as authentication processing with the reader/writer 105 and encryption processing for data to be transmitted.

FIG. 18 is a view showing example specifications of the non-contact IC card 246.

As described above, communication between the reader/writer 105 and the non-contact IC card 246 are performed at half duplex, and the communication rate is, for example, 211.87 kbps.

Also as shown in the figure, the center frequency of frequency bands used for electric power transmission from the reader/writer 105 to the non-contact IC card 246, data transfer from the reader/writer 105 to the non-contact IC card 246, and data transfer from the non-contact IC card 246 to the reader/writer 105 is, for example, 13.56 MHz.

The power of radio waves output from the reader/writer 105 for electric power transfer is, for example, 350 mW, and the communication length is, for example, about 10 cm although it depends on communication environments such as antenna characteristics.

As described above, ASK modulation is applied to data which has been encoded to be Manchester code and the modulated data is transferred from the reader/writer 105 to the non-contact IC card 246. The modulation factor (the maximum amplitude of a data signal/the maximum amplitude of the carrier wave) is, for example, about 0.1. Data transfer from the non-contact IC card 246 to the reader/writer 105 is performed, as described above, by converting output data to a transmission signal by the load

switching method (the switching device is turned on/off according to the output data to change the load of the antenna 135).

Back to FIG. 16, the Bluetooth module 247 forms a Piconet together, for example, with the Bluetooth module 106 of the personal computer 51, and transmits and receives various pieces of data under the control of the main control block 231.

Since the Bluetooth module 247 has the same structure as that shown in FIG. 13, a detailed description thereof is omitted. In the following description, the CPU of the Bluetooth module 106 is called, for example, a CPU 171A, and the CPU of the Bluetooth module 247 is called a CPU 171B. The other components are also called in the same way.

In the above description, the portable telephone 52 includes the non-contact IC card 246 and the Bluetooth module 247. For example, the structure may be made such that the non-contact IC card 246 and the Bluetooth module 247 are incorporated into the memory stick 223, the memory stick 223 is mounted to the portable telephone 52, and the noncontact IC card 246 and the Bluetooth module 247 are controlled by the memory-stick control block 243.

FIG. 19 is a view showing example function blocks of the portable telephone 52.

A host program 301 provides basic functions for the portable telephone 52, such as a telephone call function and an electronic-mail transmission and receiving function. A non- contact-IC-card control program 302 controls the operation of the non-contact IC card 246, and also performs various processes in cooperation with a card-ID setting program 303, a Bluetooth control program 304, and others.

When a portable telephone 52 is located close to the personal computer 51, for example, the non-contact-IC-card control program 302 sends the card ID corresponding to the Bluetooth address to the reader/writer 105, and activates the Bluetooth module 247 (Bluetooth control program 304) in response to receiving electromagnetic waves from the reader/writer 105.

The card-ID setting program 303 manages the card ID stored in the EEPROM 264, and rewrites it if so instructed by a user. The card-ID setting program 303 also rewrites and sets the card ID so as to

include the Bluetooth address assigned to the Bluetooth module 247.

The Bluetooth control program 304 controls the operation of the Bluetooth module 247 to implement communication with other Bluetooth devices. A Bluetooth-device-name setting program
5 305 manages the Bluetooth device name specified in a flash memory 174B (the flash memory of the Bluetooth module 247).

The operation of the communication system shown in FIG. 6 will be described next.

A series of processes in which the personal computer 51 specifies the partner of communication and establishes synchronization only with that Bluetooth device in the Piconet will be described first by
10 referring to flowcharts shown in FIG. 20 and FIG. 21.

It is assumed in the following processes that the personal computer 51 serves as the master and the other Bluetooth devices (the portable telephone 52 and the PDA 53) serve as slaves. In the following description of the flowcharts, communication means Bluetooth communication performed after synchronization is established in the Piconet and the partner of communication is identified.

15 In step S121, the reader/writer control program 86F emits electromagnetic waves in order to detect a terminal (portable telephone 52) having a built-in non-contact IC card. The reader/writer control program 86F controls the reader/writer 105 by a predetermined control command to emit electromagnetic waves from the antenna 135 at a predetermined interval.

When the portable telephone 52 is located close to the personal computer 51 and the
20 electromagnetic waves are received in step S131, the non-contact-IC-card control program 302 proceeds to step S132. The card ID corresponding to the Bluetooth address assigned to the Bluetooth module 247 is read from the EEPROM 264 and reported to the reader/writer 105.

In step S122, the Bluetooth address sent from the non-contact IC card 246 is received. The reader/writer control program 86F proceeds to step S123, and the Bluetooth address is reported to
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the Bluetooth control program 86G.

In step S101, the Bluetooth control program 86G obtains the Bluetooth address assigned to the portable telephone 52 (Bluetooth module 247).

5 Processes executed in step S102 to step S109 by the Bluetooth control program 86G, processes executed in step S141 and subsequent steps by the Bluetooth control program 304, and processes executed in step S161 and subsequent steps by the Bluetooth control program of the PDA 53 are the same as the inquiry and paging described by referring to FIG. 2 and FIG. 3.

10 In step S102, the Bluetooth control program 86G controls the Bluetooth module 106 to broadcast an IQ packet.

More specifically, the Bluetooth control program 86G uses 24 bits (9E8B33) of the LAP and four bits (all 0) of the UAP both specified in advance and the entire Bluetooth clock of 28 bits to generate an inquiry frequency hopping pattern.

15 The Bluetooth control program 86G also uses one address block of the LAP ranging from 9E8B00 to 9E8B3F specified in advance to generate IAC (inquiry access code), and broadcasts the IQ packet formed of the access code, by the calculated inquiry hopping pattern.

20 A packet transmitted and received by Bluetooth is formed of 68-bit or 72-bit basic access code indicating the destination of the transmission packet, a 54-bit packet header which includes a parameter for managing a communication link, and a payload of 0 bits to 2745 bits (variable length) serving as user data.

The IQ packet broadcasted from the antenna 194 by the process of each block of the Bluetooth module 106 is received by the Bluetooth control program 304 of the portable telephone 52 in step

S141, and is received by the Bluetooth control program of the PDA 53 in step S161.

In step S142, the Bluetooth control program 304 sends an FHS packet for reporting slave attributes to the personal computer 51, responding to the inquiry. In the FHS packet, the payload includes
5 information related to the Bluetooth address and the Bluetooth clock of the Bluetooth module 247.

The Bluetooth control program 86G receives the FHS packet in step S103 to obtain the attribute information of the portable telephone 52.

In step S162, an FHS packet indicating the attributes of the PDA 53 is sent in the same way. The Bluetooth control program 86G receives the FHS packet in step S104.

10 With the above-described inquiry processes, the Bluetooth control program 86G has obtained the attribute information of all slaves existing in a vicinity.

In step S105, the Bluetooth control program 86G detects the attribute information in the obtained FHS packets, identifies a slave having the Bluetooth address obtained through electromagnetic waves, and identifies it as a partner of communication. More specifically, since the reader/writer control
15 program 86F reports the Bluetooth address of the portable telephone 52 in advance, the Bluetooth control program 86G identifies the portable telephone 52, which has sent the FHS packet that includes the Bluetooth address, as a partner of communication.

Then, the Bluetooth control program 86G performs paging (process for establishing synchronization in the Piconet) only for the portable telephone 52, identified as the partner of communication. In other
20 words, subsequent processes are not performed between the Bluetooth control program 86G and the Bluetooth control program of the PDA 53.

In step S106, the Bluetooth control program 86G generates an ID packet according to the information described in the FHS packet obtained from the portable telephone 52, and sends the

packet to the portable telephone.

More specifically, the Bluetooth control program 86G uses the 24 bits of the LAP and the lower-order four bits of the UAP of the Bluetooth address assigned to the Bluetooth module 247 and the 28 bits of the Bluetooth clock, all included in the FHS packet, to generate a paging frequency hopping pattern.

The Bluetooth control program 86G also uses the LAP of the Bluetooth module 247 to generate a DAC (device access code), and sends an ID packet formed of the DAC to the portable telephone 52 by using the calculated paging frequency hopping pattern.

When the ID packet is received in step S143, the Bluetooth control program 304 proceeds to step S144, and sends the same ID packet to the personal computer 51 to report that the ID packet has been successfully received.

When the ID packet sent from the portable telephone 52 is received in step S107, the Bluetooth control program 86G proceeds to step S108, and sends an FHS packet for reporting its own attributes, to the portable telephone 52.

In step S145, the Bluetooth control program 304 receives the FHS packet sent from the personal computer 51 and obtains the attribute information of the master. The Bluetooth control program 304 proceeds to step S146, and sends an ID packet to the personal computer 51 to report that the FHS packet has been received.

Then, the Bluetooth control program 304 proceeds to step S147, and establishes synchronization with the personal computer 51 in the Piconet.

More specifically, the Bluetooth control program 304 uses the 24 bits of the LAP and the lower-order four bits of the UAP of the Bluetooth address assigned to the personal computer 51 (Bluetooth module

106) and 27 bits of the Bluetooth clock to generate a channel frequency hopping pattern to establish synchronization in the frequency domain.

5 The Bluetooth control program 304 also adds an offset (difference) to the Bluetooth clock managed by the program, according to the Bluetooth clock reported by the personal computer 51, to establish synchronization in the time domain.

In step S109, the Bluetooth control program 86G receives the ID packet sent from the portable telephone 52.

10 After synchronization is established with the portable telephone 52 in the Piconet, the Bluetooth control program 86G proceeds to step S110, and starts Bluetooth communication.

For example, the Bluetooth control program 86G requests a report of available profiles (services) for the portable telephone 52. In Bluetooth, all protocol specifications and user interfaces are specified for each unit expected to have Bluetooth technology, and a profile is specified for each protocol to be used. In the profile, the function of each layer of Bluetooth and coordination with the layer are specified for each application.

The Bluetooth control program 86G selects a predetermined profile from the profiles reported by the portable telephone 52, and performs communication according to the profile.

20 Mutual authentication may be required before the profiles which can be provided are obtained, or before a profile is selected and communication is performed. Authentication is performed by using link keys specified in the databases of the personal computer 51 and the portable telephone 52.

For example, when the personal computer 51 and the portable telephone 52 perform communication for the first time, the user is asked to input a PIN (personal identification number) code to specify a link key. The link key is set based on an inputted PIN code and a generated random number. The link keys set are associated with the Bluetooth addresses of partners of the communication and recorded in their respective databases.

As link keys, according to usage, "an initialization key", "a single-body key", "a combination key", and "a master key" are specified. As described above, the link key specified according to the PIN code and the random number when communication is performed for the first time is an initialization key.
5 In authentication performed with the use of an initialization key, the initialization key, the Bluetooth address of a terminal which has requested authentication, and a 128-bit random number generated by a terminal which determines authentication are used.

As described above, by communication at the reader/writer 105, the personal computer 51 can
10 obtain the Bluetooth address of the slave with which synchronization needs to be established in the Piconet, from the non-contact IC card 246. Therefore, as shown in FIG. 6, even when the PDA 53 is located close to the personal computer 51, Bluetooth communication is started only between the personal computer 51 and the portable telephone 52 without selection of a terminal.

With this, for example, to perform Bluetooth communication with the personal computer 51, the
15 user of the portable telephone 52 can start the communication just by bringing the portable telephone 52 close to the personal computer 51. To transfer data from the personal computer 51 to the portable telephone 52, the user can also start communication in the same way just by bringing the portable telephone 52 close to the personal computer 51.

In the above description, it is assumed that the Bluetooth modules of the personal computer 51, the
20 portable telephone 52, and the PDA 53 have already been activated. When the Bluetooth modules have not been activated, they may be activated, for example, when electromagnetic waves are received, and then synchronization is established in the Piconet.

A series of processes in which the communication system establishes synchronization in a Piconet when Bluetooth modules are not activated will be described next by referring to flowcharts shown in
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FIG. 22 and FIG. 23.

The processes shown in FIG. 22 and FIG. 23 are basically the same as the synchronization establishment processes described by referring to FIG. 20 and FIG. 21. The processes shown in FIG. 22 and FIG. 23 differ in that the Bluetooth module 247 of the portable telephone 52 is activated in response to receiving electromagnetic waves emitted from the reader/writer 105, and the Bluetooth module 106 of the personal computer 51 is activated in response to the state in which the reader/writer 105 receives the card ID sent from the non-contact IC card 246.

In step 201, the reader/writer control program 86F emits electromagnetic waves to detect a terminal having a built-in noncontact IC card.

When the electromagnetic waves are received in step S211, the non-contact-IC-card control program 302 proceeds to step S212, and instructs the Bluetooth control program 304 (Bluetooth module 246) to perform activation.

For example, the non-contact-IC-card control program 302 reports to the host program 301 that electromagnetic waves have been received. In response to this report, the host program 301 activates the Bluetooth control program 304, and controls the power-supply circuit block 235 to supply electric power to the Bluetooth module 247.

The Bluetooth control program 304 is activated in step S221, and, for example, (in an inquiry-scanning state) waits for an inquiry made by the master (personal computer 51).

After the non-contact-IC-card control program 302 activates the Bluetooth control program 304, the non-contact-IC-card control program 302 proceeds to step S213, and reports the card ID corresponding to the Bluetooth address to the reader/writer 105.

When the card ID is received in step S202, the reader/writer control program 86F proceeds to step S203, activates the Bluetooth control program 86G, and supplies electric power to the Bluetooth module 106.

The Bluetooth control program 86G is activated in step S181, proceeds to step S182, and receives the Bluetooth address (card ID) which the reader/writer control program 86F has obtained from the portable telephone 52.

- 5 The reader/writer control program 86F activates the Bluetooth control program 86G in step S203, proceeds to step S204, and reports the card ID obtained from the portable telephone 52 to the Bluetooth control program 86G.

- 10 In subsequent processes (processes in step S183 to step S189, and processes in step S222 to step S227), the Bluetooth control program 86G performs an inquiry and paging, described by referring to FIG. 20 and FIG. 21, for the Bluetooth module 246.

More specifically, the Bluetooth control program 86G identifies the portable telephone 52 as a slave with which synchronization should be established in the Piconet according to the Bluetooth address reported by the reader/writer 105, and establishes synchronization only with the portable telephone 52 in the Piconet.

- 15 Since the PDA 53 does not receive electromagnetic waves from the reader/writer 105, it is not activated. Therefore, it is easier to identify the partner of communication.

- 20 As described above, since the Bluetooth module 246 is activated in response to receiving electromagnetic waves, the user of the portable telephone 52 can activate the Bluetooth control program 304 just by bringing the portable telephone 52 close to the personal computer 51 without, for example, performing an operation for activating the Bluetooth control program 304. In the same way as that described above, since the partner of communication is specified according to the card ID reported from the non-contact IC card 246, Bluetooth communication with the personal computer 51 can be performed without any manipulation being performed.

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In the above description, the Bluetooth module 247 of the portable telephone 52 is activated in response to receiving electromagnetic waves emitted from the reader/writer 105, and the Bluetooth module 106 of the personal computer 51 is activated in response to receiving the card ID sent from the portable telephone 52. However, various timings may be used for their activation.

For example, the Bluetooth control program 304 of the portable telephone 52 may be activated at the time (immediately after step S213) that the card ID is reported to the personal computer 51.

It is also possible to turn on power to the portable telephone 52 according to electromotive force generated in response to receiving electromagnetic waves in a state in which the power to the portable telephone 52 is off, and then activate the Bluetooth control program 304.

In the above description, the non-contact IC card 246 and the Bluetooth module 247 are both built into the portable telephone 52. For example, the memory stick 223 in which these modules are incorporated may be mounted to the memory stick slot 222 to execute the above-described processes.

FIG. 24A is a view showing in a sketch manner a memory stick 223 in which the non-contact IC card 246 and the Bluetooth module 247 are incorporated mounted to the portable telephone 52 to extend its functions.

Even when a non-contact IC card 246 or Bluetooth module 247 is not built into the portable telephone 52, for example, the functions of the portable telephone 52 can be extended by mounting the memory stick 223 to the portable telephone 52, and processes for establishing synchronization in the Piconet, described above, can be executed.

A control program for controlling a newly added function is read from the memory stick 223 and installed on the portable telephone 52. The control program may be, for example, installed from a recording medium, such as the magnetic disk 101 to the semiconductor memory 104 shown in FIG. 11, through a USB cable.

Instead of the memory stick 223, an externally connected unit 321 in which the non-contact IC card 246 and the Bluetooth module 247 are incorporated may be used to extend the functions of the portable telephone 52, as shown in FIG. 24B. The externally connected unit 321 is connected, for example, to a USB connector provided at a predetermined position of the portable telephone 52, or to the connector of a charging cable.

FIG. 25A is a view showing in a sketch manner that a Bluetooth module 247 built in the portable telephone 52 and a memory stick 223 used to add the functions of a non-contact IC card 246 to the portable telephone 52.

When the memory stick 223 is mounted to the portable telephone 52, and the card ID assigned into the non-contact IC card 246 is set so as to include the Bluetooth address assigned to the Bluetooth module 247, the processes for establishing synchronization in a Piconet, described above, can be executed. A process for rewriting the card ID will be described later by referring to a flowchart.

As shown in FIG. 25B, only the function of the non-contact IC card 246 can be added by mounting the externally connected unit 321 to the portable telephone 52.

In contrast to FIG. 25A, FIG. 26A is a view showing in a sketch manner that the non-contact IC card 246 is built into the portable telephone 52 and the memory stick 223 is used to add the function of the Bluetooth module 247 to the portable telephone 52. FIG. 26B is a view showing in a sketch manner that the externally connected unit 321 is used to add the functions of the Bluetooth module 247 to the portable telephone 52.

In the following description, when there is no need to distinguish between the memory stick 223 and the externally connected unit 321 which adds the functions of a non-contact IC card 246, the functions of a Bluetooth module 247, or both sets of functions, they are collectively called a function extension unit.

A process for rewriting the card ID as required in the portable telephone 52 will be described next by referring to flowcharts.

A process for rewriting the card ID according to a Bluetooth address in the portable telephone 52 will be described first by referring to a flowchart shown in FIG. 27.

5 In step S251, the host program 301 queries the card-ID setting program 303 for the card ID. When the query is received in step S271, the card-ID setting program 303 proceeds to step S272, reads the card ID specified in the EEPROM 264, and reports it to the host program 301.

When the card ID is received in step S252, the host program 301 proceeds to step S253, and inquires of the Bluetooth control program 304 about the Bluetooth address.

10 When the inquiry is received in step S281, the Bluetooth control program 304 proceeds to step S282, reads the Bluetooth address stored in the flash memory 174B, and reports it to the host program 301.

In step S254, the host program 301 obtains the Bluetooth address reported by the Bluetooth control program 304, and compares it with the card ID already reported. In step S255, the host program 301 determines whether the obtained card ID includes at least the Bluetooth address (information related to the Bluetooth address).

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When the host program 301 determines in step S255 that the card ID is the same as the Bluetooth address, or that the card ID includes the Bluetooth address, the host program 301 terminates. When the host program 301 determines in step S255 that the card ID does not include the Bluetooth address, the host program 301 proceeds to step S256, and reports the obtained Bluetooth address to the card ID setting program 303.

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When the Bluetooth address is received in step S273, the card-ID setting program 303 proceeds to

step S274, and sets the card ID to the Bluetooth address. In other words, the card-ID setting program 304 rewrites the card ID specified in the EEPROM 264 to the Bluetooth address.

5 With this, the card ID includes the Bluetooth address. As described above, bringing the portable telephone 52 close to the personal computer 51 serving as the master allows the personal computer 51 to identify the slave with which synchronization should be established in the Piconet.

10 Including processes described below, the process for rewriting the card ID may be performed at a predetermined interval. Since the non-contact IC card 246 is used in various cases, such as for passing through train gates and paying for purchased goods, other than Bluetooth communication, the user may change the card ID as required. Therefore, when the card ID is rewritten at a predetermined interval, the user does not need to re-specify the card ID every time the user wants to start Bluetooth communication.

15 The card ID may be rewritten at the time that electromagnetic waves sent from the reader/writer 105 are received. With this, the master, which has the reader/writer, can identify the partner of communication more securely.

A process performed in the portable telephone 52 when a function extension unit for adding the function of the noncontact IC card 246 is mounted will be described next by referring to a flowchart shown in FIG. 28.

20 In step S301, the host program 301 determines whether a function extension unit for adding the functions of a non-contact IC card 246 has been mounted. The host program 301 waits until it determines that the unit has been mounted. When the host program 301 determines in step S301 that, for example, the memory stick 223 shown in FIG. 25A or the externally connected unit 321 shown in FIG. 25B has been mounted at a predetermined position, the host program 301 proceeds to step S302.

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Subsequent processes are the same as those described by referring to FIG. 27. More specifically, the host program 301 obtains the card ID and the Bluetooth address, and determines in step S306 whether the card ID includes at least the Bluetooth address.

5 When the host program 301 determines in step S306 that the card ID includes the Bluetooth address, the host program 301 terminates. When the host program 301 determines that the card ID does not include the Bluetooth address, the host program 301 proceeds to step S307, and reports the Bluetooth address to the card-ID setting program 303.

10 The card-ID setting program 303 rewrites, for example, the specified card ID to the received Bluetooth address.

With this, for example, by the user merely purchasing a memory stick 223 for adding the function of the non-contact IC card 246 and mounting the memory stick 223 to the portable telephone 52, the card ID of the non-contact IC card 246 can be rewritten as required.

15 Therefore, the user can use the portable telephone 52 to which the functions have been added to execute the above-described processes for establishing synchronization in the Piconet and to start Bluetooth communication without selecting a partner of communication.

A process performed in the portable telephone 52 when a function extension unit for adding the function of the Bluetooth module 247 is mounted will be described next by referring to a flowchart shown in FIG. 29.

20 In step S341, the host program 301 determines whether a function extension unit for adding the function of the Bluetooth module 247 has been mounted. The host program 301 waits until it determines that the unit has been mounted. When the host program 301 determines in step S341 that, for example, the memory stick 223 shown in FIG. 26A or the externally connected unit 321 shown in FIG. 26B has been mounted at a predetermined position, the host program 301 proceeds to step S342.

25 Subsequent processes are the same as those described by referring to FIG. 27. More specifically, the

host program 301 obtains the card ID and the Bluetooth address, and determines in step S346 whether the card ID includes at least the Bluetooth address.

5 When the host program 301 determines in step S346 that the card ID includes the Bluetooth address, the host program 301 terminates. When the host program 301 determines that the card ID does not include the Bluetooth address, the host program 301 proceeds to step S347, and reports the Bluetooth address to the card-ID setting program 303.

The card-ID setting program 303 rewrites, for example, the specified card ID to the received Bluetooth address.

10 With the above-described processes, for example, by the user merely purchasing a memory stick 223 for adding the functions of a Bluetooth module 247 and mounting the memory stick 223 to the portable telephone 52, the card ID can be rewritten as required. In addition, the user can use the portable telephone 52 to execute the above-described processes for establishing synchronization in the Piconet.

15 In the above description, memory for storing the card ID and the memory for storing the Bluetooth address are provided. One physical memory shared by the non-contact IC card 246 and the Bluetooth module 247 may store those pieces of information. The shared memory may be incorporated into the memory stick 223 or may be built into the portable telephone 52.

20 In the above description, the personal computer 51 serves as the master, and the portable telephone 52 serves as a slave. Of course either device may perform either role. When a reader/writer is also provided for the portable telephone 52, it is also possible that the portable telephone 52 detects the personal computer 51, and establishes synchronization in the Piconet according to the card ID reported from the non-contact IC card of the personal computer 51.

25 The communication system in which the Bluetooth address is obtained by communication between the non-contact IC card and the reader/writer and synchronization is established in the Piconet