AO 120 (Rev. 08/10)

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

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:22-cv-51	2/10/2022	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
COUNTERFLO AB	WALMART INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,791,829	7/29/2014	COUNTERFLO AB
2			
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Dir

AMAZON.COM, INC. ET AL.
EXHIBIT 1002

AO 120 (Rev. 08/10)

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

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas on the following

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

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:22-cv-50	2/10/2022	Eastern District of Texas

PLAINTIFF	DEFENDANT
COUNTERFLO AB	AMAZON.COM, INC. and AMAZON.COM SERVICES LLC,

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	8,791,829	7/29/2014	COUNTERFLO AB
2			
3			
4			
5			

In the above---entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
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In the above---entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1---Upon initiation of action, mail this copy to Director Copy 3---Upon termination of action, mail this copy to Director
Copy 2---Upon filing document adding patent(s), mail this copy to Director Copy 4---Case file copy

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	07/29/2014	8791829	0904-021	8165

113648 7590 07/09/2014

Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404-7999

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 1768 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Anton Gustafsson, Eskilstuna, SWEDEN;
Magnus Gyllensward, Stockholm, SWEDEN;
Christina Ohman, Saltsjo-Boo, SWEDEN;
Sara Ilstedt-Hjelm, Lidingo, SWEDEN;

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 USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

113648 7590 04/02/2014
Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404-7999

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

TITLE OF INVENTION: Visualisation Arrangement

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/02/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
GIRMA, FEKADESELASS	2689	340-635000

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

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

1 PATENT PORTFOLIO BUILDERS PLLC
2
3

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

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

(A) NAME OF ASSIGNEE: THE INTERACTIVE INSTITUTE II AB

(B) RESIDENCE: (CITY and STATE OR COUNTRY): STOCKHOLM, SWEDEN

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☒ Payment by credit card.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 50-5835 (enclose an extra copy of this form).

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

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

Authorized Signature /Steven M. duBois/ Date June 25, 2014
Typed or printed name Steven M. duBois Registration No. 35,023

Electronic Patent Application Fee Transmittal

Application Number:	11885697
Filing Date:	03-Oct-2007
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Filer:	Steven Maurice Dubois/Tina Jenkins
Attorney Docket Number:	0904-021

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	480	480
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**480**

Electronic Acknowledgement Receipt

EFS ID:	19403625
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	113648
Filer:	Steven Maurice Dubois/Tina Jenkins
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	25-JUN-2014
Filing Date:	03-OCT-2007
Time Stamp:	16:23:45
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$480
RAM confirmation Number	2886
Deposit Account	
Authorized User	

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)	2014-06-25_IF_Transmittal_0904-021.pdf	1573762 96cddb0a87520581b3e226a3d2b5fac4bef5a645	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30218 07de187f81efefdf5ef69f5985532a15e3a99c4d	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1603980	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

113648 7590 04/02/2014
Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404-7999

EXAMINER
GIRMA, FEKADESELASS

ART UNIT	PAPER NUMBER
2689	

DATE MAILED: 04/02/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

TITLE OF INVENTION: Visualisation Arrangement

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/02/2014

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: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

113648 7590 04/02/2014
Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404-7999

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

TITLE OF INVENTION: Visualisation Arrangement

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/02/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
GIRMA, FEKADESELASS	2689	340-635000

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

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

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

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

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

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

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

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

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

113648 7590 04/02/2014

Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404-7999

EXAMINER	
GIRMA, FEKADESELASS	
ART UNIT	PAPER NUMBER
2689	

DATE MAILED: 04/02/2014

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

The Patent Term Adjustment to date is 1493 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 1493 day(s).

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

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

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

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

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

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

Privacy Act Statement

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

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

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

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	11/885,697	GUSTAFSSON ET AL.	
	Examiner	Art Unit	
	Fekadeselassie Girma	2689	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Fekadeselassie Girma*. (3)_____.

(2) *Steven M. duBois* . (4)_____.

Date of Interview: *17 March 2014*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1-15*.

Identification of prior art discussed: *N/A*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant has been contacted for minor correction in the claims. However, applicant/client does not respond. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee. .

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Fekadeselassie Girma/ Examiner, Art Unit 2689	

Notice of Allowability	Application No. 11/885,697	Applicant(s) GUSTAFSSON ET AL.	
	Examiner Fekadeselassie Girma	Art Unit 2689	AIA (First Inventor to File) 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 *Appeal Brief filed on 27 January 2011*.
   ☐ 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 *1-17*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

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

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *17 March 2014* .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Fekadeselassie Girma/
Examiner, Art Unit 2689

DETAILED ACTION

Claim Status

1. Claim 1-17 are allowed in view of Examiner's Amendment presented below.

EXAMINER'S AMENDMENT

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

In the claims:

Claim 1. (Currently Amended) An arrangement for visual indication of an electrical quantity, being one or several of power, current [[and/or]] or voltage through a conductor, wherein the arrangement [[comprising]] comprises a substantially wire shaped illuminator and a controller [[adapted to]] for control at least one illumination characteristic of said wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the wire shaped illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

Claim 4. (Currently Amended) The arrangement of claim 1, wherein said wire shaped illuminator is an optical fiber [[fibre]].

Claim 5. (Currently Amended) The arrangement of claim 1, wherein said controller [[is]] further [[adapted to send]] sends a control signal to control said wire shaped illuminator.

Claim 7. (Currently Amended) The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said wire shaped illuminator receiving control signals from said processing arrangement.

Claim 8. (Currently Amended) The arrangement of claim 1, wherein said illumination characteristic [[feature]] is one or several of intensity, color [[colour]] or frequency.

Claim 9. (Currently Amended) A cord [[comprising]] comprises at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire, said substantially wire shaped illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current or [[and/or]] voltage through the at least one electric wire,

wherein said substantially wire shaped illuminator indicates the [[consumed]] current or voltage [[current/voltage]] through said at least one electric wire when at least one illumination characteristic of said substantially wire shaped illuminator is controlled with respect to said electrical quantity by feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the [[consumed]] current or voltage [[current/voltage]] through at least one electrical wire.

Claim 10. (Currently Amended) The cord of claim 9, further comprising a substantially translucent coating, covering said at least one electric wire and substantially wire shaped illuminator.

Claim 11. (Currently Amended) The cord of claim 9, wherein said substantially wire shaped illuminator is an electroluminescent wire.

Claim 12. (Currently Amended) The cord of claim 9, wherein said substantially wire shaped illuminator is an optical fiber [[fibre]].

Claim 13. (Currently Amended) The cord of claim 9, wherein said substantially wire shaped illuminator [[illuminating arrangement]] indicates current or [[and/or]] power [[consuming]] through said at least one electric wire.

Claim 14. (Currently Amended) A method of visually indicating an electrical quantity, being one or several of power, current or [[and/or]] voltage through a conductor, the method comprising the steps of:

energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said substantially wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity and

feeding the substantially wire shaped illuminator with varying current or voltage corresponding to the [[consumed]] current or voltage [[current/voltage]] through the conductor.

Claim 15. (Currently Amended) A device for providing a variable visual indication of consumption of electricity comprising:

a measurement unit, disposed [[disposable]] between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and

a controller connected to said measurement unit and configured to receive said measured variable electrical quantity [[measurements]] from said measurement unit, and further configured to control a plurality of illumination devices based on said received [[measurements]] said measured variable electrical quantity;

wherein said plurality of illumination devices output light which varies over time as a function of said measured[[,]] variable electrical quantity.

Claim 16. (**Currently Amended**) The device of claim 15, wherein said plurality of illumination devices each comprise a copper wire coated with a phosphorous material and two transmitter wires wrapped around the copper wire.

Claim 17. (**Currently Amended**). The device of claim 15, wherein said light output by said plurality of illumination devices varies in at least one of intensity, color [[colour]] or frequency over time based on said measured variable electrical quantity.

Allowable Subject Matter

3. The following is a statement of reasons for the indication of allowable subject matter: The following is an examiner's statement of reasons for allowance: the prior art of record fails to disclose or suggest a combination of a plurality of an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor, wherein the arrangement comprise a substantially wire shaped illuminator and a controller control at least one illumination characteristic of said wire shaped illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the wire shaped illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor. Moreover, the prior art indicates that this particular device and method is novel and has not been published or patented by other entities. This along with the rest of the claimed limitations is not shown by the prior art.

The best prior arts found during examination process do not fairly show or suggest a claimed invention. For example, Hussaini (US 7195561) is directed to a "Video Game Controller with Illuminated Cable" (Hussaini, Title). Hussaini teaches (id, Fig. 2, 3a) a video game controller cable 7 having a communication cable 7b and a side glow fiber optic cable 7a running the length of the communication cable (id., col. 2, 11. 33-36, 45-56). A light transmitting protective outer sheath 7c covers both the communication cable 7b and the fiber optic cable 7a.

Woodruff (US 6758314) is directed to "a portable light reel system holding electro-luminescent (EL) wire and self-contained electronics..." Woodruff teaches the brightness of the electro-luminescent cable may be varied by varying the output power and frequency

characteristic of an inverter that drives the electroluminescent cable or by use of a dimmer or toggle switch.

Davenport (US 7270442) is directed to "monitoring the status of a visual signal lamp," such as those found in a railway signal. Davenport teaches that light 32 from a signal lamp 12 is transported by an optical fiber 14 to a photo-detector 16. Photo-detector 16 produces an electrical output proportional to the light 32 from the signal lamp 12. The output of photo-detector 16 is compared, using threshold detection circuitry 18, to predetermined threshold values to determine if the output of photo-detector 16 falls outside a predetermined threshold to activate a logical processor 22 and alerting system 24. Hussaini's side glow fiber optic cable 7a (Hussaini) on the optic fiber cable to teach the recited "substantially wire shaped illuminator" which is fed with varying current or voltage corresponding to the electrical quantity measured in the conductor.

The previous office action relies on Woodruff to teach varying the current or voltage to a wire shaped illuminator to vary the intensity of the light produced by the wire shaped illuminator. That is, the previous office action relies on Hussaini's optic cable 7a and Woodruff's electro-luminescent cable to teach an output indication resulting from measuring the electrical quantity in the conductor.

Thus, in the combination articulated by the previous office action of the electrical quantity measured by Davenport's threshold detection circuitry 18 would be the result of monitoring the wire shaped illuminator (i.e., Hussaini's side glow fiber optic cable 7a (Hussaini, Figs. 2, 3A) or Woodruff's EL wire (Woodruff, Abstract)). Note, however, that the wire shaped illuminator is itself controlled by feeding the wire shaped illuminator with a current or voltage

determined from the measuring of the electrical quantity. Therefore it has been concluded that the related arts have not identified a rational underpinning for the combination of Davenport with Hussaini and Woodruff. Independent claims 9, 14, and 15, which recite similar limitations to claim 1 and were rejected on similar grounds and claims 2-8, 10-13, 16, and 17, which variously depend, directly or indirectly, from claims 1, 9, or 15.

Therefore, claims 1-17 of the present application are considered novel, consequently, are allowed.

Citation of Other Prior Arts

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

i. Davenport discloses in System and method for monitoring status of a visual signal device (US 2005/0040954),

ii. Hussaini discloses in Video game controller with illuminated cable (US 7195561) and

iii. Woodruff discloses in Portable light reel system (US 6758314).

Conclusion

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

examiner should be directed to FEKADESELASSIE GIRMA whose telephone number is (571)270-5886. The examiner can normally be reached on Monday thru Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Mehmood can be reached on 571-272-2976. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/Fekadeselassie Girma/

Examiner Art Unit 2689

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	11/885,697	GUSTAFSSON ET AL.	
	Examiner	Art Unit	
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☐ Attachment

/Fekadeselassie Girma/ Examiner, Art Unit 2689	

Notice of References Cited	Application/Control No. 11/885,697	Applicant(s)/Patent Under Reexamination GUSTAFSSON ET AL.	
	Examiner Fekadeselassie Girma	Art Unit 2689	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2005/0040954	02-2005	McNally, Terry C.	340/573.3
*	B	US-7,195,561	03-2007	Hussaini et al.	463/31
*	C	US-6,758,314	07-2004	Woodruff, George	191/12.2R
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11885697	GUSTAFSSON ET AL.
Examiner	**Art Unit**
FEKADESELASSIE GIRMA	2689

CPC

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CPC Combination Sets

Symbol	Type	Set	Ranking	Version
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		Total Claims Allowed:	
(Assistant Examiner)	(Date)	1	
/FEKADESELASSIE GIRMA/ Examiner.Art Unit 2689 (Primary Examiner)	03/15/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	**Art Unit**
	FEKADESELASSIE GIRMA	2689

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
340	635

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
340	854.6	854.9	568.2		
385	901	102			
439	101	102			
315	313	312	315		
362	84	319	186		

INTERNATIONAL CLASSIFICATION														
CLAIMED						**NON-CLAIMED**								
G	0	8	B	21 / 00 (2006.01.01)										
G	0	8	B	13 / 12 (2006.01.01)										
G	0	2	B	6 / 44 (2006.01.01)										
H	0	1	R	13 / 648 (2006.01.01)										
G	0	5	F	1 / 00 (2006.01.01)										
F	2	1	V	9 / 16 (2006.01.01)										

(Assistant Examiner)	(Date)	**Total Claims Allowed:** 1	
/FEKADESELASSIE GIRMA/ Examiner.Art Unit 2689	03/15/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	**Art Unit**
	FEKADESELASSIE GIRMA	2689

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

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

(Assistant Examiner)	(Date)	Total Claims Allowed: 1	
/FEKADESELASSIE GIRMA/ Examiner.Art Unit 2689	03/15/2014	O.G. Print Claim(s) 1	O.G. Print Figure 1
(Primary Examiner)	(Date)		

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BIB DATA SHEET

CONFIRMATION NO. 8165

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/885,697	10/03/2007 RULE	340	2689	0904-021

APPLICANTS

INVENTORS

Anton Gustafsson, Eskilstuna, SWEDEN;
Magnus Gyllensward, Stockholm, SWEDEN;
Christina Ohman, Saltsjo-Boo, SWEDEN;
Sara Ilstedt-Hjelm, Lidingo, SWEDEN;

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

This application is a 371 of PCT/SE06/00283 03/06/2006

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

SWEDEN 0500523-6 03/07/2005

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

04/09/2008

Foreign Priority claimed ☑ Yes ☐ No		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met ☑ Yes ☐ No	☐ Met after Allowance				
Verified and Acknowledged /FEKADESELASSIE GIRMA/ Examiner's Signature	/FG/ Initials	SWEDEN	3	14	3

ADDRESS

Patent Portfolio Builders, PLLC
P.O. Box 7999
Fredericksburg, VA 22404-7999
UNITED STATES

TITLE

Visualisation Arrangement

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

BIB (Rev. 05/07).

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	("7195561" | "7270442" | "6758314").pn.	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 18:59
L2	324	bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 19:24
L3	8189	340/854,635, 9|340/568.2|340/596, 385/901|385/102|385/16|439/102|439/901	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 19:52
L4	13380	340/854 |340/635 | 340/568.2 | 340/596 | 385/901 | 385/102 | 385/16 |439/102 | 439/901	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 19:54
L5	1	2 4	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 19:54
L6	5	poker table illuminat$4	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2014/03/15 20:05
L7	51847	electroluminescent	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:10
L8	804	L7 and ((copper or aluminum or conductor) adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:10
L9	75	(cord cable wire) with (glow$3 illuminat$4) with (dim dimming dimable)	US-PGPUB; USPAT; USOCR	OR	ON	2014/03/15 20:11
L10	177	hologram near target	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:12
L11	1588	340/854.9|340/568.2|340/596	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:12
L12	0	(G01R31/343 | H02H3/006 | H01R13/641 | H02H3/042 | G01R31/008)".cpc"	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:19

L13	3476	(G01R31/343 | H02H3/006 | H01R13/641 | H02H3/042 | G01R31/008).cpc.	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:22
L14	0	2 13	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:22
L15	1411267	(meter or volt$meter or ammeter or indicator or voltage$meter or (volt$3 adj1 meter))	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L16	1072	L15 13	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:23
L17	4408	362/84	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L18	441	362/552	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L19	1445	439/490	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L20	100035	"174".clas.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L21	6849	340/815$	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L22	4877	(340/815.42-815.75).ccls.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L23	131	"340"/815.5	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L24	713	340/641	US-PGPUB; USPAT; EPO; JPO	AND	ON	2014/03/15 20:23
L25	116372	(L17 or L18 or L19 or L20 or L21 or L22 or L23 or L24)	US-PGPUB;	AND	ON	2014/03/15 20:23

			USPAT; EPO; JPO			
L26	62	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and L25	US-PGPUB; USPAT; USOCR	AND	ON	2014/03/15 20:23
S1	80	6169491|6377054|5122733|6347172|20020039666	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S2	80	(6169491|6377054|5122733|6347172|20020039666)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S3	5	(6169491|6377054|5122733|6347172|20020039666).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S4	12	"6347172"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 09:39
S5	17	("5506674" | "5577147" | "5638483" | "5671308" | "5708499" | "5905837" | "5982967" | "5987199" | "5995702" | "6275644").PN. OR ("6347172").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 20:54
S6	1339	385/901	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:09
S7	11	((conductor or copper) adj3 wire$2) and S6	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:16
S8	11	("3819928" | "4623217" | "4887190" | "5140659" | "5222165" | "5311410").PN. OR ("5454056").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:26
S9	7146	385/901|385/102|385/16|439/102|439/901	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:31
S10	257	((conductor or copper) adj3 wire$2) and S9	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:31
S11	6	("4424954" | "5136673" | "5165003" | "6032449" | "6127626" | "6193824").PN. OR ("7352936").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:07
S12	23261	(power or current or volt$4) adj3 indicator$2	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:24

S13	16	S9 S12	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:24
S14	15	("20040058733" | "20050221250" | "20060018596" | "20080089088" | "4422719" | "4466697" | "4830461" | "4872837" | "4893897" | "4909594" | "5334206" | "5431647" | "5542017" | "6551346" | "7356225").PN. OR ("7620279").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:27
S15	886	385/101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:39
S16	1	"20080191890" A1	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:42
S17	287	(power adj1 cord) same (meter or voltmeter or ammeter ot indicator)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:49
S18	0	S17 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:52
S19	1	S17 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:53
S20	1	S17 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:53
S21	962931	(meter or volt$meter or ammeter or indicator or voltage$meter or (volt$3 adj1 meter))	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S22	237	S21 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S23	887	S21 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S24	188	S21 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S25	2	S22 S23 S24	US-	AND	ON	2009/12/09

			PGPUB; USPAT; EPO; JPO			23:55
S26	1020	S22 S23 S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/09 23:57
S27	2324	surge adj2 protector	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:10
S28	3663	S27 S6	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:11
S29	0	S27 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S30	1	S27 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S31	3	S27 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S32	2	S27 S17	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:13
S33	525	40/544	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:20
S34	963372	S33 S21	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:26
S35	84	S33 S21	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:26
S36	0	S35 (5|11|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:26
S37	1021	S34 (5|11|2)	US-	AND	ON	2009/12/10

			PGPUB; USPAT; EPO; JPO			00:27
S38	25477	S34 and (I5|I11|I2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S39	1	S35 and (I5|I11|I2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S40	102	S27 and (I5|I11|I2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:28
S41	8	("20020039666" | "20040067387" | "20050037233" | "5122733" | "5485355" | "6169491" | "6347172" | "6377054").PN.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 11:21
S42	2	("2002/0039666").URPN.	USPAT	AND	ON	2009/12/10 11:22
S43	20	("20020011219" | "20020039666" | "3798481" | "3819973" | "5333228" | "5383100" | "5485355" | "5669214" | "5753381" | "5842766" | "5876863" | "5995702" | "6169835" | "6341550" | "6347172" | "6394625" | "6742909" | "6976762" | "RE32374").PN. OR ("7401961").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 11:25
S44	11	("0807189" | "1096457" | "4903179" | "5345531" | "5528477").PN. OR ("6394625").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:17
S45	3	(7379642|7170007|7202418).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:25
S46	2	poker table illuminat$4	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:30
S47	80	6169491|6377054|5122733|6347172|20020039666	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:35
S48	5	(6169491|6377054|5122733|6347172|20020039666).pn.	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:35
S49	2	("2002/0039666").URPN.	USPAT	AND	ON	2009/12/10 13:36
S50	3	"20040058733"	US-	AND	ON	2009/12/10

			PGPUB; USPAT; EPO; JPO			13:37
S51	39	(6854869|20020065134|6347172|20040048665)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:40
S52	4	(6854869|20020065134|6347172|20040048665).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:40
S53	26	("4234907" | "5709448" | "6016038" | "6126233" | "6302570" | "6577794").PN. OR ("6854869").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:41
S54	17	("5506674" | "5577147" | "5638483" | "5671308" | "5708499" | "5905837" | "5982967" | "5987199" | "5995702" | "6275644").PN. OR ("6347172").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:55
S55	13	("20020065134" | "20040048665" | "2410277" | "5286922" | "6159037" | "6347172" | "6854869").PN. OR ("7195561").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:03
S56	33271	electroluminescent	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:19
S57	87	S56 and (conductor adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:19
S58	336	S56 and ((copper or aluminum or conductor) adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:20
S59	324	S58 and (measure$2 or value or current or volt$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:20
S60	21	S59 and (phosphorus and color$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:23
S61	1055	340/854.9|340/568.2|340/596	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 15:18
S62	6	"6758314"	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 15:20
S63	42	(cord cable wire) with (glow$3 illuminat$4) with (dim dimming dimable)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:28
S64	1	"20080191890"	US-	OR	ON	2009/12/10

			PGPUB; USPAT; USOCR			15:39
S65	2131	light$4 with electric adj4 (cable$2 or cord$2)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:41
S66	325	illuminat$4 with electric adj4 (cable$2 or cord$2)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:41
S67	4	wo adj1 "03"?105538	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 16:55
S68	1	wo adj1 "03"?093394	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 16:56
S69	6	"6758314"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 17:11
S70	1	"20080191890"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 17:22
S71	2	"20040145313"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 18:53
S72	2304	translucent adj3 coat$4	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:41
S73	567	S72 and (wire or cable)	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:42
S74	21	S72 and ((copper or alumnum) adj3 (wire or cable))	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:48
S75	4478	metal adj2 detector	US-	AND	ON	2009/12/11

			PGPUB; USPAT; USOCR			09:58
S76	705	S75 with magnet$4	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 09:58
S77	10344	magnet$4 adj4 detector	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:02
S78	66	S77 with battery	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:03
S79	619	(magnet$4 and detector$3).ti.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:57
S80	23	S79 and (magnetic adj3 switch)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:59
S81	0	(magnet$4 adj1 flex adj1 detector$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:10
S82	316	(magnet$4 adj1 flux adj1 detector$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:11
S83	63	S82 and led	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:11
S84	0	S80 S83	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:11
S85	17	(magnet$4 and flux and detector$3).ti.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:14
S86	1	"20080191890" A1	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 01:06
S87	49	(cord cable wire) with (glow$3 illuminat$4) with (dim dimming dimable)	US-PGPUB; USPAT; USOCR	OR	ON	2010/05/11 01:11
S88	1	dim near5 bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (conductor or wire or illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:22
S89	188	bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (conductor or wire or illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:23

S90	175	bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:32
S91	2050	bright$5 near5 ((control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:33
S92	2288	bright$5 near5 ((control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:33
S93	2239	bright$5 near5 ((control or adjust$4)) near4 (illumina$5)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:33
S94	2355	bright$5 near5 ((control or adjust$4)) near4 (illumina$5 or electroluminescent$3 or luminescent$3)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:34
S95	757	S94 not display	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:35
S96	1	bright$5 near5 (power adj2 cable) near4 (illumina$5 or electroluminescent$3 or luminescent$3)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:38
S97	155	(power adj2 cable) near4 (illumina$5 or electroluminescent$3 or luminescent$3)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:39
S98	4	("2005/0141237").URPN.	USPAT	AND	ON	2010/05/11 21:47
S99	0	("20020067290" | "20040213540" | "20050024877" | "20050057942").PN.	USPAT	AND	ON	2010/05/11 21:59
S100	4	("20020067290" | "20040213540" | "20050024877" | "20050057942").PN.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:59
S101	92661	"362".clas.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S102	249	S91 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S103	255	S92 S101	US-PGPUB;	AND	ON	2010/05/11 22:04

			USPAT; EPO; JPO			
S104	253	S93 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S105	259	S94 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S106	120	S95 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S107	261	S102 or S103 or S103 or S104 or S105 or S106	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:05
S108	1	("2006/0146552").URPN.	USPAT	AND	ON	2010/05/11 22:08
S109	3	("20030137849" | "20060146552" | "6861809").PN. OR ("7708435").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:10
S110	0	hologram near parking	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:12
S111	100	hologram near target	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:12
S112	30	hologram near4 target and vehicl$2	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:13
S113	43	("4261647" | "4407564" | "4560233" | "4613200" | "4655540" | "4763990").PN. OR ("4832427").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:18
S114	1	US "20080191890" A1	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 11:55
S115	7	"7195561"	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 11:58
S116	19	"6826593"	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 13:28
S117	100	("5857986" | "6135450")	US-PGPUB;	AND	ON	2010/05/13 15:42

			USPAT; USOCR			
S118	2	("5857986" | "6135450").pn.	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 15:42
S119	982	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and (cable$2 or wire or tublar or illumnat$4 or arche$3 or lumnus)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 15:48
S120	765	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and (cable$2 or wire or tublar or illumnat$4 or arche$3 or lumnus)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 15:49
S121	2451	362/84	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
S122	304	362/552	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
S123	1112	439/490	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
S124	86073	"174".clas.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
S125	4928	340/815$	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:10
S126	0	340/815.42-75	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:10
S127	0	(340/815.42-75)".ccls"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:10
S128	4402	(340/815.42-815.75).ccls.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
S129	1	"340"/.5	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11

S130	104	"340"/815.5	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
S131	601	340/641	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
S132	98019	(8|9|10|11|12|15|17|18)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:12
S133	28945	(I8|I9|I10|I11|I12|I15|I17|I18)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:12
S134	98019	(S121 or S122 or S123 or S124 or S125 or S128 or S130 or S131)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:13
S135	39	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and S134	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 16:13
S136	19	("20020039666" | "20040067387" | "20050037233" | "20050057942" | "20050141237" | "20060291136" | "3819973" | "5122733" | "5485355" | "6169491" | "6347172" | "6377054" | "6742909" | "6758314" | "7068893" | "7195561" | "7270442" | "7324006" | "7401961").PN.	US-PGPUB; USPAT; USOCR	AND	ON	2011/05/09 10:34
S137	1	"20080191890"	US-PGPUB; USPAT; USOCR	AND	ON	2011/05/09 12:04

3/15/2014 8:24:20 PM
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	Art Unit
	Fekadeselassie Girma	2612

CPC- SEARCHED		
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CPC COMBINATION SETS - SEARCHED		
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US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
340/854,635, 9|340/568.2|340/596, 385/901|385/102|385/16|439/102|439/901 Text and cursory search	12/10/2009	FG
See attached EAST search notes	12/10/2009	FG
inventor and assignee search	12/10/2009	FG
Consulted with Danny Wu	12/10/2009	FG
fwd and back citation search	12/10/2009	FG
plus search	12/10/2009	FG
340/815.42, 815.57, 815.77, 815.75, 641, 362/84, 552, 439/490 text and cursory search	5/13/2010	FG
See attached EAST search notes	5/13/2010	FG
fwd and back citation search	5/13/2010	FG
consulted with Husar, Stephen	5/13/2010	FG
Consulted with Danny Wu	5/13/2010	FG
340/854,635, 9|340/568.2|340/596, 385/901|385/102|385/16|439/102|439/901 Text and cursory search	3/15/2014	FG
See attached EAST search notes	3/15/2014	FG
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INTERFERENCE SEARCH			
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Same as above	Same as above	3/15/2014	FG

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First Named Inventor	Anton Gustafsson
Art Unit	2689
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Signature /stevenmdubois/

Typed or Printed Name Steven M. duBois

Date	Telephone
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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.

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

Electronic Acknowledgement Receipt

EFS ID:	18302901
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Emily Chartier
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	26-FEB-2014
Filing Date:	03-OCT-2007
Time Stamp:	09:21:27
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	2014-02-26_CHANGE_CORRESP_0904-021.pdf	249791 47a8bd002801aedc168f904ad765c7c3b59a7b87	no	2

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 01/13/2014

POTOMAC PATENT GROUP PLLC
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EXAMINER	
GIRMA, FEKADESELASS	
ART UNIT	**PAPER NUMBER**
2689	

NOTIFICATION DATE	DELIVERY MODE
01/13/2014	ELECTRONIC

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANTON GUSTAFSSON, MAGNUS GYLLENSWARD, CHRISTINA OHMAN, and SARA ILSTEDT-HJELM

Appeal 2011-013071
Application 11/885,697
Technology Center 2600

Before CARLA M. KRIVAK, JASON V. MORGAN, and BRUCE R. WINSOR, *Administrative Patent Judges*.

WINSOR, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants[1] appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1-17, which constitute all the claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

---

[1] The real party in interest identified by Appellants is The Interactive Institute II AB. Br. 2.

STATEMENT OF THE CASE

Appellants' disclosure "relates to a visualisation arrangement, especially formed as a cable or wire surrounding, for visualisation of current and/or power consumption." Spec. 1:5-6. Claim 1, which is illustrative, reads as follows:

> 1. An arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor,
>
> wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

The Examiner relies on the following prior art in rejecting the claims:

Hosford	US 3,819,973	June 25, 1974
Woodruff	US 6,758,314 B2	July 6, 2004
Hussaini	US 7,195,561 B2	Mar. 27, 2007
Davenport	US 7,270,442 B2	Sept. 18, 2007

Claims 1, 2, 4, 5, 7-9, and 12-15 stand rejected under 35 U.S.C. § 103(a) as obvious over Hussaini, Woodruff, and Davenport. Ans. 5-8.

Claims 3, 6, 10, 11, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as obvious over Hussaini, Woodruff, Davenport, and Hosford. Ans. 8-10.

Rather than repeat the arguments here, we refer to the Brief ("Br." filed Mar. 10, 2011) and the Answer ("Ans." mailed June 8, 2011) for the respective positions of Appellants and the Examiner.

ISSUE

Appellants argue the patentability of claims 2-17 by reference to the arguments made for the patentability of claim 1. *See generally* Br. 7-15. Accordingly, we discuss the appeal by reference to claim 1.

The dispositive issue presented by Appellants' contentions is as follows: Has the Examiner provided "some articulated reasoning with some rational underpinning," *KSR Int'l. Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)), to support the combination of Davenport with Hussaini and Woodruff, thus rendering claim 1 obvious? [2]

ANALYSIS

Hussaini is directed to a "Video Game Controller with Illuminated Cable" (Hussaini, Title). Hussaini teaches (*id,* Fig. 2, 3a) a video game controller cable 7 having a communication cable 7b and a side glow fiber optic cable 7a running the length of the communication cable (*id.,* col. 2, ll. 33-36, 45-56). A light transmitting protective outer sheath 7c covers both the communication cable 7b and the fiber optic cable 7a.

Woodruff is directed to "[a] portable light reel system holding electro-luminescent (EL) wire and self-contained electronics . . ." (Woodruff, Abstract). Woodruff teaches the brightness of the electro-luminescent cable may be varied by varying the output power and frequency characteristic of an inverter that drives the electroluminescent cable (*id.,* col. 5, ll. 4-6) or by use of a dimmer or toggle switch (*id.*, col. 5, ll. 6-8).

---

[2] Appellants' contentions present additional issues. As the identified issue is dispositive of the appeal, we do not reach the additional issues.

Davenport is directed to "monitoring the status of a visual signal lamp" (Davenport, Abstract), such as those found in a railway signal (*id.* col. 1, ll. 10-15). Davenport teaches (*id.*, Fig. 1; col, 4. ll. 3-20) that light 32 from a signal lamp 12 is transported by an optical fiber 14 to a photodetector 16. Photodetector 16 produces an electrical output proportional to the light 32 from the signal lamp 12 (*id.*, col. 4, ll. 25-27). The output of photodetector 16 is compared, using threshold detection circuitry 18, to predetermined threshold values to determine if the output of photodetector 16 falls outside a predetermined threshold to activate a logical processor 22 and alerting system 24 (*id.*, col. 5, ll. 3-44).

The Examiner finds it would have been obvious to incorporate Davenport into a combination of Hussaini and Woodruff "in order to monitor the status of a visual signal lamp." Ans. 6; *see also* Ans. 18. Appellants contend that although the Examiner has correctly stated the intended function of Davenport's teaching, neither Hussaini nor Woodruff has a visual signal lamp to monitor. Br. 13. We agree with Appellants' conclusion. Although Hussaini's side glow fiber optic cable 7a (Hussaini, Fig. 3a) is arguably analogous to a "visual signal lamp," the Examiner relies on the optic fiber cable to teach the recited "substantially wire shaped illuminator" (Ans. 5) which is fed with varying current or voltage corresponding to the electrical quantity measured in the conductor.

The Examiner relies on Woodruff to teach varying the current or voltage to a wire shaped illuminator to vary the intensity of the light produced by the illuminator (*id.*). That is, the Examiner relies on Hussaini's optic cable 7a and Woodruff's electro-luminescent cable to teach an output indication resulting from measuring the electrical quantity in the conductor.

Thus, in the combination articulated by the Examiner the electrical quantity measured by Davenport's threshold detection circuitry 18 (Davenport, Fig. 1) would be the result of monitoring the illuminator (i.e., Hussaini's side glow fiber optic cable 7a (Hussaini, Figs. 2, 3A) or Woodruff's EL wire (Woodruff, Abstract)). Note, however, that the illuminator is *itself* controlled by feeding the illuminator with a current or voltage determined from the measuring of the electrical quantity.

It is not clear, therefore, from the Examiner's rejection (Ans. 5-6) or explanations (Ans. 12-20) how Hussaini's illuminated cable (Hussaini, Title) combined with Woodruff's portable light reel (Woodruff, Abstract) would benefit from monitoring the status of a visual signal lamp. We conclude the Examiner has not identified a rational underpinning for the combination of Davenport with Hussaini and Woodruff. Accordingly, we do not sustain the rejection of (1) claim 1; (2) independent claims 9, 14, and 15, which recite similar limitations to claim 1 and were rejected on similar grounds (*see* Ans. 7-8); and (3) claims 2-8, 10-13, 16, and 17, which variously depend, directly or indirectly, from claims 1, 9, or 15.

DECISION

The decision of the Examiner to reject claims 1-17 is reversed.

REVERSED

ELD

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 09/13/2011

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EXAMINER	
GIRMA, FEKADESELASS	
ART UNIT	PAPER NUMBER
2612	

NOTIFICATION DATE	DELIVERY MODE
09/13/2011	ELECTRONIC

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FREDERICKSBURG, VA 22404

Appeal No: 2011-013071
Application: 11/885,697
Appellant: Anton Gustafsson et al.

Board of Patent Appeals and Interferences
Docketing Notice

Application 11/885,697 was received from the Technology Center at the Board on September 06, 2011 and has been assigned Appeal No: 2011-013071.

In all future communications regarding this appeal, please include both the application number and the appeal number.

The mailing address for the Board is:

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The facsimile number of the Board is 571-273-0052. Because of the heightened security in the Washington D.C. area, facsimile communications are recommended. Telephone inquiries can be made by calling 571-272-9797 and referencing the appeal number listed above.

By order of the Board of Patent Appeals and Interferences.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 06/08/2011

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ART UNIT	**PAPER NUMBER**
2612	

NOTIFICATION DATE	DELIVERY MODE
06/08/2011	ELECTRONIC

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Interview Summary	Application No.	Applicant(s)	
	11/885,697	GUSTAFSSON ET AL.	
	Examiner	Art Unit	
	FEKADESELASSIE GIRMA	2612	

All participants (applicant, applicant's representative, PTO personnel):

(1) *FEKADESELASSIE GIRMA*. (3)_____.

(2) *Steven M DuBois*. (4)_____.

Date of Interview: *05/24/2011*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1,9,14 and 15*.

Identification of prior art discussed: *N/A*.

Agreement with respect to the claims f)☐ was reached. g)☒ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Examiner initiated interview with Steven M DuBois regarding representation of the applicant without having the representation documnet in the USPTO Attorney/Agent Information file. Attorney recognizes that the representing attorney name is not in the USPTO Attorney/Agent Information file and the attorney informs the examiner that it is permissible to practice/represent client under 37 USC 1.34 "Acting in a representative capacity." Read as, "When a patent practitioner acting in a representative capacity appears in person or signs a paper in practice before the United States Patent and Trademark Office in a patent case, his or her personal appearance or signature shall constitute a representation to the United States Patent and Trademark Office that under the provisions of this subchapter and the law, he or she is authorized to represent the particular party on whose behalf he or she acts. In filing such a paper, the patent practitioner must set forth his or her registration number, his or her name and signature. Further proof of authority to act in a representative capacity may be required." Examiner agrees that the attorney is allowed to practice per MPEP 402 [R-5]; 37 CFR 1.34.

During conducting the above interview, applicant representative requested if it is possible to amend the independent claims to shorten the prosecution procedure and bring the application in condition for allowance. Examiner conducts quick search and advised by primary examiners and suggests applicant to incorporate claim 6 limitations into independent claims 1, 9, 14 & 15 to bring the application to be in condition for allowance. However, after applicant representative discussed with the inventors/ applicant, applicant representative notified examiner that the inventor/applicant decided to proceed with the appeal brief process.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 11/885,697
Filing Date: October 03, 2007
Appellant(s): GUSTAFSSON ET AL.

Steven M DuBois
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10 March 2011 appealing from the Office action mailed 28 May 2010.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-17.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN

REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

7270442	Davenport	09-2007
7195561	Hussaini	03-2007
6758314	Woodruff	07-2004
3819973	Hodford	06-1974
2006/0291136	Okishima	12-2006
2005/0057942	Mako	03-2005
2005/0141237	Goto	06-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

2. The following is a quotation of 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 of this title, 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 negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hussaini (US 7195561) in view of Woodruff (US 6758314) and further in view of Davenport (US 7270442).

As to claim 1, Hussaini discloses in Video game controller with illuminated cable having claimed an arrangement for visual indication read on Col. 2, Lines 48-56; power, current and/or voltage through a conductor read on Col. 2, Lines 45-48; a substantially wire shaped illuminator read on Col. 2, Lines 33-36; a controller read on Col. 4, Lines 13-20; illuminator with varying current or voltage met by ac power supply (read on Col. 4, Lines 56-61; corresponding to electrical quantity in the conductor read on Col. 4, Lines 56-59. Hussaini does not explicitly disclose visual indication of an electrical quantity.

However, Woodruff in a portable light reel system holding electro-luminescent (EL) wire and self-contained electronics teaches indication of an electrical brightness quantity read on Col. 5, Lines 4-8. The artisan recognizes the obviousness of the brightness intensity level depends on the voltage and frequency applied to it. The higher the voltage and frequency, the brighter the EL wire illuminates. Using an inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in order to provide proper illuminated intensity level by controlling the input voltage. Hussaini in view of Woodruff do not explicitly disclose measuring the electrical quantity.

However, Davenport in a system and method for detecting and reporting teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines

3-20. The artisan recognizes the obviousness of a threshold detection circuitry connected to the photo-detector and configured to detect a lighting parameter in relation to the signal lamp according to a predetermined criterion. The threshold detection circuitry 18 detects a lighting parameter such as brightness or intensity or irradiance in relation to the signal lamp 12.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp.

As to claim 2, Hussaini further discloses wire shaped illuminator is arranged along said conductor read on Col. 2, Lines 33-36.

As to claim 4, Hussaini further discloses wire shaped illuminator is an optical fiber read on Col. 2, Lines 33-36.

As to claim 5, Hussaini further discloses controller is further adapted to measure said electrical quantity and adopt a control signal to control said illuminator read on Col. 3, Lines 20-29.

As to claim 7, Woodruff further discloses a processing arrangement and measuring arrangement and driver read on Col. 5, Lines 4-8 & Col. 4, Lines 25-32. The artisan recognizes the obviousness of the inverter together with electrical components controls the intensity of brightness of the illuminated EL wire. The variable inverter and electrical components process the output power/voltage to a measured value and drive the current to vary the brightness of illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in view of Davenport in order to provide proper illuminated intensity level by controlling the input voltage.

As to claim 8, Hussaini further discloses illumination feature is one or several of intensity, color or frequency read on Col. 2, Lines 56-60.

As to claim 9, Davenport further teaches illuminator indicates the consumed current/voltage through electric wire read on Col. 4, Lines 3-20 & Col. 4, Line 42 – Col. 5, Line 6. The artisan recognizes the obviousness of a monitoring the status of a visual signal lamp 12 in accordance with one embodiment of the invention. The system 10 includes an optical fiber 14 to capture and transport light signals 32 emanated by the signal lamp 12 and a photo-detector 16 to sense the optical power of the light signals 32 captured and transported by the optical fiber 14. The system 10 also includes a threshold detection circuitry 18 that compares the output of the photo-detector 16 with a reference threshold value. The status of the signal lamp 12 is determined remotely and directly by the combination of the photo-detector 16 and the threshold detection circuitry 18.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp.

As to claim 12, the claim is interpreted and rejected as to claim 4.

As to claim 13, Hussaini further discloses illuminating arrangement indicates current or power consuming through electric wire read on Col. 3, Lines 20-29.

As to claim 14, the claim is interpreted and rejected as to claim 1 & 9.

As to claim 15, the claim is interpreted and rejected as to claim 1 & 9.

4. Claims 3, 6, 10, 11, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (US 3819973).

As to claim 3, Hussaini in view of Woodruff and further in view of Davenport discloses all claimed limitations except a wire shaped illuminator is electroluminescent. However, Hosford in electroluminescent devices offering high brightness and efficiency at the voltage and alternating cycle chosen teaches a wire shaped illuminator is electroluminescent read on Col. 3, Lines 12-17. The artisan recognizes the obviousness of using the electroluminescent filament with the helical colors combination comprises a copper wire as a central electrode core wire. The copper wire is placed at the central position of the coreless orientation to convey signal. Incorporating the electroluminescent wire in the disclosure of Hussaini's single side glow fiber optics cable for the purpose of transmitting signals presents no new or unexpected results since Hosford's electroluminescent wire and Hussaini's single side glow fiber optics cable are both transmitting electrical current using wire consisting of copper conductor and illuminated material are laid in abutment in a roughly parallel configuration to introduce light through the electroluminescent or fiber optics to enhance visibility of the cable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of Woodruff and further in view of Davenport in order to enhance visibility of the cable.

As to claim 6, Hussaini in view of Woodruff discloses all claimed limitations except electroluminescent includes a central conductive wire coated with a phosphorus material and transmitter wires wrapped around it and covered by a coating and a colored vinyl coat.

However, Hosford in electroluminescent includes a central conductive wire coated with a phosphorus material coating read on Col. 3, Lines 27-36 & Col. 3, Lines 58-65; transmitter wires wrapped around it read on Col. 3, Lines 15-20; covered by a coating and a colored vinyl coat read on Col. 4, Lines 23-30. It is obvious that electroluminescent phosphors exhibit luminescence in the presence of electric fields. A phosphor is applied to the outer surface of the wires and caused to luminance by an electrical current applied across the conductors. Higher voltage and/or higher frequency of alternating current yields higher brightness. It is most desirable to construct a filament or combined with other filaments.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of Woodruff and further in view of Davenport in order to provide a gentle, even illumination to the entire display, efficient light output and long life at moderate voltage power.

As to claim 10, Hosford further teaches a substantially translucent coating covering said wire and illuminating arrangement read on Col. 3, Lines 12-26. The artisan recognizes the obviousness of allowing light to pass diffusely through the wire by having transparent coating. A light transparent or at least highly translucent polymeric coating covers and protects the entire filament from damage due to hard use.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of

Woodruff and further in view of Davenport in order to provide protection from damage while keeping transparent characteristics.

As to claim 11, the claim is interpreted and rejected as to claim 6.

As to claim 16, the claim is interpreted and rejected as to claim 6.

As to claim 17, Woodruff further teaches light output by illumination device varies in intensity based on measured electrical quantity read on Col. 5, Lines 4-8. The artisan recognizes the obviousness of the brightness intensity level depends on the voltage and frequency applied to it. The higher the voltage and frequency, the brighter the EL wire illuminates. Using an inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in view of Davenport in order to provide proper illuminated intensity level by controlling the input voltage.

Response to Arguments

5. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Citation of Other Prior Arts

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Goto discloses in Illuminating apparatus using full-color LEDs (US 2005/0141237),

Mako discloses in Illumination and reflective strips (US 2005/0057942), and Okishima discloses in Lighting equipment (US 2006/0291136).

Conclusion

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

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

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fekadeselassie Girma whose telephone number is (571) 270-5886. The examiner can normally be reached on Monday thru Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel J. Wu can be reached on 571-272-2964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

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

/FG/

(10) Response to Argument

A. Appellant argued:

Independent claim 1 recites, inter alia: wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor. It is respectfully submitted that neither Hussaini, Woodruff, nor Davenport disclose at least the above feature of independent claim 1. Specifically, it is submitted that the tertiary citation to Davenport does not cure the conceded insufficiency in the primary and secondary citations to Hussaini and Woodruff. Accordingly, without conceding its propriety, the proposed combination of Hussaini, Woodruff, and Davenport is likewise insufficient, even in view of the knowledge of one of ordinary skill in the art. The Final Official Action concedes (page 3, second paragraph) that the primary and secondary citations to Hussaini and Woodruff do not disclose "measuring the electrical quantity." Official Action, page 3. This is not surprising given that Hussaini merely teaches, in relevant part, the provision of an illuminated cable to a game controller to avoid the trip hazard that the cable poses. Woodruff merely teaches, in relevant part, that electro-luminescent wire, i.e., wire whose luminescence varies as a function of voltage and frequency, exists per se. Thus there is no reason for either of these two references to measure an electrical quantity and feed the illuminator with current or voltage corresponding to the electrical quantity measured in a conductor, as claimed.

Examiner reply:

Hussaini discloses an arrangement for visual indication read on Col. 2, Lines 48-56, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game. The side glow fiber optic cable 7a is disposed adjacent the communication cable 7b and run substantially along the entire length thereof); power, current and/or voltage through a conductor read on Col. 2, Lines 45-48, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game); a substantially wire shaped illuminator read on Col. 2, Lines 33-36, (a communication cable 7 having a single side glow fiber optic cable 7a running along side of a conventional cable bundle 7b for transmitting operation commands to the game console 50); a controller read on Col. 4, Lines 13-20, (such rope lighting strings incorporate circuitry to covert a standard AC power supply to a low voltage power supply to power the LEDs 108); illuminator with varying current or voltage met by ac power supply read on Col. 4, Lines 56-61, (an AC power supply to facilitate a more power lighting and brighter illumination of the cable); corresponding to electrical quantity in the conductor read on Col. 4, Lines 56-59, (The adapter may also simply contain resistant circuitry to provide current directly to the LED lights 108 of the light string of FIG. 5). Woodruff teaches indication of an electrical brightness quantity read on Col. 5, Lines 4-8, (Using an alternative inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire). The motivation for doing so would have been to provide proper illuminated intensity level by controlling the input voltage. Davenport teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20, (The threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and determine whether the direct voltage or current output of

the input device falls outside of the predetermined reference value). The motivation for doing so would have been to monitor the status of a visual signal lamp.

B. Appellant further argues:

The Final Official Action thus rejects independent claim 1, contending that the tertiary citation to Davenport provides this necessary disclosure. Official Action, page 3. This contention is respectfully traversed. First, it is respectfully noted that, Hussaini and Woodruff fail to disclose that a visual indication of an illuminator is controlled, dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply among other things. In other words, Hussaini and Woodruff fail to disclose not just "measuring electrical quantity", but rather "a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity."

Examiner reply:

Examiner agrees with the above statement, Hussaini and Woodruff fail to disclose that a visual indication of an illuminator is controlled, dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply. However, the office action clearly indicates that Davenport teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20, (The threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and determine whether the direct voltage or current output of the input device falls outside of the predetermined reference value). The motivation for doing so would have been to monitor the status of a visual signal lamp.

C. Appellant further argues:

Turning to the newly added tertiary citation, Davenport relates to "a system.., for detecting and reporting railroad signal light status." Davenport, col. 1, lines 7-10. As explained in Davenport, the "optical power [of a railroad signal light] can be reduced by several factors

including bulb age, dirt on lens or reflector surfaces, and damage to lens." Davenport, col. 1, lines 17-19. The system of Davenport provides a system to observe the optical power of the railroad light signal to determine that the signal is in its desired state (illuminated, dark, flashing). The specific citation to Davenport discusses a photodetector 16 and threshold detection circuitry 74 for converting the direct voltage output from the photodetector 16 into a measure of the optical power incident on the photodetector 16. Thus, the Official Action contends that "it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp." Final Official Action, page 3. However, as noted above, what is recited in claim 1 is not just measuring electrical quantity, but rather, also includes a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity. The undersigned notes the Board of Patent Appeals and Interferences decision in In re Wada and Murphy that "[w]hen determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention -including all its limitations - with the teaching of the prior art." Appeal 2007-3733 (BPAI 2008)(citing In re Ochiai, 71 F.3d 1565, 1572 (Fed. Cir. 1995)). "Thus, 'obviousness requires a suggestion of all limitations in a claim.'" Id (citing CFMT, Inc. v. Yieldup Intern. Corp., 349 F.3d 1333, 1342 (Fed. Cir. 2003)(citing In re Royka, 490 F.2d 981,985 (CCPA 1974))(emphasis added).

Examiner reply:

Davenport discloses in Col. 4, Lines 3-20 “The input device in this embodiment of the invention is the photodetector 16 and the threshold detection circuitry 74 converts the direct voltage output of the photodetector 16 into a measure of the optical power incident on the photodetector 16. That, to a large extent, correlates to a number of lighting parameters such as intensity, brightness, and irradiance in relation to the signal lamp 12.” the threshold detection circuitry 18 detects a lighting parameter such as brightness or intensity or irradiance in relation to the signal lamp 12. The threshold detection circuitry 18 is a mixed signal device that is in communication with an input device. There is a predetermined reference value of control voltage or current configured as the threshold for reference. The threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and

determine whether the direct voltage or current output of the input device falls outside of the predetermined reference value. The input device in this embodiment of the invention is the photodetector 16 and the threshold detection circuitry 74 converts the direct voltage output of the photodetector 16 into a measure of the optical power incident on the photodetector 16. That, to a large extent, correlates to a number of lighting parameters such as intensity, brightness, and irradiance in relation to the signal lamp 12.

D. Appellant further argues:

Accordingly, Davenport cannot properly be relied upon for disclosing the above feature. Finally, it is further noted that Hosford has not been contended to cure the insufficiency in the primary, secondary, and tertiary citations. Similar comments apply to independent claims 9, 14 and 15. In particular note, claim 15 which recites both a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and a controller connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices based on said received measurements. At best the proposed combination of Hussaini, Woodruff and Davenport would teach a combination of elements that lacks the claimed controller.

Examiner reply:

Hussaini discloses an arrangement for visual indication read on Col. 2, Lines 48-56, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game. The side glow fiber optic cable 7a is disposed adjacent the communication cable 7b and run substantially along the entire length thereof); power, current and/or voltage through a conductor read on Col. 2, Lines 45-48, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game); a substantially wire shaped illuminator read on Col. 2, Lines 33-36, (a communication cable 7 having a single side glow fiber optic cable 7a running along side of a conventional cable bundle

7b for transmitting operation commands to the game console 50); a controller read on Col. 4, Lines 13-20, (such rope lighting strings incorporate circuitry to covert a standard AC power supply to a low voltage power supply to power the LEDs 108); illuminator with varying current or voltage met by ac power supply read on Col. 4, Lines 56-61, (an AC power supply to facilitate a more power lighting and brighter illumination of the cable); corresponding to electrical quantity in the conductor read on Col. 4, Lines 56-59, (The adapter may also simply contain resistant circuitry to provide current directly to the LED lights 108 of the light string of FIG. 5). Woodruff teaches indication of an electrical brightness quantity read on Col. 5, Lines 4-8, (Using an alternative inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire). The motivation for doing so would have been to provide proper illuminated intensity level by controlling the input voltage. Davenport teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20, (The threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and determine whether the direct voltage or current output of the input device falls outside of the predetermined reference value). The motivation for doing so would have been to monitor the status of a visual signal lamp.

E. Appellant further argues:

Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport since there is No Motivation to Combine These Documents in a Manner to Have Arrived at the Claimed Combinations. Moreover, it is respectfully submitted that the Official Action has provided no reasonable motivation or reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way independent claims 1, 9, 14, and 15 do. As noted in the Office's own examination manual, the United States Supreme Court indicated that it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention

does." Manual of Patent Examination Procedure § 2143 (citing KSR International Co. v. Teleflex Inc., 550 U.S. 398, 418, 82 USPQ2d 1385, 1395-97 (2007)). Simply restating a goal of one of the cited references does not provide any insight, reasoning, or logic that could be properly called "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements" and is mere hindsight reconstruction. While inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known, simply finding claim features piecemeal in the prior art references and restating a goal of one of the cited references does not provide the reasoning required to maintain a prima facie case of obviousness. The Official Action merely states that it would have been obvious to combine the teachings "in order to monitor the status of a visual signal lamp." See Final Official Action, page 3 and Continuation Sheet of Advisory Action at section A. While this appears to be the goal of the tertiary citation to Davenport, the citations to Hussaini, Woodruff and the Official Action - fail to provide a reason as to why one of skill in the art would be motivated to make such a combination, i.e., since Hussaini and Woodruff appear to have no "visual signal lamp" whose status could be monitored using the technique of Davenport. Stated differently, it is difficult to see why one of ordinary skill in the art would care to monitor the visual status of either (a) the statically illuminated cord to a video game controller of Hussaini or (b) the wound up electro-luminescent wire of Woodruff. 3. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport Since These References are Non-Analogous Art and Would Not Be Considered Together By One of Ordinary Skill in the Art
Additionally, in this context, it is respectfully submitted that the art relied upon to piece together Appellants' claimed combinations is non-analogous art. Indeed the undersigned respectfully submits that it is difficult to conceive of three things that are less related to one another than a video game controller (Hussaini et al.), a portable light reel system (Woodruff) and a railroad signal display monitoring system (Davenport et al.). The Official Action provides no reason why one of ordinary skill in the art would have been motivated to have combined these three, disparate technologies to somehow reach Appellant's claimed combinations and, accordingly, the undersigned respectfully submits that this represents another, independent reason for finding the currently pending claims to be patentable.

Examiner reply:

Hussaini discloses an arrangement for visual indication read on Col. 2, Lines 48-56, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game. The side glow fiber optic cable 7a is disposed adjacent the communication cable 7b and run substantially along the entire length thereof); power, current and/or voltage through a conductor read on Col. 2, Lines 45-48, (The cable 7b carries operational

command signals to and from the controller to facilitate interactive play of the video game); a substantially wire shaped illuminator read on Col. 2, Lines 33-36, (a communication cable 7 having a single side glow fiber optic cable 7a running along side of a conventional cable bundle 7b for transmitting operation commands to the game console 50); a controller read on Col. 4, Lines 13-20, (such rope lighting strings incorporate circuitry to covert a standard AC power supply to a low voltage power supply to power the LEDs 108); illuminator with varying current or voltage met by ac power supply read on Col. 4, Lines 56-61, (an AC power supply to facilitate a more power lighting and brighter illumination of the cable); corresponding to electrical quantity in the conductor read on Col. 4, Lines 56-59, (The adapter may also simply contain resistant circuitry to provide current directly to the LED lights 108 of the light string of FIG. 5). Woodruff teaches indication of an electrical brightness quantity read on Col. 5, Lines 4-8, (Using an alternative inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire). The motivation for doing so would have been to provide proper illuminated intensity level by controlling the input voltage. Davenport teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20, (The threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and determine whether the direct voltage or current output of the input device falls outside of the predetermined reference value). The motivation for doing so would have been to monitor the status of a visual signal lamp.

F. Appellant further argues:

In the Advisory Action, the Examiner comments on this argument by referring to the number of references not being excessive and re-states the espoused reasons for combining the

references as "[m]otivations for incorporating Hussaini into Woodruff would have been to monitor the status of a visual signal lamp and incorporating Hussaini in view of Woodruff with Davenport would have been to provide proper illuminated intensity level by controlling the input voltage." The undersigned replies as follows: (a) it is not the quantity of references that is being objected to in this argument, but instead their quality. More specifically, the diverse fields of art which are involved make it unreasonable to contend that these three specific references would be consulted by the hypothetical person of ordinary skill in the art to arrive at Appellants' claimed combinations. Stated differently, and just as one example, it seems unlikely that someone trying to solve a problem associated with a video controller would refer to art in the reel and winding art and the railroad industry to address that problem; (b) stating that "Hussaini into Woodruff" is motivated to "monitor the status of the visual signal lamp" makes no sense as neither Hussaini nor Woodruff have a visual signal lamp; and (c) stating that "incorporating Hussaini in view of Woodruff with Davenport" is motivated to "provide proper illuminated intensity level by controlling the input voltage" is unclear, as there is no suggestion that either the illuminated video game cord of Hussaini or the wound up EL wire of Davenport could in any way benefit from having a "proper illuminated intensity level". All of the arguments set forth above in sections 1-3 apply to all of the independent claims based on their specific (and different) recitations, as well as to the dependent claims.

Examiner's reply:

Please see the above examiner's reply.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/FG/

Conferees:

/Jennifer Mehmood/
Acting SPE of Art Unit 2612
May 25, 2011

/Brian A Zimmerman/
Supervisory Patent Examiner, Art Unit 2612

Patent
Attorney's Docket No. 0904-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	Group Art Unit: 2612
	)	
Anton GUSTAFSSON *et al*.	)	Examiner: Fekadeselassie Girma
	)	
Application No.: 11/885,697	)	Confirmation No.: 8165
	)	
Filed: October 3, 2007	)	
	)	
For: VISUALISATION ARRANGEMENT	)	
	)	

CORRECTED APPEAL BRIEF PURSUANT TO 37 C.F.R § 41.37

Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

Further to the Notice of Appeal filed on October 28, 2010 in connection with the above-identified application and the Notification of Non-Compliant Appeal Brief dated February 16, 2011, submitted herewith is the corrected Appeal Brief. This corrected Appeal Brief now includes the Evidence Appendix and Related Proceedings Appendix.

(i) **REAL PARTY IN INTEREST**

The real party in interest is the assignee, The Interactive Institute II AB.

(ii) **RELATED APPEALS AND INTERFERENCES**

To the best of the undersigned's knowledge, there are no related appeals or interferences.

(iii) **STATUS OF CLAIMS**

Claims 1-17 currently pending, have all been rejected two or more times with the exception of claims 15-17 which have been rejected once, and are all the subject of this appeal.

(iv) **STATUS OF AMENDMENTS**

No Amendments have been submitted subsequent to the Final Rejection dated May 28, 2010.

(v) **SUMMARY OF CLAIMED SUBJECT MATTER**

According to exemplary embodiments, independent claim 1 describes an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor, wherein the arrangement comprising a substantially wire shaped illuminator (see, e.g., Figure 1, wires 14, 15, 16 and page 4, first full paragraph of the specification) and a controller (See e.g., Figure 3, controlling arrangement 34 and Figure 4, controlling arrangement 40) adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor (see, e.g., page 5, lines 20-35 of the specification).

According to another exemplary embodiment, independent claim 9 describes a cord comprising at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire (see, e.g., page 6, lines 1-6 of the specification), said illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current and/or voltage through the at least one electric wire (e.g., “phosphorus material coating” at page 6, line 2 of the specification), wherein said illuminator indicates the consumed current/voltage through said at least one electric wire when at least one illumination characteristic of said illuminator is controlled with respect to said electrical quantity by feeding the illuminator with varying current or voltage corresponding to the consumed

current/voltage through at least one electrical wire (see, e.g., page 5, lines 7-11 of the specification).

According to another exemplary embodiment, independent claim 14 describes a method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator (see, e.g., page 5, lines 31-32 "feeds the illuminating wires with varying current, voltage and frequency) and controlling at least one illumination characteristic (see, e.g., page 6, lines 7-8, "intensity, color and/or pulsing") of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor.

According to another exemplary embodiment, independent claim 15 describes a device for providing a variable visual indication of consumption of electricity comprising: a measurement unit (see, e.g., Figure 4, measurement unit 43) disposable between an external power source (see, e.g., wall socket in Figure 3) and a device which consumes said electricity (see, e.g., cord 33 in Figure 3), configured to measure a variable electrical quantity associated with said electricity; and a controller (see, e.g., processing unit 42) connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices (see, e.g., PWMs 44a-44c and/or drivers 45a-45c and/or illuminating wires) based on said received measurements; wherein said plurality of illumination devices

output light which varies over time as a function of said measured, variable electrical quantity (see, e.g., (see, e.g., page 5, lines 7-11 of the specification).

(vi) **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

A number of grounds of rejection are raised by the Examiner and listed below. Appellants request review of each of these grounds of rejection on appeal.

a. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini (U.S. Patent No. 7,195,561) in view of Woodruff (U.S. Patent No. 6,758,314) and further in view of Davenport (U.S. Patent No. 7,270,442).

b. Claims 3, 6, 10, 11, 16 and 17 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (U.S. Patent No. 3,819,973).

(vii) **ARGUMENT**

Exemplary embodiments described in the present application provide a useful and novel solution for indicating the consumption of power in various electrical appliances, by creating a visual indication of an electrical quantity through a conductor which feeds electric power to the appliance. The "electrical quantity" can be power, current and/or voltage which are measured as running through the conductor. According to exemplary embodiments, a wire shaped "illuminator", e.g., 14, 15, 16 in Figure 1, is to provide the visual indication and an "illumination characteristic" of the illuminator, e.g., intensity, color and/or pulsing of light in the illuminating wires, is controlled dependent on, and responsive to, the measured electrical quantity.

It will be appreciated that many electric appliances consume power dependent on the usage thereof. For example, a TV set may increase its power consumption momentarily when the sound level or screen brightness is increased, or a computer may increase its power consumption if its cooling fan is running, which changes in power consumption are made directly visible to the user by these exemplary embodiments.

One important feature of these exemplary embodiments is thus that a change of the visible illumination characteristic directly corresponds to a changed power consumption. In this way, consumers can easily be made aware of their power consumption at all times, which naturally can contribute to keeping the power consumption down, without relying on centrally placed meters or the like which are

seldom observed or noticed anyway. The exemplary embodiments can also be very useful for detecting any unexpected or abnormal drain of power by an apparatus which may be noticed by a change of color, intensity or pulsation pattern in the illuminator. The visualization arrangement according to these exemplary embodiments may also be used for indicating overload of devices, and it is easy to track a particular apparatus being overloaded or consuming high power by following the visually indicating cable.

By way of contrast, the cited references do not appreciate this combination of elements or functions and would not have motivated one of ordinary skill in the art to have arrived at Appellants' claimed combinations. Briefly, Hussaini relates to providing an illuminated cable to a video game controller, Woodruff relates to a reel for winding electro-luminescent wire and Davenport is concerned with signal lamps in railway systems. No combination of these teachings would have reasonably motivated one of ordinary skill in the art to have arrived at Appellants' claims, as will be described in more detail below with respect to each specific ground of rejection.

1. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport since None These Documents Do Not Disclose All of the Claimed Elements

Independent claim 1 recites, inter alia:

> wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical

> quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

It is respectfully submitted that neither Hussaini, Woodruff, nor Davenport disclose at least the above feature of independent claim 1. Specifically, it is submitted that the tertiary citation to Davenport does not cure the conceded insufficiency in the primary and secondary citations to Hussaini and Woodruff. Accordingly, without conceding its propriety, the proposed combination of Hussaini, Woodruff, and Davenport is likewise insufficient, even in view of the knowledge of one of ordinary skill in the art.

The Final Official Action concedes (page 3, second paragraph) that the primary and secondary citations to Hussaini and Woodruff do not disclose "measuring the electrical quantity." Official Action, page 3.

This is not surprising given that Hussaini merely teaches, in relevant part, the provision of an illuminated cable to a game controller to avoid the trip hazard that the cable poses. Woodruff merely teaches, in relevant part, that electro-luminescent wire, i.e., wire whose luminescence varies as a function of voltage and frequency, exists *per se*. Thus there is no reason for either of these two references to measure an electrical quantity and feed the illuminator with current or voltage corresponding to the electrical quantity measured in a conductor, as claimed.

The Final Official Action thus rejects independent claim 1, contending that the

tertiary citation to Davenport provides this necessary disclosure. Official Action, page 3. This contention is respectfully traversed.

First, it is respectfully noted that, Hussaini and Woodruff fail to disclose that a visual indication of an illuminator is controlled, dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply among other things. In other words, Hussaini and Woodruff fail to disclose not just "measuring electrical quantity", but rather "a controller adapted to **control at least one illumination characteristic** of said illuminator **with respect to said electrical quantity**."

Turning to the newly added tertiary citation, Davenport relates to "a system… for detecting and reporting railroad signal light status." Davenport, col. 1, lines 7-10. As explained in Davenport, the "optical power [of a railroad signal light] can be reduced by several factors including bulb age, dirt on lens or reflector surfaces, and damage to lens." Davenport, col. 1, lines 17-19. The system of Davenport provides a system to observe the optical power of the railroad light signal to determine that the signal is in its desired state (illuminated, dark, flashing).

The specific citation to Davenport discusses a photodetector 16 and threshold detection circuitry 74 for converting the direct voltage output from the photodetector 16 into a measure of the optical power incident on the photodetector 16. Thus, the Official Action contends that "it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual

signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp." Final Official Action, page 3.

However, as noted above, what is recited in claim 1 is not just measuring electrical quantity, but rather, also includes a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity. The undersigned notes the Board of Patent Appeals and Interferences decision in In re Wada and Murphy that "[w]hen determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention – including all its limitations – with the teaching of the prior art." Appeal 2007-3733 (BPAI 2008)(citing In re Ochiai, 71 F.3d 1565, 1572 (Fed. Cir. 1995)). "Thus, 'obviousness **requires a suggestion of all limitations** in a claim.'" Id (citing CFMT, Inc. v. Yieldup Intern. Corp., 349 F.3d 1333, 1342 (Fed. Cir. 2003)(citing In re Royka, 490 F.2d 981, 985 (CCPA 1974))(emphasis added).

Accordingly, Davenport cannot properly be relied upon for disclosing the above feature. Finally, it is further noted that Hosford has not been contended to cure the insufficiency in the primary, secondary, and tertiary citations.

Similar comments apply to independent claims 9, 14 and 15. In particular note, claim 15 which recites **both** a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and a controller connected to said measurement unit and configured to receive measurements from said measurement

unit, and further configured to control a plurality of illumination devices based on said received measurements. At best the proposed combination of Hussaini, Woodruff and Davenport would teach a combination of elements that lacks the claimed controller.

2. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport Since There is No Motivation To Combine These Documents in a Manner to Have Arrived at the Claimed Combinations

Moreover, it is respectfully submitted that the Official Action has provided no reasonable motivation or reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way independent claims 1, 9, 14, and 15 do. As noted in the Office's own examination manual, the United States Supreme Court indicated that it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." Manual of Patent Examination Procedure § 2143 (citing KSR International Co. v. Teleflex Inc., 550 U.S. 398, 418, 82 USPQ2d 1385, 1395-97 (2007)). Simply restating a goal of one of the cited references does not provide any insight, reasoning, or logic that could be properly called "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements" and is mere hindsight reconstruction. While inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known, simply finding claim features piecemeal in the prior art references and restating a goal of one of the cited references

does not provide the reasoning required to maintain a prima facie case of obviousness.

The Official Action merely states that it would have been obvious to combine the teachings "in order to monitor the status of a visual signal lamp." See Final Official Action, page 3 and Continuation Sheet of Advisory Action at section A. While this appears to be the goal of the tertiary citation to Davenport, the citations to Hussaini, Woodruff --and the Official Action – fail to provide a reason as to why one of skill in the art would be motivated to make such a combination, i.e., since Hussaini and Woodruff appear to have no “visual signal lamp” whose status could be monitored using the technique of Davenport.

Stated differently, it is difficult to see why one of ordinary skill in the art would care to monitor the visual status of either (a) the statically illuminated cord to a video game controller of Hussaini or (b) the wound up electro-luminescent wire of Woodruff.

3. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport Since These References are Non-Analogous Art and Would Not Be Considered Together By One of Ordinary Skill in the Art

Additionally, in this context, it is respectfully submitted that the art relied upon to piece together Appellants’ claimed combinations is non-analogous art. Indeed the undersigned respectfully submits that it is difficult to conceive of three things that are less related to one another than a video game controller (Hussaini et al.), a portable light reel system (Woodruff) and a railroad signal display monitoring system (Davenport et al.). The Official Action provides no reason why one of ordinary skill in the art would

have been motivated to have combined these three, disparate technologies to somehow reach Applicant's claimed combinations and, accordingly, the undersigned respectfully submits that this represents another, independent reason for finding the currently pending claims to be patentable.

In the Advisory Action, the Examiner comments on this argument by referring to the number of references not being excessive and re-states the espoused reasons for combining the references as "[m]otivations for incorporating Hussaini into Woodruff would have been to monitor the status of a visual signal lamp and incorporating Hussaini in view of Woodruff with Davenport would have been to provide proper illuminated intensity level by controlling the input voltage."

The undersigned replies as follows:

(a) it is not the quantity of references that is being objected to in this argument, but instead their quality. More specifically, the diverse fields of art which are involved make it unreasonable to contend that these three specific references would be consulted by the hypothetical person of ordinary skill in the art to arrive at Applicants' claimed combinations. Stated differently, and just as one example, it seems unlikely that someone trying to solve a problem associated with a video controller would refer to art in the reel and winding art and the railroad industry to address that problem;

(b) stating that "Hussaini into Woodruff" is motivated to "monitor the status of the visual signal lamp" makes no sense as neither Hussaini nor Woodruff have a visual signal lamp; and

(c) stating that "incorporating Hussaini in view of Woodruff with Davenport" is motivated to "provide proper illuminated intensity level by controlling the input voltage" is unclear, as there is no suggestion that either the illuminated video game cord of Hussaini or the wound up EL wire of Davenport could in any way benefit from having a "proper illuminated intensity level".

All of the arguments set forth above in sections 1-3 apply to all of the independent claims based on their specific (and different) recitations, as well as to the dependent claims.

4. Claims 3, 6, 10, 11, 16 and 17 are Patentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (U.S. Patent No. 3,819,973).

These dependent claims are also respectfully submitted to be patentable for at least the reasons set forth above with respect to the independent claims from which they depend.

Conclusions

Accordingly it is respectfully submitted that the rejection of claims 1-17 under 35 U.S.C. § 103(a) as being unpatentable does not establish a *prima facie* case of obviousness and should be reversed.

For at least the foregoing reasons, it is respectfully submitted that the claims are patentable over the documents cited. Accordingly, it is respectfully requested that the rejection in the Official Action of May 28, 2010 be REVERSED.

Respectfully submitted,
POTOMAC PATENT GROUP PLLC

By: /stevenmdubois/
Steven M. duBois
Registration No. 35,023

Dated: March 10, 2011

(viii) **CLAIMS APPENDIX**

1. An arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor,

wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

2. The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. The arrangement of claim 1, wherein said wire shaped illuminator is electroluminescent.

4. The arrangement of claim 1, wherein said wire shaped illuminator is an optical fibre.

5. The arrangement of claim 1, wherein said controller is further adapted to send a control signal to control said illuminator.

6. The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire coated with a phosphorus material coating and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said illuminator receiving control signals from said processing arrangement.

8. The arrangement of claim 1, wherein said illumination feature is one or several of intensity, colour or frequency.

9. A cord comprising at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire, said illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current and/or voltage through the at least one electric wire,

wherein said illuminator indicates the consumed current/voltage through said at least one electric wire when at least one illumination characteristic of said illuminator is controlled with respect to said electrical quantity by feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through at least one electrical wire.

10. The cord of claim 9, further comprising a substantially translucent coating, covering said wire and illuminator.

11. The cord of claim 9, wherein said illuminator is an electroluminescent wire.

12. The cord of claim 9, wherein said illuminator is an optical fibre.

13. The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor.

15. A device for providing a variable visual indication of consumption of electricity comprising:

a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and

a controller connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices based on said received measurements;

wherein said plurality of illumination devices output light which varies over time as a function of said measured, variable electrical quantity.

16. The device of claim 15, wherein said illumination devices each comprise a copper wire coated with a phosphorous material and two transmitter wires wrapped around the copper wire.

17. The device of claim 15, wherein said light output by said plurality of illumination devices varies in at least one of intensity, colour or frequency over time based on said measured electrical quantity.

(ix) **EVIDENCE APPENDIX**

None.

(x) **RELATED PROCEEDINGS APPENDIX**

None.

Electronic Acknowledgement Receipt

EFS ID:	9633873
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Tammy Pasto
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	10-MAR-2011
Filing Date:	03-OCT-2007
Time Stamp:	16:49:19
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Supplemental Appeal Brief	20110310_corrected_appeal_brief_0904-021.pdf	128524 1eb564f62d8fc969449e6eb45f87b0a517e15882	no	21

Warnings:	
Information:	

Total Files Size (in bytes):	128524

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 02/16/2011

POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

EXAMINER	
ART UNIT	PAPER NUMBER

DATE MAILED: 02/16/2011

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

Notification of Non-Compliant Appeal Brief (37 CFR 41.37)	Application No.	Applicant(s)	
	11/885,697	Gustafsson, Anton	
	Examiner	Art Unit	
	Girma, Fekadeselassie	2612	

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

The Appeal Brief filed on *27 January 2011* is defective for failure to comply with one or more provisions of 37 CFR 41.37.

To avoid dismissal of the appeal, applicant must file anamended brief or other appropriate correction (see MPEP 1205.03) within **ONE MONTH or THIRTY DAYS** from the mailing date of this Notification, whichever is longer. **EXTENSIONS OF THIS TIME PERIOD MAY BE GRANTED UNDER 37 CFR 1.136.**

1. ☒ The brief does not contain the items required under 37 CFR 41.37(c), or the items are not under the proper heading or in the proper order.

2. ☐ The brief does not contain a statement of the status of all claims, (e.g., rejected, allowed, withdrawn, objected to, canceled), or does not identify the appealed claims (37 CFR 41.37(c)(1)(iii)).

3. ☐ At least one amendment has been filed subsequent to the final rejection, and the brief does not contain a statement of the status of each such amendment (37 CFR 41.37(c)(1)(iv)).

4. ☐ (a) The brief does not contain a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number and to the drawings, if any, by reference characters; and/or (b) the brief fails to: (1) identify, for each independent claim involved in the appeal and for each dependent claim argued separately, every means plus function and step plus function under 35 U.S.C. 112, sixth paragraph, and/or (2) set forth the structure, material, or acts described in the specification as corresponding to each claimed function with reference to the specification by page and line number, and to the drawings, if any, by reference characters (37 CFR 41.37(c)(1)(v)).

5. ☐ The brief does not contain a concise statement of each ground of rejection presented for review (37 CFR 41.37(c)(1)(vi))

6. ☐ The brief does not present an argument under a separate heading for each ground of rejection on appeal (37 CFR 41.37(c)(1)(vii)).

7. ☐ The brief does not contain a correct copy of the appealed claims as an appendix thereto (37 CFR 41.37(c)(1)(viii)).

8. ☐ The brief does not contain copies of the evidence submitted under 37 CFR 1.130, 1.131, or 1.132 or of any other evidence entered by the examiner **and relied upon by appellant in the appeal**, along with a statement setting forth where in the record that evidence was entered by the examiner, as an appendix thereto (37 CFR 41.37(c)(1)(ix)).

9. ☐ The brief does not contain copies of the decisions rendered by a court or the Board in the proceeding identified in the Related Appeals and Interferences section of the brief as an appendix thereto (37 CFR 41.37(c)(1)(x)).

10. ☒ Other (including any explanation in support of the above items):

The Evidence Appendix and Related Proceedings Appendix are missing..

J. Gunter-Riley, Paralegal
571-272-7929
Supervisory Paralegal: D. Perry
571-272-9797

Patent
Attorney's Docket No. 0904-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	Group Art Unit: 2612
	)	
Anton GUSTAFSSON *et al*.	)	Examiner: Fekadeselassie Girma
	)	
Application No.: 11/885,697	)	Confirmation No.: 8165
	)	
Filed: October 3, 2007	)	
	)	
For: VISUALISATION ARRANGEMENT	)	
	)	

APPEAL BRIEF PURSUANT TO 37 C.F.R § 41.37

Sir:

Further to the Notice of Appeal filed on October 28, 2010 and in connection with the above-identified application submitted herewith is the Appeal Brief.

(i) **REAL PARTY IN INTEREST**

The real party in interest is the assignee, The Interactive Institute II AB.

(ii) **RELATED APPEALS AND INTERFERENCES**

To the best of the undersigned's knowledge, there are no related appeals or interferences.

(iii) **STATUS OF CLAIMS**

Claims 1-17 currently pending, have all been rejected two or more times with the exception of claims 15-17 which have been rejected once, and are all the subject of this appeal.

(iv) **STATUS OF AMENDMENTS**

No Amendments have been submitted subsequent to the Final Rejection dated May 28, 2010.

(v) **SUMMARY OF CLAIMED SUBJECT MATTER**

According to exemplary embodiments, independent claim 1 describes an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor, wherein the arrangement comprising a substantially wire shaped illuminator (see, e.g., Figure 1, wires 14, 15, 16 and page 4, first full paragraph of the specification) and a controller (See e.g., Figure 3, controlling arrangement 34 and Figure 4, controlling arrangement 40) adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor (see, e.g., page 5, lines 20-35 of the specification).

According to another exemplary embodiment, independent claim 9 describes a cord comprising at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire (see, e.g., page 6, lines 1-6 of the specification), said illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current and/or voltage through the at least one electric wire (e.g., “phosphorus material coating” at page 6, line 2 of the specification), wherein said illuminator indicates the consumed current/voltage through said at least one electric wire when at least one illumination characteristic of said illuminator is controlled with respect to said electrical quantity by feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through at least one electrical wire (see, e.g., page 5, lines 7-11 of the specification).

According to another exemplary embodiment, independent claim 14 describes a method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator (see, e.g., page 5, lines 31-32 "feeds the illuminating wires with varying current, voltage and frequency) and controlling at least one illumination characteristic (see, e.g., page 6, lines 7-8, "intensity, color and/or pulsing") of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor.

According to another exemplary embodiment, independent claim 15 describes a device for providing a variable visual indication of consumption of electricity comprising: a measurement unit (see, e.g., Figure 4, measurement unit 43) disposable between an external power source (see, e.g., wall socket in Figure 3) and a device which consumes said electricity (see, e.g., cord 33 in Figure 3), configured to measure a variable electrical quantity associated with said electricity; and a controller (see, e.g., processing unit 42) connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices (see, e.g., PWMs 44a-44c and/or drivers 45a-45c and/or illuminating wires) based on said received measurements; wherein said plurality of illumination devices output light which varies over time as a function of said measured, variable electrical quantity (see, e.g., (see,

e.g., page 5, lines 7-11 of the specification).

(vi) **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

A number of grounds of rejection are raised by the Examiner and listed below. Appellants request review of each of these grounds of rejection on appeal.

a. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini (U.S. Patent No. 7,195,561) in view of Woodruff (U.S. Patent No. 6,758,314) and further in view of Davenport (U.S. Patent No. 7,270,442).

b. Claims 3, 6, 10, 11, 16 and 17 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (U.S. Patent No. 3,819,973).

(vii) **ARGUMENT**

Exemplary embodiments described in the present application provide a useful and novel solution for indicating the consumption of power in various electrical appliances, by creating a visual indication of an electrical quantity through a conductor which feeds electric power to the appliance. The "electrical quantity" can be power, current and/or voltage which are measured as running through the conductor. According to exemplary embodiments, a wire shaped "illuminator", e.g., 14, 15, 16 in Figure 1, is to provide the visual indication and an "illumination characteristic" of the illuminator, e.g., intensity, color and/or pulsing of light in the illuminating wires, is controlled dependent on, and responsive to, the measured electrical quantity.

It will be appreciated that many electric appliances consume power dependent on the usage thereof. For example, a TV set may increase its power consumption momentarily when the sound level or screen brightness is increased, or a computer may increase its power consumption if its cooling fan is running, which changes in power consumption are made directly visible to the user by these exemplary embodiments.

One important feature of these exemplary embodiments is thus that a change of the visible illumination characteristic directly corresponds to a changed power consumption. In this way, consumers can easily be made aware of their power consumption at all times, which naturally can contribute to keeping the power consumption down, without relying on centrally placed meters or the like which are

seldom observed or noticed anyway. The exemplary embodiments can also be very useful for detecting any unexpected or abnormal drain of power by an apparatus which may be noticed by a change of color, intensity or pulsation pattern in the illuminator. The visualization arrangement according to these exemplary embodiments may also be used for indicating overload of devices, and it is easy to track a particular apparatus being overloaded or consuming high power by following the visually indicating cable.

By way of contrast, the cited references do not appreciate this combination of elements or functions and would not have motivated one of ordinary skill in the art to have arrived at Appellants' claimed combinations. Briefly, Hussaini relates to providing an illuminated cable to a video game controller, Woodruff relates to a reel for winding electro-luminescent wire and Davenport is concerned with signal lamps in railway systems. No combination of these teachings would have reasonably motivated one of ordinary skill in the art to have arrived at Appellants' claims, as will be described in more detail below with respect to each specific ground of rejection.

1. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport since None These Documents Do Not Disclose All of the Claimed Elements

Independent claim 1 recites, inter alia:

> wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying

current or voltage corresponding to the electrical quantity measured in the conductor.

It is respectfully submitted that neither Hussaini, Woodruff, nor Davenport disclose at least the above feature of independent claim 1. Specifically, it is submitted that the tertiary citation to Davenport does not cure the conceded insufficiency in the primary and secondary citations to Hussaini and Woodruff. Accordingly, without conceding its propriety, the proposed combination of Hussaini, Woodruff, and Davenport is likewise insufficient, even in view of the knowledge of one of ordinary skill in the art.

The Final Official Action concedes (page 3, second paragraph) that the primary and secondary citations to Hussaini and Woodruff do not disclose "measuring the electrical quantity." Official Action, page 3.

This is not surprising given that Hussaini merely teaches, in relevant part, the provision of an illuminated cable to a game controller to avoid the trip hazard that the cable poses. Woodruff merely teaches, in relevant part, that electro-luminescent wire, i.e., wire whose luminescence varies as a function of voltage and frequency, exists *per se*. Thus there is no reason for either of these two references to measure an electrical quantity and feed the illuminator with current or voltage corresponding to the electrical quantity measured in a conductor, as claimed.

The Final Official Action thus rejects independent claim 1, contending that the tertiary citation to Davenport provides this necessary disclosure. Official Action, page 3. This contention is respectfully traversed.

First, it is respectfully noted that, Hussaini and Woodruff fail to disclose that a visual indication of an illuminator is controlled, dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply among other things. In other words, Hussaini and Woodruff fail to disclose not just "measuring electrical quantity", but rather "a controller adapted to **control at least one illumination characteristic** of said illuminator **with respect to said electrical quantity**."

Turning to the newly added tertiary citation, Davenport relates to "a system… for detecting and reporting railroad signal light status." Davenport, col. 1, lines 7-10. As explained in Davenport, the "optical power [of a railroad signal light] can be reduced by several factors including bulb age, dirt on lens or reflector surfaces, and damage to lens." Davenport, col. 1, lines 17-19. The system of Davenport provides a system to observe the optical power of the railroad light signal to determine that the signal is in its desired state (illuminated, dark, flashing).

The specific citation to Davenport discusses a photodetector 16 and threshold detection circuitry 74 for converting the direct voltage output from the photodetector 16 into a measure of the optical power incident on the photodetector 16. Thus, the Official Action contends that "it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp." Final Official Action, page 3.

However, as noted above, what is recited in claim 1 is not just measuring

electrical quantity, but rather, also includes a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity. The undersigned notes the Board of Patent Appeals and Interferences decision in In re Wada and Murphy that "[w]hen determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention – including all its limitations – with the teaching of the prior art." Appeal 2007-3733 (BPAI 2008)(citing In re Ochiai, 71 F.3d 1565, 1572 (Fed. Cir. 1995)). "Thus, 'obviousness **requires a suggestion of all limitations** in a claim.'" Id (citing CFMT, Inc. v. Yieldup Intern. Corp., 349 F.3d 1333, 1342 (Fed. Cir. 2003)(citing In re Royka, 490 F.2d 981, 985 (CCPA 1974))(emphasis added).

Accordingly, Davenport cannot properly be relied upon for disclosing the above feature. Finally, it is further noted that Hosford has not been contended to cure the insufficiency in the primary, secondary, and tertiary citations.

Similar comments apply to independent claims 9, 14 and 15. In particular note, claim 15 which recites **both** a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and a controller connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices based on said received measurements. At best the proposed combination of Hussaini, Woodruff and Davenport would teach a combination of elements that lacks the claimed controller.

2. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport Since There is No Motivation To Combine These Documents in a Manner to Have Arrived at the Claimed Combinations

Moreover, it is respectfully submitted that the Official Action has provided no reasonable motivation or reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way independent claims 1, 9, 14, and 15 do. As noted in the Office's own examination manual, the United States Supreme Court indicated that it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." Manual of Patent Examination Procedure § 2143 (citing KSR International Co. v. Teleflex Inc., 550 U.S. 398, 418, 82 USPQ2d 1385, 1395-97 (2007)). Simply restating a goal of one of the cited references does not provide any insight, reasoning, or logic that could be properly called "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements" and is mere hindsight reconstruction. While inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known, simply finding claim features piecemeal in the prior art references and restating a goal of one of the cited references does not provide the reasoning required to maintain a prima facie case of obviousness.

The Official Action merely states that it would have been obvious to combine

the teachings "in order to monitor the status of a visual signal lamp." See Final Official Action, page 3 and Continuation Sheet of Advisory Action at section A. While this appears to be the goal of the tertiary citation to Davenport, the citations to Hussaini, Woodruff --and the Official Action – fail to provide a reason as to why one of skill in the art would be motivated to make such a combination, i.e., since Hussaini and Woodruff appear to have no “visual signal lamp” whose status could be monitored using the technique of Davenport.

Stated differently, it is difficult to see why one of ordinary skill in the art would care to monitor the visual status of either (a) the statically illuminated cord to a video game controller of Hussaini or (b) the wound up electro-luminescent wire of Woodruff.

3. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are not unpatentable over Hussaini, Woodruff and Davenport Since These References are Non-Analogous Art and Would Not Be Considered Together By One of Ordinary Skill in the Art

Additionally, in this context, it is respectfully submitted that the art relied upon to piece together Appellants’ claimed combinations is non-analogous art. Indeed the undersigned respectfully submits that it is difficult to conceive of three things that are less related to one another than a video game controller (Hussaini et al.), a portable light reel system (Woodruff) and a railroad signal display monitoring system (Davenport et al.). The Official Action provides no reason why one of ordinary skill in the art would have been motivated to have combined these three, disparate technologies to somehow reach Applicant’s claimed combinations and, accordingly, the undersigned respectfully submits that this represents another, independent

reason for finding the currently pending claims to be patentable.

In the Advisory Action, the Examiner comments on this argument by referring to the number of references not being excessive and re-states the espoused reasons for combining the references as "[m]otivations for incorporating Hussaini into Woodruff would have been to monitor the status of a visual signal lamp and incorporating Hussaini in view of Woodruff with Davenport would have been to provide proper illuminated intensity level by controlling the input voltage."

The undersigned replies as follows:

(a) it is not the quantity of references that is being objected to in this argument, but instead their quality. More specifically, the diverse fields of art which are involved make it unreasonable to contend that these three specific references would be consulted by the hypothetical person of ordinary skill in the art to arrive at Applicants' claimed combinations. Stated differently, and just as one example, it seems unlikely that someone trying to solve a problem associated with a video controller would refer to art in the reel and winding art and the railroad industry to address that problem;

(b) stating that "Hussaini into Woodruff" is motivated to "monitor the status of the visual signal lamp" makes no sense as neither Hussaini nor Woodruff have a visual signal lamp; and

(c) stating that "incorporating Hussaini in view of Woodruff with Davenport" is motivated to "provide proper illuminated intensity level by controlling the input voltage" is unclear, as there is no suggestion that either the illuminated video game

cord of Hussaini or the wound up EL wire of Davenport could in any way benefit from having a “proper illuminated intensity level”.

All of the arguments set forth above in sections 1-3 apply to all of the independent claims based on their specific (and different) recitations, as well as to the dependent claims.

4. Claims 3, 6, 10, 11, 16 and 17 are Patentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (U.S. Patent No. 3,819,973).

These dependent claims are also respectfully submitted to be patentable for at least the reasons set forth above with respect to the independent claims from which they depend.

Conclusions

Accordingly it is respectfully submitted that the rejection of claims 1-17 under 35 U.S.C. § 103(a) as being unpatentable does not establish a *prima facie* case of obviousness and should be reversed.

For at least the foregoing reasons, it is respectfully submitted that the claims are patentable over the documents cited. Accordingly, it is respectfully requested that the rejection in the Official Action of May 28, 2010 be REVERSED.

Respectfully submitted,
POTOMAC PATENT GROUP PLLC

By: /stevenmdubois/
Steven M. duBois
Registration No. 35,023

Dated: January 27, 2011

(viii) **CLAIMS APPENDIX**

1. An arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor,

wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

2. The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. The arrangement of claim 1, wherein said wire shaped illuminator is electroluminescent.

4. The arrangement of claim 1, wherein said wire shaped illuminator is an optical fibre.

5. The arrangement of claim 1, wherein said controller is further adapted to send a control signal to control said illuminator.

6. The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire coated with a phosphorus material coating and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said illuminator receiving control signals from said processing arrangement.

8. The arrangement of claim 1, wherein said illumination feature is one or several of intensity, colour or frequency.

9. A cord comprising at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire, said illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current and/or voltage through the at least one electric wire,

wherein said illuminator indicates the consumed current/voltage through said at least one electric wire when at least one illumination characteristic of said illuminator is controlled with respect to said electrical quantity by feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through at least one electrical wire.

10. The cord of claim 9, further comprising a substantially translucent coating, covering said wire and illuminator.

11. The cord of claim 9, wherein said illuminator is an electroluminescent wire.

12. The cord of claim 9, wherein said illuminator is an optical fibre.

13. The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical

quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor.

15. A device for providing a variable visual indication of consumption of electricity comprising:

a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and

a controller connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices based on said received measurements;

wherein said plurality of illumination devices output light which varies over time as a function of said measured, variable electrical quantity.

16. The device of claim 15, wherein said illumination devices each comprise a copper wire coated with a phosphorous material and two transmitter wires wrapped around the copper wire.

17. The device of claim 15, wherein said light output by said plurality of illumination devices varies in at least one of intensity, colour or frequency over time based on said measured electrical quantity.

Electronic Patent Application Fee Transmittal

Application Number:	11885697
Filing Date:	03-Oct-2007
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Filer:	Steven Maurice Dubois/Andrea Terry
Attorney Docket Number:	0904-021

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Filing a brief in support of an appeal	2402	1	270	270
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	2251	1	65	65
Miscellaneous:				
			Total in USD ($)	**335**

Electronic Acknowledgement Receipt

EFS ID:	9318722
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Andrea Terry
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	27-JAN-2011
Filing Date:	03-OCT-2007
Time Stamp:	14:06:12
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$335
RAM confirmation Number	291
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Extension of Time	201101027_1-month_EOT_Appeal_Brief_0904-021.pdf	322125 fa078fae1819bbf9edcf94bc2a95bc618e82fa23	no	2
Warnings:					
Information:					
2	Appeal Brief Filed	201101027_Appeal_Brief_0904-021.pdf	153340 f36a5de73af4550f29de8bda710bec7295eb5314	no	19
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	31787 d3c1f1e15da1fc958c484b652a2c8a132e65341a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	507252		

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/22 (07-09)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2009** (*Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).*)	Docket Number (Optional) 0904-021
Application Number 11/885,697	Filed October 3, 2007
For Visualisation Arrangement	
Art Unit 2612	Examiner Fekadeselassie Girma

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$130	$65	$ 65.00
☐	Two months (37 CFR 1.17(a)(2))	$490	$245	$
☐	Three months (37 CFR 1.17(a)(3))	$1110	$555	$
☐	Four months (37 CFR 1.17(a)(4))	$1730	$865	$
☐	Five months (37 CFR 1.17(a)(5))	$2350	$1175	$

☑ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

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

☑ attorney or agent of record. Registration Number 35,023

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

/stevenmdubois/	January 27, 2011
Signature	Date
Steven M. duBois	(540) 361-1863
Typed or printed name	Telephone Number

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

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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.

Privacy Act Statement

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

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

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

PTO/SB/31 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Docket Number (Optional): 0904-021

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]
on _____

Signature _____

Typed or printed name _____

In re Application of: Anton GUSTAFSSON

Application Number	Filed
11/885,697	October 3, 2007

For: Visualisation Arrangement

Art Unit	Examiner
2612	Fekadeselassie Girma

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) $ 540.00

☑ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is: $ 270.00

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. _____ .

☐ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

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

☑ attorney or agent of record.
Registration number 35,023.

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34. _____

/stevenmdubois/
Signature

Steven M. duBois
Typed or printed name

(540) 361-1863
Telephone number

October 28, 2010
Date

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

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 41.31. 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, 1.14 and 41.6. 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.**

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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).
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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.

Electronic Patent Application Fee Transmittal

Application Number:	11885697
Filing Date:	03-Oct-2007
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Filer:	Steven Maurice Dubois/Andrea Terry
Attorney Docket Number:	0904-021

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Notice of appeal	2401	1	270	270
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	2252	1	245	245
Miscellaneous:				
			Total in USD ($)	**515**

Electronic Acknowledgement Receipt

EFS ID:	8718654
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Andrea Terry
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	28-OCT-2010
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Application Type:	U.S. National Stage under 35 USC 371

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Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Extension of Time	20101028_2-month_EOT_Notice_of_Appeal_0904-021.pdf	315623 981abac97909ad8c6a4ef3e87d1f97d52d0c19dd	no	2
Warnings:					
Information:					
2	Notice of Appeal Filed	20101028_Notice_of_Appeal_0904-021.pdf	245722 ad961eec5a38d3bc233bf07eeee354e119249566	no	2
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	31854 1e141e5458b80c2b700763c9a2a76d0f20a4c534	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	593199		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/22 (07-09)
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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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2009** (*Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).*)	Docket Number (Optional) 0904-021
Application Number 11/885,697	Filed October 3, 2007
For Visualisation Arrangement	
Art Unit 2612	Examiner Fekadeselassie Girma

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$130	$65	$
☑	Two months (37 CFR 1.17(a)(2))	$490	$245	$ 245.00
☐	Three months (37 CFR 1.17(a)(3))	$1110	$555	$
☐	Four months (37 CFR 1.17(a)(4))	$1730	$865	$
☐	Five months (37 CFR 1.17(a)(5))	$2350	$1175	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

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

☑ attorney or agent of record. Registration Number 35,023

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

/stevenmdubois/	October 28, 2010
Signature	Date
Steven M. duBois	(540) 361-1863
Typed or printed name	Telephone Number

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

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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.

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.

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UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 09/10/2010

POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

EXAMINER	
GIRMA, FEKADESELASS	

ART UNIT	PAPER NUMBER
2612	

NOTIFICATION DATE	DELIVERY MODE
09/10/2010	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):

tammy@ppglaw.com
andrea@ppglaw.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 11/885,697	**Applicant(s)** GUSTAFSSON ET AL.	
	Examiner Fekadeselassie Girma	**Art Unit** 2612	

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

THE REPLY FILED 30 August 2010 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires *3* months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: _____.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Daniel Wu/
Supervisory Patent Examiner, Art Unit 2612

Continuation of 11. does NOT place the application in condition for allowance because: A. Applicant argues,
Wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor. Independent claims 9, 14, and 15, which each have their own scope, recite similar features. It is respectfully submitted that neither Hussaini, Woodruff, nor Davenport disclose at least the above feature of independent claim 1.

Examiner reply:
Hussaini discloses an arrangement for visual indication read on Col. 2, Lines 48-56, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game. The side glow fiber optic cable 7a is disposed adjacent the communication cable 7b and run substantially along the entire length thereof); power, current and/or voltage through a conductor read on Col. 2, Lines 45-48, (The cable 7b carries operational command signals to and from the controller to facilitate interactive play of the video game); a substantially wire shaped illuminator read on Col. 2, Lines 33-36, (a communication cable 7 having a single side glow fiber optic cable 7a running along side of a conventional cable bundle 7b for transmitting operation commands to the game console 50); a controller read on Col. 4, Lines 13-20, (such rope lighting strings incorporate circuitry to covert a standard AC power supply to a low voltage power supply to power the LEDs 108); illuminator with varying current or voltage met by ac power supply read on Col. 4, Lines 56-61, (an AC power supply to facilitate a more power lighting and brighter illumination of the cable); corresponding to electrical quantity in the conductor read on Col. 4, Lines 56-59, (The adapter may also simply contain resistant circuitry to provide current directly to the LED lights 108 of the light string of FIG. 5).
Woodruff teaches indication of an electrical brightness quantity read on Col. 5, Lines 4-8, (Using an alternative inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire).
The motivation for doing so would have been to provide proper illuminated intensity level by controlling the input voltage.
Davenport teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20, (The threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and determine whether the direct voltage or current output of the input device falls outside of the predetermined reference value).
The motivation for doing so would have been to monitor the status of a visual signal lamp.

B. Applicant further argues:

The Official Action concedes that the primary and secondary citations to Hussaini and Woodruff do not disclose "measuring the electrical quantity." Official Action, page 3. The Official Action rejects independent claim 1, contending that the tertiary citation to Davenport provides this necessary disclosure. Official Action, page 3. This contention is respectfully traversed.

Examiner reply:
Davenport teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20, the threshold detection circuitry 18 is configured to compare an output of the input device with the predetermined threshold and determine whether the direct voltage or current output of the input device falls outside of the predetermined reference value. The input device in this embodiment of the invention is the photodetector 16 and the threshold detection circuitry 74 converts the direct voltage output of the photodetector 16 into a measure of the optical power incident on the photodetector 16. That, to a large extent, correlates to a number of lighting parameters such as intensity, brightness, and irradiance in relation to the signal lamp 12.

C. Applicant further argues:

First, it is respectfully noted that, as argued in the previous amendment, Hussaini and Woodruff fail to disclose that a visual indication of an illuminator is controlled, dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply among other things. In other words, Hussaini and Woodruff fail to disclose not just "measuring electrical quantity", but rather "a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity.

Examiner reply:
Davenport teaches FIG. 2 is a simplified schematic diagram of an exemplary system 20 for monitoring status of visual signal lamp 12 in accordance with a third embodiment of the invention. The system 20 is enhanced by the addition of a lamp-head voltage detection circuitry 19, an electrical conductor 49 that connects the lamp-head voltage detection circuitry 19 with the threshold detection circuitry 18 and a light frequency filter 39. Other than the lamp-head voltage detection circuitry 19, the conductor 49 and the light frequency filter 39, the system 20 is substantially similar to system 10 shown in FIG. 1. Components in system 20 that are identical to components of system 10 are identified in FIG. 2 using the same reference numerals used in FIG. 1.

D. Applicant further argues:
Indeed the undersigned respectfully submits that it is difficult to conceive of three things that are less related to one another than a video game controller (Hussaini et al.), a portable ligh reel system (Woodruff) and a railroad signal display monitoring system (Davenport et al.). The Official Action provides no reason why one of ordinary skill in the art would have been motivated to have combined these three, disparate technologies to somehow reach Applicant's claimed combinations and, accordingly, the undersigned respectfully submits that this represents another, independent reason for finding the currently pending claims to be patentable.

Examiner reply:

In response to applicant's argument that the examiner has combined an excessive number of references, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. Motivations for incorporating Hussaini into Woodruff would have been to monitor the status of a visual signal lamp and incorporating Hussaini in view of Woodruff with Davenport would have been to provide proper illuminated intensity level by controlling the input voltage.

Therefore the rejection sustains..

/F.G./

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 09/01/2010

POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

EXAMINER	
GIRMA, FEKADESELASS	
ART UNIT	PAPER NUMBER
2612	

NOTIFICATION DATE	DELIVERY MODE
09/01/2010	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):

tammy@ppglaw.com
andrea@ppglaw.com

Interview Summary	Application No.	Applicant(s)	
	11/885,697	GUSTAFSSON ET AL.	
	Examiner	Art Unit	
	Fekadeselassie Girma	2612	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Fekadeselassie Girma*. (3)_____.

(2) *Chris Mitchell*. (4)_____.

Date of Interview: *25 August 2010*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1 and 15*.

Identification of prior art discussed: *N/A*.

Agreement with respect to the claims f)☐ was reached. g)☐ was not reached. h)☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Fekadeselassie Girma/ Examiner, Art Unit 2612	/Daniel Wu/ Supervisory Patent Examiner, Art Unit 2612

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

———

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Mr. Chris Mitchell appreciate examiner for having the interview after final action had been sent. Mr. Mitchell starts the interview by elaborating the invention. The current invention includes illuminated wire with an electrical quantity measurement device and a controller to light up the wire based on measured electrical quantity and the brightness of the wired light depends on the measured quantity of current. Examiner relies on three references to reject the current application. Examiner relies on Hussaini (US 7195561), Woodruff (US 6758314) and Davenport (US 7270442). Mr. Mitchell request examiner's opinion about the rejections since the current invention discloses different from the above listed prior arts. For example the current invention has a controller that controls the brightness of the lighted wire based on the current. Claim 1 and 15 discloses a controller to perform the above disclosed invention.
Examiner answers for the question raised by the applicant representative that the current invention elaborates clearly that a distributor is connected to a wall socket. Electric equipment is connected to the distributor through a plug and a cord is provided with the illuminating wires. The wire shaped illuminator and a controller which controls at least one illumination characteristic of said illuminator with respect to said electrical feature. However, the claims are written broadly that the limitations in the claim can read on the prior arts. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

Mr. Mitchell requests examiners opinion on rejection regarding claim 15. The claim includes a controller controlling the glow of the wire based on the current which any of the prior arts discloses.
Examiner reply that claim 15 is rejected as claim 1 and claim 9. Davenport reference discloses a controller which is met by a logical processor 22 and an alerting system 24. A logical processor typically is a processing unit that performs computing tasks and it is created using software application programs or operating system resources.

.

Patent
Attorney's Docket No. 0904-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	Group Art Unit: 2612
	)	
Anton GUSTAFSSON *et al*.	)	Examiner: Fekadeselassie Girma
	)	
Application No.: 11/885,697	)	Confirmation No.: 8165
	)	
Filed: October 3, 2007	)	
	)	
For: VISUALISATION ARRANGEMENT	)	
	)	

REQUEST FOR RECONSIDERATION UNDER 37 C.F.R. § 1.116

Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

In complete response to the Official Action dated May 28, 2010, reconsideration is respectfully requested.

AMENDMENTS TO THE CLAIMS:

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

LISTING OF CLAIMS:

1. (Previously Presented) An arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor,

wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

2. (Original) The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. (Previously Presented) The arrangement of claim 1, wherein said wire shaped illuminator is electroluminescent.

4. (Previously Presented) The arrangement of claim 1, wherein said wire shaped illuminator is an optical fibre.

5. (Previously Presented) The arrangement of claim 1, wherein said controller is further adapted to send a control signal to control said illuminator.

6. (Previously Presented) The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire coated with a phosphorus

material coating and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. (Previously Presented) The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said illuminator receiving control signals from said processing arrangement.

8. (Previously Presented) The arrangement of claim 1, wherein said illumination feature is one or several of intensity, colour or frequency.

9. (Previously Presented) A cord comprising at least one electric wire and a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire, said illuminator having means for illumination when energized to indicate an electrical quantity, being one or several of power, current and/or voltage through the at least one electric wire,

wherein said illuminator indicates the consumed current/voltage through said at least one electric wire when at least one illumination characteristic of said illuminator is controlled with respect to said electrical quantity by feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through at least one electrical wire.

10. (Previously Presented) The cord of claim 9, further comprising a substantially translucent coating, covering said wire and illuminator.

11. (Previously Presented) The cord of claim 9, wherein said illuminator is an electroluminescent wire.

12. (Previously Presented) The cord of claim 9, wherein said illuminator is an optical fibre.

13. (Original) The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. (Previously Presented) A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor.

15. (Previously Presented) A device for providing a variable visual indication of consumption of electricity comprising:

a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and

a controller connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices based on said received measurements;

wherein said plurality of illumination devices output light which varies over time as a function of said measured, variable electrical quantity.

16. (Previously Presented) The device of claim 15, wherein said illumination devices each comprise a copper wire coated with a phosphorous material and two transmitter wires wrapped around the copper wire.

17. (Previously Presented). The device of claim 15, wherein said light output by said plurality of illumination devices varies in at least one of intensity, colour or frequency over time based on said measured electrical quantity.

REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested. Claims 1-17 are currently pending. No claims are currently added, amended, canceled, or withdrawn.

Applicants thank the Examiner for the telephone interview of August 25, 2010. Comments regarding the cited art rejections that were discussed are included below.

Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini (U.S. Patent No. 7,195,561) in view of Woodruff (U.S. Patent No. 6,758,314) and further in view of Davenport (U.S. Patent No. 7,270,442). Claims 3, 6, 10, 11, 16 and 17 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (U.S. Patent No. 3,819,973). These rejections are traversed and reconsideration is respectfully requested.

Independent claim 1 recites, inter alia:

> wherein the arrangement comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

Independent claims 9, 14, and 15, which each have their own scope, recite similar features.

It is respectfully submitted that neither Hussaini, Woodruff, nor Davenport

disclose at least the above feature of independent claim 1. Specifically, it is submitted that the tertiary citation to Davenport does not cure the conceded insufficiency in the primary and secondary citations to Hussaini and Woodruff. Accordingly, without conceding its propriety, the proposed combination of Hussaini, Woodruff, and Davenport is likewise insufficient, even in view of the knowledge of one of ordinary skill in the art.

The Official Action concedes that the primary and secondary citations to Hussaini and Woodruff do not disclose "measuring the electrical quantity." Official Action, page 3. The Official Action rejects independent claim 1, contending that the tertiary citation to Davenport provides this necessary disclosure. Official Action, page 3. This contention is respectfully traversed.

First, it is respectfully noted that, as argued in the previous amendment, Hussaini and Woodruff fail to disclose that a visual indication of an illuminator is controlled, dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply among other things. In other words, Hussaini and Woodruff fail to disclose not just "measuring electrical quantity", but rather "a controller adapted to **control at least one illumination characteristic** of said illuminator **with respect to said electrical quantity**.

Turning to the newly added tertiary citation, Davenport relates to "a system… for detecting and reporting railroad signal light status." Davenport, col. 1, lines 7-10. As explained in Davenport, the "optical power [of a railroad signal light] can be reduced by several factors including bulb age, dirt on lens or reflector surfaces, and damage to lens." Davenport, col. 1, lines 17-19. The system of Davenport provides

a system to observe the optical power of the railroad light signal to determine that the signal is in its desired state (illuminated, dark, flashing).

The specific citation to Davenport discusses a photodetector 16 and threshold detection circuitry 74 converting the direct voltage output from the photodetector 16 into a measure of the optical power incident on the photodetector 16. Thus, the Official Action contends that "it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp." Official Action, page 3.

However, as noted above, what is recited in claim 1 is not just measuring electrical quantity, but rather, a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity. Applicants' note the Board of Patent Appeals and Interferences decision in In re Wada and Murphy that "[w]hen determining whether a claim is obvious, an examiner must make "a searching comparison of the claimed invention – including all its limitations – with the teaching of the prior art." Appeal 2007-3733 (BPAI 2008)(citing In re Ochiai, 71 F.3d 1565, 1572 (Fed. Cir. 1995)). "Thus, 'obviousness **requires a suggestion of all limitations** in a claim.'" Id (citing CFMT, Inc. v. Yieldup Intern. Corp., 349 F.3d 1333, 1342 (Fed. Cir. 2003)(citing In re Royka, 490 F.2d 981, 985 (CCPA 1974))(emphasis added). Accordingly, Davenport cannot properly be relied upon for disclosing the above feature. Finally, it is further noted that Hosford has not been contended to cure the insufficiency in the primary, secondary, and tertiary citations.

Moreover, it is respectfully submitted that the Official Action has provided no

reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way independent claims 1, 9, 14, and 15 do. As noted in the Office's own examination manual, the United States Supreme Court indicated that it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." Manual of Patent Examination Procedure § 2143 (citing KSR International Co. v. Teleflex Inc., 550 U.S. 398, 418, 82 USPQ2d 1385, 1395-97 (2007)). Simply restating a goal of one of the cited references does not provide any insight, reasoning, or logic that could be properly called "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements" and is mere hindsight reconstruction. While inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known, simply finding claim features piecemeal in the prior art references and restating a goal of one of the cited references does not provide the reasoning required to maintain a prima facie case of obviousness.

The Official Action merely states that it would have been obvious to combine the teachings "in order to monitor the status of a visual signal lamp." Official Action, page 3. While this appears to be the goal of the tertiary citation to Davenport, the citations to Hussaini, Woodruff, Davenport - and the Official Action – fail to provide a reason as to why one of skill in the art would be motivated to make such a combination.

Additionally, in this context, it is respectfully submitted that the art relied upon

to piece together Applicant's claimed combinations is non-analogous art. Indeed the undersigned respectfully submits that it is difficult to conceive of three things that are less related to one another than a video game controller (Hussaini et al.), a portable ligh reel system (Woodruff) and a railroad signal display monitoring system (Davenport et al.). The Official Action provides no reason why one of ordinary skill in the art would have been motivated to have combined these three, disparate technologies to somehow reach Applicant's claimed combinations and, accordingly, the undersigned respectfully submits that this represents another, independent reason for finding the currently pending claims to be patentable.

In view of the above, it is respectfully submitted that the Official Action has provided no reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way independent claims 1, 9, 14, and 15 do.

In view of at least the above reasons, it is respectfully submitted that the Official Action fails to establish a prima facie case of obviousness. Accordingly, favorable reconsideration and withdrawal of the §103 rejections are respectfully requested.

All of the objections and rejections raised in the Official Action having been addressed, it is respectfully submitted that this application is in condition for allowance and a notice to that effect is earnestly solicited. Should the Examiner have any questions regarding this response or the application in general, she or he is invited to contact the undersigned at (540) 361-1863.

Respectfully submitted,

POTOMAC PATENT GROUP PLLC

By: /Steven M. duBois/
Steven M. duBois
Registration No. 35,023

Date: August 30, 2010

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(540) 361-1863

Electronic Acknowledgement Receipt

EFS ID:	8316921
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Andrea Terry
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	30-AUG-2010
Filing Date:	03-OCT-2007
Time Stamp:	14:55:36
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20100830_as-filed_Response_to_Final_OA_0904-021.pdf	123700 9918cc31d7309ba48570aaa14de79ce9fbe98f56	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment After Final	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	10
Warnings:			
Information:			
	Total Files Size (in bytes):	123700	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☒ To be Mailed
11/885,697	10/03/2007	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ 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			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	08/30/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0	X $26 =	0	OR	X $ =	
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $110 =	0	OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE	

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

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

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

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

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

Legal Instrument Examiner:
/KATRINA HARLING/

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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 05/28/2010

POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

EXAMINER	
GIRMA, FEKADESELASS	
ART UNIT	PAPER NUMBER
2612	

NOTIFICATION DATE	DELIVERY MODE
05/28/2010	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):

tammy@ppglaw.com

Office Action Summary	Application No.	Applicant(s)	
	11/885,697	GUSTAFSSON ET AL.	
	Examiner	Art Unit	
	Fekadeselassie Girma	2612	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☒ Responsive to communication(s) filed on *15 March 2010*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

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

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

Application Papers

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

10)☒ The drawing(s) filed on *05 September 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☒ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to amendment filed on 15 March 2010. Claims 1, 5, 9-12 and 14 are amended, claims 15-17 has been newly introduced, and no claims has been cancelled. Therefore, claims 1-17 are currently pending in this application

Claim Rejections - 35 USC § 103

2. The following is a quotation of 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 of this title, 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 negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, 5, 7, 8, 9 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hussaini (US 7195561) in view of Woodruff (US 6758314) and further in view of Davenport (US 7270442).

As to claim 1, Hussaini discloses in Video game controller with illuminated cable having claimed an arrangement for visual indication read on Col. 2, Lines 48-56; power, current and/or voltage through a conductor read on Col. 2, Lines 45-48; a substantially wire shaped illuminator read on Col. 2, Lines 33-36; a controller read on Col. 4, Lines 13-20; illuminator with varying current or voltage met by ac power supply (read on Col. 4, Lines 56-61; corresponding to electrical quantity in the conductor read on Col. 4, Lines 56-59. Hussaini does not explicitly disclose visual indication of an electrical quantity.

However, Woodruff in a portable light reel system holding electro-luminescent (EL) wire and self-contained electronics teaches indication of an electrical brightness quantity read on Col.

5, Lines 4-8. The artisan recognizes the obviousness of the brightness intensity level depends on the voltage and frequency applied to it. The higher the voltage and frequency, the brighter the EL wire illuminates. Using an inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in order to provide proper illuminated intensity level by controlling the input voltage. Hussaini in view of Woodruff do not explicitly disclose measuring the electrical quantity.

However, Davenport in a system and method for detecting and reporting teaches measuring the electrical quantity corresponding to feeding the illuminator read on Col. 4, Lines 3-20. The artisan recognizes the obviousness of a threshold detection circuitry connected to the photo-detector and configured to detect a lighting parameter in relation to the signal lamp according to a predetermined criterion. The threshold detection circuitry 18 detects a lighting parameter such as brightness or intensity or irradiance in relation to the signal lamp 12.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp.

As to claim 2, Hussaini further discloses wire shaped illuminator is arranged along said conductor read on Col. 2, Lines 33-36.

As to claim 4, Hussaini further discloses wire shaped illuminator is an optical fiber read on Col. 2, Lines 33-36.

As to claim 5, Hussaini further discloses controller is further adapted to measure said electrical quantity and adopt a control signal to control said illuminator read on Col. 3, Lines 20-29.

As to claim 7, Woodruff further discloses a processing arrangement and measuring arrangement and driver read on Col. 5, Lines 4-8 & Col. 4, Lines 25-32. The artisan recognizes the obviousness of the inverter together with electrical components controls the intensity of brightness of the illuminated EL wire. The variable inverter and electrical components process the output power/voltage to a measured value and drive the current to vary the brightness of illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in view of Davenport in order to provide proper illuminated intensity level by controlling the input voltage.

As to claim 8, Hussaini further discloses illumination feature is one or several of intensity, color or frequency read on Col. 2, Lines 56-60.

As to claim 9, Davenport further teaches illuminator indicates the consumed current/voltage through electric wire read on Col. 4, Lines 3-20 & Col. 4, Line 42 – Col. 5, Line 6. The artisan recognizes the obviousness of a monitoring the status of a visual signal lamp 12 in accordance with one embodiment of the invention. The system 10 includes an optical fiber 14 to capture and transport light signals 32 emanated by the signal lamp 12 and a photo-detector 16 to sense the optical power of the light signals 32 captured and transported by the optical fiber 14. The system 10 also includes a threshold detection circuitry 18 that compares the output of the photo-detector 16 with a reference threshold value. The status of the signal lamp 12 is

determined remotely and directly by the combination of the photo-detector 16 and the threshold detection circuitry 18.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the system and method for monitoring status of a visual signal device of Davenport into Hussaini in view of Woodruff in order to monitor the status of a visual signal lamp.

As to claim 12, the claim is interpreted and rejected as to claim 4.

As to claim 13, Hussaini further discloses illuminating arrangement indicates current or power consuming through electric wire read on Col. 3, Lines 20-29.

As to claim 14, the claim is interpreted and rejected as to claim 1 & 9.

As to claim 15, the claim is interpreted and rejected as to claim 1 & 9.

4. Claims 3, 6, 10, 11, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hussaini in view of Woodruff and further in view of Davenport and further in view of Hosford (US 3819973).

As to claim 3, Hussaini in view of Woodruff and further in view of Davenport discloses all claimed limitations except a wire shaped illuminator is electroluminescent. However, Hosford in electroluminescent devices offering high brightness and efficiency at the voltage and alternating cycle chosen teaches a wire shaped illuminator is electroluminescent read on Col. 3, Lines 12-17. The artisan recognizes the obviousness of using the electroluminescent filament with the helical colors combination comprises a copper wire as a central electrode core wire. The copper wire is placed at the central position of the coreless orientation to convey signal.

Incorporating the electroluminescent wire in the disclosure of Hussaini's single side glow fiber optics cable for the purpose of transmitting signals presents no new or unexpected results since Hosford's electroluminescent wire and Hussaini's single side glow fiber optics cable are both transmitting electrical current using wire consisting of copper conductor and illuminated material are laid in abutment in a roughly parallel configuration to introduce light through the electroluminescent or fiber optics to enhance visibility of the cable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of Woodruff and further in view of Davenport in order to enhance visibility of the cable.

As to claim 6, Hussaini in view of Woodruff discloses all claimed limitations except electroluminescent includes a central conductive wire coated with a phosphorus material and transmitter wires wrapped around it and covered by a coating and a colored vinyl coat.

However, Hosford in electroluminescent includes a central conductive wire coated with a phosphorus material coating read on Col. 3, Lines 27-36 & Col. 3, Lines 58-65; transmitter wires wrapped around it read on Col. 3, Lines 15-20; covered by a coating and a colored vinyl coat read on Col. 4, Lines 23-30. It is obvious that electroluminescent phosphors exhibit luminescence in the presence of electric fields. A phosphor is applied to the outer surface of the wires and caused to luminance by an electrical current applied across the conductors. Higher voltage and/or higher frequency of alternating current yields higher brightness. It is most desirable to construct a filament or combined with other filaments.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of

Woodruff and further in view of Davenport in order to provide a gentle, even illumination to the entire display, efficient light output and long life at moderate voltage power.

As to claim 10, Hosford further teaches a substantially translucent coating covering said wire and illuminating arrangement read on Col. 3, Lines 12-26. The artisan recognizes the obviousness of allowing light to pass diffusely through the wire by having transparent coating. A light transparent or at least highly translucent polymeric coating covers and protects the entire filament from damage due to hard use.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of Woodruff and further in view of Davenport in order to provide protection from damage while keeping transparent characteristics.

As to claim 11, the claim is interpreted and rejected as to claim 6.

As to claim 16, the claim is interpreted and rejected as to claim 6.

As to claim 17, Woodruff further teaches light output by illumination device varies in intensity based on measured electrical quantity read on Col. 5, Lines 4-8. The artisan recognizes the obviousness of the brightness intensity level depends on the voltage and frequency applied to it. The higher the voltage and frequency, the brighter the EL wire illuminates. Using an inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in view of Davenport in order to provide proper illuminated intensity level by controlling the input voltage.

Response to Arguments

5. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Citation of Other Prior Arts

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Goto discloses in Illuminating apparatus using full-color LEDs (US 2005/0141237), Mako discloses in Illumination and reflective strips (US 2005/0057942), and Okishima discloses in Lighting equipment (US 2006/0291136).

Conclusion

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

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

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fekadeselassie Girma whose telephone number is (571) 270-5886. The examiner can normally be reached on Monday thru Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel J. Wu can be reached on 571-272-2964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/FG/

/Daniel Wu/
Supervisory Patent Examiner, Art Unit 2612

Notice of References Cited	Application/Control No. 11/885,697	Applicant(s)/Patent Under Reexamination GUSTAFSSON ET AL.	
	Examiner Fekadeselassie Girma	Art Unit 2612	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,270,442	09-2007	Davenport et al.	362/276
*	B	US-7,195,561	03-2007	Hussaini et al.	463/31
*	C	US-6,758,314	07-2004	Woodruff, George	191/12.2R
*	D	US-3,819,973	06-1974	Hosford, Alonzo L.	313/498
*	E	US-2006/0291136	12-2006	Okishima, Kiyoshi	361/289
*	F	US-2005/0057942	03-2005	Mako et al.	362/554
*	G	US-2005/0141237	06-2005	Goto, Hiromitsu	362/555
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	Art Unit
	Fekadeselassie Girma	2612

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

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

CLAIM		DATE								
Final	Original	12/10/2009	05/13/2010							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15		✓							
	16		✓							
	17		✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	Art Unit
	Fekadeselassie Girma	2612

SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
340/854,635, 9|340/568.2|340/596, 385/901|385/102|385/16|439/102|439/901 Text and cursory search	12/10/2009	FG
See attached EAST search notes	12/10/2009	FG
inventor and assignee search	12/10/2009	FG
Consulted with Danny Wu	12/10/2009	FG
fwd and back citation search	12/10/2009	FG
plus search	12/10/2009	FG
340/815.42, 815.57, 815.77, 815.75, 641, 362/84, 552, 439/490 text and cursory search	5/13/2010	FG
See attached EAST search notes	5/13/2010	FG
fwd and back citation search	5/13/2010	FG
consulted with Husar, Stephen	5/13/2010	FG
Consulted with Danny Wu	5/13/2010	FG

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

/F. G./ Examiner.Art Unit 2612	

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CONFIRMATION NO. 8165

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/885,697	10/03/2007 RULE	034	2612	0904-021

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

This application is a 371 of PCT/SE06/00283 03/06/2006

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

SWEDEN 0500523-6 03/07/2005

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

04/09/2008

Foreign Priority claimed	☑ Yes ☐ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☑ Yes ☐ No					
Verified and Acknowledged	/FEKADESELASSIE GIRMA/ Examiner's Signature	/FG/ Initials	SWEDEN	3	14	3

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TITLE

Visualisation Arrangement

FILING FEE RECEIVED		
625	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
L1	1	US "20080191890" A1	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 11:55
L2	7	"7195561"	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 11:58
L3	19	"6826593"	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 13:28
L4	100	("5857986" | "6135450")	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 15:42
L5	2	("5857986" | "6135450").pn.	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 15:42
L6	982	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and (cable$2 or wire or tublar or illumnat$4 or arche$3 or lumnus)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 15:48
L7	765	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and (cable$2 or wire or tublar or illumnat$4 or arche$3 or lumnus)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 15:49
L8	2451	362/84	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
L9	304	362/552	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
L10	1112	439/490	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03
L11	86073	"174".clas.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:03

L12	4928	340/815$	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:10
L13	0	340/815.42-75	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:10
L14	0	(340/815.42-75)".ccls"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:10
L15	4402	(340/815.42-815.75).ccls.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
L16	1	"340"/.5	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
L17	104	"340"/815.5	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
L18	601	340/641	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:11
L19	98019	(8|9|10|11|12|15|17|18)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:12
L20	28945	(l8|l9|l10|l11|l12|l15|l17|l18)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:12
L21	98019	(l8 or l9 or l10 or l11 or l12 or l15 or l17 or l18)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/13 16:13
L22	39	measur$4 near4 (volt$4 or current$2 or power$2 or electric$4) same bright$5 and l21	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/13 16:13
S1	80	6169491|6377054|5122733|6347172|20020039666	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S2	80	(6169491|6377054|5122733|6347172|20020039666)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S3	5	(6169491|6377054|5122733|6347172|20020039666).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29

S4	12	"6347172"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 09:39
S5	17	("5506674" | "5577147" | "5638483" | "5671308" | "5708499" | "5905837" | "5982967" | "5987199" | "5995702" | "6275644").PN. OR ("6347172").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 20:54
S6	1339	385/901	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:09
S7	11	((conductor or copper) adj3 wire$2) and S6	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:16
S8	11	("3819928" | "4623217" | "4887190" | "5140659" | "5222165" | "5311410").PN. OR ("5454056").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:26
S9	7146	385/901|385/102|385/16| 439/102|439/901	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:31
S10	257	((conductor or copper) adj3 wire$2) and S9	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:31
S11	6	("4424954" | "5136673" | "5165003" | "6032449" | "6127626" | "6193824").PN. OR ("7352936").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:07
S12	23261	(power or current or volt$4) adj3 indicator$2	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:24
S13	16	S9 S12	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:24
S14	15	("20040058733" | "20050221250" | "20060018596" | "20080089088" | "4422719" | "4466697" | "4830461" | "4872837" | "4893897" | "4909594" | "5334206" | "5431647" | "5542017" | "6551346" | "7356225").PN. OR ("7620279").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:27

S15	886	385/101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:39
S16	1	"20080191890" A1	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:42
S17	287	(power adj1 cord) same (meter or voltmeter or ammeter ot indicator)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:49
S18	0	S17 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:52
S19	1	S17 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:53
S20	1	S17 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:53
S21	962931	(meter or volt$meter or ammeter or indicator or voltage$meter or (volt$3 adj1 meter))	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S22	237	S21 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S23	887	S21 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S24	188	S21 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S25	2	S22 S23 S24	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S26	1020	S22 S23 S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/09 23:57
S27	2324	surge adj2 protector	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:10
S28	3663	S27 S6	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:11

S29	0	S27 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S30	1	S27 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S31	3	S27 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S32	2	S27 S17	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:13
S33	525	40/544	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:20
S34	963372	S33 S21	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:26
S35	84	S33 S21	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:26
S36	0	S35 (5|11|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:26
S37	1021	S34 (5|11|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S38	25477	S34 and (15|111|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S39	1	S35 and (15|111|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S40	102	S27 and (15|111|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:28
S41	8	("20020039666" | "20040067387" | "20050037233" | "5122733" | "5485355" | "6169491" | "6347172" | "6377054").PN.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 11:21
S42	2	("2002/0039666").URPN.	USPAT	AND	ON	2009/12/10 11:22

S43	20	("20020011219" | "20020039666" | "3798481" | "3819973" | "5333228" | "5383100" | "5485355" | "5669214" | "5753381" | "5842766" | "5876863" | "5995702" | "6169835" | "6341550" | "6347172" | "6394625" | "6742909" | "6976762" | "RE32374"). PN. OR ("7401961"). URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 11:25
S44	11	("0807189" | "1096457" | "4903179" | "5345531" | "5528477").PN. OR ("6394625").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:17
S45	3	(7379642|7170007| 7202418).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:25
S46	2	poker table illuminat$4	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:30
S47	80	6169491|6377054|5122733| 6347172|20020039666	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:35
S48	5	(6169491|6377054|5122733| 6347172|20020039666).pn.	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:35
S49	2	("2002/0039666").URPN.	USPAT	AND	ON	2009/12/10 13:36
S50	3	"20040058733"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:37
S51	39	(6854869|20020065134| 6347172|20040048665)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:40
S52	4	(6854869|20020065134| 6347172|20040048665).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:40
S53	26	("4234907" | "5709448" | "6016038" | "6126233" | "6302570" | "6577794").PN. OR ("6854869").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:41

S54	17	("5506674" | "5577147" | "5638483" | "5671308" | "5708499" | "5905837" | "5982967" | "5987199" | "5995702" | "6275644").PN. OR ("6347172").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:55
S55	13	("20020065134" | "20040048665" | "2410277" | "5286922" | "6159037" | "6347172" | "6854869").PN. OR ("7195561").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:03
S56	33271	electroluminescent	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:19
S57	87	S56 and (conductor adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:19
S58	336	S56 and ((copper or aluminum or conductor) adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:20
S59	324	S58 and (measure$2 or value or current or volt$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:20
S60	21	S59 and (phosphorus and color$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:23
S61	1055	340/854.9|340/568.2| 340/596	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 15:18
S62	6	"6758314"	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 15:20
S63	42	(cord cable wire) with (glow $3 illuminat$4) with (dim dimming dimable)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:28
S64	1	"20080191890"	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:39
S65	2131	light$4 with electric adj4 (cable$2 or cord$2)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:41
S66	325	illuminat$4 with electric adj4 (cable$2 or cord$2)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:41

S67	4	wo adj1 "03"?105538	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 16:55
S68	1	wo adj1 "03"?093394	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 16:56
S69	6	"6758314"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 17:11
S70	1	"20080191890"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 17:22
S71	2	"20040145313"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 18:53
S72	2304	translucent adj3 coat$4	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:41
S73	567	S72 and (wire or cable)	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:42
S74	21	S72 and ((copper or alumnum) adj3 (wire or cable))	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:48
S75	4478	metal adj2 detector	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 09:58
S76	705	S75 with magnet$4	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 09:58
S77	10344	magnet$4 adj4 detector	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:02
S78	66	S77 with battery	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:03

S79	619	(magnet$4 and detector$3).ti.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:57
S80	23	S79 and (magnetic adj3 switch)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 10:59
S81	0	(magnet$4 adj1 flex adj1 detector$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:10
S82	316	(magnet$4 adj1 flux adj1 detector$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:11
S83	63	S82 and led	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:11
S84	0	S80 S83	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:11
S85	17	(magnet$4 and flux and detector$3).ti.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/11 11:14
S86	1	"20080191890" A1	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 01:06
S87	49	(cord cable wire) with (glow $3 illuminat$4) with (dim dimming dimable)	US-PGPUB; USPAT; USOCR	OR	ON	2010/05/11 01:11
S88	1	dim near5 bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (conductor or wire or illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:22
S89	188	bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (conductor or wire or illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:23
S90	175	bright$5 near5 ((electric or voltage or power or current) near4 (control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:32
S91	2050	bright$5 near5 ((control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 21:33

S92	2288	bright$5 near5 ((control or adjust$4)) near4 (illumina$5 or cable)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:33
S93	2239	bright$5 near5 ((control or adjust$4)) near4 (illumina $5)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:33
S94	2355	bright$5 near5 ((control or adjust$4)) near4 (illumina$5 or electroluminescent$3 or luminescent$3)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:34
S95	757	S94 not display	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:35
S96	1	bright$5 near5 (power adj2 cable) near4 (illumina$5 or electroluminescent$3 or luminescent$3)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:38
S97	155	(power adj2 cable) near4 (illumina$5 or electroluminescent$3 or luminescent$3)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:39
S98	4	("2005/0141237").URPN.	USPAT	AND	ON	2010/05/11 21:47
S99	0	("20020067290" | "20040213540" | "20050024877" | "20050057942").PN.	USPAT	AND	ON	2010/05/11 21:59
S100	4	("20020067290" | "20040213540" | "20050024877" | "20050057942").PN.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 21:59
S101	92661	"362".clas.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S102	249	S91 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S103	255	S92 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S104	253	S93 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S105	259	S94 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04

S106	120	S95 S101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:04
S107	261	S102 or S103 or S103 or S104 or S105 or S106	US-PGPUB; USPAT; EPO; JPO	AND	ON	2010/05/11 22:05
S108	1	("2006/0146552").URPN.	USPAT	AND	ON	2010/05/11 22:08
S109	3	("20030137849" | "20060146552" | "6861809").PN. OR ("7708435").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:10
S110	0	hologram near parking	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:12
S111	100	hologram near target	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:12
S112	30	hologram near4 target and vehicl$2	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:13
S113	43	("4261647" | "4407564" | "4560233" | "4613200" | "4655540" | "4763990").PN. OR ("4832427").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2010/05/11 22:18

5/13/2010 6:23:36 PM
C:\Documents and Settings\fgirma\My Documents\EAST\Workspaces\11885697 VISUALISATION ARRANGEMENT.wsp

Patent
Attorney's Docket No. 0904-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
	)	Group Art Unit: 2612
Anton GUSTAFSSON et al.	)	
	)	Examiner: Fekadeselass Girma
Application No.: 11/885,697	)	
	)	Confirmation No.: 8165
Filed: October 3, 2007	)	
	)	
For: VISUALISATION ARRANGEMENT	)	
	)	
	)	

AMENDMENT UNDER 37 U.S.C. §1.111

Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

In complete response to the Office Action dated December 18, 2009, reconsideration and allowance of the above-identified application are respectfully requested as follows:

AMENDMENTS TO THE CLAIMS:

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

LISTING OF CLAIMS:

1. (Currently Amended) An arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor,

wherein the arrangement ~~comprises~~ comprising a substantially wire shaped illuminator and a controller adapted to control at least one illumination characteristic of said illuminator with respect to said electrical quantity ~~feature~~ by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the electrical quantity measured in the conductor.

2. (Original) The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. (Previously Presented) The arrangement of claim 1, wherein said wire shaped illuminator is electroluminescent.

4. (Previously Presented) The arrangement of claim 1, wherein said wire shaped illuminator is an optical fibre.

5. (Currently Amended) The arrangement of claim 1, wherein said controller is further adapted to ~~measure said electrical quantity and adopt~~ send a control signal to control said illuminator.

6. (Previously Presented) The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire coated with a phosphorus material coating and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. (Previously Presented) The arrangement of claim 1, wherein said controller comprises a processing arrangement and a measuring arrangement and a driver for driving said illuminator receiving control signals from said processing arrangement.

8. (Previously Presented) The arrangement of claim 1, wherein said illumination feature is one or several of intensity, colour or frequency.

9. (Currently Amended) A cord comprising at least one electric wire and ~~an illuminating arrangement,~~ a substantially wire shaped illuminator at least partly arranged along an extension of said at least one electric wire, said illuminator ~~illuminating arrangement~~ having means for illumination when energized to indicate an electrical quantity, being one or several of power, current and/or voltage through the at least one electric wire,

wherein said illuminator indicates the consumed current/voltage through said at least one electric wire when at least one illumination characteristic of said illuminator is controlled with respect to said electrical quantity by feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through at least one electrical wire.

10. (Currently Amended) The cord of claim 9, further comprising a substantially translucent coating, covering said wire and illuminator ~~illuminating arrangement~~.

11. (Currently Amended) The cord of claim 9, wherein said illuminator ~~illuminating arrangement~~ is an electroluminescent wire.

12. (Currently Amended) The cord of claim 9, wherein said illuminator ~~illuminating arrangement~~ is an optical fibre.

13. (Original) The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. (Currently Amended) A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical quantity ~~feature~~ by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor.

15. (New) A device for providing a variable visual indication of consumption of electricity comprising:

a measurement unit, disposable between an external power source and a device which consumes said electricity, configured to measure a variable electrical quantity associated with said electricity; and

a controller connected to said measurement unit and configured to receive measurements from said measurement unit, and further configured to control a plurality of illumination devices based on said received measurements;

wherein said plurality of illumination devices output light which varies over time as a function of said measured, variable electrical quantity.

16. (New) The device of claim 15, wherein said illumination devices each comprise a copper wire coated with a phosphorous material and two transmitter wires wrapped around the copper wire.

17. (New). The device of claim 15, wherein said light output by said

plurality of illumination devices varies in at least one of intensity, colour or frequency over time based on said measured electrical quantity.

REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested. Claims 1-14 are currently pending. Claims 1, 5, 8, 9, 10-12, and 14 have been amended. Claims 15-17 are new.

Applicant notes with appreciation that the Examiner has considered and made of record the documents submitted with the Information Disclosure Statement filed on September 5, 2007.

Claims 1, 2, 5, 7, 8, 9, 12 and 14 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini (U.S. Patent No. 7,195,561) in view of Woodruff (U.S. Patent No. 6,758,314). Claims 3, 6, 10 and 11 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hussaini in view of Woodruff and further in view of Hosford (U.S. Patent No. 3,819,973). Prior to discussing these grounds of rejection in detail, a brief summary of exemplary embodiments is provided to highlight advantageous characteristics thereof.

Exemplary embodiments provide a useful and novel solution for indicating the consumption of power in various electrical appliances, by creating a visual indication of an electrical quantity through a conductor which feeds electric power to the appliance. The “electrical quantity” can be power, current and/or voltage which is measured as running through the conductor. According to exemplary embodiments, a wire shaped “illuminator” 14, 15, 16 is used for visual indication and an “illumination characteristic” of the illuminator is controlled dependent on, and responsive to, the measured electrical quantity.

It will be appreciated that many electric appliances consume power dependent on the usage thereof. For example, a TV set may increase its power consumption momentarily when the sound level or screen brightness is increased, which change in power consumption is made directly visible for the user by these exemplary embodiments.

One important feature of these exemplary embodiments is thus that a change of the visible illumination characteristic directly corresponds to a changed power consumption. In this way, consumers can easily be made aware of their power consumption at all times, which naturally can contribute to keeping the power consumption down, without relying on centrally placed meters or the like which are seldom observed or noticed anyway. The exemplary embodiments can also be very useful for detecting any unexpected or abnormal drain of power by an apparatus which may be noticed by a change of color, intensity or pulsation pattern in the illuminator. The visualization may be used for indicating overload, and it is easy to track a particular apparatus being overloaded or consuming high power by following the visually indicating cable.

The Official Action relies primarily upon the two references Hussaini and Woodruff in the obviousness rejection of the independent claims 1, 9 and 14. However, neither document discloses that a visual indication of an illuminator is controlled dependent on, and responsive to, the magnitude of an electrical quantity as measured through a conductor used for power supply among other things.

Hussaini discloses a video game device having a cable that includes a communication cable 7b and a “side glow” fiber optic cable 7a, the latter being

connected to a light source to illuminate the cable when used. No control mechanism for the light in the fiber optic cable 7a is described whatsoever.

Woodruff discloses a storage reel for electro-luminescent (EL) wire which can be illuminated by means of a power supply. In Fig. 5, a switch 114 can take two positions to provide either a continuous light or a blinking light through the EL wire, see col. 4, lines 34-40. It is also briefly mentioned that "the brightness intensity level depends on the voltage and frequency applied to it", see col. 2, lines 17-22, and that "using an alternative inverter with different output power and frequency characteristics, one may vary the brightness", see col. 5, lines 4-6, which is a well-known feature of EL wires as such.

The Official Action alleges that it is obvious to combine these two references, and that the claimed invention is achieved by this combination. However, none of the two documents teaches or suggests the significant feature, now added to the amended independent claims, specifying that a controller controls *"at least one illumination characteristic of said illuminator with respect to said electrical quantity by measuring the electrical quantity and feeding the illuminator with varying current or voltage corresponding to the consumed current/voltage through the conductor".* Therefore, one of ordinary skill in the art would not have been able to derive the invention and its benefits by merely combining the teachings of Hussaini and Woodruff.

The Official Action further states that it would have been obvious to incorporate the portable light reel system of Woodruff into Hussaini "in order to provide proper illuminated intensity level by controlling the input voltage". However,

this does not address the deficiencies identified above. In contrast, exemplary embodiments indicate the level of current and/or power consumption of one or several apparatuses, particularly the load a power cable is exposed to. This cannot be achieved by the cited documents in any combination. Accordingly, reconsideration and withdrawal of this ground of rejection are respectfully requested.

New claims 15-17 provide additional claim coverage. These claims are also not taught or suggested by the cited documents.

All of the objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that this application is in condition for allowance and a notice to that effect is earnestly solicited. Should the Examiner have any questions regarding this response or the application in general, she or he is invited to contact the undersigned at (540) 361-1863.

Respectfully submitted,

POTOMAC PATENT GROUP PLLC

By: /stevenmdubois/
Steven M. duBois
Registration No. 35,023

Date: March 15, 2010

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Electronic Patent Application Fee Transmittal

Application Number:	11885697
Filing Date:	03-Oct-2007
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Filer:	Steven Maurice Dubois/Andrea Terry
Attorney Docket Number:	0904-021

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Independent claims in excess of 3	2614	1	110	110
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**110**

Electronic Acknowledgement Receipt

EFS ID:	7210474
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Andrea Terry
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	15-MAR-2010
Filing Date:	03-OCT-2007
Time Stamp:	16:46:04
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$110
RAM confirmation Number	3233
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		20100315_Response_to_OA_0904-021.pdf	113550 dfad6ca43366594db6391fd299f6ed9d6b8657fd	yes	10

	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	10

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	29931 79df2da4e78918bea5ff32b8356e3b7ca7055045	no	2

Warnings:

Information:

Total Files Size (in bytes):	143481

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/885,697	10/03/2007	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☒ RATE ($)	SMALL ENTITY ☒ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ 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			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 03/15/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0	X $26 =	0	OR	X $ =	
Independent (37 CFR 1.16(h))	* 4	Minus	***3	= 1	X $110 =	110	OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE	110	OR	TOTAL ADD'L FEE	

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

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

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

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

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

Legal Instrument Examiner:
/MYRTLE B. LEIGH/

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.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/885,697	10/03/2007	Anton Gustafsson	0904-021	8165

42015 7590 12/18/2009

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EXAMINER	
GIRMA, FEKADESELASS	
ART UNIT	**PAPER NUMBER**
2612	

NOTIFICATION DATE	DELIVERY MODE
12/18/2009	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):

tammy@ppglaw.com

Office Action Summary	Application No.	Applicant(s)	
	11/885,697	GUSTAFSSON ET AL.	
	Examiner	Art Unit	
	Fekadeselassie Girma	2612	

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☒ Responsive to communication(s) filed on *03 October 2007*.

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

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

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

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

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

Application Papers

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

10)☒ The drawing(s) filed on *05 September 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

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

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

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

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

a)☒ All b)☐ Some * c)☐ None of:

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

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

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

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

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05 September 2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-14 are currently pending in the application

Claim Rejections - 35 USC § 103

2. The following is a quotation of 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 of this title, 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 negatived by the manner in which the invention was made.

3. Claims 1, 2, 5, 7, 8, 9, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hussaini (US 7195561) in view of Woodruff (US 6758314).

As to claim 1, Hussaini discloses in Video game controller with illuminated cable having claimed an arrangement for visual indication read on Col. 2, Lines 48-56; power, current and/or voltage through a conductor read on Col. 2, Lines 45-48; a substantially wire shaped illuminator read on Col. 2, Lines 33-36; a controller read on Col. 4, Lines 13-20. Hussaini does not explicitly disclose visual indication of an electrical quantity.

However, Woodruff in a portable light reel system holding electro-luminescent (EL) wire and self-contained electronics teaches indication of an electrical brightness quantity read on Col. 5, Lines 4-8. The artisan recognizes the obviousness of the brightness intensity level depends on the voltage and frequency applied to it. The higher the voltage and frequency, the brighter the EL wire illuminates. Using an inverter with different output power and frequency characteristics one may vary the brightness of the illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of

invention to incorporate the Portable light reel system of Woodruff into Hussaini in order to provide proper illuminated intensity level by controlling the input voltage.

As to claim 2, Hussaini further discloses wire shaped illuminator is arranged along said conductor read on Col. 2, Lines 33-36.

As to claim 4, Hussaini further discloses wire shaped illuminator is an optical fiber read on Col. 2, Lines 33-36.

As to claim 5, Hussaini further discloses controller is further adapted to measure said electrical quantity and adopt a control signal to control said illuminator read on Col. 3, Lines 20-29.

As to claim 7, Woodruff further discloses a processing arrangement and measuring arrangement and driver read on Col. 5, Lines 4-8 & Col. 4, Lines 25-32. The artisan recognizes the obviousness of the inverter together with electrical components controls the intensity of brightness of the illuminated EL wire. The variable inverter and electrical components process the output power/voltage to a measured value and drive the current to vary the brightness of illuminated EL wire.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the Portable light reel system of Woodruff into Hussaini in order to provide proper illuminated intensity level by controlling the input voltage.

As to claim 8, Hussaini further discloses illumination feature is one or several of intensity, color or frequency read on Col. 2, Lines 56-60.

As to claim 9, the claim is interpreted and rejected as to claim 1.

As to claim 12, the claim is interpreted and rejected as to claim 4.

As to claim 13, Hussaini further discloses illuminating arrangement indicates current or power consuming through electric wire read on Col. 3, Lines 20-29.

As to claim 14, the claim is interpreted and rejected as to claim 1.

4. Claims 3, 6, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hussaini in view of Woodruff and further in view of Hosford (US 3819973).

As to claim 3, Hussaini in view of Woodruff discloses all claimed limitations except a wire shaped illuminator is electroluminescent. However, Hosford in electroluminescent devices offering high brightness and efficiency at the voltage and alternating cycle chosen teaches a wire shaped illuminator is electroluminescent read on Col. 3, Lines 12-17. The artisan recognizes the obviousness of using the electroluminescent filament with the helical colors combination comprises a copper wire as a central electrode core wire. The copper wire is placed at the central position of the coreless orientation to convey signal. Incorporating the electroluminescent wire in the disclosure of Hussaini's single side glow fiber optics cable for the purpose of transmitting signals presents no new or unexpected results since Hosford's electroluminescent wire and Hussaini's single side glow fiber optics cable are both transmitting electrical current using wire consisting of copper conductor and illuminated material are laid in abutment in a roughly parallel configuration to introduce light through the electroluminescent or fiber optics to enhance visibility of the cable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of Woodruff in order to enhance visibility of the cable.

As to claim 6, Hussaini in view of Woodruff discloses all claimed limitations except electroluminescent includes a central conductive wire coated with a phosphorus material and transmitter wires wrapped around it and covered by a coating and a colored vinyl coat. However, Hosford in electroluminescent includes a central conductive wire coated with a phosphorus material coating read on Col. 3, Lines 58-65; transmitter wires wrapped around it read on Col. 3, Lines 15-20; covered by a coating and a colored vinyl coat read on Col. 4, Lines 23-30. It is obvious that electroluminescent phosphors exhibit luminescence in the presence of electric fields. A phosphor is applied to the outer surface of the wires and caused to luminance by an electrical current applied across the conductors. Higher voltage and/or higher frequency of alternating current yields higher brightness. It is most desirable to construct a filament or combined with other filaments.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of Woodruff in order to provide a gentle, even illumination to the entire display, efficient light output and long life at moderate voltage power.

As to claim 10, Hosford further teaches a substantially translucent coating covering said wire and illuminating arrangement read on Col. 3, Lines 12-26. The artisan recognizes the obviousness of allowing light to pass diffusely through the wire by having transparent coating. A light transparent or at least highly translucent polymeric coating covers and protects the entire filament from damage due to hard use.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to replace the electroluminescent filament of Hosford into Hussaini in view of

Woodruff in order to provide protection from damage while keeping transparent characteristics.

As to claim 11, the claim is interpreted and rejected as to claim 6.

Citation of Other Prior Arts

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Oh discloses in Optical fiber composite electrical power cable (US 7068893), Godard discloses in Remote display ammeter for power plug or power strip (US 7324006), Conti discloses in lighted line (US 6742909), and Longatti discloses in Luminous wire rope (US 7401961).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fekadeselassie Girma whose telephone number is (571) 270-5886. The examiner can normally be reached on Monday thru Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel J. Wu can be reached on 571-272-2964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)? If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/FG/

/Daniel Wu/
Supervisory Patent Examiner, Art Unit 2612

Notice of References Cited	Application/Control No. 11/885,697	Applicant(s)/Patent Under Reexamination GUSTAFSSON ET AL.	
	Examiner Fekadeselassie Girma	Art Unit 2612	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,195,561	03-2007	Hussaini et al.	463/31
*	B	US-6,758,314	07-2004	Woodruff, George	191/12.2R
*	C	US-3,819,973	06-1974	Hosford, Alonzo L.	313/498
*	D	US-7,068,893	06-2006	Oh et al.	385/101
*	E	US-7,324,006	01-2008	Godard, Jean Luc	340/664
*	F	US-6,742,909	06-2004	Conti et al.	362/84
*	G	US-7,401,961	07-2008	Longatti et al.	362/551
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	Art Unit
	Fekadeselassie Girma	2612

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

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

CLAIM		DATE								
Final	Original	12/10/2009								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11885697	GUSTAFSSON ET AL.
	Examiner	**Art Unit**
	Fekadeselassie Girma	2612

SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
340/854,635, 9|340/568.2|340/596, 385/901|385/102|385/16|439/102|439/901 Text and cursory search	12/10/2009	FG
See attached EAST search notes	12/10/2009	FG
inventor and assignee search	12/10/2009	FG
Consulted with Danny Wu	12/10/2009	FG
fwd and back citation search	12/10/2009	FG
plus search	12/10/2009	FG

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

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BIB DATA SHEET

CONFIRMATION NO. 8165

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/885,697	10/03/2007 RULE	034	2612	0904-021

APPLICANTS

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

This application is a 371 of PCT/SE06/00283 03/06/2006

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

SWEDEN 0500523-6 03/07/2005

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **

04/09/2008

Foreign Priority claimed	☑ Yes ☐ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☑ Yes ☐ No					
Verified and Acknowledged	/FEKADESELASSIE GIRMA/ Examiner's Signature	/FG/ Initials	SWEDEN	3	14	3

ADDRESS

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P. O. BOX 270
FREDERICKSBURG, VA 22404
UNITED STATES

TITLE

Visualisation Arrangement

FILING FEE RECEIVED		
515	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
L1	8	("20020039666" | "20040067387" | "20050037233" | "5122733" | "5485355" | "6169491" | "6347172" | "6377054").PN.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 11:21
L2	2	("2002/0039666").URPN.	USPAT	AND	ON	2009/12/10 11:22
L3	20	("20020011219" | "20020039666" | "3798481" | "3819973" | "5333228" | "5383100" | "5485355" | "5669214" | "5753381" | "5842766" | "5876863" | "5995702" | "6169835" | "6341550" | "6347172" | "6394625" | "6742909" | "6976762" | "RE32374").PN. OR ("7401961").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 11:25
L4	11	("0807189" | "1096457" | "4903179" | "5345531" | "5528477").PN. OR ("6394625").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:17
L6	3	(7379642|7170007|7202418).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:25
L7	2	poker table illuminat$4	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:30
L8	80	6169491|6377054|5122733|6347172|20020039666	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:35
L9	5	(6169491|6377054|5122733|6347172|20020039666).pn.	US-PGPUB; USPAT; EPO; JPO	WITH	ON	2009/12/10 13:35
L10	2	("2002/0039666").URPN.	USPAT	AND	ON	2009/12/10 13:36

L16	3	"20040058733"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:37
L17	39	(6854869|20020065134| 6347172|20040048665)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:40
L18	4	(6854869|20020065134| 6347172|20040048665).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 13:40
L19	26	("4234907" | "5709448" | "6016038" | "6126233" | "6302570" | "6577794"). PN. OR ("6854869"). URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:41
L20	17	("5506674" | "5577147" | "5638483" | "5671308" | "5708499" | "5905837" | "5982967" | "5987199" | "5995702" | "6275644"). PN. OR ("6347172"). URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 13:55
L21	13	("20020065134" | "20040048665" | "2410277" | "5286922" | "6159037" | "6347172" | "6854869").PN. OR ("7195561").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:03
L22	33271	electroluminescent	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:19
L23	87	l22 and (conductor adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:19
L24	336	l22 and ((copper or aluminum or conductor) adj1 wire)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:20
L25	324	l24 and (measure$2 or value or current or volt$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:20
L26	21	l25 and (phosphorus and color$3)	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 14:23
L27	1055	340/854.9|340/568.2| 340/596	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 15:18

L28	6	"6758314"	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/10 15:20
L29	42	(cord cable wire) with (glow $3 illuminat$4) with (dim dimming dimable)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:28
L30	1	"20080191890"	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:39
L31	2131	light$4 with electric adj4 (cable$2 or cord$2)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:41
L32	325	illuminat$4 with electric adj4 (cable$2 or cord$2)	US-PGPUB; USPAT; USOCR	OR	ON	2009/12/10 15:41
L33	4	wo adj1 "03"?105538	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 16:55
L34	1	wo adj1 "03"?093394	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 16:56
L35	6	"6758314"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 17:11
L36	1	"20080191890"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 17:22
L37	2	"20040145313"	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 18:53
L38	2304	translucent adj3 coat$4	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:41
L39	567	l38 and (wire or cable)	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:42

L40	21	l38 and ((copper or alumnum) adj3 (wire or cable))	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	ON	2009/12/10 20:48
S1	80	6169491|6377054|5122733|6347172|20020039666	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S2	80	(6169491|6377054|5122733|6347172|20020039666)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S3	5	(6169491|6377054|5122733|6347172|20020039666).pn.	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/08 20:29
S4	12	"6347172"	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 09:39
S5	17	("5506674" | "5577147" | "5638483" | "5671308" | "5708499" | "5905837" | "5982967" | "5987199" | "5995702" | "6275644"). PN. OR ("6347172"). URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 20:54
S6	1339	385/901	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:09
S7	11	((conductor or copper) adj3 wire$2) and S6	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:16
S8	11	("3819928" | "4623217" | "4887190" | "5140659" | "5222165" | "5311410"). PN. OR ("5454056"). URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:26
S9	7146	385/901|385/102|385/16|439/102|439/901	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:31
S10	257	((conductor or copper) adj3 wire$2) and S9	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 21:31
S11	6	("4424954" | "5136673" | "5165003" | "6032449" | "6127626" | "6193824"). PN. OR ("7352936"). URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:07

S12	23261	(power or current or volt $4) adj3 indicator$2	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:24
S13	16	S9 S12	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:24
S14	15	("20040058733" | "20050221250" | "20060018596" | "20080089088" | "4422719" | "4466697" | "4830461" | "4872837" | "4893897" | "4909594" | "5334206" | "5431647" | "5542017" | "6551346" | "7356225").PN. OR ("7620279").URPN.	US-PGPUB; USPAT; USOCR	AND	ON	2009/12/09 22:27
S15	886	385/101	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:39
S16	1	"20080191890" A1	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:42
S17	287	(power adj1 cord) same (meter or voltmeter or ammeter ot indicator)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:49
S18	0	S17 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:52
S19	1	S17 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:53
S20	1	S17 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:53
S21	962931	(meter or volt$meter or ammeter or indicator or voltage$meter or (volt$3 adj1 meter))	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S22	237	S21 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S23	887	S21 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55

S24	188	S21 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S25	2	S22 S23 S24	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/09 23:55
S26	1020	S22 S23 S24	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/09 23:57
S27	2324	surge adj2 protector	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:10
S28	3663	S27 S6	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:11
S29	0	S27 S6	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S30	1	S27 S15	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S31	3	S27 S9	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:11
S32	2	S27 S17	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:13
S33	525	40/544	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:20
S34	963372	S33 S21	US-PGPUB; USPAT; EPO; JPO	OR	ON	2009/12/10 00:26
S35	84	S33 S21	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:26
S36	0	S35 (5|11|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:26
S37	1021	S34 (5|11|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S38	25477	S34 and (15|111|2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27

S39	1	S35 and (l5|l1 1|l2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:27
S40	102	S27 and (l5|l1 1|l2)	US-PGPUB; USPAT; EPO; JPO	AND	ON	2009/12/10 00:28

12/10/2009 10:58:13 PM
C:\Documents and Settings\fgirma\My Documents\EAST\Workspaces\11885697 VISUALISATION ARRANGEMENT.wsp

Receipt date: 09/05/2007 11885697 - GAU: 2612 11/885697

Patent

Attorney's Docket No. 0904-021

IAP18 Rec'd PCT/PTO 05 SEP 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of Anton GUSTAFSSON et al. Application No.: National Stage of PCT/SE2006/000283 Filed: September 5, 2007 For: VISUALISATION ARRANGEMENT	Group Art Unit: Unassigned Examiner: Unassigned

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97(b)

Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

Applicants submit herewith PTO/SB/08A and PTO/SB/08B - Information Disclosure Statement together with any required copies of patents, publications or other information of which Applicants are aware, which Applicants believe may be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56.

A copy of the International Search Report in which these documents were cited is also attached.

This Information Disclosure Statement is submitted before the mailing date of a first Office Action on the merits and therefore no fee is required.

It is requested that the information disclosed herein be made of record in this application.

Respectfully submitted,
POTOMAC PATENT GROUP PLLC

By: _____
Steven M. duBois
Registration No. 35,023

Date: September 5, 2007

Customer No. 42015
Potomac Patent Group PLLC
P.O. Box 270
Fredericksburg, VA 22404
(540) 361-1863

PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Complete if Known 05 SEP 2007

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Application Number	National Stage of PCT/SE2006/000283
Filing Date	September 5, 2007
First Named Inventor	Anton GUSTAFSSON et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket No.	0904-021

Sheet 1 of 2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No[1]	Document Number Number-Kind Code[2](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		U.S. 6,169,491 B1	01/02/2001	McDONALD	
		U.S. 6,377,054 B1	04/23/2002	BEHA	
		U.S. 5,122,733	06/16/1992	HAVEL	
		U.S. 5,485,355	01/16/1996	VOSKOBOINIK et al.	
		U.S. 6,347,172 B1	02/12/2002	KELLER et al.	
		U.S. 2005/0037233 A1	02/17/2005	DOBBS et al.	
		U.S. 2004/0067387 A1	04/08/2004	KIM et al.	
		U.S. 2002/0039666 A1	04/04/2002	NAKAMURA	
		U.S.			
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		U.S.			
		U.S.			
		U.S.			

FOREIGN PATENT DOCUMENTS

Examiner's Initials*	Cite No[1]	Foreign Patent Document "Country Code"[3] "Number"[4] "Kind Code"[5] (If known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
		WO 03/105538 A1	12/18/2003	Siba Specialty Chemicals Holding Inc.		
		WO 03/093394 A1	11/13/2003	ELAM-T Limited		

Examiner's Signature	/Fekadeselassie Girma/	Date Considered	12/10/2009

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.G./

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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 2 hours 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, 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 (1-800-786-9199) and select option* *

PTO/SB/08B (08-03)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	National Stage of PCT/SE2006/000283
Filing Date	September 5, 2007
First Named Inventor	Anton GUSTAFSSON et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket No.	0904-021

PATENT & TRADEMARK OFFICE 05 SEP 2007

NON-PATENT LITERATURE DOCUMENTS

Examiner's Initials*	Cite No[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		International Search Report for PCT/SE2006/000283, mailed June 4, 2006	

Examiner's Signature	/Fekadeselassie Girma/	Date Considered	12/10/2009

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /F.G./

This collection of information is required by 37 CFR 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 2 hours 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, 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 (1-800-786-9199) and select option 2.*

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

PLUS Search Results for S/N 11885697, Searched Wed Aug 05 08:09:20 EDT 2009

The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

20080191890 85
5184253 84
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20080192787 70
20090129051 70
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4997263 70
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United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/885,697	10/03/2007	Anton Gustafsson	0904-021

CONFIRMATION NO. 8165

42015
POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

PUBLICATION NOTICE

OC000000031570335

Title: Visualisation Arrangement

Publication No.US-2008-0191890-A1
Publication Date:08/14/2008

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/885,697	10/03/2007	Anton Gustafsson	0904-021

CONFIRMATION NO. 8165

42015
POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA22404

Date Mailed. 05/09/2008

NOTICE OF NEW OR REVISED PROJECTED PUBLICATION DATE

The above-identified application has a new or revised projected publication date. The current projected publication date for this application is 08/14/2008. If this is a new projected publication date (there was no previous projected publication date), the application has been cleared by Licensing & Review or a secrecy order has been rescinded and the application is now in the publication queue.

If this is a revised projected publication date (one that is different from a previously communicated projected publication date), the publication date has been revised due to processing delays in the USPTO or the abandonment and subsequent revival of an application. The application is anticipated to be published on a date that is more than six weeks different from the originally-projected publication date.

More detailed publication information is available through the private side of Patent Application Information Retrieval (PAIR) System. The direct link to access PAIR is currently http://pair.uspto.gov. Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Questions relating to this Notice should be directed to the Office of Patent Publication at 1-888-786-0101.

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U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
11/885,697	Anton Gustafsson	0904-021

42015
POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

INTERNATIONAL APPLICATION NO.	
PCT/SE06/00283	
I.A. FILING DATE	PRIORITY DATE
03/06/2006	03/07/2005

CONFIRMATION NO. 8165
371 ACCEPTANCE LETTER

OC000000029328949

Date Mailed: 04/15/2008

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

10/03/2007	10/03/2007
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Indication of Small Entity Status
- Copy of the International Application filed on 09/05/2007
- Copy of the International Search Report filed on 09/05/2007
- Preliminary Amendments filed on 09/05/2007
- Information Disclosure Statements filed on 09/05/2007
- Oath or Declaration filed on 10/03/2007
- Request for Immediate Examination filed on 09/05/2007
- U.S. Basic National Fees filed on 09/05/2007
- Priority Documents filed on 09/05/2007
- Specification filed on 09/05/2007
- Claims filed on 09/05/2007
- Abstracts filed on 09/05/2007
- Drawings filed on 09/05/2007

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

TONI M HOOD

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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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
11/885,697	10/03/2007	3749	515	0904-021	14	3

CONFIRMATION NO. 8165

42015
POTOMAC PATENT GROUP PLLC
P. O. BOX 270
FREDERICKSBURG, VA 22404

FILING RECEIPT



Date Mailed: 04/15/2008

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Anton Gustafsson, Eskilstuna, SWEDEN;
Magnus Gyllensward, Stockholm, SWEDEN;
Christina Ohman, Saltsjo-Boo, SWEDEN;
Sara Ilstedt-Hjelm, Lidingo, SWEDEN;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/SE06/00283 03/06/2006

Foreign Applications

SWEDEN 0500523-6 03/07/2005

If Required, Foreign Filing License Granted: 04/09/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 11/885,697**

Projected Publication Date: 371 Perfected

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****

Title

Visualisation Arrangement

Preliminary Class

034

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 (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

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DO/ EO WORKSHEET

Patent Application Specialist/ National Stage Division

U.S. Appl. No. 11/885697 International Appl. No. PCT/SE2006/000283

WIPO PUBLICATION INFORMATION :

Publication No.: WO2006/096115 Publication Language : ☑ English (IA used as specification) ☐ German ☐ Japanese ☐ Chinese ☐ Korean ☐ French ☐ Spanish ☐ Russian ☐ Other : ___

Publication Date : 14 SEPT 2006 Not Published : ☐ U.S. only ☐ Early Pub. Request Published : ☐ Early Pub.

INTERNATIONAL APPLICATION PAPERS IN THE APPLICATION FILE :

- ☑ International Application *(RECORD COPY)*
- ☐ Article 19 Amendments
- ☐ PCT/IPEA/409 - IPER (check Examination Authority) : ☐ EP ☐ JP ☐ SE ☐ AU ☐ US ☐ FR ☐ CN ☐ ES ☐ RU ☐ AT ☐ CA ☐ KR ☐ ___
- ☐ Annexes to 409
- ☐ PCT/ISA/237 (check Searching Authority) : ☐ EP ☐ JP ☐ SE ☐ AU ☐ US ☐ FR ☐ CN ☐ ES ☐ RU ☐ AT ☐ CA ☐ KR ☐ ___
- ☐ Other : _____
- ☐ PCT/IB/306
- ☐ Request form PCT/RO/101
- ☑ PCT/ISA/210 - Search Report (check Searching Authority) : ☐ EP ☐ JP ☑ SE ☐ AU ☐ US ☐ FR ☐ CN ☐ ES ☐ RU ☐ AT ☐ CA ☐ KR ☐ ___ ☐ NONE
- ☐ Search Report References
- ☑ Priority Document (s) No. 1 ☐ N/A ☐ Priority Document was NOT AVAILABLE at the time of paralegal review
- ☐ Other : _____

RECEIPTS FROM THE APPLICANT *(filed with the application unless noted otherwise) :*

- ☑ Basic National Fee (*or authorization to charge*)
- ☑ Description 6 ☑ Claims 2 ☑ Abstract 1
- ☑ Number of Drawing Sheets : 3
- ☐ Translation of Article 19 Amendments ☐ entered ☐ not entered : ☐ not a page for page substitution ☐ replaced by Article 34 Amendment
- ☐ Annexes to 409 ☐ entered ☐ not entered : ☐ not a page for page substitution ☐ no translation ☐ other : _____
- ☐ Application Data Sheet
- ☐ Power of Attorney
- ☐ Change of Address
- ☐ PG Pub Early Publication Request
- ☑ Express Request to Begin Nat'l Examination Procedures
- ☑ Preliminary Amendment(s) Filed on : 1. ☑ same as 371 request date 2. _____ 3. _____
- ☑ Information Disclosure Statement(s) Filed on : 1. ☑ same as 371 request date 2. _____ 3. _____
- ☐ Assignee Statement Under 37 CFR 3.73(b)
- ☐ Assignee PG Publication Notice
- ☐ Substitute Specification Filed on : 1. ☐ same as 371 request date 2. _____ 3. _____
- ☐ Verified Small Status Statement
- ☑ Oath/ Declaration (executed) 10/03/07
- ☐ Defective Oath/ Declaration ☐ unsigned ☐ no citizenship ☐ other
- ☐ DNA Diskette ☐ Sequence Listing
- ☐ Other : _____
- ☐ Other : _____

NOTES :

35 U.S.C. 371 - Receipt of Request (PTO-1390)	9/5/07
Date Acceptable Oath/ Declaration Received	10/3/07
Date of Completion of requirements under 35 U.S.C. 371	10/3/07
Date of Completion of DO/ EO 903 - Notification of Acceptance	4/8/08
Date of Completion of DO/ EO 905 - Notification of Missing Requirements	
Date of Completion of DO/ EO 909 - Notification of Abandonment	
Date of Completion of DO/ EO 916 - Notification of Defective Response	
Date of Completion of DO/ EO 922 - Notification to Comply w/ Requirements for Patent Applications Containing Nucleotide and/or Amino Acid Sequence Disclosures	
Date of Completion of DO/ EO 923	

MULTIPLE DEPENDENT CLAIM
FEE CALCULATION SHEET
(FOR USE WITH FORM PTO-875)

SERIAL NO. 11/885697 | FILING DATE

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1ST AMENDMENT		AFTER 2ND AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
1	1		1			
2		1		1		
3		2		1		
4		2		1		
5		1		1		
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7		2		1		
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9	1		1			
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TOTAL IND.	3	⬇	3	⬇		⬇
TOTAL DEP.	14	⬅	11	⬅		⬅
TOTAL CLAIMS	17		14			

	AS FILED		AFTER 1ST AMENDMENT		AFTER 2ND AMENDMENT	
	IND.	DEP.	IND.	DEP.	IND.	DEP.
51						
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100						
TOTAL IND.		⬇		⬇		⬇
TOTAL DEP.		⬅		⬅		⬅
TOTAL CLAIMS						

PATENT APPLICATION FEE DETERMINATION RECORD

Effective December 8, 2004

Application or Docket Number: 11/885697

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)	SMALL ENTITY TYPE ☐ RATE	FEE	OR	OTHER THAN SMALL ENTITY RATE	FEE
U.S. NATIONAL STAGE FEES							
BASIC FEE	SMALL ENT. = $ 150	LARGE ENT. = $ 300	BASIC FEE	150	OR	BASIC FEE	
EXAMINATION FEE	Satisfies PCT Article 33(1)-(4) = $ 50 / $ 100	All other situations = $ 100 / $ 200	EXAM. FEE	100		EXAM. FEE	
SEARCH FEE	U.S. is ISA = $ 50 / $ 100 ALL other countries = $ 200 / $ 400	ALL other situations = $ 250 / $ 500	SEARCH FEE	200		SEARCH FEE	
FEE FOR EXTRA SPEC. PGS.	minus 100 =	/ 50 =	X $ 125 =			X $ 250 =	
TOTAL CHARGEABLE CLAIMS	14 minus 20 =	*	X $ 25 =		OR	X $ 50 =	
INDEPENDENT CLAIMS	3 minus 3 =	*	X $ 100 =		OR	X $ 200 =	
MULTIPLE DEPENDENT CLAIM PRESENT ☐			+ $ 180 =		OR	+ $ 360 =	
			TOTAL	450	OR	TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY RATE	ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	ADDITIONAL FEE
X $ 25 =		OR	X $ 50 =	
X $ 100 =		OR	X $ 200 =	
+ $ 180 =		OR	+ $ 360 =	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

SMALL ENTITY RATE	ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	ADDITIONAL FEE
X $ 25 =		OR	X $ 50 =	
X $ 100 =		OR	X $ 200 =	
+ $ 180 =		OR	+ $ 360 =	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

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

PTO-1390 (Rev. 09-2006)
Approved for use through 3/31/2007. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
0904-021	11/885,697

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/SE2006/000283	March 6, 2006	March 7, 2005

TITLE OF INVENTION
VISUALISATION ARRANGEMENT

APPLICANT(S) FOR DO/EO/US
Anton GUSTAFSSON; Magnus GYLLENSWARD, Christina OHMAN and Sara ILSTEDT-HJELM

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☐ This is a **FIRST** submission of items concerning a submission under 35 U.S.C. 371.
2. ☑ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected (Article 31).
5. ☐ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☑ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A preliminary amendment.
14. ☐ An Application Data Sheet under 37 CFR 1.76.
15. ☐ A substitute specification.
16. ☐ A power of attorney and/or change of address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.2 and 37 CFR 1.821- 1.825.
18. ☐ A second copy of the published International Application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. 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 15 minutes to complete, including gathering information, preparing, and submitting the completed 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
11/885,697	PCT/SE2006/000283	0904-021

20. Other items or information:

The following fees have been submitted	CALCULATIONS	PTO USE ONLY
21. ☐ Basic national fee (37 CFR 1.492(a)) **$300**	$	
22. ☐ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** All other situations **$200**	$	
23. ☐ Search fee (37 CFR 1.492(b)) If the written opinion of the ISA/US or the International preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$100** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... **$400** All other situations **$500**	$	
TOTAL OF 21, 22 and 23 =	$	
☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)). The fee is **$250** for each additional 50 sheets of paper or fraction thereof.		
Total Sheets: - 100 = / Extra Sheets: /50 = / Number of each additional 50 or fraction thereof (round up to a whole number): / RATE: x **$250**	$	
Surcharge of **$130.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$ 130.00	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	- 20 =	0	x **$ 50**	$	
Independent claims	- 3 =	0	x **$200**	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$360**	$	
			TOTAL OF ABOVE CALCULATIONS =	$ 130.00	
☑ Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by ½.					
			SUBTOTAL =	$ 65.00	
Processing fee of **$130.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +				$	
			TOTAL NATIONAL FEE =	$ 65.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
			TOTAL FEES ENCLOSED =	$ 65.00	
			Amount to be refunded:	$	
			Amount to be charged	$	

a. ☐ A check in the amount of $ _____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.

c. ☐ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. _____. A duplicate copy of this sheet is enclosed.

d. ☑ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended paying fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

SEND ALL CORRESPONDENCE TO:

Customer No. 42015
Potomac Patent Group PLLC
P.O. Box 270
Fredericksburg, VA 22404

/stevenmdubois/
SIGNATURE

Steven M. duBois
NAME

35,023
REGISTRATION NUMBER

Attorney Docket No. 0904-021

DECLARATION UNDER 37 CFR § 1.63

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below with their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Visualisation Arrangement

The specification of which

☐ is attached hereto

OR

☒ was filed March 6, 2006 as PCT Application Number PCT/SE2006/000283

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

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

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

Application Number	Country	Filing Date
PCT/SE2006/000283	PCT	03/06/2006
0500523-6	SE	03/07/2005

I hereby claim priority benefit under 35 U.S.C. 119(e) of any U.S. Provisional Patent Application(s) as listed below.

Application Number	Filing Date

Direct all correspondence to:

☒ Customer Number:

42015

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

NAME OF FIRST INVENTOR:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle) **Anton**

Family Name or Surname **GUSTAFSSON**

Inventor's Signature

Date 2007-09-06

Residential Address: Sommarogatan 1

City: Eskilstuna State: N/A ZIP: SE-632 26 Country: Sweden Citizenship: Sweden

NAME OF SECOND INVENTOR:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle) **Magnus**

Family Name or Surname **GYLLENSWÄRD**

Inventor's Signature

Date 25 AUG 2007 STOCKHOLM

Residential Address: Polhemsgatan 34

City: Stockholm State: N/A ZIP: SE-112 30 Country: Sweden Citizenship: Sweden

NAME OF THIRD INVENTOR:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle) **Christina**

Family Name or Surname **ÖHMAN**

Inventor's Signature

Date Stockholm, 15 aug 2007

Residential Address: Kadettbacken 4

City: Saltsjö-Boo State: N/A ZIP: SE-132 47 Country: Sweden Citizenship: Sweden

NAME OF FOURTH INVENTOR:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle) **Sara**

Family Name or Surname **ILSTEDT-HJELM**

Inventor's Signature

Date + 28/8 2007

Residential Address: Norrstigen 41

City: Lidingö State: N/A ZIP: SE-181 31 Country: Sweden Citizenship: Sweden

Electronic Patent Application Fee Transmittal

Application Number:	11885697
Filing Date:	
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Filer:	Steven Maurice Dubois/Tammy Pasto
Attorney Docket Number:	0904-021

Filed as Small Entity

U.S. National Stage under 35 USC 371 Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	2051	1	65	65
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**65**

Electronic Acknowledgement Receipt

EFS ID:	2272746
Application Number:	11885697
International Application Number:	
Confirmation Number:	8165
Title of Invention:	Visualisation Arrangement
First Named Inventor/Applicant Name:	Anton Gustafsson
Customer Number:	42015
Filer:	Steven Maurice Dubois/Tammy Pasto
Filer Authorized By:	Steven Maurice Dubois
Attorney Docket Number:	0904-021
Receipt Date:	03-OCT-2007
Filing Date:	
Time Stamp:	11:22:11
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$65
RAM confirmation Number	6381
Deposit Account	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	20071003transltdec0904021.pdf	143966 e5d170cccc60e57fc9d7f2e75fc9714c401203c3	no	3
Warnings:					
Information:					
2	Oath or Declaration filed	20071003execdec0904021.pdf	97603 4bdf591e0415671bf3b884284f34d2b2c34cc28e	no	3
Warnings:					
Information:					
3	Fee Worksheet (PTO-06)	fee-info.pdf	8150 5aa6c91194ff103beab6f80e9775683d4e2e5b57	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	249719		

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.

IAP6 Rec'd PCT/PTO 05 SEP 2007

PTO-1390 (Rev. 09-2006)
Approved for use through 3/31/2007. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
0904-021	
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	
11/885697	

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/SE2006/000283	March 6, 2006	March 7, 2005

TITLE OF INVENTION
VISUALISATION ARRANGEMENT

APPLICANT(S) FOR DO/EO/US
Anton GUSTAFSSON; Magnus GYLLENSWARD, Christina OHMAN and Sara ILSTEDT-HJELM

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

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2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a submission under 35 U.S.C. 371.
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   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
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   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☑ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

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12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☑ A preliminary amendment.
14. ☐ An Application Data Sheet under 37 CFR 1.76.
15. ☐ A substitute specification.
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PTO-1390 (Rev. 09-2006)
Approved for use through 3/31/2007. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
11/885697	PCT/SE2006/000283	0904-021

20. Other items or information:

Copy of PCT/SE2006/000283 as published on September 14, 2006 as WO 2006/096115 A1

The following fees have been submitted	CALCULATIONS	PTO USE ONLY
21. ☑ Basic national fee (37 CFR 1.492(a)) $300	$ 300.00	
22. ☑ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... $0 All other situations..... $200	$ 200.00	
23. ☑ Search fee (37 CFR 1.492(b)) If the written opinion of the ISA/US or the International preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... $0 Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority..... $100 International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB..... $400 All other situations..... $500	$ 400.00	
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Independent claims	3 - 3 =	0	x $200	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $360	$	
			TOTAL OF ABOVE CALCULATIONS =	$ 900.00	
☑ Applicant claims small entity status. See 37 CFR 1.27. Fees above are reduced by ½.				450.00	
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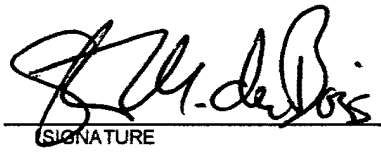
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35,023

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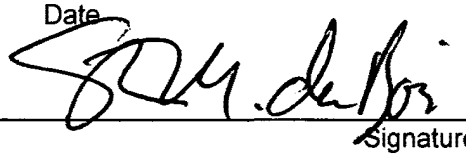
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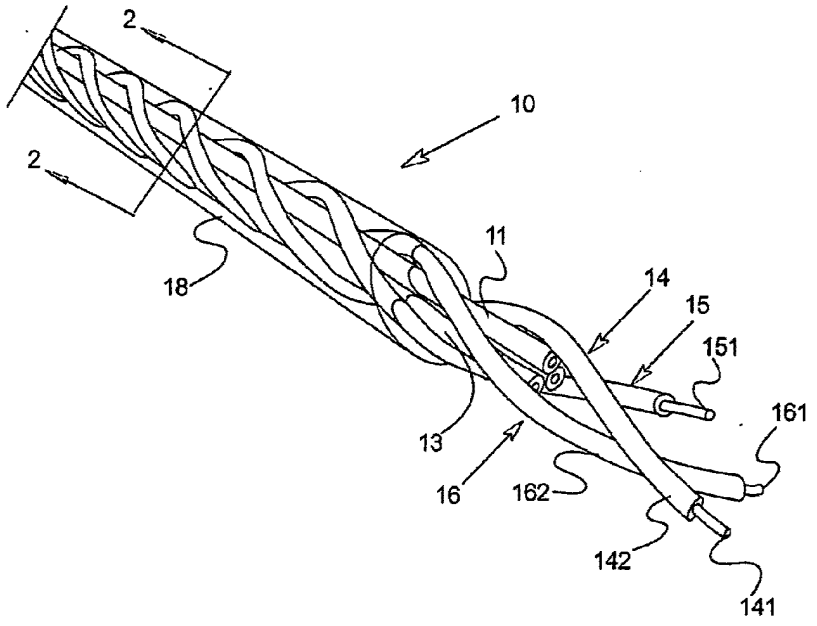
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(54) Title: VISUALISATION ARRANGEMENT



(57) Abstract: The present invention relates to a method and an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator (14, 15, 16) and a controller (34, 40) which controls at least one illumination characteristic of said illuminator with respect to said electrical feature.

WO 2006/096115 A1

Visualisation Arrangement

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a visualisation arrangement, especially formed as a cable or wire surrounding, for visualisation of current and/or power consumption.

BACKGROUND OF THE INVENTION

Electricity is an invisible phenomenon. Usually, the state of the electrical equipment is indicated using some form of illuminator such as LEDs arranged in a housing. The light from the illuminator indicates whether the equipment is on or off.

US 6,347,172 describes an optically observable cable and a method of manufacturing the same. The optically observable cable includes a conduit for conducting signals and a side-emitting optical fiber disposed on a periphery of the conduit and extending along a length of the conduit, and a cable jacket encapsulating the conduit and the side-emitting optical fiber, wherein the cable jacket is at least partially translucent such that the side-emitting optical fiber is optically exposed through the cable jacket. A method of detecting individual cables from amongst a plurality of signal transmission cables each having a side-emitting optical fiber includes positioning a light source at an interface which houses and end of a cable to be detected, transmitting light from the light source into the interface, and observing light emitted from an axis of a cable to be detected. This invention aims to solve the problem of identifying different cables in a large number of cable structures.

In the prior art, materials emitting light when an electric current passes through them are well known and used in a wide range of display applications. Typical electroluminescent devices comprise an anode, normally of an electrically light transmitting material, a layer of a hole transporting material, a layer of the electroluminescent material, optionally a layer of an electron transmitting material and a metal cathode. There can be other layers, such as buffer layers and the layers can be combined using mixtures of one or more of the hole transporting material, electroluminescent material and the electron transmitting material.

For example, WO 03/093394 relates to an electroluminescent device having a layer which emits light in the blue, purple/blue or ultraviolet section of the spectrum and a layer which contains a fluorescent material and optionally a layer comprising one or more color filters so that light emitted by the electroluminescent layer excites the fluorescent material causing light to be emitted at a longer wavelength.

US 2002/0039666 relates to an electric luminescence fiber, which can be maintained in any desired shape and can be used in wider applications. The invention provides a flexible luminescence substance produced by arranging electrode wires in electric luminescence powder, said electric luminescence substance is coated with thermoplastic resin, thermosetting resin, or UV-setting resin. The coated resin is hardened and stabilized in linear or other desired shape, and the electric luminescence substance inside the coated resin is maintained in the desired shape.

SUMMARY OF THE INVENTION

The present invention provides a novel method and arrangement for indicating the level of current and/or power consumption of one or several apparatuses. Mainly, the invention provides an arrangement and method for indicating the load a power cable is exposed to.

For these reasons, an arrangement is provided for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator and a controller which is adapted to control at least one illumination characteristic of the illuminator with respect to the electrical feature. Preferably, the wire shaped illuminator is arranged along the conductor. According to one embodiment, the wire shaped illuminator is electroluminescent. According to another embodiment, the wire shaped illuminator is an optical fibre.

Preferably, the controller is further adapted to measure the electrical quantity and adopt a control signal to control the illuminator. The controller may comprise a processing arrangement and a measuring arrangement and a driver for driving the illuminator receiving control signals from the processing arrangement.

According to preferred embodiments, the illumination feature is one or several of intensity, colour or frequency.

The invention also relates to a cord comprising at least one electric wire and an illuminating arrangement, at least partly arranged along extension of said electric wire, said illuminating arrangement having means for illumination when energized. The cord further comprising a substantially translucent coating, covering said wire and illuminating arrangement. According to one embodiment, the illuminating arrangement is electroluminescent wire. According to another embodiment the illuminating arrangement is an optical fibre. The illuminating arrangement indicates current and/or power consuming through said electric wire.

The invention also relates to a method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention will be further described in a non-limiting way with reference to the accompanying drawings in which:

Fig. 1 schematically illustrates a part of an arrangement according to a preferred embodiment of the invention in perspective,

Fig. 2 is a cross sectional view through a cord arrangement of Fig. 1 along line 2-2,

Fig. 3 is a schematic illustration of a cord, according to the invention, connected to a distributor, and

Fig. 4 is an exemplary block diagram of a controlling arrangement.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Figs. 1 and 2 illustrate an exemplary embodiment of the invention comprising a cord arrangement 10 including three ordinary electrical wires 11, 12 and 13 arranged around a centre axis. The electrical wires may extend parallel to the centre axis, as shown in Fig. 1, but may also be arranged in a twisted configuration around the centre axis. According to the present example, the three wires may be arranged as power, ground and neutral. The invention can be realised by twisting a number of illuminating wires 14, 15 and 16, which include conductors 141, 151 and 161 coated by an illuminating coating 142, 152 and 162, respectively.

The illuminating wires may be of the type known as electroluminescents, such as described in US 2005037233, WO 031/05538, US 2004067387, WO 03/093394, US 2002/0039666, US 5,485,355 etc. The illuminating wires may also comprise of wires manufactured under trademark Lytec ® by ELAM ltd.

The illuminating wires may also comprise optical fibres, preferably side-emitting optical fibres.

The twisted electrical wires and illuminating wires are covered by a light transparent or semi transparent coating 18, for example made of silicon, rubber etc.

It is appreciated by a skilled person that the present invention is not limited to three illuminating wires and the invention may be applied using any number of illuminating wires and/or electrical wires.

Fig. 3 illustrates one application of the invention as a cord 30 of a distributor 31. The distributor 31 is connected to a wall socket 32. An electric equipment (not shown) is connected to the distributor through a plug 33. The cord is provided with the illuminating wires as mentioned earlier. It is also possible to provide the distributor and the wall plug itself with illuminating wires and consequently using them as part of the indicator.

The illuminating wires are connected to a controlling arrangement 34, in this case arranged inside the distributor.

An exemplary controlling arrangement is described in the following in conjunction with the block diagram of Fig. 4.

Power to the controlling arrangement 40 is supplied through a power supply 41, which is connected to, for example, a wall socket through the cord 30. The power is adapted to the power level of the electronics in the controlling arrangement. The power supplier converts the power from AC to DC. A processing unit 42, such as a micro computer is arranged to process the information on power level or current amount received from a measuring arrangement 43.

The measuring arrangement 43 is arranged between the wall socket and before connection to an electric equipment so that the power and/or current consumption can be measured. The measuring arrangement may sample current and voltage cautiously and provide data to the micro computer. The power is product of current multiplied with voltage. In the event of stable voltage, the phase shift can be ignored and the current can be measured and used to approximate the power. Thus, the difference between the visualisation of current consumption and power consumption can be minimized.

The micro computer controls, in this example, three pulse width modulators (PWMs) 44a-44c for controlling analog circuits with a processor's digital outputs. The number of PWMs corresponds to the number of illuminating wires. The PWMs are connected to drivers 45a-45c, which operate in a suitable range, e.g. 0-110 V, 8 KHz. The illuminating wires are connected to the drivers and thus operate in the output range of the inverter modules. The drivers may be inverter modules.

In case of optical fibers, the drivers may be connected to intensity and/or pulse controlled light sources, such as light emitting diodes (LED) connected to one end of the fibers.

Depending on the current/voltage through the electrical wires, the micro computer will output suitable control signal to the drivers, which feeds the illuminating wires with varying current, voltage and frequency corresponding to the consumed current/voltage through the electrical wires.

In a preferred embodiment, the electroluminescent wires includes a central copper wire coated with a phosphorus material coating and two tiny transmitter wires wrapped around it, and covered by a PVC coating and finally a colored vinyl coat. The driver takes the voltage from a DC power source and inverts it to, e.g. 110 volts AC. When connected to a power source and driver, the charge creates a glow in the wire, e.g. very similar to neon.

Thus, the controlling arrangement controls the illuminating characteristics, e.g. intensity, color and/or pulsing (frequency) of the illuminating wires in relation to the consumed power and/or current through the electric wires. This allows obtaining a simultaneous characteristic change, shifting the pulsing in the wires to obtain visual effects such as flowing light, etc.

It should be appreciated by a skilled person that the aforementioned controlling arrangement, and input and output values are given as an example and other types of controlling arrangement operating with different electrical values may occur.

The invention is not limited to applications in cables and cords, especially distributor cords; the invention may likewise be applied in household appliance for providing visual indication of poser consumption of different appliances. In industrial and construction site applications, the visualization may be used for indicating overload. Especially, if many apparatuses are connected, it is possible to track a particular apparatus being overloaded or consuming high power by following the visually indicating cable. The visualization allows finding cables in limited sight situations.

The invention is not limited to the shown embodiments but can be varied in a number of ways without departing from the scope of the appended claims and the arrangement and the method can be implemented in various ways depending on application, functional units, needs and requirements etc.

CLAIMS

1. An arrangement (10, 30) for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor (11, 12, 13), characterised in
that the arrangement comprises a substantially wire shaped illuminator (14, 15, 16) and a controller (34, 40) adapted to control at least one illumination characteristic of said illuminator with respect to said electrical feature.

2. The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. The arrangement of claim 1 or 2, wherein said wire shaped illuminator is electroluminescent (14, 15, 16).

4. The arrangement of claim 1 or 2, wherein said wire shaped illuminator is an optical fibre.

5. The arrangement of claim 1, wherein said controller (34, 40) is further adapted to measure said electrical quantity and adopt a control signal to control said illuminator.

6. The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire (141, 151, 161) coated with a phosphorus material coating (141, 152, 162) and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. The arrangement according to any of preceding claims, wherein said controller (40) comprises a processing arrangement (42) and a measuring arrangement (43) and a driver (45a-45c) for driving said illuminator receiving control signals from said processing arrangement.

8. The arrangement according to any of preceding claims, wherein said illumination feature is one or several of intensity, colour or frequency.

9. A cord (10) comprising at least one electric wire (11, 12, 13) and an illuminating arrangement (14, 15, 16), at least partly arranged along extension of said electric wire, said illuminating arrangement having means (142, 152, 162) for illumination when energized.

10. The cord of claim 9, further comprising a substantially translucent coating (18), covering said wire and illuminating arrangement.

11. The cord of claim 9, wherein said illuminating arrangement is electroluminescent wire.

12. The cord of claim 9, wherein said illuminating arrangement is an optical fibre.

13. The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

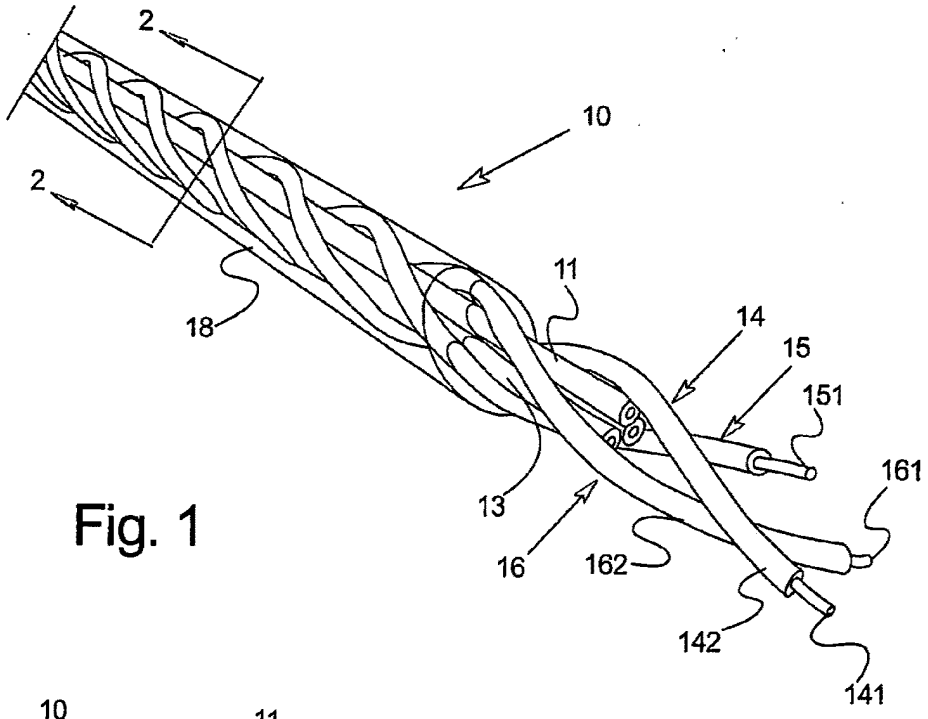

2
10
2
18
11
14
15
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161
13
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142
141

Fig. 1

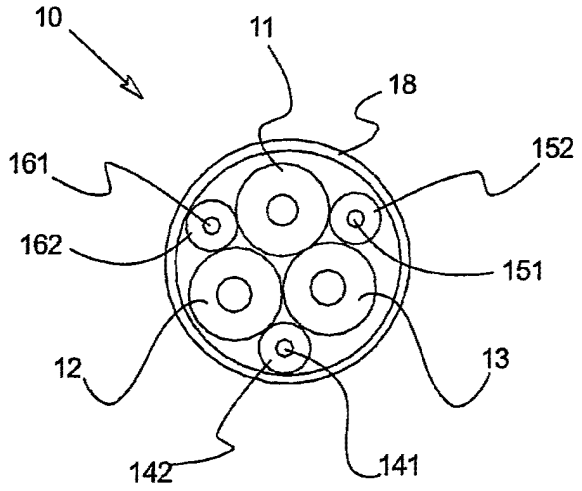

10
11
18
161
152
162
151
12
13
142
141

Fig. 2

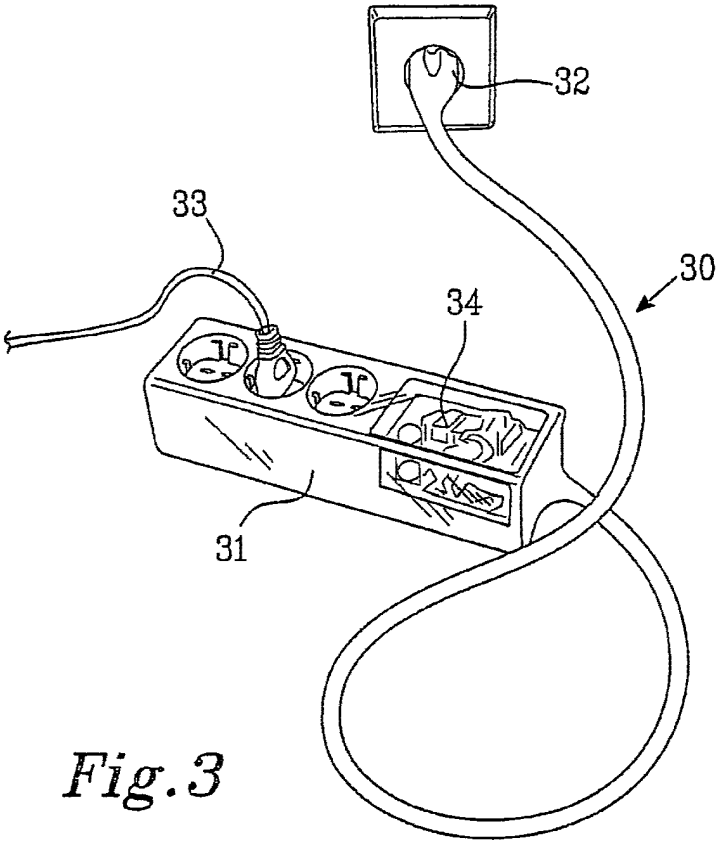


Fig.3

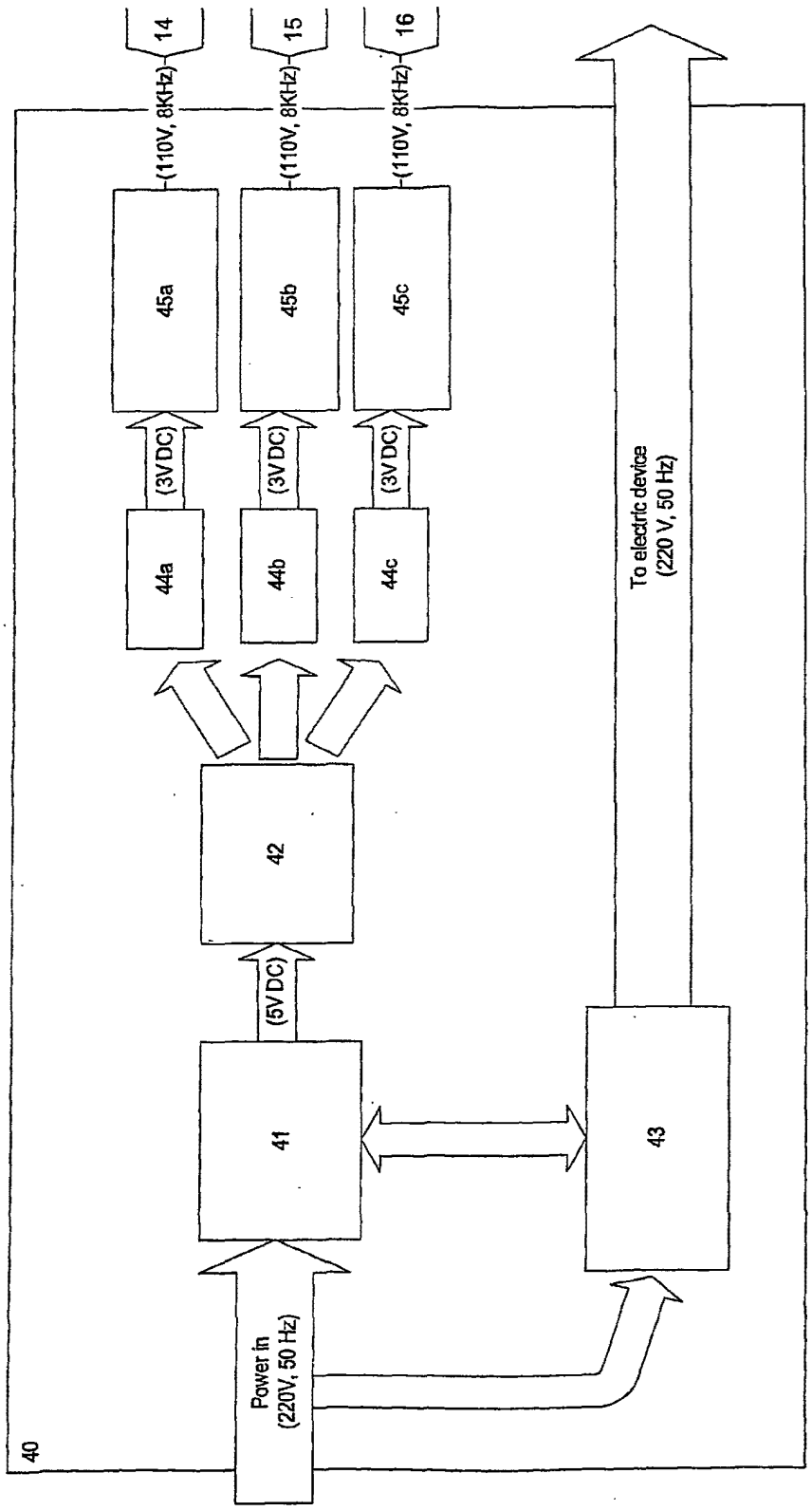

14
15
16
(110V, 8KHz)
(110V, 8KHz)
(110V, 8KHz)
45a
45b
45c
(3V DC)
(3V DC)
(3V DC)
44a
44b
44c
42
(5V DC)
41
43
To electric device
(220 V, 50 Hz)
Power in
(220V, 50 Hz)
40

Fig. 4

11/885697
IAP18 Rec'd PCT/PTO 05 SEP 2007

Patent
Attorney's Docket No. 0904-021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of Anton GUSTAFSSON et al. Application No.: National Stage of PCT/SE2006/000283 Filed: September 5, 2007 For: VISUALISATION ARRANGEMENT	Group Art Unit: Unassigned Examiner: Unassigned

PRELIMINARY AMENDMENT

Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

Prior to examination of the above-identified application, please enter the following amendments:

AMENDMENTS TO THE SPECIFICATION:

Please **add** the following paragraph on page 1, at line 3, immediately before the paragraph entitled "Technical Field":

This application claims priority and benefit from International Application No. PCT/SE2006/000283, filed March 6, 2006, which claims priority to Swedish patent application No. 0500523-6, filed March 7, 2005, the entire teachings of which are incorporated herein by reference.

IN THE ABSTRACT:

Please **add** the abstract as follows:

The present invention relates to a method and an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator and a controller which controls at least one illumination characteristic of said illuminator with respect to said electrical feature.

AMENDMENTS TO THE CLAIMS:

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

LISTING OF CLAIMS:

1. (Currently Amended) An arrangement ~~(10, 30)~~ for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor ~~(11, 12, 13)~~,

~~characterised in that~~ wherein the arrangement comprises a substantially wire shaped illuminator ~~(14, 15, 16)~~ and a controller ~~(34, 40)~~ adapted to control at least one illumination characteristic of said illuminator with respect to said electrical feature.

2. (Original) The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. (Currently Amended) The arrangement of claim 1 ~~or 2~~, wherein said wire shaped illuminator is electroluminescent ~~(14, 15, 16)~~.

4. (Currently Amended) The arrangement of claim 1 ~~or 2~~, wherein said wire shaped illuminator is an optical fibre.

5. (Currently Amended) The arrangement of claim 1, wherein said controller ~~(34, 40)~~ is further adapted to measure said electrical quantity and adopt a control signal to control said illuminator.

6. (Currently Amended) The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire ~~(141, 151, 161)~~ coated with a phosphorus material coating ~~(141, 152, 162)~~ and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. (Currently Amended) The arrangement ~~according to any of preceding claims~~ of claim 1, wherein said controller ~~(40)~~ comprises a processing arrangement ~~(42)~~ and a measuring arrangement ~~(43)~~ and a driver ~~(45a-45c)~~ for driving said illuminator receiving control signals from said processing arrangement.

8. (Currently Amended) The arrangement ~~according to any of preceding claims~~ of claim 1, wherein said illumination feature is one or several of intensity, colour or frequency.

9. (Currently Amended) A cord ~~(10)~~ comprising at least one electric wire ~~(11, 12, 13)~~ and an illuminating arrangement ~~(14, 15, 16)~~, at least partly arranged along extension of said electric wire, said illuminating arrangement having means ~~(142, 152, 162)~~ for illumination when energized.

10. (Currently Amended) The cord of claim 9, further comprising a substantially translucent coating ~~(18)~~, covering said wire and illuminating arrangement.

11. (Original) The cord of claim 9, wherein said illuminating arrangement is electroluminescent wire.

12. (Original) The cord of claim 9, wherein said illuminating arrangement is an optical fibre.

13. (Original) The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. (Original) A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

REMARKS

By this preliminary amendment, the specification has been amended to include the priority information, an abstract has been added and the claims have been amended to put them in better form for U.S. examination. No new matter has been added. Prompt examination on the merits is respectfully requested.

Respectfully submitted,

POTOMAC PATENT GROUP PLLC

By: _____
Steven M. duBois
Registration No. 35,023

Date: September 5, 2007

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Patent

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, VA 22313-1450

Sir:

Applicants submit herewith PTO/SB/08A and PTO/SB/08B - Information Disclosure Statement together with any required copies of patents, publications or other information of which Applicants are aware, which Applicants believe may be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56.

A copy of the International Search Report in which these documents were cited is also attached.

This Information Disclosure Statement is submitted before the mailing date of a first Office Action on the merits and therefore no fee is required.

It is requested that the information disclosed herein be made of record in this application.

Respectfully submitted,

POTOMAC PATENT GROUP PLLC

By: _____

Steven M. duBois
Registration No. 35,023

Date: September 5, 2007

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PTO/SB/08A (08-03)
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Complete if Known 05 SEP 2007

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Application Number	National Stage of PCT/SE2006/000283
Filing Date	September 5, 2007
First Named Inventor	Anton GUSTAFSSON et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket No.	0904-021

Sheet 1 of 2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No[1]	Document Number Number-Kind Code[2](if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		U.S. 6,169,491 B1	01/02/2001	McDONALD	
		U.S. 6,377,054 B1	04/23/2002	BEHA	
		U.S. 5,122,733	06/16/1992	HAVEL	
		U.S. 5,485,355	01/16/1996	VOSKOBOINIK et al.	
		U.S. 6,347,172 B1	02/12/2002	KELLER et al.	
		U.S. 2005/0037233 A1	02/17/2005	DOBBS et al.	
		U.S. 2004/0067387 A1	04/08/2004	KIM et al.	
		U.S. 2002/0039666 A1	04/04/2002	NAKAMURA	
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FOREIGN PATENT DOCUMENTS

Examiner's Initials*	Cite No[1]	Foreign Patent Document "Country Code"[3] "Number"[4] "Kind Code"[5] (If known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
		WO 03/105538 A1	12/18/2003	Siba Specialty Chemicals Holding Inc.		
		WO 03/093394 A1	11/13/2003	ELAM-T Limited		

Examiner's Signature		Date Considered	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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 2 hours 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, 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 (1-800-786-9199) and select option* *

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Complete if Known	
				Application Number	10/ National Stage of PCT/SE2006/000283
				Filing Date	September 5, 2007
				First Named Inventor	Anton GUSTAFSSON et al.
				Art Unit	Unassigned
				Examiner Name	Unassigned
Sheet	2	of	2	Attorney Docket No.	0904-021

PATENT & TRADEMARK OFFICE 05 SEP 2007

NON-PATENT LITERATURE DOCUMENTS

Examiner's Initials*	Cite No[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		International Search Report for PCT/SE2006/000283, mailed June 4, 2006	

Examiner's Signature		Date Considered	

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(72) Inventors; and

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(74) Common Representative: **SIBA SPECIALTY CHEMICALS HOLDING INC.**; Klybeckstrasse 141, CH-4057 Basel (CH).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ELECTROLUMINESCENT DEVICE

(57) Abstract: Disclosed are electroluminescent devices that comprise organic layers that contain certain 2H-benzotriazole compounds. The 2H-benzotriazole compounds of blue-emitting, durable, organo-electrouminescent layers. The electroluminescent devices may be employed for full color display panels in for example mobile phones, televisions and personal computer screens.

WO 03/105538 A1

ELECTROLUMINESCENT DEVICE

The present invention relates to organo-electroluminescent (EL) devices, in particular EL devices that comprise durable, blue-emitting organo-electrouminescent layers. The organo-electroluminescent layers comprise certain 2H-benzotriazoles.

Progress has been made towards developing organic-based electroluminescent devices suitable for full color displays. Generally, an EL device is comprised of a light-emitting layer or layers and a pair of facing electrodes sandwiching the light-emitting layer(s). Application of an electric field between the electrodes results in the injection of electrons and holes to the system, resulting in the release of energy as light.

However, organo EL devices have not been developed that have suitable stability under continuous operation. In particular, there remains a need for blue-emitting, stable organo EL devices.

U.S. Pat. No. 5,104,740 teaches an electroluminescent element that comprises a fluorescent layer containing a coumarinic or azacoumarinic derivative and a hole transport layer, both made of organic compounds and laminated on top of the other. Certain of the coumarinic compounds disclosed have 2H-benzotriazole substitutents.

U.S. Pat. No. 6,280,859 discloses certain polyaromatic organic compounds for use as a light-emitting material in organo-electroluminescent devices. A 2H-benzotriazole moiety is listed among a long list of possible divalent aromatic linking groups.

U.S. Pat. No. 5,116,708 is aimed at a hole transport material for EL devices.

U.S. Pat. No. 5,518,824 teaches an EL device comprising one or more organic layers, wherein at least one of the layers is obtained by thermal or radiation-induce crosslinking. Certain benzotriazoles are disclosed as suitable charge transport compounds.

U.S. Pat. No. 4,533,612 discloses electrophotographic recording materials that comprise certain 2H-benzotriazoles as charge carrier-transporting compounds.

JP 58009151 discloses the use of certain polyaromatic benzotriazole systems in a charge transport layer of an electrophotographic photoreceptor.

U.S. Pat. No. 5,629,389 discloses an electroluminescent device having a layer that comprises 2-(2H-benzotriaol-2-yl)-4,6-bis(1-methyl-1-phenylethyl)phenol.

EP 764712 discloses ortho hydroxyphenyl-2H-benzotriazoles as stabilizers in EL devices.

Tsutsui, et al., in *Synthetic Metals*, 1997 (85) 1201-1204, discloses 2-(2-hydroxy-5-methylphenyl)-2H-benzotriazole as a fluorescence quencher in an electron transport layer.

U.S. Pat. No. 2,784,183, 2,713,056, 2,784,197, 3,288,786, 3,341,530, 5,006,662, GB-A-1150408, DE-A-1052405, and DE-A-1919181 disclose naphthobenzotriazoles used as optical brighteners.

U.S. Pat. No. 3,793,315 teaches stilbenyl benzotriazole derivatives as optical brighteners.

Woessner, et al., in *J. Phys. Chem.*, 1985 (89), 3629-3636 studied the emission of 2-(2-hydroxy-5-methylphenyl) -2H-benzotriazole, and the methoxy analogue thereof.

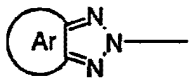
U.S. Pat. No. 5,486,406 teaches the use of metal complexes of ortho hydroxyphenyl-2H-benzotriazoles in organic light emitting devices.

JP 00256667 and JP 98140145 disclose metal complexes of ortho hydroxyphenyl-2H-benzotriazoles for use in electroluminescent devices.

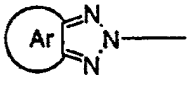
Certain 2H-benzotriazole derivatives are found to be suitable for use in organo-electroluminescent devices. In particular, certain 2H-benzotriazole derivatives are suitable blue emitters with good durability.

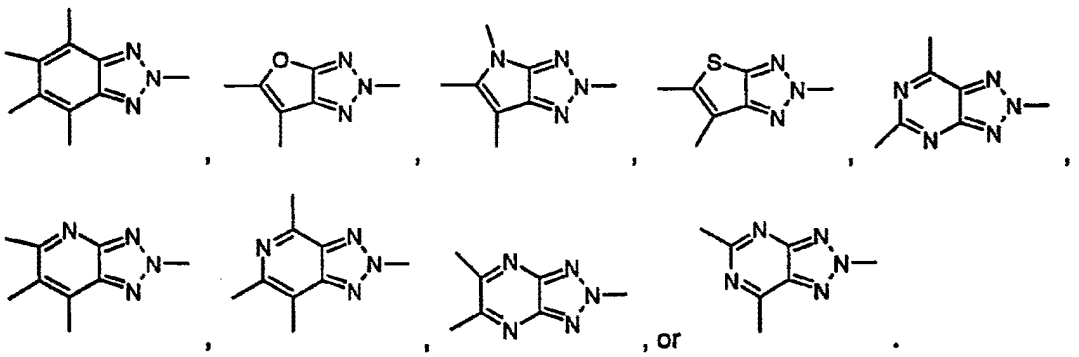
The present invention is aimed at an electroluminescent device comprising an organic light-emitting layer comprising a blue-emitting 2H-benzotriazole compound.

The 2H-benzotriazole compound comprises for example one or more 2H-benzotriazole moieties:



Ar can be any form of an aromatic or heteroaromatic ring (or ring system). That is 2H-benzotriazole compound in the context of the present invention means a 2H-benzotriazole or hetero-2H-benzotriazole because Ar can be any form of an aromatic ring (not only carbons).

Examples that specify the possibilities for the  group designated above are as follows:

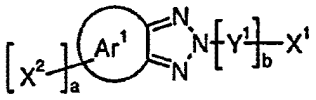


For example, the present 2H-benzotriazole compounds comprise one, two, three or four 2H-benzotriazole moeities. It is understood that the open valences in the 2H-benzotriazole moiety represents a covalent bond that is not limited in its substitution. According to the present invention the EL device comprise at least a 2H-benzotriazole compound, i.e. it may comprise two or more 2H-benzotriazole compounds.

The 2H-benzotriazole compound or compounds should emit light below about 520 nm, especially between about 380 nm and about 520 nm. The 2H-benzotriazole compound or compounds should have a NTSC coordinate of between about (0.12, 0.05) and about (0.16, 0.10), especially a NTSC coordinate of about (0.14, 0.08).

The 2H-benzotriazole compound or compounds should have a melting point above about 150°C, especially above about 200°C, more preferred above about 250°C, most preferred above about 300°C.

Accordingly, the present invention relates to an electroluminescent device (EL device), comprising a 2H-benzotriazole compound, especially a compound of the formula

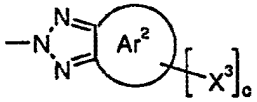


(I), wherein

a is 0, or 1,

b is 0, or 1,

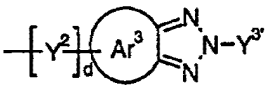
X^1 is a group of formula



, if b is 1, or Y^3, if b is 0, wherein

c is 0, or 1,

X^2 and X^3 are independently of each other a group of formula



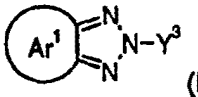
, wherein d is 0, or 1,

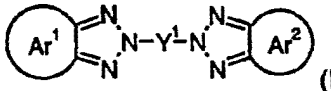
Ar^1, Ar^2, and Ar^3 are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted,

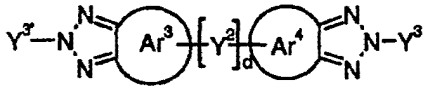
Y^1 and Y^2 are independently of each other a divalent linking group, and

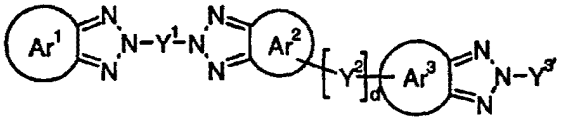
Y^3 and $Y^{3'}$ are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted.

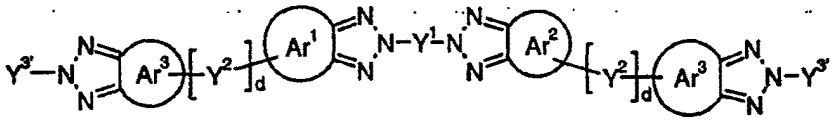
In more detail, the present invention relates to an electroluminescent device, comprising a 2H-benzotriazole compound of the formula


(II),


(III),


(IV),


(V), and/or

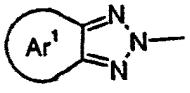
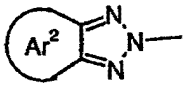

(VI), wherein

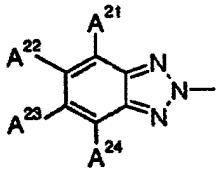
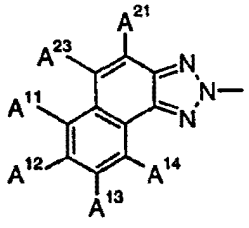
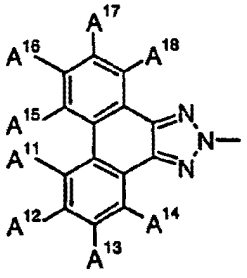
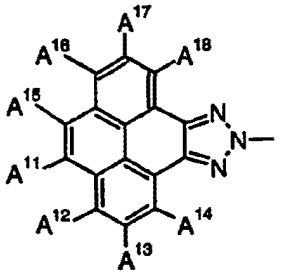
Ar^1, Ar^2, Ar^3, X^2, X^3, Y^1 and Y^2 are defined as above,

d is 0, or 1,

Ar^4 stand for C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted, and

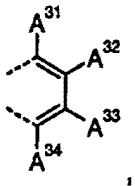
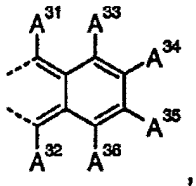
Y^3 and $Y^{3'}$ are independently of each other C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted.

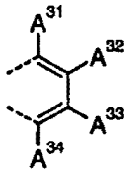
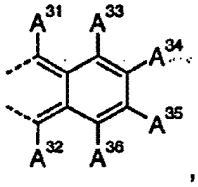
The groups  and  in formula II or III are independently of each other a group of formula


, 
, 
, or 
,

wherein

A^{21}, A^{22}, A^{23}, A^{24}, A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17} and A^{18} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or $-NR^{25}-$, $-NR^{25}R^{26}$, C_1-C_{24}alkylthio, $-PR^{32}R^{32}$, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or $-CO-R^{28}$, or

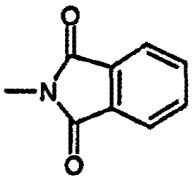
A^{22} and A^{23} or A^{11} and A^{23} are a group  , or  , or

two groups A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17} and A^{18}, which are neighbouring to each other, are a group  , or  , wherein A^{31}, A^{32}, A^{33}, A^{34}, A^{35}, A^{36} and A^{37} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or $-NR^{25}-$, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or $-CO-R^{28}$,

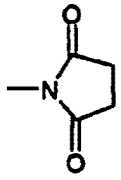
D is -CO-; -COO-; -S-; -SO-; $-SO_2-$; -O-; $-NR^{25}-$; $-SiR^{30}R^{31}-$; $-POR^{32}-$; $-CR^{23}=CR^{24}-$; or -C≡C-; and

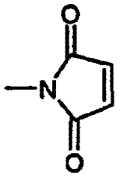
E is $-OR^{29}$; $-SR^{29}$; $-NR^{25}R^{26}$; $-COR^{28}$; $-COOR^{27}$; $-CONR^{25}R^{26}$; -CN; $-OCOOR^{27}$; or halogen; wherein

R^{23}, R^{24}, R^{25} and R^{26} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-; or



R^{25} and R^{26} together form a five or six membered ring, in particular ,



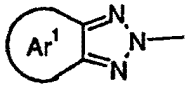
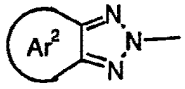
, or  ,

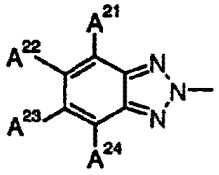
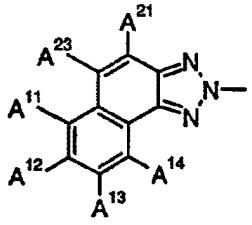
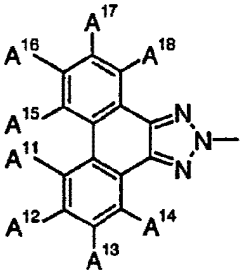
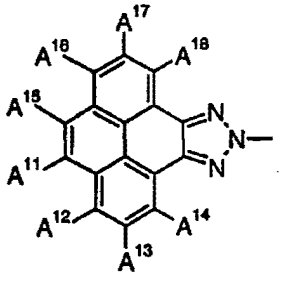
R^{27} and R^{28} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

R^{29} is H; C_6-C_{18}aryl; C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

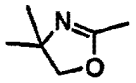
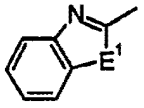
R^{30} and R^{31} are independently of each other C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, and

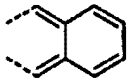
R^{32} is C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl.

Preferably, the groups  and  are independently of each other a group of formula

 ,  ,  , or  , wherein

A^{21}, A^{22}, A^{23} and A^{24} are independently of each other hydrogen, halogen, C_1-C_{24}alkyl, C_1-C_{24}perfluoroalkyl, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl,

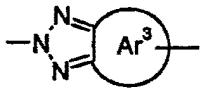
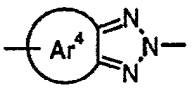
especially a group of formula  or  , or

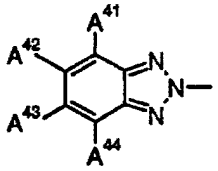
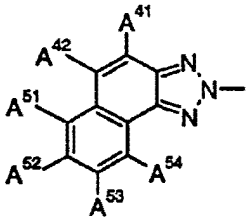
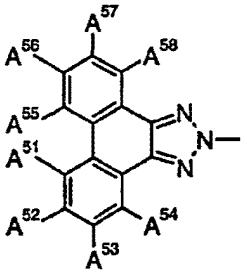
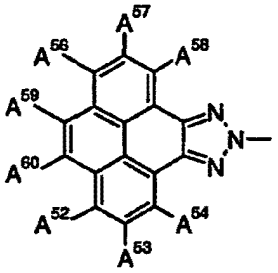
A^{22} and A^{23} are a group of formula  , or  ,

A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17}, and A^{18} are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl, wherein

E^1 is O, S, or NR^{25},

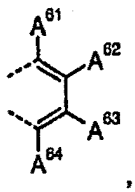
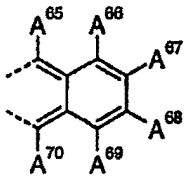
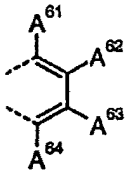
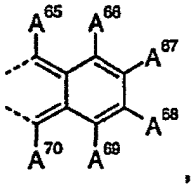
R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl, R^{27} is C_1-C_{24}alkyl.

The groups  and  in formula IV are independently of each other a group of formula

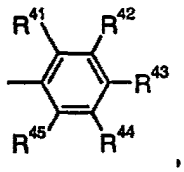
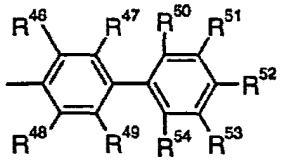
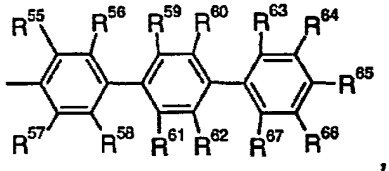
 ,  ,  , or  ,

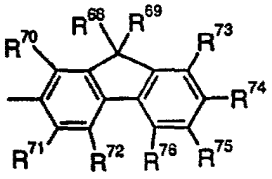
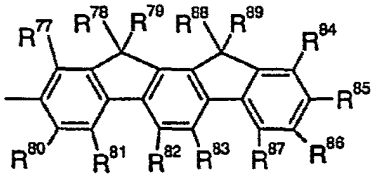
wherein

A^{41}, A^{42}, A^{43}, A^{44}, A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59} and A^{60} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, $NR^{25}R^{26}$, C_1-C_{24}alkylthio, -$PR^{32}R^{32}$, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28}, or

A^{42} and A^{43} or A^{42} and A^{51} are a group  , or  , two groups A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59} and A^{60}, which are neighbouring to each other, are a group  , or  , wherein A^{61}, A^{62}, A^{63}, A^{64}, A^{65}, A^{66}, A^{67}, A^{68}, A^{69} and A^{70} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28}, wherein E, D, R^{25} and R^{28} are defined as above and one of the substituents A^{41}, A^{42}, A^{43}, A^{44}, A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59}, A^{60}, A^{61}, A^{62}, A^{63}, A^{64}, A^{65}, A^{66}, A^{67}, A^{68}, A^{69} and A^{70} represents a single bond, i.e. the linkage to Y^2. Preferably, A^{43} and A^{43} are not a group –$NR^{25}R^{26}$ at the same time.

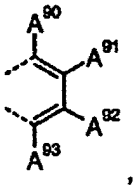
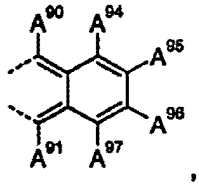
Y^3 and $Y^{3'}$ in formula II, IV and V are independently of each other a group of formula

 ,  ,  ,

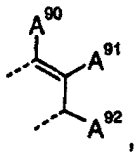
 , or  , wherein

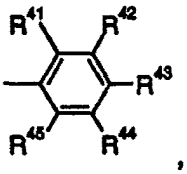
R^{41}, R^{42}, R^{43}, R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, R^{52}, R^{53}, R^{54}, R^{55}, R^{56}, R^{57}, R^{58}, R^{59}, R^{60}, R^{61}, R^{62}, R^{63}, R^{64}, R^{65}, R^{66}, R^{67}, R^{70}, R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{77}, R^{80}, R^{81}, R^{82}, R^{83}, R^{84}, R^{85}, R^{86}, and R^{87} are independently of each other H, C_1-C_{24}alkyl, which is optionally substituted by E and/or interrupted by D, C_1-C_{24}alkenyl, which is optionally substituted by E, C_5-C_{12}cycloalkyl, which is optionally substituted by E, C_5-C_{12}cycloalkoxy, which is optionally substituted by E, C_6-C_{18}aryl, which is optionally substituted by E, C_1-C_{24}alkoxy, which is

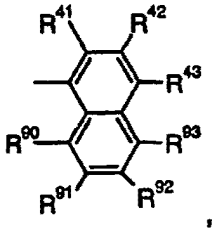
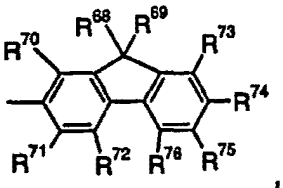
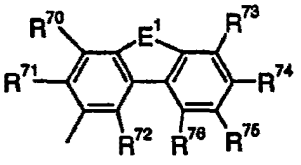
optionally substituted by E and/or interrupted by D, C_6-C_{18}aryloxy, which is optionally substituted by E, C_7-C_{18}arylalkoxy, which is optionally substituted by E, C_1-C_{24}alkylthio, which is optionally substituted by E and/or interrupted by D, C_1-C_{24}alkylselenium, which is optionally substituted by E and/or interrupted by D, C_1-C_{24}alkyltellurium, which is optionally substituted by E and/or interrupted by D, C_2-C_{20}heteroaryl which is substituted by E, or C_6-C_{18}aralkyl, which is optionally substituted by E, or

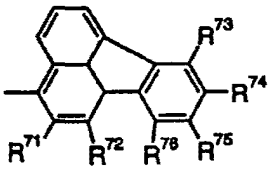
two groups R^{41}, R^{42}, R^{43}, R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, R^{52}, R^{53}, R^{54}, R^{55}, R^{56}, R^{57}, R^{58}, R^{59}, R^{60}, R^{61}, R^{62}, R^{63}, R^{64}, R^{65}, R^{66}, R^{67}, R^{70}, R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{77}, R^{80}, R^{81}, R^{82}, R^{83}, R^{84}, R^{85}, R^{86}, and R^{87}, which are neighbouring to each other, are a group  ,  or , wherein A^{90}, A^{91}, A^{92}, A^{93}, A^{94}, A^{95}, A^{96} and A^{97} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28},

R^{68}, R^{69}, R^{78}, R^{79}, R^{88} and R^{89} are independently of each other C_1-C_{18} alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, or C_7-C_{25}aralkyl, or

R^{68} and R^{69}, R^{78} and R^{79}, and/or R^{88} and R^{89} form a ring, especially a five- or six-membered ring, or R^{68} and R^{70}, R^{69} and R^{73}, R^{77} and R^{78} and/or R^{84} and R^{89} are a group  , wherein D, E, R^{25} and R^{28} are defined as above.

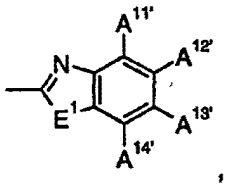
Preferably, Y^3 and $Y^{3'}$ are independently of each other a group of formula  ,

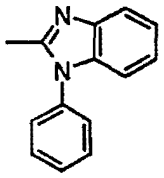
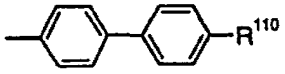
 ,  ,  or

 , wherein

R^{41} is hydrogen, C_1-C_{24}alkoxy, or OC_7-C_{18}aralkyl,

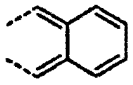
R^{42} is hydrogen, or C_1-C_{24}alkyl,

R^{43} is hydrogen, halogen, $-CONR^{25}R^{26}$, $-COOR^{27}$,  ,

especially  , or  , wherein

E^1 is -S-, -O-, or $-NR^{25'}$-, wherein $R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl,

R^{110} is C_1-C_{24}alkyl, or

R^{42} and R^{43} are a group of formula  , or  ,

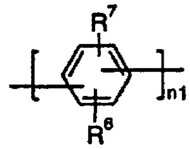
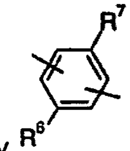
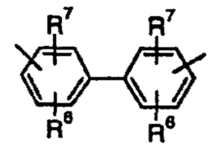
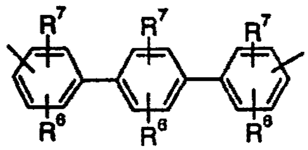
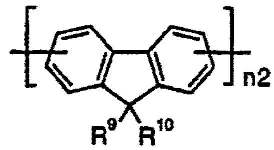
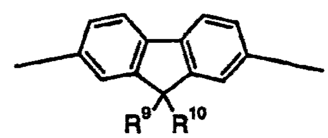
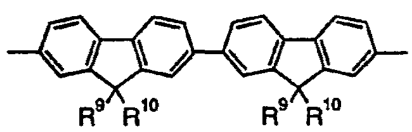
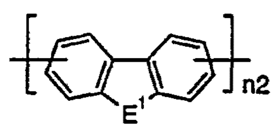
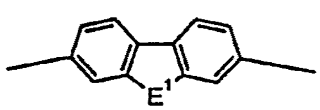
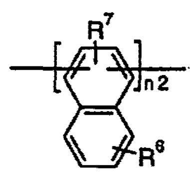
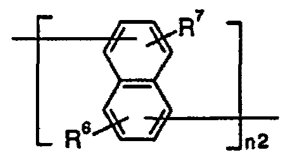
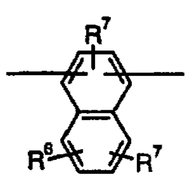
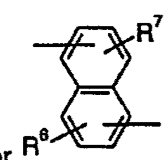
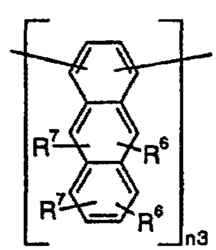
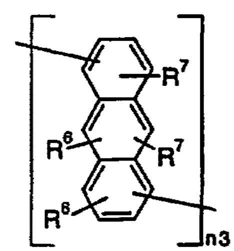
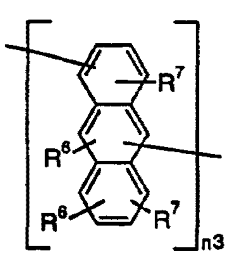
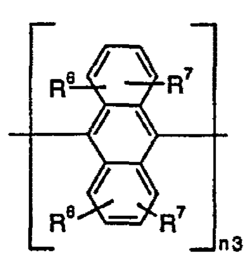
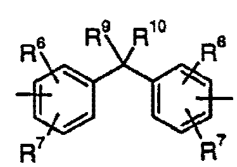
R^{44} is hydrogen, or C_1-C_{24}alkyl,

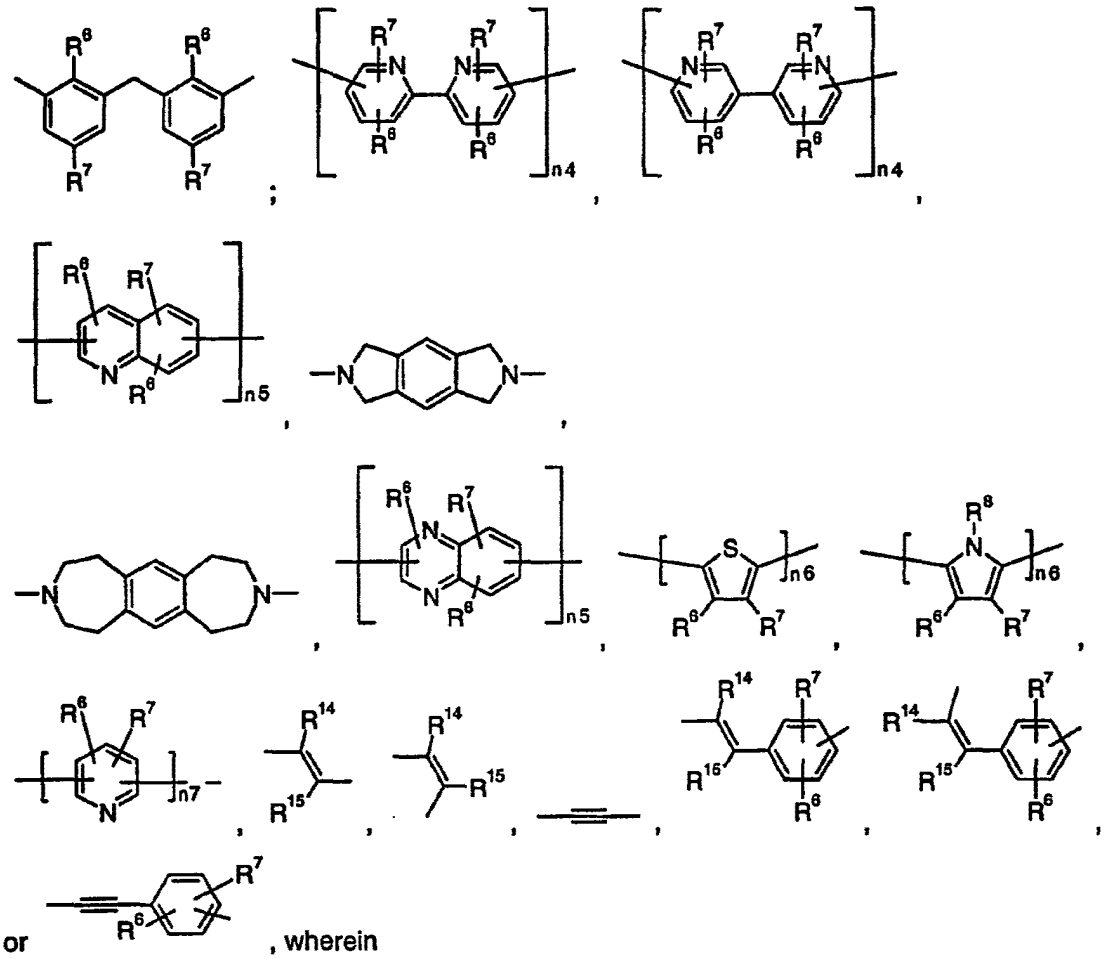
R^{45} is hydrogen, or C_1-C_{24}alkyl,

$A^{11'}$, $A^{12'}$, $A^{13'}$, and $A^{14'}$ are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, $-NR^{25}R^{26}$, $-CONR^{25}R^{26}$, or $-COOR^{27}$,

R^{68} and R^{69} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, especially hexyl, heptyl, 2-ethylhexyl, and octyl, which can be interrupted by one or two oxygen atoms,

R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{90}, R^{91}, R^{92}, and R^{93} are independently of each other H, CN, C_1-C_{24}alkyl, C_6-C_{10}aryl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, $-NR^{25}R^{26}$, $-CONR^{25}R^{26}$, or $-COOR^{27}$, R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl, and R^{27} is C_1-C_{24}alkyl.

Examples of the divalent linking groups Y^1 and Y^2 in formula III, IV and VI are a single bond, -O-, -S-, $-NR^{25}-$,  , especially  ,  ,  ,  , especially  , or  ;  , especially  ;  ,  , especially  , or  ;  ,  ,  ,  ,  , especially



, wherein

n1, n2, n3, n4, n5, n6 and n7 are 1, 2, or 3, in particular 1,

E^1 is -S-, -O-, or -$NR^{25'}$-, wherein $R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl,

R^6 and R^7 are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28},

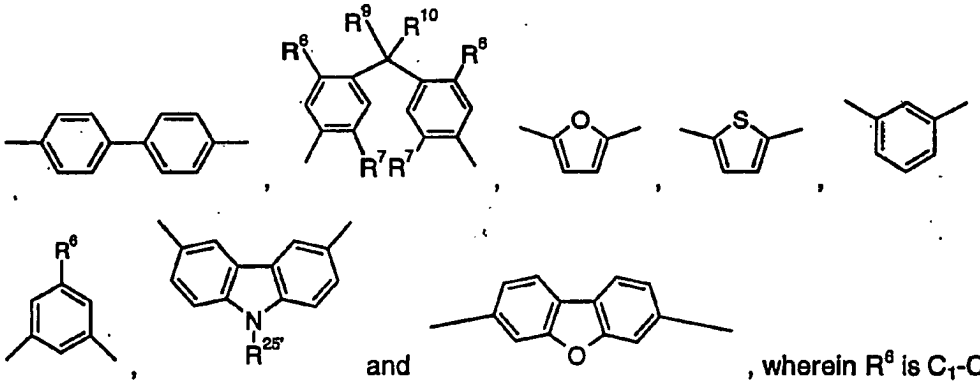
R^8 is C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24} aryl, or C_7-C_{25}aralkyl,

R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl,

C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, or C_7-C_{25}aralkyl, or R^9 and R^{10} form a ring, especially a five- or six-membered ring,

R^{14} and R^{15} are independently of each other H, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, or C_2-C_{20}heteroaryl which is substituted by E, wherein D, E, R^{25} and R^{28} are defined as above.

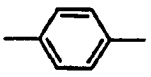
Preferably, Y^1 is selected from



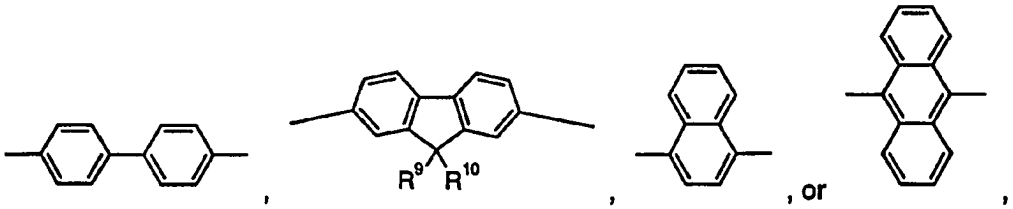
and

, wherein R^6 is C_1-C_{24}alkoxy, or -O-C_7-C_{25}aralkyl, R^7 is H, or C_1-C_{24}alkyl, R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms, and $R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl.

Y^2 is preferably a single bond, -O-, -S-, -NR^{25}, a group of formula



,

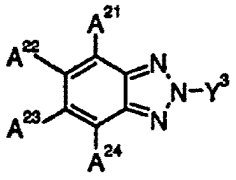
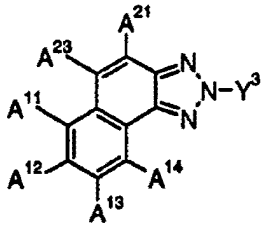
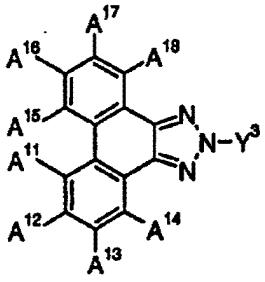
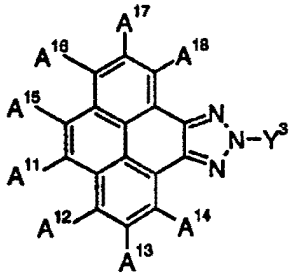


, or

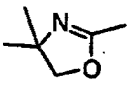
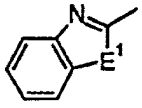
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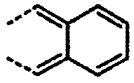
wherein R^{25}, R^9 and R^{10} are defined as above.

In a first aspect, the present invention relates to an electroluminescent device, wherein the 2H-benzotriazole compound is a compound of formula II, especially of formula


(IIa),

(IIb),

(IIc), or

(IId), wherein

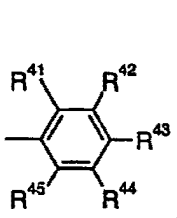
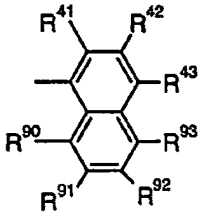
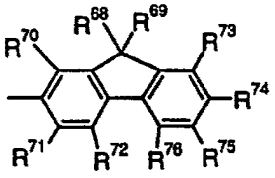
A^{21}, A^{22}, A^{23} and A^{24} are independently of each other hydrogen, halogen, C_1-C_{24}alkyl, C_1-C_{24}perfluoroalkyl, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -CO $NR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl,

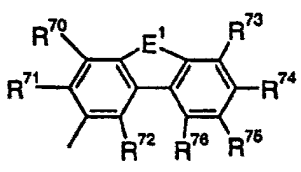
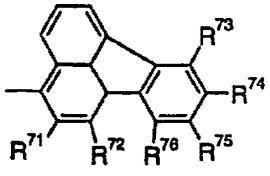
especially a group of formula  or  , or

A^{22} and A^{23} or A^{11} and A^{23} are a group of formula  , or  ,

A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17}, and A^{18} are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl, wherein

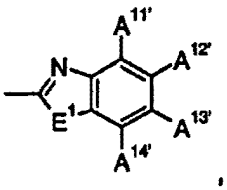
R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl, R^{27} is C_1-C_{24}alkyl, and

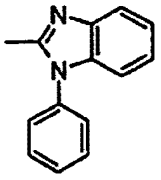
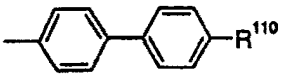
Y^3 is a group of formula  ,  ,  ,

 or  , wherein

R^{41} is hydrogen, C_1-C_{24}alkoxy, or OC_7-C_{18}aralkyl,

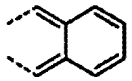
R^{42} is hydrogen, or C_1-C_{24}alkyl,

R^{43} is hydrogen, halogen, -$CONR^{25}R^{26}$, -$COOR^{27}$,  ,

especially  , or  , wherein

E^1 is -S-, -O-, or -$NR^{25'}$-, wherein $R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl,

R^{110} is H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or

R^{42} and R^{43} are a group of formula  , or  ,

R^{44} is hydrogen, or C_1-C_{24}alkyl,

R^{45} is hydrogen, or C_1-C_{24}alkyl,

$A^{11'}$, $A^{12'}$, $A^{13'}$, and $A^{14'}$ are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$,

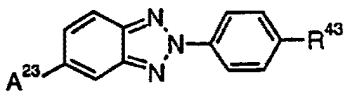
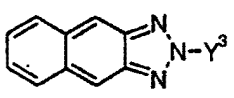
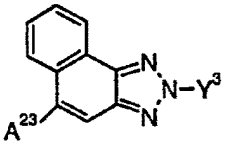
R^{68} and R^{69} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, especially hexyl, heptyl, 2-ethylhexyl, and octyl, which can be interrupted by one or two oxygen atoms,

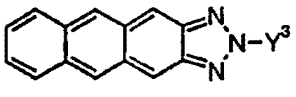
R^{70}, R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{90}, R^{91}, R^{92}, and R^{93} are independently of each other H, CN, C_1-C_{24}alkyl, C_6-C_{10}aryl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$,

R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl, and

R^{27} is C_1-C_{24}alkyl.

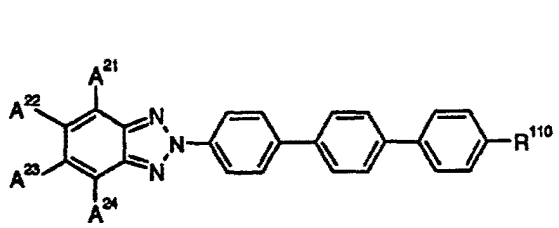
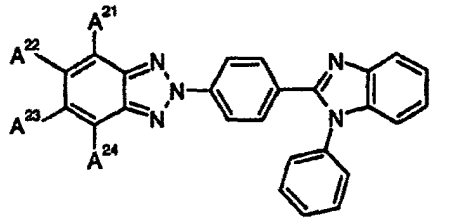
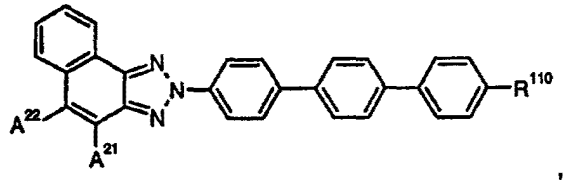
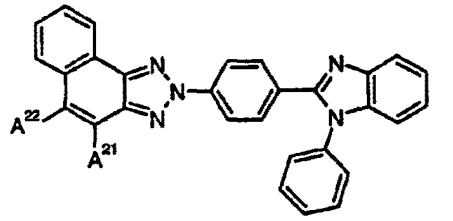
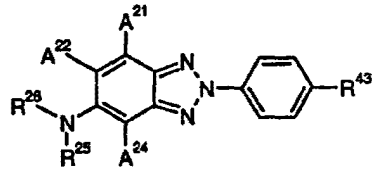
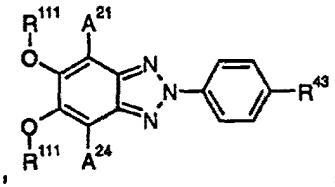
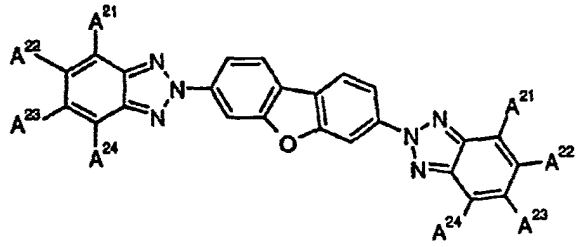
Among the compounds of formula IIa the following derivatives are preferred

 ,  ,  , and

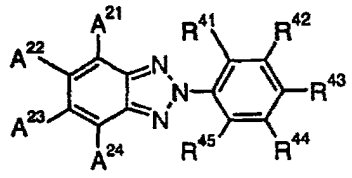
 , wherein A^{23} is halogen, or C_1-C_{24}perfluoroalkyl, and R^{43} and Y^3 is defined as above, wherein the compounds of formula IIb, IIc and IId are more preferred.

In a further embodiment, those compounds of formula II, especially of formula IIa are preferred, wherein R^{41} is different from a hydroxy group.

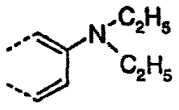
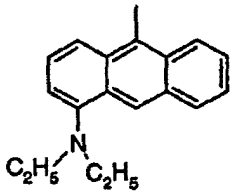
In this aspect, the compounds listed below are most preferred:

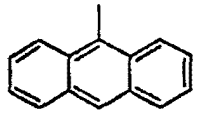


,


,


, and

,

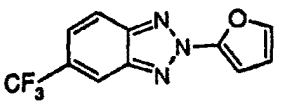
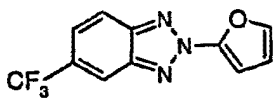
wherein R^{111} is hydrogen, C_1-C_{24}alkyl, C_1-C_{24}perfluoroalkyl, or C_6-C_{18}aryl, and A^{21}, A^{22}, A^{23}, A^{24}, R^{25}, R^{26}, R^{43}, and R^{110} are defined as above.

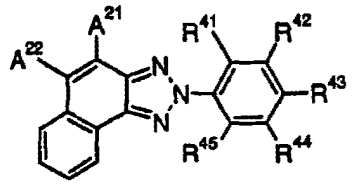


Cpd.	A^{21}	A^{22}	A^{23}	A^{24}	R^{41}	R^{42}	R^{43}	R^{44}	R^{45}
A1	H	H	H	H	$-OCH_2Ph$	H	H	$-CH_3$	H
A2	H	H	H	H	OCH_2R	H	H	$-CH_3$	H
A3	H	H	$-CO_2CH_3$	H	$-OCH_3$	-tBu	H	-tBu	H
A4	H	H	Cl	H	$-OCH_3$	-tBu	H	-tBu	H
A5	H	H	Ph	H	$-OCH_3$	-tBu	H	-tBu	H
A6	H	H	$-N(CH_2Ph)_2$	H	H	H	H	H	H
A7	H	H	Br	H	-OH	H	H	[1]	[1]
A8	H	H	Br	H	$-OCH_3$	H	H	[1]	[1]
A9	H	H	$-N(CH_2Ph)_2$	H	$-OCH_3$	H	H	[1]	[1]
A10	H	H	$-CF_3$	H	$-OCH_2Ph$	H	H	$-CH_3$	H
A11	H	H	$-CF_3$	H	H	H	-NHPh	H	H
A12	H	H	$-CF_3$	H	H	H	-OPh	H	H
A13	H	H	F	H	H	H	-OPh	H	H
A14	H	H	Cl	H	H	H	$-NPh_2$	H	H
A15	H	H	H	H	H	H	$-N(CH_3)CH_2Ph$	[1]	[1]
A16	H	H	H	H	[1]	[1]	[2]	[1]	[1]
A17	Ph	H	H	H	H	H	-N(Et)Ph	H	H
A18	Ph	H	H	Ph	H	H	$-N(CH_3)Ph$	H	H
A19	H	H	Ph	H	H	H	$-NPh_2$	H	H

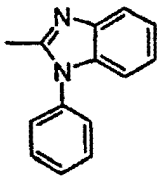
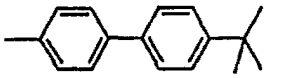
[1] R^{44} and R^{45} are a group of formula  ;  , i.e. Y^3 =  ,

R =  .

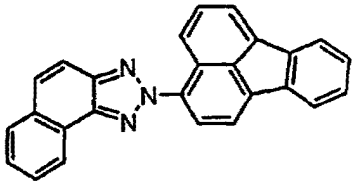
5  **A20,**  **A21**



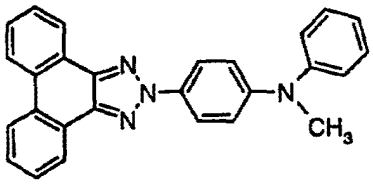
Cpd.	A^{21}	A^{22}	R^{41}	R^{42}	R^{43}	R^{44}	R^{45}
B1	H	H	H	H	$-CO_2Et$	H	H
B2	H	H	H	H	$-CO_2Na$	H	H
B3	H	H	H	H	-R'	H	H
B4	H	H	H	H	Br	H	H
B5	H	H	H	H	-R"	H	H
B6	H	H	H	H	$-NCH_3Ph$	H	H

R' =  ; R" =  .

5



B7

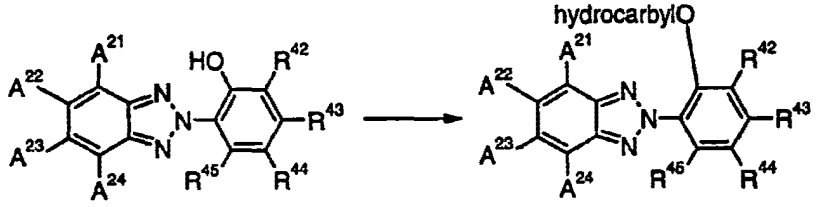


C1

10 The present 2H-benzotriazole compounds of formula IIa are for instance derivatives of known hydroxyphenyl-2H-benzotriazole compounds. Known 2H-hydroxyphenyl-2H-benzotriazole compounds are commercially useful as ultraviolet light absorbers (UVA's). 2H-Benzotriazole ultraviolet light absorbers are characterized by having an ortho hydroxyphenyl-2H-benzotriazole moiety, for example as disclosed in U.S. Pat. Nos. 3,004,896; 3,055,896;

3,072,585; 3,074,910; 3,189,615; 3,218,332; 3,230,194; 4,127,586; 4,226,763; 4,275,004; 4,278,589; 4,315,848; 4,347,180; 4,383,863; 4,675,352; 4,681,905, 4,853,471; 5,268,450; 5,278,314; 5,280,124; 5,319,091; 5,410,071; 5,436,349; 5,516,914; 5,554,760; 5,563,242; 5,574,166; 5,607,987, 5,977,219 and 6,166,218, the relevant parts of which are hereby incorporated by reference.

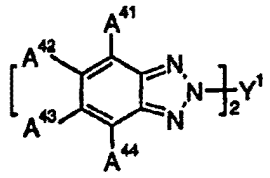
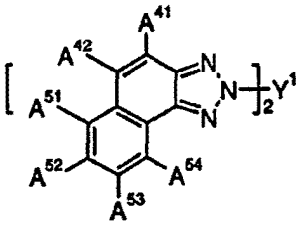
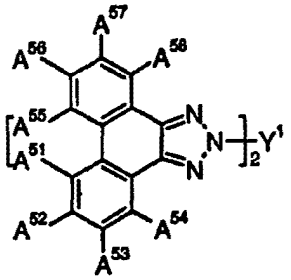
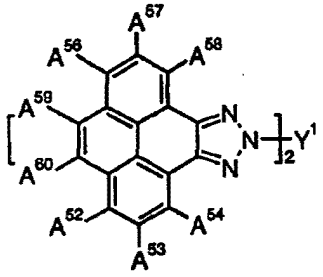
The present 2H-benzotriazoles may be obtained by simply capping the ortho hydroxy (the phenol) of known 2H-benzotriazole UV absorbers. This is achieved for example by alkylating the phenol to obtain an ortho-hydrocarbyloxyphenyl-2H-benzotriazole, for example:



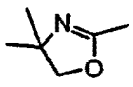
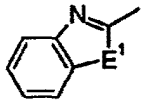
The known 2H-benzotriazole UV absorbers are prepared as disclosed in the above-mentioned U.S. Patents. The benzotriazoles of this invention may have substitution patterns as disclosed in the above-mentioned U.S. Patents. The term "alkylating" above refers to "capping" the hydroxy with any suitable hydrocarbyl group. That is, the ortho hydroxy is replaced with an ortho hydrocarbyloxy group.

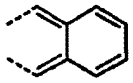
The term "hydrocarbyl group" broadly refers to a monovalent hydrocarbon group in which the valency is derived by abstraction of a hydrogen from a carbon atom. Hydrocarbyl includes for example aliphatics (straight and branched chain), cycloaliphatics, aromatics and mixed groups such as C_7-C_{25}aralkyl, C_7-C_{25}alkylaryl, C_2-C_{24}alkynyl, C_5-C_{12}cycloalkynyl. Hydrocarbyl includes such groups as alkyl, C_5-C_{12}cycloalkyl, C_6-C_{30}aryl, C_7-C_{25}aralkyl, C_7-C_{25}alkylaryl, C_2-C_{24}alkenyl, and C_5-C_{12}cycloalkenyl. A hydrocarbyl may optionally be interrupted by carbonyl, carboxyl, amino, amido, thio, sulfoxide, sulfonyl and ether groups and/or may optionally be substituted by hydroxy, amino, amido, carboxyl and thio groups.

In a second aspect, the present invention relates to an EL device, comprising a 2H-benzotriazole compound of formula III, especially of formula


(IIIa),

(IIIb),


(IIIc), or (IIId), wherein

A^{41}, A^{42}, A^{43} and A^{44} are independently of each other hydrogen, halogen, C_1-C_{24}alkyl, C_1-C_{24}perfluoroalkyl, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -CO $NR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl,

especially a group of formula  or  , or

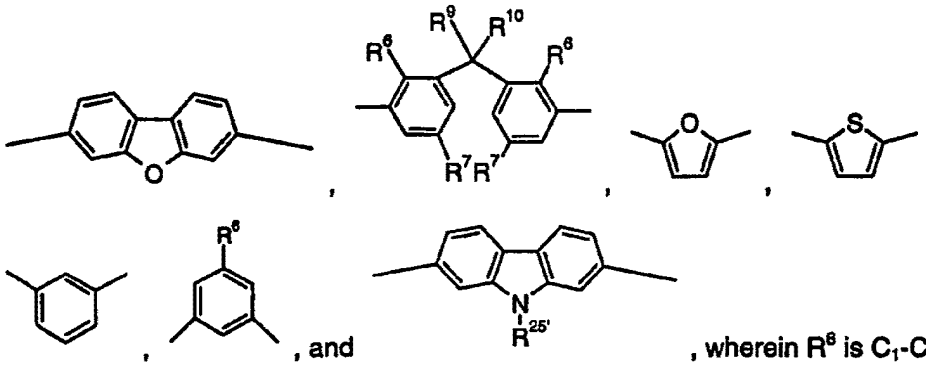
A^{42} and A^{43} are a group of formula  , or  ,

A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59} and A^{60} are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl, wherein

E^1 is O, S, or NR^{25},

R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl, R^{27} is C_1-C_{24}alkyl, and

Y^1 is a group of formula



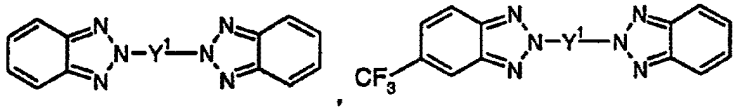
, wherein R^6 is C_1-C_{24}alkoxy, or -O-C_7-C_{25}aralkyl,

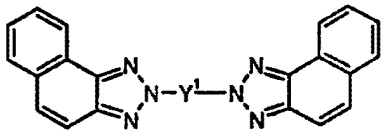
R^7 is H, or C_1-C_{24}alkyl,

R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms, and

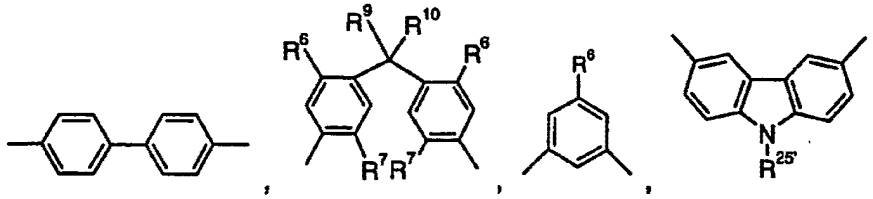
$R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl,.

In this aspect the compounds listed below are most preferred:

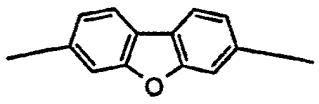




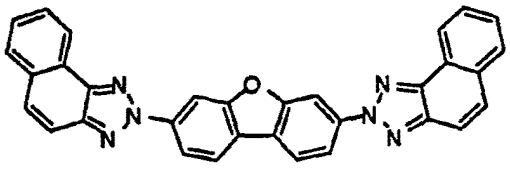
, wherein Y^1 is selected from



and

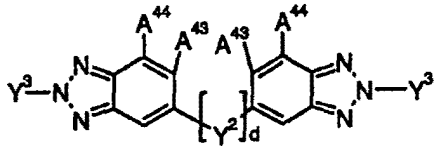


, wherein R^6 is C_1-C_{24}alkoxy, or -O-C_7-C_{25}aralkyl, R^7 is H, or C_1-C_{24}alkyl, R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms, and $R^{25'}$ is C_1-C_{24}alkyl, wherein R^6 is C_1-C_{24}alkoxy, or -O-C_7-C_{25}aralkyl, R^7 is H, or C_1-C_{24}alkyl, R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms;



D2.

In a third aspect, the present invention relates to an EL device, comprising a 2H-benzotriazole compound of formula IV, especially of formula

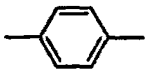
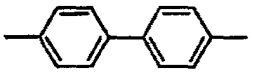
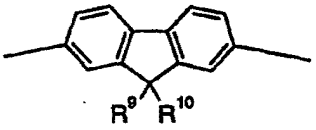


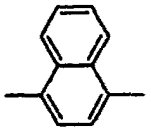
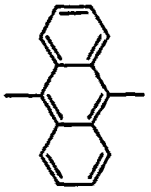
(VIa), wherein

d is 0, or 1,

A^{43} and A^{44} are defined as above,

Y^2 is a group of formula -O-, -S-, $-NR^{25}-$,

a group of formula  ,  ,  ,

 , or  ,

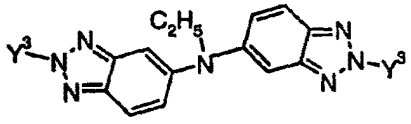
Y^3 is a group of formula  , wherein

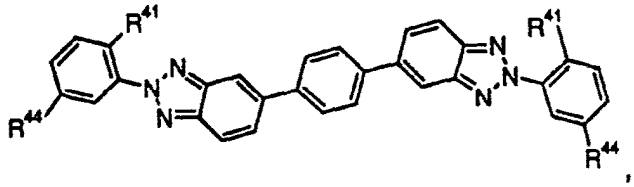
R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms,

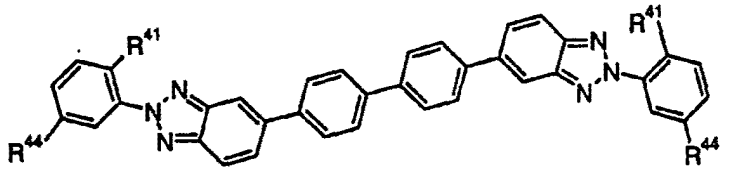
R^{41} is C_1-C_{24}alkoxy, or C_7-C_{15}phenylalkoxy and

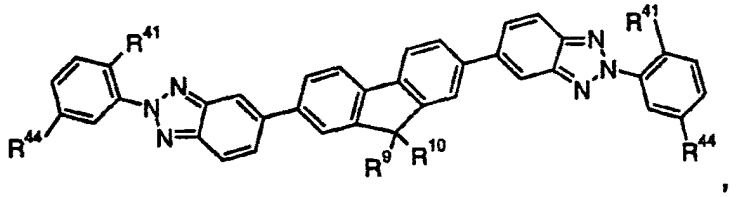
R^{44} is is H, C_6-C_{10}aryl, or C_1-C_{24}alkyl.

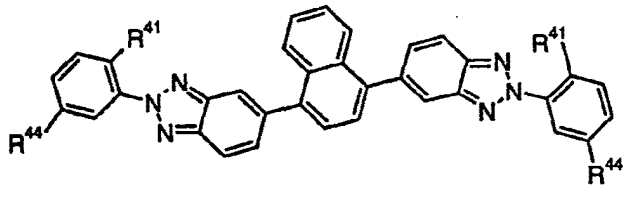
In this aspect, the following compounds are most preferred:



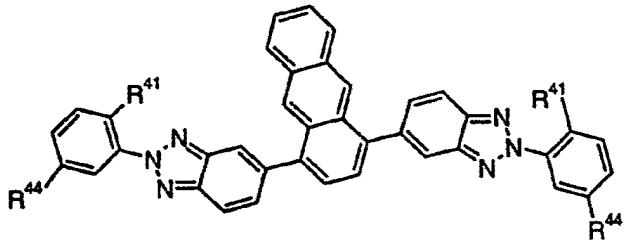




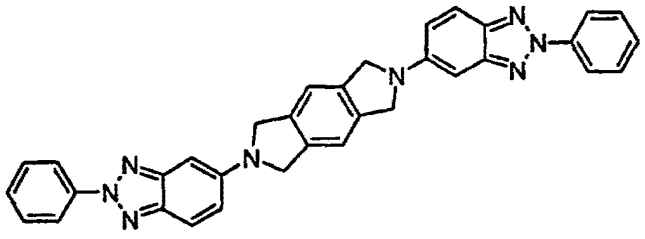




, or



, wherein Y^3, R^9, R^{10}, R^{41} and R^{44} are defined as above; and

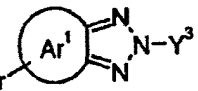
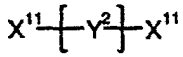
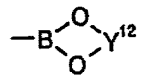


E1.

In a fourth aspect, the present invention relates to an EL device, comprising a 2H-benzotriazole compound of formula V, wherein Ar^1, Ar^2, Y^1, Y^2, and $Y^{3'}$ are defined as above.

In a fifth aspect, the present invention relates to an EL device, comprising a 2H-benzotriazole compound of formula (VI), wherein Ar^1, Ar^2, Ar^3, Y^1, Y^2, and $Y^{3'}$ are defined as above.

The 2H-benzotriazoles of formulas (IV), (V) and (VI) may be prepared by any suitable process, for example, by the amination reaction as described in Hartwig et al., Journal Organic Chemistry 1999 (64), 5575, but can also be prepared by the process described below. The condensation reaction of an aromatic boronate and a bromide, commonly referred to as the "Suzuki reaction", is tolerant of the presence of a variety of organic functional groups and as reported by N. Miyaua and A. Suzuki in Chemical Reviews, Vol. 95, pp. 457-2483 (1995).

To prepare 2H-benzotriazoles corresponding to formula (IV) 2 equivalents of a bromide of formula  are reacted with one equivalent diboronic acid or diboronate corresponding to formula  or a mixture thereof, wherein X^{11} is independently in each occurrence a $-B(OH)_2$, $-B(OY^{11})_2$ or  , wherein Y^{11} is independently in each occurrence a C_1-C_{10}alkyl group and Y^{12} is independently in each occurrence a C_2-C_{10}alkylene group, such as $-CY^{13}Y^{14}-CY^5Y^6-$, or $-CY^7Y^8-CY^9Y^{10}-CY^{15}Y^{16}-$, wherein Y^5, Y^6, Y^7, Y^8, Y^9, Y^{10}, Y^{13}, Y^{14}, Y^{15} and Y^{16} are independently of each other hydrogen, or a C_1-C_{10}alkyl group, especially $-C(CH_3)_2C(CH_3)_2-$, or $-C(CH_3)_2CH_2C(CH_3)_2-$, under the catalytic action of Pd and triphenylphosphine. The reaction is typically conducted at about 70 °C to 120 °C in an aromatic hydrocarbon solvent such as toluene. Other solvents such as dimethylformamide and tetrahydrofuran can also be used alone, or in mixtures with an aromatic hydrocarbon. An aqueous base, preferably sodium carbonate or bicarbonate, is used as the HBr scavenger. Depending on the reactivities of the reactants, a polymerization reaction may take 2 to 100 hours. Organic bases, such as, for example, tetraalkylammonium hydroxide, and phase transfer catalysts, such as, for exampleTBAB, can promote the activity of the boron (see, for example, Leadbeater & Marco; Angew. Chem. Int. Ed., **2003**, 42, 1407 and references cited therein). Other variations of reaction conditions are given by T. I. Wallow and B. M. Novak in Journal of Organic Chemistry, Vol. 59, pp. 5034-5037 (1994); and M. Remmers, M. Schulze, and G. Wegner in Macromolecular Rapid Communications, Vol. 17, pp. 239-252 (1996). The 2H-benzotriazoles of formulas (IV), (V) and (VI) can be prepared accordingly.

Halogen is fluorine, chlorine, bromine and iodine.

C_1-C_{24}alkyl is a branched or unbranched radical such as for example methyl, ethyl, propyl, isopropyl, n-butyl, sec-butyl, isobutyl, tert-butyl, 2-ethylbutyl, n-pentyl, isopentyl, 1-methylpentyl, 1,3-dimethylbutyl, n-hexyl, 1-methylhexyl, n-heptyl, isoheptyl, 1,1,3,3-tetramethylbutyl, 1-methylheptyl, 3-methylheptyl, n-octyl, 2-ethylhexyl, 1,1,3-trimethylhexyl, 1,1,3,3-tetramethylpentyl, nonyl, decyl, undecyl, 1-methylundecyl, dodecyl, 1,1,3,3,5,5-hexamethylhexyl, tridecyl, tetradecyl, pentadecyl, hexadecyl, heptadecyl, octadecyl, icosyl or docosyl.

C_1-C_{24}perfluoroalkyl is a branched or unbranched radical such as for example $-CF_3$, $-CF_2CF_3$, $-CF_2CF_2CF_3$, $-CF(CF_3)_2$, $-(CF_2)_3CF_3$, and $-C(CF_3)_3$.

C_1-C_{24}alkoxy radicals are straight-chain or branched alkoxy radicals, e.g. methoxy, ethoxy, n-propoxy, isopropoxy, n-butoxy, sec-butoxy, tert-butoxy, amyloxy, isoamyloxy or tert-amyloxy, heptyloxy, octyloxy, isooctyloxy, nonyloxy, decyloxy, undecyloxy, dodecyloxy, tetradecyloxy, pentadecyloxy, hexadecyloxy, heptadecyloxy and octadecyloxy.

C_2-C_{24}alkenyl radicals are straight-chain or branched alkenyl radicals, such as e.g. vinyl, allyl, methallyl, isopropenyl, 2-butenyl, 3-butenyl, isobutenyl, n-penta-2,4-dienyl, 3-methyl-but-2-enyl, n-oct-2-enyl, n-dodec-2-enyl, isododecenyl, n-dodec-2-enyl or n-octadec-4-enyl.

C_{2-24}alkynyl is straight-chain or branched and preferably C_{2-8}alkynyl, which may be unsubstituted or substituted, such as, for example, ethynyl, 1-propyn-3-yl, 1-butyn-4-yl, 1-pentyn-5-yl, 2-methyl-3-butyn-2-yl, 1,4-pentadiyn-3-yl, 1,3-pentadiyn-5-yl, 1-hexyn-6-yl, cis-3-methyl-2-penten-4-yn-1-yl, trans-3-methyl-2-penten-4-yn-1-yl, 1,3-hexadiyn-5-yl, 1-octyn-8-yl, 1-nonyn-9-yl, 1-decyn-10-yl, or 1-tetracosyn-24-yl.

C_4-C_{18}cycloalkyl, especially C_5-C_{12}cycloalkyl, is preferably C_5-C_{12}cycloalkyl or said cycloalkyl substituted by one to three C_1-C_4alkyl groups, such as, for example, cyclopentyl, methylcyclopentyl, dimethylcyclopentyl, cyclohexyl, methylcyclohexyl, dimethylcyclohexyl, trimethylcyclohexyl, tert-butylcyclohexyl, cycloheptyl, cyclooctyl, cyclononyl, cyclodecyl, cyclododecyl. Cyclohexyl and cyclopentyl are most preferred.

Examples of C_4-C_{18}cycloalkyl, which is interrupted by S, O, or NR^{25}, are piperidyl, piperazinyl and morpholinyl.

C_2-C_{24}alkenyl is for example vinyl, allyl, butenyl, pentenyl, hexenyl, heptenyl, or octenyl.

Aryl is usually C_6-C_{30}aryl, preferably C_6-C_{24}aryl, which optionally can be substituted, such as, for example, phenyl, 4-methylphenyl, 4-methoxyphenyl, naphthyl, biphenylyl, 2-fluorenyl, phenanthryl, anthryl, tetracyl, pentacyl, hexacyl, terphenylyl or quadphenylyl; or phenyl substituted by one to three C_1-C_4alkyl groups, for example o-, m- or p-methylphenyl, 2,3-dimethylphenyl, 2,4-dimethylphenyl, 2,5-dimethylphenyl, 2,6-dimethylphenyl, 3,4-dimethylphenyl, 3,5-dimethylphenyl, 2-methyl-6-ethylphenyl, 4-tert-butylphenyl, 2-ethylphenyl or 2,6-diethylphenyl.

C_7-C_{24}aralkyl radicals are preferably C_7-C_{15}aralkyl radicals, which may be substituted, such as, for example, benzyl, 2-benzyl-2-propyl, β-phenethyl, α-methylbenzyl, α,α-dimethylbenzyl, ω-phenyl-butyl, ω-phenyl-octyl, ω-phenyl-dodecyl; or phenyl-C_1-C_4alkyl substituted on the phenyl ring by one to three C_1-C_4alkyl groups, such as, for example, 2-methylbenzyl, 3-methylbenzyl, 4-methylbenzyl, 2,4-dimethylbenzyl, 2,6-dimethylbenzyl or 4-tert-butylbenzyl.or 3-methyl-5-(1',1',3',3'-tetramethyl-butyl)-benzyl.

Heteroaryl is typically C_2-C_{26}heteroaryl, i.e. a ring with five to seven ring atoms or a condensed rig system, wherein nitrogen, oxygen or sulfur are the possible hetero atoms, and is typically an unsaturated heterocyclic radical with five to 30 atoms having at least six conjugated π-electrons such as thienyl, benzo[b]thienyl, dibenzo[b,d]thienyl, thianthrenyl, furyl, furfuryl, 2H-pyranyl, benzofuranyl, isobenzofuranyl, dibenzofuranyl, phenoxythienyl, pyrrolyl, imidazolyl, pyrazolyl, pyridyl, bipyridyl, triazinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolizinyl, isoindolyl, indolyl, indazolyl, purinyl, quinolizinyl, chinolyl, isochinolyl, phthalazinyl, naphthyridinyl, chinoxalinyl, chinazolinyl, cinnolinyl, pteridinyl, carbazolyl, carbolinyl, benzotriazolyl, benzoxazolyl, phenanthridinyl, acridinyl, perimidinyl, phenanthrolinyl, phenazinyl, isothiazolyl, phenothiazinyl, isoxazolyl, furazanyl or phenoxazinyl, which can be unsubstituted or substituted.

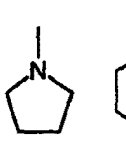
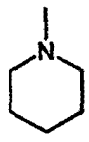
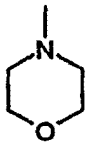
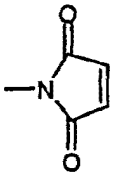
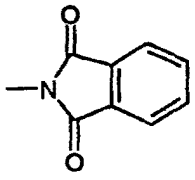
C_6-C_{18}cycloalkoxy is, for example, cyclopentyloxy, cyclohexyloxy, cycloheptyloxy or cyclooctyloxy, or said cycloalkoxy substituted by one to three C_1-C_4alkyl, for example, methylcyclopentyloxy, dimethylcyclopentyloxy, methylcyclohexyloxy, dimethylcyclohexyloxy, trimethylcyclohexyloxy, or tert-butylcyclohexyloxy.

C_6-C_{24}aryloxy is typically phenoxy or phenoxy substituted by one to three C_1-C_4alkyl groups, such as, for example o-, m- or p-methylphenoxy, 2,3-dimethylphenoxy, 2,4-dimethylphenoxy, 2,5-dimethylphenoxy, 2,6-dimethylphenoxy, 3,4-dimethylphenoxy, 3,5-dimethylphenoxy, 2-methyl-6-ethylphenoxy, 4-tert-butylphenoxy, 2-ethylphenoxy or 2,6-diethylphenoxy.

C_6-C_{24}aralkoxy is typically phenyl-C_1-C_8alkoxy, such as, for example, benzyloxy, α-methylbenzyloxy, α,α-dimethylbenzyloxy or 2-phenylethoxy.

C_1-C_{24}alkylthio radicals are straight-chain or branched alkylthio radicals, such as e.g. methylthio, ethylthio, propylthio, isopropylthio, n-butylthio, isobutylthio, pentylthio, isopentylthio, hexylthio, heptylthio, octylthio, decylthio, tetradecylthio, hexadecylthio or octadecylthio. C_1-C_{24}alkylselenium and C_1-C_{24}alkyltellurium are C_1-C_{24}alkylSe- and C_1-C_{24}alkylTe-, respectively.

Examples of a five or six membered ring formed by R^9 and R^{10} and R^{25} and R^{26}, respectively are heterocycloalkanes or heterocycloalkenes having from 3 to 5 carbon atoms which can have one additional hetero atom selected from nitrogen, oxygen and sulfur, for example


, 
, 
, or 
, which can be part of a bicyclic system, for example 
or 
.

Possible substituents of the above-mentioned groups are C_1-C_8alkyl, a hydroxyl group, a mercapto group, C_1-C_8alkoxy, C_1-C_8alkylthio, halogen, halo-C_1-C_8alkyl, a cyano group, an aldehyde group, a ketone group, a carboxyl group, an ester group, a carbamoyl group, an amino group, a nitro group or a silyl group.

The term "haloalkyl" means groups given by partially or wholly substituting the above-mentioned alkyl group with halogen, such as trifluoromethyl etc. The "aldehyde group, ketone group, ester group, carbamoyl group and amino group" include those substituted by an C_1-C_{24}alkyl group, a C_4-C_{18}cycloalkyl group, an C_6-C_{30}aryl group, an C_7-C_{24}aralkyl group

or a heterocyclic group, wherein the alkyl group, the cycloalkyl group, the aryl group, the aralkyl group and the heterocyclic group may be unsubstituted or substituted. The term "silyl group" means a group of formula $-SiR^{105}R^{106}R^{107}$, wherein R^{105}, R^{106} and R^{107} are independently of each other a C_1-C_8alkyl group, in particular a C_1-C_4 alkyl group, a C_6-C_{24}aryl group or a C_7-C_{12}aralkylgroup, such as a trimethylsilyl group.

If a substituent, such as, for example R^6 and R^7, occurs more than one time in a group, it can be different in each occurrence.

As described above, the aforementioned radicals may be substituted by E and/or, if desired, interrupted by D. Interruptions are of course possible only in the case of radicals containing at least 2 carbon atoms connected to one another by single bonds; C_6-C_{18}aryl is not interrupted; interrupted arylalkyl or alkylaryl contains the unit D in the alkyl moiety. C_1-C_{24}alkyl substituted by one or more E and/or interrupted by one or more units D is, for example, $(CH_2CH_2O)_n$-R^x, where n is a number from the range 1-9 and R^x is H or C_1-C_{10}alkyl or C_2-C_{10}alkanoyl (e.g. CO-$CH(C_2H_5)C_4H_9$), CH_2-$CH(OR^{y'})$-CH_2-O-R^y, where R^y is C_1-C_{24}alkyl, C_5-C_{12}cycloalkyl, phenyl, C_7-C_{15}phenylalkyl, and $R^{y'}$ embraces the same definitions as R^y or is H; C_1-C_8alkylene-COO-R^z, e.g. CH_2COOR^z, $CH(CH_3)COOR^z$, $C(CH_3)_2COOR^z$, where R^z is H, C_1-C_{24}alkyl, $(CH_2CH_2O)_{1\text{-}9}$-R^x, and R^x embraces the definitions indicated above; CH_2CH_2-O-CO-$CH=CH_2$; $CH_2CH(OH)CH_2$-O-CO-$C(CH_3)=CH_2$.

The blue-emitting 2H-benzotriazoles of this invention emit light below about 520 nm, for example between about 380 nm and about 520 nm. For example, the blue-emitting 2H-benzotriazoles of this invention have a NTSC coordinate of about (0.14, 0.08), where the first coordinate is between about 0.12 and about 0.16, and the second coordinate is between about 0.05 and about 0.10.

The present compounds of formula I, including those of formulae II, III, IV, V and VI, as well as the ortho-hydrocarbyloxyphenyl-2H-benzotriazoles, may also function as other than a blue-emitting organic compound, for example they may also function as a hole-injecting, hole-transporting, and electron-injecting or an electron-transporting material.

The organic EL device of the present invention has significant industrial values since it can be adapted for a flat panel display of an on-wall television set, a flat light-emitting device, a light source for a copying machine or a printer, a light source for a liquid crystal display or counter, a display signboard and a signal light.

The material of the present invention can be used in the fields of an organic EL device, an

electrophotographic photoreceptor, a photoelectric converter, a solar cell, and an image sensor.

To obtain organic layers of this invention with the proper T_g, or glass transition temperature, it is advantageous that the present 2H-benzotriazoles have a melting point greater than about 150°C, for example greater than about 200°C, for example greater than about 250°C, for instance greater than about 300°C.

The electroluminescent devices of the present invention are otherwise designed as is known in the art, for example as described in U.S. Pat. Nos. 5,518,824, 6,280,859, 5,629,389, 5,486,406, 5,104,740 and 5,116,708, the relevant disclosures of which are hereby incorporated by reference.

The present invention relates to an electroluminescent device having the 2H-benzotriazoles of of formula I between an anode and a cathode and emitting light by the action of electrical energy.

Typical constitutions of latest organic electroluminescent devices are:
(i) an anode/a hole transporting layer/an electron transporting layer/a cathode, in which 2H-benzotriazoles of of formula I are used either as positive-hole transport compound, which is exploited to form the light emitting and hole transporting layers, or as electron transport compound, which can be exploited to form the light-emitting and electron transporting layers,
(ii) an anode/a hole transporting layer/a light-emitting layer/an electron transporting layer/a cathode, in which the 2H-benzotriazoles of of formula I form the light-emitting layer regardless of whether they exhibit positive-hole or electron transport properties in this constitution,
(iii) an anode/a hole injection layer /a hole transporting layer/a light-emitting layer/an electron transporting layer/a cathode,
(iv) an anode/a hole transporting layer/a light-emitting layer/ a positive hole inhibiting layer/ an electron transporting layer/a cathode,
(v) an anode/a hole injection layer/a hole transporting layer/a light-emitting layer/ a positive hole inhibiting layer/an electron transporting layer/a cathode,
(vi) an anode/a light-emitting layer/an electron transporting layer/a cathode,
(vii) an anode/a light-emitting layer/a positive hole inhibiting layer/an electron transporting layer/a cathode,

(viii) a mono-layer containing a light emitting material alone or a combination of a light emitting material and any of the materials of the hole transporting layer, the hole-blocking layer and/or the electron transporting layer, and

(ix) a multi-layered structure described in (ii) to (vii), wherein a light emitting layer is the mono-layer defined in (viii).

The 2H-benzotriazoles of of formula I can, in principal be used for any organic layer, such as, for example, hole transporting layer, light emitting layer, or electron transporting layer, but are preferably used as the light emitting material in the light emitting layer, optionally as a host or guest component.

The light emitting compounds of this invention exhibit intense fluorescence in the solid state and have excellent electric-field-applied light emission characteristics. Further, the light emitting compounds of this invention are excellent in the injection of holes from a metal electrode and the transportation of holes; as well as being excellent in the injection of electrons from a metal electrode and the transportation of electrons. They are effectively used as light emitting materials and may be used in combination with other hole transporting materials, other electron transporting materials or other dopants.

The 2H-benzotriazoles of the present invention form uniform thin films. The light emitting layers may therefore be formed of the present 2H-benzotriazoles alone.

Alternatively, the light-emitting layer may contain a known light-emitting material, a known dopant, a known hole-injecting material or a known electron-injecting material as required. In the organic EL device, a decrease in the brightness and life caused by quenching can be prevented by forming it as a multi-layered structure. The light-emitting material, a dopant, a hole-injecting material and an electron-injecting material may be used in combination as required. Further, a dopant can improve the light emission brightness and the light emission efficiency, and can attain red, green or blue light emission. Further, each of the hole-injecting zone, the light-emitting layer and the electron-injecting zone may have the layer structure of at least two layers. In the hole-injecting zone in this case, a layer to which holes are injected from an electrode is called "hole-injecting layer", and a layer which receives holes from the hole-injecting layer and transport the holes to a light-emitting layer is called "hole-transporting layer". In the electron-injecting zone, a layer to which electrons are injected from an electrode is called "electron-injecting layer", and a layer which receives electrons from the electron-injecting layer and transports the electrons to a light-emitting layer is called "electron-transporting layer". These layers are selected and used depending upon factors such as the energy level and heat resistance of materials and adhesion to an organic layer or metal

electrode.

The light-emitting material or the dopant which may be used in the light-emitting layer together with the 2H-benzotriazoles of the present invention includes for example anthracene, naphthalene, phenanthrene, pyrene, tetracene, coronene, chrysene, fluorescein, perylene, phthaloperylene, naphthaloperylene, perinone, phthaoperinone, naphthaloperinone, diphenylbutadiene, tetraphenylbutadiene, coumarine, oxadiazole, aldazine, bisbenzoxazoline, bisstyryl, pyrazine, cyclopentadiene, quinoline metal complex, aminoquinoline metal complex, benzoquinoline metal complex, imine, diphenylethylene, vinyl anthracene, diaminocarbazole, pyran, thiopyran, polymethine, merocyanine, an imidazole-chelated oxynoid compound, quinacridone, rubrene, and fluorescent dyestuffs for a dyestuff laser or for brightening.

The 2H-benzotriazoles of the present invention and the above compound or compounds that can be used in a light-emitting layer may be used in any mixing ratio for forming a light-emitting layer. That is, 2H-benzotriazoles of the present invention may provide a main component for forming a light-emitting layer, or they may be a doping material in another main material, depending upon a combination of the above compounds with the present 2H-benzotriazoles of the present invention. Good results are, for example, achieved, when DPVBi (4,4'-bis-(2,2-diphenyl-1-vinyl) biphenyl) is used as host and Compound B7 is used as guest.

Thin film type electroluminescent devices usually consist essentially of a pair of electrodes and at least one charge transporting layer in between. Usually two charge transporting layers, a hole transporting layer (next to the anode) and an electron transporting layer (next to the cathode) are present. Either one of them contains - depending on its properties as hole-transporting or electron-transporting material - an inorganic or organic fluorescence substance as light-emitting material. It is also common, that a light-emitting material is used as an additional layer between the hole-transporting and the electron-transporting layer. In the above mentioned device structure, a hole injection layer can be constructed between an anode and a hole transporting layer and/or a positive hole inhibiting layer can be constructed between a light emitting layer and an electron transporting layer to maximise hole and electron population in the light emitting layer, reaching large efficiency in charge recombination and intensive light emission.

The devices can be prepared in several ways. Usually, vacuum evaporation is used for the preparation. Preferably, the organic layers are laminated in the above order on a

commercially available indium-tin-oxide ("ITO") glass substrate held at room temperature, which works as the anode in the above constitutions. The membrane thickness is preferably in the range of 1 to 10,000 nm, more preferably 1 to 5,000 nm, more preferably 1 to 1,000 nm, more preferably 1 to 500 nm. The cathode metal, such as a Mg/Ag alloy, a binary Li-Al or LiF-Al system with an thickness in the range of 50-200 nm is laminated on the top of the organic layers. The vacuum during the deposition is preferably less than 0.1333 Pa (1x 10^{-3} Torr), more preferably less than 1.333x 10^{-3} Pa (1x 10^{-5} Torr), more preferably less than 1.333x 10^{-4} Pa (1x 10^{-6} Torr).

As anode usual anode materials which possess high work function such as metals like gold, silver, copper, aluminum, indium, iron, zinc, tin, chromium, titanium, vanadium, cobalt, nickel, lead, manganese, tungsten and the like, metallic alloys such as magnesium/copper, magnesium/silver, magnesium/aluminum, aluminum/indium and the like, semiconductors such as Si, Ge, GaAs and the like, metallic oxides such as indium-tin-oxide ("ITO"), ZnO and the like, metallic compounds such as CuI and the like, and furthermore, electroconducting polymers, such as polyacetylene, polyaniline, polythiophene, polypyrrole, polyparaphenylene and the like, preferably ITO, most preferably ITO on glass as substrate can be used.

Of these electrode materials, metals, metallic alloys, metallic oxides and metallic compounds can be transformed into electrodes, for example, by means of the sputtering method. In the case of using a metal or a metallic alloy as a material for an electrode, the electrode can be formed also by the vacuum deposition method. In the case of using a metal or a metallic alloy as a material forming an electrode, the electrode can be formed, furthermore, by the chemical plating method (see for example, Handbook of Electrochemistry, pp 383-387, Mazuren, 1985). In the case of using an electroconducting polymer, an electrode can be made by forming it into a film by means of anodic oxidation polymerization method onto a substrate which is previously provided with an electroconducting coating. The thickness of an electrode to be formed on a substrate is not limited to a particular value, but, when the substrate is used as a light emitting plane, the thickness of the electrode is preferably within the range of from 1 nm to 300 nm, more preferably, within the range of from 5 to 200 nm so as to ensure transparency.

In a preferred embodiment ITO is used on a substrate having an ITO film thickness in the range of from 10 nm (100 Å) to 1 μ (10000 Å), preferably from 20 nm (200 Å) to 500 nm (5000 Å). Generally, the sheet resistance of the ITO film is chosen in the range of not more than 100 Ω/cm^2, preferably not more than 50 Ω/cm^2.

Such anodes are commercially available from Japanese manufacturers, such as Geomatech Co.Ltd., Sanyo Vacuum Co. Ltd., Nippon Sheet Glass Co. Ltd.

As substrate either an electronconducting or electrically insulating material can be used. In case of using an electroconducting substrate, a light emitting layer or a positive hole transporting layer is directly formed thereupon, while in case of using an electrically insulating substrate, an electrode is firstly formed thereupon and then a light emitting layer or a positive hole transporting layer is superposed.

The substrate may be either transparent, semi-transparent or opaque. However, in case of using a substrate as an indicating plane, the substrate must be transparent or semi-transparent.

Transparent electrically insulating substrates are, for example, inorganic compounds such as glass, quartz and the like, organic polymeric compounds such as polyethylene, polypropylene, polymethylmethacrylate, polyacrylonitrile, polyester, polycarbonate, polyvinylchloride, polyvinylalcohol, polyvinylacetate and the like. Each of these substrates can be transformed into a transparent electroconducting substrate by providing it with an electrode according to one of the methods described above.

Examples of semi-transparent electrically insulating substrates are inorganic compounds such as alumina, YSZ (yttrium stabilized zirconia) and the like, organic polymeric compounds such as polyethylene, polypropylene, polystyrene, epoxy resins and the like. Each of these substrates can be transformed into a semi-transparent electroconducting substrate by providing it with an electrode according to one of the abovementioned methods.

Examples of opaque electroconducting substrates are metals such as aluminum, indium, iron, nickel, zinc, tin, chromium, titanium, copper, silver, gold, platinum and the like, various elctroplated metals, metallic alloys such as bronze, stainless steel and the like, semiconductors such as Si, Ge, GaAs, and the like, electroconducting polymers such as polyaniline, polythiophene, polypyrrole, polyacetylene, polyparaphenylene and the like.

A substrate can be obtained by forming one of the above listed substrate materials to a desired dimension. It is preferred that the substrate has a smooth surface. Even, if it has a rough surface, it will not cause any problem for practical use, provided that it has round unevenness having a curvature of not less than 20 μm. As for the thickness of the substrate, there is no restriction as far as it ensures sufficient mechanical strength.

As cathode usual cathode materials which possess low work function such as alkali metals, earth alkaline metals, group 13 elements, silver, and copper as well as alloys or mixtures thereof such as sodium, lithium, potassium, calcium, lithium fluoride (LiF), sodium-potassium alloy, magnesium, magnesium-silver alloy, magnesium-copper alloy, magnesium-aluminum alloy, magnesium-indium alloy, aluminum, aluminum-aluminum oxide alloy, aluminum-lithium alloy, indium, calcium, and materials exemplified in EP-A 499,011 such as electroconducting

polymers e.g. polypyrrole, polythiophene, polyaniline, polyacetylene etc., preferably Mg/Ag alloys, LiF-Al or Li-Al compositions can be used.

In a preferred embodiment a magnesium-silver alloy or a mixture of magnesium and silver, or a lithium-aluminum alloy, lithium fluoride-aluminum alloy or a mixture of lithium and aluminum can be used in a film thickness in the range of from 10 nm (100 Å) to 1 μm (10000 Å), preferably from 20 nm (200 Å) to 500 nm (5000 Å).

Such cathodes can be deposited on the foregoing electron transporting layer by known vacuum deposition techniques described above.

In a preferred ambodiment of this invention a light-emitting layer can be used between the hole transporting layer and the electron transporting layer. Usually the light-emitting layer is prepared by forming a thin film on the hole transporting layer.

As methods for forming said thin film, there are, for example, the vacuum deposition method, the spin-coating method, the casting method, the Langmuir-Blodgett ("LB") method and the like. Among these methods, the vacuum deposition method, the spin-coating method and the casting method are particularly preferred in view of ease of operation and cost.

In case of forming a thin film using a composition by means of the vacuum deposition method, the conditions under which the vacuum deposition is carried out are usually strongly dependent on the properties, shape and crystalline state of the compound(s). However, optimum conditions are usually as follows: temperature of the heating boat: 100 to 400°C; substrate temperature: -100 to 350°C; pressure:1.33×10^{4} Pa (1×10^{2} Torr) to 1.33×10^{-4} Pa (1×10^{-6} Torr) and deposition rate: 1 pm to 6 nm/sec.

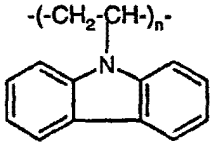
In an organic EL element, the thickness of the light emitting layer is one of the factors determining its light emission properties. For example, if a light emitting layer is not sufficiently thick, a short circuit can occur quite easily between two electrodes sandwiching said light emitting layer, and therefor, no EL emission is obtained. On the other hand, if the light emitting layer is excessively thick, a large potential drop occurs inside the light emitting layer because of its high electrical resistance, so that the threshold voltage for EL emission increases. Accordingly, the thickness of the organic light emitting layer is limited to the range of from 5 nm to 5 μm, preferably to the range of from 10 nm to 500 nm.

In the case of forming a light emitting layer by using the spin-coating method and the casting method, ink jet printing method, the coating can be carried out using a solution prepared by dissolving the composition in a concentration of from 0.0001 to 90% by weight in an appropriate organic solvent such as benzene, toluene, xylene, tetrahydrofurane, methyltetrahydrofurane, N,N-dimethylformamide, dichloromethane, dimethylsulfoxide and the like. If the concentration exceeds 90% by weight, the solution usually is so viscous that it no

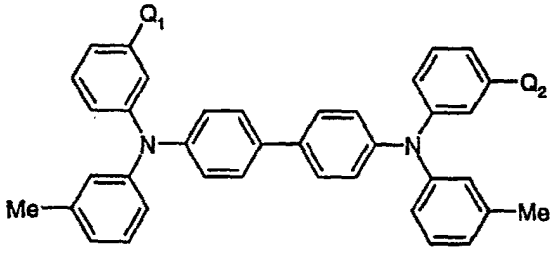
longer permits forming a smooth and homogenous film. On the other hand, if the concentration is less than 0.0001% by weight, the efficiency of forming a film is too low to be economical. Accordingly, a preferred concentration of the composition is within the range of from 0.01 to 80% by weight.

In the case of using the above spin-coating or casting method, it is possible to further improve the homogeneity and mechanical strength of the resulting layer by adding a polymer binder to the solution for forming the light emitting layer. In principle, any polymer binder may be used, provided that it is soluble in the solvent in which the composition is dissolved. Examples of such polymer binders are polycarbonate, polyvinylalcohol, polymethacrylate, polymethylmethacrylate, polyester, polyvinylacetate, epoxy resin and the like. However, if the solid content composed of the polymer binder and the composition exceeds 99% by weight, the fluidity of the solution is usually so low that it is impossible to form a light emitting layer excellent in homogeneity. On the other hand, if the content of the composition is substantially smaller than that of the polymer binder, the electrical resistance of said layer is very large, so that it does not emit light unless a high voltage is applied thereto. Accordingly, the preferred ratio of the polymer binder to the composition is chosen within the range of from 10:1 to 1:50 by weight, and the solid content composed of both components in the solution is preferably within the range of from 0.01 to 80% by weight, and more preferably, within the range of 0.1 to 60% by weight.

As hole-transporting layers known organic hole transporting compounds such as polyvinyl carbazole

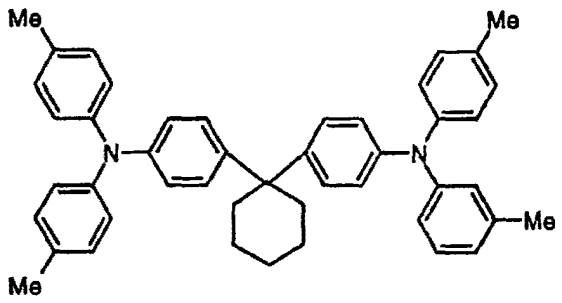


a TPD compound disclosed in J. Amer. Chem. Soc. 90 (1968) 3925:



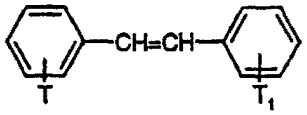
wherein Q_1 and Q_2 each represent a hydrogen atom or a methyl group;

a compound disclosed in J. Appl. Phys. 65(9) (1989) 3610:



;

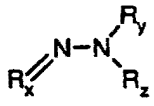
a stilbene based compound



,

wherein T and T_1 stand for an organic radical;

a hydrazone based compound



, wherein Rx, Ry and Rz stand for an organic radical,

and the like can be used.

Compounds to be used as a positive hole transporting material are not restricted to the above listed compounds. Any compound having a property of transporting positive holes can be used as a positive hole transporting material such as triazole derivatives, oxadiazole derivatives, imidazole derivatives, polyarylalkane derivatives, pyrazoline derivative, pyrazolone derivatives, phenylene diamine derivatives, arylamine derivatives, amino substituted chalcone derivatives, oxazole derivatives, stilbenylanthracene derivatives, fluorenone derivatives, hydrazone derivatives, stilbene derivatives, copolymers of aniline derivatives, PEDOT (poly (3,4-ethylenedioxy-thiophene)) and the derivatives thereof, electro-conductive oligomers, particularly thiophene oligomers, porphyrin compounds, aromatic tertiary amine compounds, stilbenyl amine compounds etc.

Particularly, aromatic tertiary amine compounds such as N,N,N',N'-tetraphenyl-4,4'-diaminobiphenyl, N,N'-diphenyl-N,N'-bis(3-methylphenyl)- 4,4'-diaminobiphenyl (TPD), 2,2'-bis(di-p-torylaminophenyl)propane, 1,1'-bis(4-di-torylaminophenyl)-4-phenylcyclohexane, bis(4-dimethylamino-2-methylphenyl)phenylmethane, bis(4-di-p-tolylaminophenyl)phenyl-methane, N,N'-diphenyl-N,N'-di(4-methoxyphenyl)-4,4'-diaminobiphenyl, N,N,N',N'-tetraphenyl-4,4'-diaminodiphenylether, 4,4'-bis(diphenylamino)quaterphenyl, N,N,N-tri(p-tolyl)amine, 4-(di-p-tolylamino)-4'-[4-(di-p-tolylamino)stilyl]stilbene, 4-N,N-diphenylamino-(2-

diphenylvinyl)benzene, 3-methoxy-4'-N,N-diphenylaminostilbene, N-phenylcarbazole etc. are used.

Furthermore, 4,4'-bis[N-(1-naphtyl)-N-phenylamino]biphenyl disclosed in US-B-5,061,569 and the compounds disclosed in EP-A 508,562, in which three triphenylamine units are bound to a nitrogen atom, such as 4,4',4"-tris[N-(3-methylphenyl)-N-phenylamino]triphenylamine, can be used.

A positive hole transporting layer can be formed by preparing an organic film containing at least one positive hole transporting material on the anode. The positive hole transporting layer can be formed by the vacuum deposition method, the spin-coating method, the casting method, the ink jet printing method, the LB method and the like. Of these methods, the vacuum deposition method, the spin-coating method and the casting method are particularly preferred in view of ease and cost.

In the case of using the vacuum deposition method, the conditions for deposition may be chosen in the same manner as described for the formation of a light emitting layer (see above). If it is desired to form a positive hole transporting layer comprising more than one positive hole transporting material, the coevaporation method can be employed using the desired compounds.

In the case of forming a positive hole transporting layer by the spin-coating method or the casting method, the layer can be formed under the conditions described for the formation of the light emitting layer (see above).

As in the case of forming the light emitting layer a smoother and more homogeneous positive hole transporting layer can be formed by using a solution containing a binder and at least one positive hole transporting material. The coating using such a solution can be performed in the same manner as described for the light emitting layer. Any polymer binder may be used, provided that it is soluble in the solvent in which the at least one positive hole transporting material is dissolved. Examples of appropriate polymer binders and of appropriate and preferred concentrations are given above when describing the formation of a light emitting layer.

The thickness of the positive hole transporting layer is preferably chosen in the range of from 0.5 to 1000 nm, preferably from 1 to 100 nm, more preferably from 2 to 50 nm.

As hole injection materials known organic hole transporting compounds such as metal-free phthalocyanine (H_2Pc), copper-phthalocyanine (Cu-Pc) and their derivatives as described, for example, in JP64-7635 can be used. Furthermore, some of the aromatic amines defined as hole transporting materials above, which have a lower ionisation potential than the hole transporting layer, can be used.

A hole injection layer can be formed by preparing an organic film containing at least one hole injection material between the anode layer and the hole transporting layer. The hole injection layer can be formed by the vacuum deposition method, the spin-coating method, the casting method, the LB method and the like. The thickness of the layer is preferably from 5 nm to 5 µm, and more preferably from 10 nm to 100 nm.

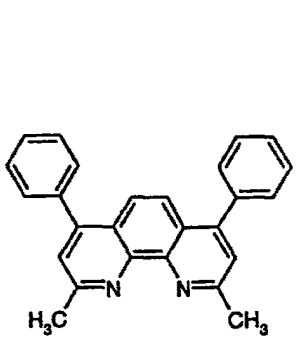
The electron transporting materials, which is for example a metal complex compound or a nitrogen-containing five-membered derivative, should have a high electron injection efficiency (from the cathode) and a high electron mobility. The following materials can be exemplified for electron transporting materials: lithium 8-hydroxyquinolinate, zinc bis(8-hydroxyquinolinate), copper bis(8-hydroxyquinolinate), manganese bis(8-hydroxyquinolinate), gallium tris(8-hydroxyquinolinate), tris(8-hydroxyquinolinato)-aluminum(III) and its derivatives, such as, for example, aluminum tris(2-methyl-8-hydroxyquinolinate), bis(10-hydroxybenzo[h]quinolinolato)beryllium(II) and its derivatives, zinc bis(10-hydroxybenzo[h]quinolinate), chlorogallium bis(2-methyl-8-quinolinate), gallium bis(2-methyl-8-quinolinate)(o-cresolate), aluminum bis(2-methyl-8-quinolinate)(1-naphtholate), gallium bis(2-methyl-8-quinolinate)(2-naphtholate), gallium bis(2-methyl-8-quinolinate)phenolate, zinc bis(o-(2-benzooxazolyl)phenolate), zinc bis(o-(2-benzothiazolyl)phenolate) and zinc bis(o-(2-benzotrizolyl)phenolate); oxadiazole derivatives, such as 2-(4-biphenyl)-5-(4-tert.-butylphenyl)-1,3,4-oxadiazole and 2,5-bis(1-naphthyl)-1,3,4-oxadiazole, and its dimer systems, such as 1,4-bis[2-(5-phenyloxadiazolyl)]benzene, 1,4-bis[2-(5-phenyloxadiazolyl)-4-tert-butylbenzene], 2,5-bis(1-phenyl)-1,3,4-oxadiazole, 2-(4'-tert-butylphenyl)-5-(4"-biphenyl)1,3,4-oxadiazole, 1,3-bis(4-tert.-butylphenyl-1,3,4)oxadiazolyl)biphenylene and 1,3-bis(4-tert.-butylphenyl-1,3,4-oxadiazolyl)phenylene, oxazole derivatives, dioxazole derivatives, thiazole derivatives, thiadiazole derivatives, triazole derivatives, such as 2,5-bis(1-phenyl)-1,3,4-oxazole, 1,4-bis(2-(4-methyl-5-phenyloxazolyl)benzene, 2,5-bis(1-phenyl)-1,3,4-thiazole, 2-(4'-tert-butylphenyl)-5-(4"-biphenyl)-1,3,4-thiadiazole, 2,5-bis(1-naphthyl)-1,3,4-thiadiazole, 1,4-bis[2-(5-phenylthiazolyl)]benzene, 2-(4'-tert-butylphenyl)-5-(4"-biphenyl)-1,3,4-triazole, or 2,5-bis(1-naphthyl)-1,3,4-triazole and 1,4-bis[2-(5-phenyltriazolyl)]benzene, coumarine derivatives, imidazopyridine derivatives, phenanthroline derivatives or perylene tetracarboxylic acid derivatives disclosed in Appl. Phys. Lett. 48 (2) (1986) 183.

An electron transporting layer can be formed by preparing an organic film containing at least one electron transporting material on the hole transporting layer or on the light-emitting layer.

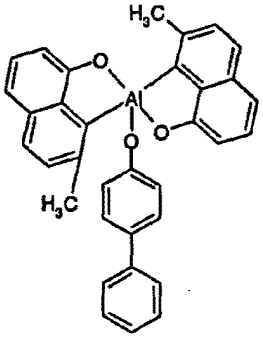
The electron transporting layer can be formed by the vacuum deposition method, the spin-coating method, the casting method, the LB method and the like.

It is preferred that the positive hole inhibiting materials for a positive hole inhibiting layer have high electron injection/transporting efficiency from the electron transporting layer to the light emission layer and also have higher ionisation potential than the light emitting layer to prevent the flowing out of positive holes from the light emitting layer to avoid a drop in luminescence efficiency.

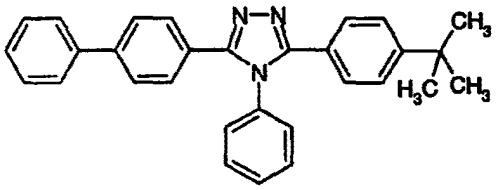
As the positive hole inhibiting material known materials, such as Balq, TAZ and phenanthroline derivatives, e.g. bathocuproine (BCP), can be used:



BCP



Balq



TAZ

The positive hole inhibiting layer can be formed by preparing an organic film containing at least one positive hole inhibiting material between the electron transporting layer and the light-emitting layer. The positive hole inhibiting layer can be formed by the vacuum deposition method, the spin-coating method, the casting method, ink jet printing method, the LB method and the like. The thickness of the layer preferably is chosen within the range of from 5 nm to 2 μm, and more preferably, within the range of from 10 nm to 100 nm.

As in the case of forming a light emitting layer or a positive hole transporting layer, a smoother and more homogeneous electron transporting layer can be formed by using a solution containing a binder and at least one electron transporting material.

The thickness of an electron transporting layer is preferably chosen in the range of from 0.5 to 1000 nm, preferably from 1 to 100 nm, more preferably from 2 to 50 nm.

The hole-injecting material may be sensitivity-increased by incorporating an electron-accepting material, and the electron-injecting material may be sensitivity-increased by incorporating an electron-donating material.

In the organic EL device of the present invention, the light-emitting layer may contain, in addition to the light-emitting 2H-benzotriazole material of the present invention, at least one

of other light-emitting material, other dopant, other hole-injecting material and other electron-injecting material. For improving the organic EL device of the present invention in the stability against temperature, humidity and ambient atmosphere, a protective layer may be formed on the surface of the device, or the device as a whole may be sealed with a silicone oil, or the like.

The electrically conductive material used for the cathode is suitably selected from those having a work function of smaller than 4 eV. The electrically conductive material includes magnesium, calcium, tin, lead, titanium, yttrium, lithium, ruthenium, manganese, aluminum and alloys of these, while the electrically condutive material shall not be limited to these. Examples of the alloys include magnesium/silver, magnesium/indium and lithium/aluminum, while the alloys shall not be limited to these. Each of the anode and the cathode may have a layer structure formed of two layers or more as required.

For the effective light emission of the organic EL device, at least one of the electrodes is desirably sufficiently transparent in the light emission wavelength region of the device. Further, the substrate is desirably transparent as well. The transparent electrode is produced from the above electrically conductive material by a deposition method or a sputtering method such that a predetermined light transmittance is secured. The electrode on the light emission surface side has for instance a light transmittance of at least 10%. The substrate is not specially limited so long as it has adequate mechanical and thermal strength and has transparency. For example, it is selected from glass substrates and substrates of transparent resins such as a polyethylene substrate, a polyethylene terephthalate substrate, a polyether sulfone substrate and a polypropylene substrate.

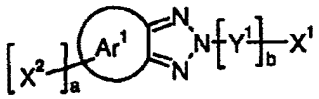
In the organic EL device of the present invention, each layer can be formed by any one of dry film forming methods such as a vacuum deposition method, a sputtering method, a plasma method and an ion plating method and wet film forming methods such as a spin coating method, a dipping method and a flow coating method. The thickness of each layer is not specially limited, while each layer is required to have a proper thickness. When the layer thickness is too large, inefficiently, a high voltage is required to achieve predetermined emission of light. When the layer thickness is too small, the layer is liable to have a pinhole, etc., so that sufficient light emission brightness is hard to obtain when an electric field is applied. The thickness of each layer is for example in the range of from about 5 nm to about 10 μm, for instance about 10 nm to about 0.2 μm.

In the wet film forming method, a material for forming an intended layer is dissolved or

dispersed in a proper solvent such as ethanol, chloroform, tetrahydrofuran and dioxane, and a thin film is formed from the solution or dispersion. The solvent shall not be limited to the above solvents. For improving the film formability and preventing the occurrence of pinholes in any layer, the above solution or dispersion for forming the layer may contain a proper resin and a proper additive. The resin that can be used includes insulating resins such as polystyrene, polycarbonate, polyarylate, polyester, polyamide, polyurethane, polysulfone, polymethyl methacrylate, polymethyl acrylate and cellulose, copolymers of these, photoconductive resins such as poly-N-vinylcarbozole and polysilane, and electroconducting polymers such as polythiophene and polypyrrole. The above additive includes an antioxidant, an ultraviolet absorbent and a plasticizer.

When the light-emitting benzotriazole material of the present invention is used in a light-emitting layer of an organic EL device, an organic EL device can be improved in organic EL device characteristics such as light emission efficiency and maximum light emission brightness. Further, the organic EL device of the present invention is remarkably stable against heat and electric current and gives a usable light emission brightness at a low actuation voltage. The problematic deterioration of conventional devices can be remarkably decreased.

The 2H-benzotriazole compounds of the formula



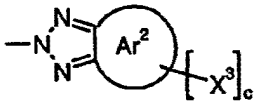
(I) are new and form a further subject of the present invention,

wherein

a is 0, or 1,

b is 0, or 1,

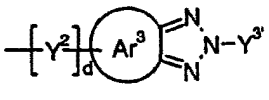
X^1 is a group of formula



, if b is 1, or Y^3, if b is 0, wherein

c is 0, or 1

X^2 and X^3 are independently of each other a group of formula

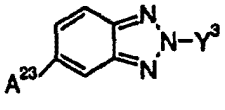
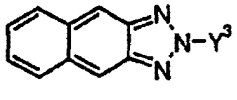
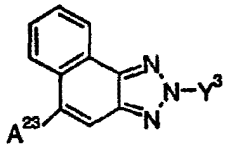


, wherein d is 0, or 1,

Ar^1, Ar^2, and Ar^3 are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted,

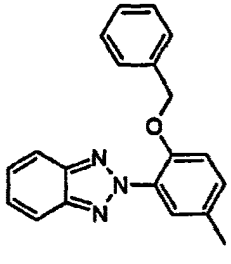
Y^1 and Y^2 are independently of each other a divalent linking group, and
Y^3 and $Y^{3'}$ are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted.

Among the compounds of formula IIa the following derivatives are preferred


, 
, and 
, wherein Y^3 and A^{23} are defined as above, wherein the compounds of formula IIb, IIc and IId are more preferred.

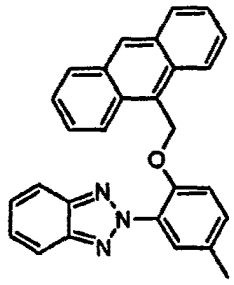
The following Examples illustrate the invention. In the Examples and throughout this application, the term light emitting material means the present 2H-benzotriazole compounds.

Example 1


A1

2-(2-Hydroxy-5-methylphenyl)benzotriazole, 10.0 g, 44.4 mmol, potassium carbonate, 12.0 g, 86.8 mmol., acetone, 150 ml and benzyl bromide, 5.3 ml, 7.6 g, 44.6 mmol., are placed in a 500 ml flask with a stir bar. The mixture is heated to 70°C (reflux) with vigorous stirring for a total of 8 hours. The mixture is cooled to room temperature and filtered. Removal of volatiles in vacuo give a colorless oil. The product is crystallized from 5:1 hexanes:acetone (55 ml) to give a colorless solid. Yield: 12.86 g, 40.8 mmol, 92%. T_m = 68°C. ^{1}H NMR (ppm, $CDCl_3$): 7.97 (m, 2H), 7.53 (d, 1H), 7.42 (m, 2H), 7.24 (m, 6H), 7.04 (m, 1H), 5.14 (s, 2H), 2.35 (s, 3H). The material has a λ_{max} emission of 407 nm, CIE (0.159, 0.037) in solution.

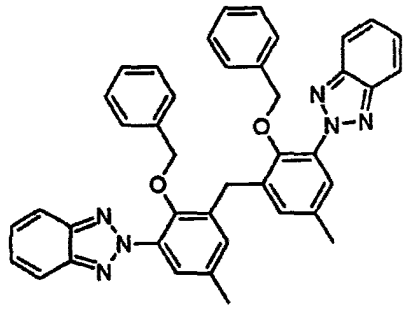
Example 2



A2

2-(2-Hydroxy-5-methylphenyl)benzotriazole, 2.64 g, 11.7 mmol., potassium carbonate, 2.0 g, 14 mmol, acetone, 60 ml and 9-chloromethylanthracene, 2.66 g, 11.7 mmol., are placed in a 250 ml flask with a stir bar. The mixture is heated to 70°C (reflux) with vigorous stirring for a total of 32 hours. The mixture is cooled to room temperature and filtered. Removal of volatiles in vacuo give a slightly yellow solid, 4.83 g, 11.6 mmol, 99%. The product is triturated in hexanes:ethyl acetate, 5:2 overnight. Filtration and removal of volatiles in vacuo give a pale yellow solid. Yield: 3.53 g, 8.50 mmol, 73%. T_m = 132°C. ^{1}H NMR (ppm, $CDCl_3$): 8.41 (s, 1H), 8.26 (d, 2H), 7.94 (dd, 2H), 7.87 (m, 2H), 7.52 (s, 1H), 7.40 (m, 8H), 6.04 (s, 2H), 2.40 (s, 3H).

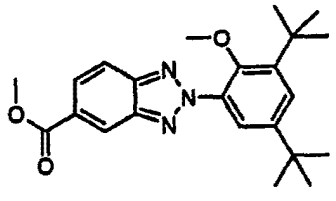
Example 3



D1

2, 2'-Methylene bis-(6-(2H-benzotriazolyl)-4-methylphenol) (cf. US-B-4,937,348), 3.00 g, 6.49 mmol, is slurried in DMF, 30 ml. The mixture is heated to 40°C and NaOMe, 5.4 M in CH_3OH, 2.40 ml, 13 mmol, is added via syringe, forming an orange, homogeneous mixture. The temperature of the mixture is brought to 70°C and benzyl bromide, 1.70 ml, 2.44 g, 14.3 mmol, is added via syringe. After 4 hours at 100°C, volatiles are removed in vacuo to give a semi-solid. The product is obtained using column chromatography, 19:1 hexanes:ethyl acetate. Yield: 3.32 g, 5.17 mmol, 80%. T_m = 150°C. ^{1}H NMR (ppm, $CDCl_3$): 7.90 (m, 4H), 7.42 (d, 2H), 7.38 (m, 4H), 7.08 (m, 6H), 6.97 (m, 4H), 6.90 (d, 2H), 4.34 (s, 4H), 2.26 (s, 6H).

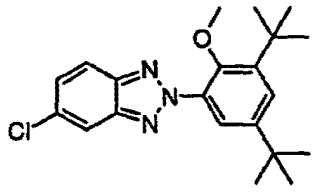
Example 4



A3

2-(5-carboxy-2H-benzotriazolyl)-4,6-di-tert-butylphenol, 5.00 g, 13.6 mmol., potassium carbonate, 5.64 g, 40.8 mmol, acetone, 80 ml, and DMF, 40 ml are placed in a 250 ml flask with a stir bar. Iodomethane, 4.2 ml, 9.6 g, 68 mmol, is added via syringe. The mixture is heated to 45°C for 17 hours. Volatiles are removed in vacuo and the product is extracted with toluene. Filtration and removal of toluene in vacuo give a colorless solid in quantitative yield. 4.0 g of this material is chromatographed on silica using hexanes:ethyl acetate, 19:1, to give 3.8 g, 9.6 mmol, 95% (purification step) of product. T_m = 112°C. ^{1}H NMR (ppm, $CDCl_3$): 8.82 (s, 1H), 8.09 (m, 2H), 7.56 (d, 1H), 7.51 (d, 1H), 4.02 (s, 3H), 3.10 (s, 3H), 1.48 (s, 9H), 1.37 (s, 9H). The material has a λ_{max} emission of 445 nm, CIE (0.157, 0.132) in solution.

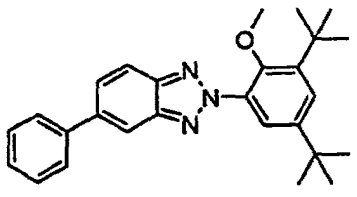
Example 5



A4

2-(5-chloro-2H-benzotriazolyl)-4,6-di-tert-butylphenol, 30.06 g, 83.99 mmol, potassium carbonate, 23.3 g, 0.169 mol, acetone, 200 ml, and iodomethane, 26 ml, 59 g, 0.42 mol (added in portions), are heated to 45°C for 3 days. The mixture is cooled and removed of volatiles in vacuo. The product is dissolved with toluene, filtered and removed of volatiles in vacuo to give a colorless solid. Yield, 31.18 g, 83.84 mmol., 99.8%. T_m = 224°C. ^{1}H NMR (ppm, $CDCl_3$): 8.16 (d, 1H), 8.12 (d, 1H), 7.69 (d, 1H), 7.63 (d, 1H), 7.57 (dd, 1H), 3.25 (s, 3H), 1.62 (s, 9H), 1.51 (s, 9H).

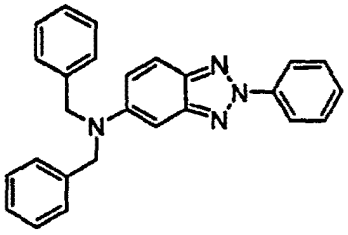
Example 6



A5

The compound from example 5, 2.00 g, 5.38 mmol, potassium carbonate, 2.23 g, 16.1 mmol., and phenylboronic acid, 0.98 g, 8.04 mmol, are slurried in toluene, 30 ml, and heated to 110°C under argon. Allyl, tricyclohexylphosphinyl palladium chloride (cf. WO01/16057), 20 mg, is added, followed by heating at 110°C for 24 hours. The mixture is cooled to room temperature and filtered through a pad of silica and washed with toluene. Volatiles are removed in vacuo and the crude material is triturated in pentane, 20 ml, for 15 hours to give a clean product. Yield, 1.53 g, 3.70 mmol, 69%. T_m = 152°C. ^{1}H NMR (ppm, $CDCl_3$): 8.28 (s, 1H), 8.18 (d, 1H), 7.82 (m, 3H), 7.62 (m, 4H), 7.37 (m, 1H), 3.23 (s, 3H), 1.58 (s, 9H), 1.46 (s, 9H). The material has a λ_{max} emission of 413 nm, CIE (0.157, 0.053) in solution.

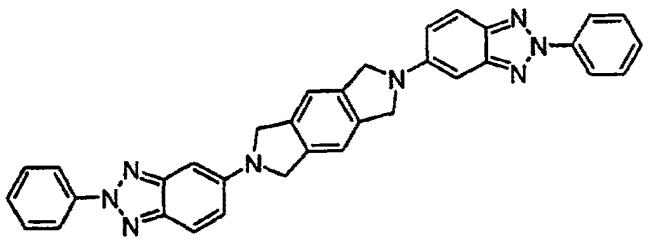
Example 7



A6

5-Amino-2-phenyl-2H-benzotriazole (Kehrmann, et. al., *Chem. Ber.* **1892**, *25*, 899.), 2.10 g, 10.0 mmol, potassium carbonate, 4.15 g, 30.0 mmole, and benzyl bromide, 3.42 g, 20.0 mmol, were placed in a 100 ml flask with DMF, 30 ml, and a stir bar. The mixture is heated to 100°C for 15 hours. The flask is cooled and ethyl acetate is added. The solution is extracted and washed with water (5 x 250 ml) to remove DMF. Drying with $MgSO_4$, filtration and removal of volatiles in vacuo give a green-yellow semi-solid. The product is purified by trituration in hexanes:ethyl acetate, 4:1, 30 ml, followed by crystallization from toluene, 20 ml. Yield, 2.12 g, 5.43 mmol., 54%. T_m = 158°C. ^{1}H NMR (ppm, $CDCl_3$): 8.24 (d, 2H), 7.73 (d, 1H), 7.49 (t, 2H), 7.29 (m, 11H), 7.17 (dd, 1H), 6.91 (d, 1H), 4.75 (s, 4H). The material has a λ_{max} emission of 455 nm and 497 nm in solution.

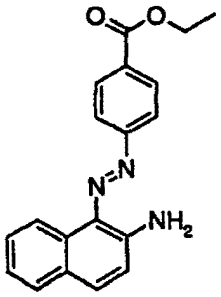
Example 8



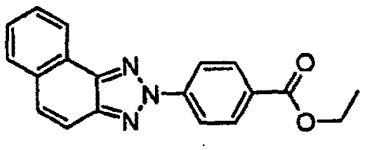
E1

5-Amino-2-phenyl-2H-benzotriazole (Kehrmann, et. al., *Chem. Ber.* **1892**, *25*, 899.), 2.00 g, 9.51 mmol, potassium carbonate, 3.47 g, 25.1 mmol, and 1,2,4,5-tetrakisbromomethylbenzene, 2.14 g, 4.76 mmol, are placed in a 100 ml flask with a stir bar. DMF, 40 ml, is added and the mixture is heated to 100°C. After 4 hours, a thick yellow precipitate is found and TLC showed only one component with a very low R_f (1:1 hexanes:ethyl acetate). The flask is cooled and water, 30 ml, is added. The product is filtered and washed several times with water, then with methanol. Remaining volatiles are removed in vacuo to give a yellow solid. Yield, 2.49 g, 4.56 mmol, 96%. T_m = 364°C; T_g = 167°C. MS (EI): 546 (M^+).

Example 9



a) Benzocaine, 23.00 g, 139.2 mmol, is slurried in water, 400 ml, and concentrated HCl, 29 ml, 0.35 mol, is added, forming a homogeneous solution. The mixture is cooled to 0°C and sodium nitrite, 10.09 g, 146.2 mmol., in water, 50 ml, is added dropwise. After 40 minutes, sulfamic acid, 3.0 g, 31 mmol, in water, 20 ml, is slowly added to destroy excess nitrite. The diazonium salt is cannulated into a 2.5 l reactor containing 1-naphthylamine-2-sulfonic acid, 31.08 g, 139.2 mmol, sodium carbonate, 29.5 g, 0.278 mol, in water, 800 ml at 0°C. After 2 hours at 0 to 5°C, the product is filtered and washed with water (2 x 300 ml) to form a red solid. TLC shows one major spot and a minor impurity. All was used for b).

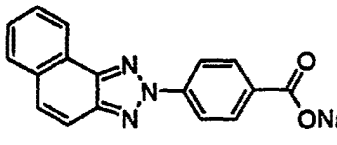


B1

b) The product from a) and copper(II) acetate, 0.25 g, 1.38 mmol, are slurried in tert-amyl alcohol. Upon heating to 80°C, the mixture become homogeneous and tert-butyl hydroperoxide, 100 ml, 70 g, 0.78 mol, is added over 2 days. The mixture is cooled and filtered to remove the product. Washing with tert-amyl alcohol and removal of volatiles in vacuo give a pink solid. Yield, 27.46 g, 86.53 mmol, 62%. T_m = 161°C. ^{1}H NMR (ppm,

$CDCl_3$): 8.42 (d, 1H), 8.23 (d, 2H), 8.01 (d, 2H), 7.66 (d, 1H), 7.55 (m, 2H), 7.45 (m, 2H), 4.21 (q, 2H), 1.22 (t, 3H).

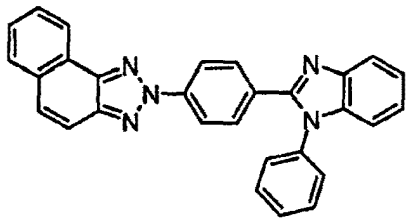
Example 10



B2

The product from example 9 is slurried in ethanol:water, 1:1, 700 ml, and sodium hydroxide, 6.94 g, 0.174 mol, is added. The mixture is heated to reflux (105°C external) for 4 hours. The flask is cooled to 70°C and filtered to give a light brown solution of the product. Upon cooling to room temperature overnight, crystals form. The product is filtered, washed with ethanol:water, 1:1, 50 ml, and dried using high vacuum. This material is used for example 11 without purification. Yield: 21.22 g, 68.17 mmol., 79%.

Example 11

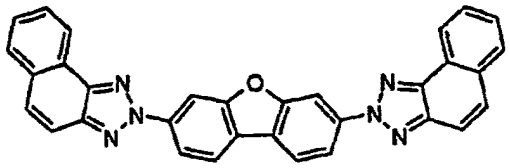


B3

The product from example 10, 3.00 g, 9.64 mmol, is slurried at room temperature in dichloromethane, 40 ml, containing a few drops of DMF. Thionyl chloride, 2.4 ml, 3.9 g, 33 mmol, is added via syringe, causing a precipitate to form along with an exotherm. The flask is heated to an external temperature of 53°C for 5 hours, followed by cooling to room temperature. Volatiles are removed in vacuo to give a pale brown solid. A solution of N-phenyl-1,2-phenylenediamine, 1.78 g, 9.66 mol., in N-methylpyrrolidinone, 20 ml, is added dropwise to the solid under argon. After 30 minutes at room temperature, the mixture is heated to 60°C for 2 hours. The product is isolated by pouring into water, filtration and washing with water as well as methanol, 25 ml. High vacuum is used to isolate the material. The material is heated to 260°C under vacuum (100 mbar) for 3 hours to form a melt of the product. After cooling to room temperature, the product is extracted with dichloromethane and filtered through a silica pad. Solvent is removed in vacuo to give a near colorless solid that is one spot by TLC (hexanes:ethyl acetate, 1:1). Yield, 3.03 g, 6.93 mmol, 72 %. The material is purified by trituration in MeOH, 25 ml, overnight. Filtration and removal of volatiles in vacuo give a colorless solid. Yield, 2.48 g, 5.67 mmol, 59%. T_m = 208°C, T_g = 75°C. MS

(EI): 437 (M^+). ^1H NMR (ppm, $CDCl_3$): 8.54 (d, 1H), 8.27 (d, 2H), 7.84 (m, 2H), 7.71 (m, 2H), 7.67 (d, 1H), 7.58 (m, 3H), 7.46 (m, 3H), 7.32 (m, 3H), 7.23 (m, 2H).

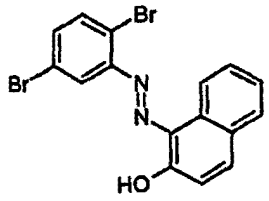
Example 12



D5

3,7-Diaminodibenzofuran (Nimura, S., et. al. *J. Phys. Chem. A* **1997**, *101*, 2083.), 10.0 g, 50.4 mmol., water, 150 ml, and concentrated HCl, 25 ml, 0.30 mol., are placed in a 500 ml reactor. Sodium nitrite, 7.00 g, 0.101 mol, in water, 28 ml, is added dropwise at 0°C. DMF, 45 ml, is added slow enough to not let the temperature above 5°C. After 10 minutes, the diazonium salt is added dropwise to a solution of 2-naphthylamine, 14.4 g, 0.101 mol, in water, 100 ml, DMF, 50 ml, and HCl, 10 ml, 0.12 mol, to give a dark mixture. Sodium acetate trihydrate, 40 g, 0.29 mol., is added to the reaction at 0°C, followed by stirring for 2 hours at room temperature. The bis-azo intermediate is filtered and washed with water.
The product is placed in a 1 l reactor with pyridine, 225 ml, and copper(II) acetate monohydrate, 50 g, 0.25 mol. The mixture is heated to reflux for 6 hours and then cooled to room temperature. The beige product is filtered and washed with water, 7 x 150 ml, and methanol, 2 x 50 ml. Volatiles are removed in vacuo. The compound is purified by dissolving in hot trichlorobenzene, filtering through activated carbon (while hot) and cooling to room temperature to give yellow crystals. Yield, 13.15 g, 26.2 mmol., 52%. T_m = 348°C. MS (EI): 502 (M^+).

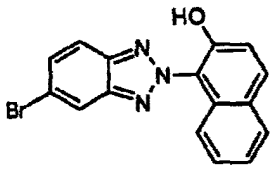
Example 13



a) 2,5-dibromoaniline, 19.71 g, 78.5 mmol, is dissolved in EtOH, 130 ml, at room temperature. While stirring, H_2SO_4, 4.2 ml, 7.7 g, 79 mmol, is added via syringe, causing a precipitate to form. Volatiles are removed in vacuo to give a beige powder.

The anilinium sulfate salt above, 26.00 g, 77.0 mmol, is slurried in water, 200 ml, and HCl, 5 ml, 60 mmol, at 0°C. Sodium nitrite, 5.31 g, 77.0 mmol, in water, 30 ml, is added dropwise.

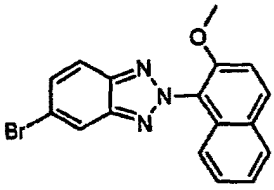
The reaction is stirred for 2 hours at 0°C. The diazonium salt solution is added portion-wise to a solution of 2-naphthol, 11.1 g, 77.0 mmol, in ethanol, 450 ml, also at 0°C. The orange mixture is stirred for 3 hours and warmed to room temperature. The product is filtered and washed with water (3 x 200 ml) and dried under vacuum. The product is purified by trituration in 19:1 hexanes:ethyl acetate (200 ml), filtered and dried in vacuo to give an orange solid. Yield, 28.13 g, 69.27 mmol, 90%. T_{dec} = 170°C. ^{1}H NMR (ppm, $CDCl_3$): 8.63 (d, 1H), 8.32 (d, 1H), 7.85 (d, 1H), 7.72 (m, 2H), 7.62 (d, 1H), 7.57 (t, 1H), 7.35 (dd, 1H), 6.93 (d, 1H).



A7

b) The product from a), 28.13 g, 69.27 mmol, sodium azide, 4.50 g, 69.3 mmol, and copper(I) bromide, 0.10 g, 0.69 mmol, are placed in a 500 ml flask with a stir bar and DMF, 200 ml. The mixture is heated to 80°C for 2 hours and cooled to room temperature. The solution is poured into water, 500 ml, and washed with water (4 x 500 ml). Removal of volatiles in vacuo give a brown solid, pure by TLC (1:1 hexanes:ethyl acetate). Yield, 21.1 g, 62.0 mmol, 90%. ^{1}H NMR (ppm, $CDCl_3$): 8.62 (d, 1H), 8.22 (s, 1H), 7.90 (m, 3H), 7.60 (m, 2H), 7.41 (m, 2H).

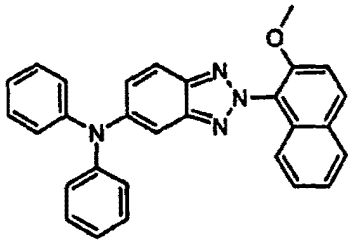
Example 14



A8

The product from example 13, 20.7 g, 60.9 mmol, and potassium carbonate, 16.9 g, 122 mmol, are placed in a 500 ml flask with a stir bar and DMF, 200 ml. Iodomethane, 7.8 ml, 17.8 g, 122 mmol, is added via syringe. The flask is heated to 50°C (external) for 3 hours. Volatiles are removed in vacuo and the product is extracted with toluene:water (1:1, 1l). The organic phase is separated and dried. Filtration and removal of volatiles in vacuo give a brown solid, pure by TLC and NMR. Yield, 17.2 g, 48.6 mmol, 80%. T_m = 116°C. ^{1}H NMR (ppm, $CDCl_3$): 8.22 (s, 1H), 8.06 (d, 1H), 7.92 (d, 1H), 7.87 (m, 1H), 7.56 (dd, 1H), 7.41 (m, 3H), 6.92 (m, 1H), 3.88 (s, 3H).

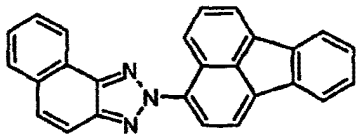
Example 15



A9

The product from example 14, 5.00 g, 14.1 mmol, diphenylamine, 2.39 g, 14.1 mmol, sodium tert-butoxide, 2.71 g, 28.2 mmol, tris-(dibenzylidineacetone) dipalladium(0), 129 mg, 0.141 mmol, and bis-(diphenylphosphino) ferrocene, 156 mg, 0.281 mmol, are placed in a 250 ml flask with a stir bar. Toluene, 100 ml, is added and the mixture is heated to 100°C for 24 hours. The product is adsorbed onto alumina and chromatographed using hexanes:ethyl acetate (15:1). The product is further purified via sublimation. T_m = 214°C, T_g = 78°C. MS (EI): 442 (M^+). ^{1}H NMR (ppm, $CDCl_3$): 8.14 (d, 1H), 7.94 (d, 2H), 7.51 (m, 4H), 7.38 (m, 5H), 7.28 (m, 4H), 7.16 (m, 3H), 4.00 (s, 3H). The material has a λ_{max} emission of 478 nm in solution.

Example 16

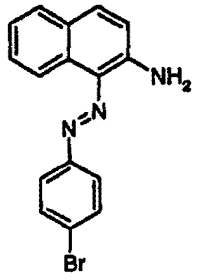


B7

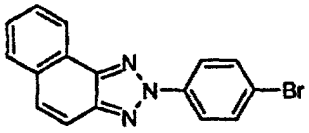
3-Aminofluoranthene, 10.85 g, 49.94 mmol, is suspended in water, 50 ml, and HCl, 12 M, 10 ml, 0.12 mol, at 0°C. Sodium nitrite, 3.50 g, 50.7 mmol, in water, 10 ml, is added dropwise over 15 minutes. After 30 minutes at 0°C, the red-brown solution is filtered. Tobias acid (2-naphthylamine-1-sulfonic acid), 11.15 g, 49.96 mmol, is dissolved in pyridine, 50 ml, and cooled to 0°C. The diazonium salt solution is then added dropwise over 30 minutes at 0°C. After 2 hours, the suspension is filtered, washed with water and dried in vacuo to give a purple-red solid.

The material, 15.6 g, 42.0 mmol, is heated in pyridine, 250 ml, to 60°C in a 1 l reactor. Copper(II) sulfate pentahydrate, 26.4 g, 0.105 mol, in water, 100 ml, is added dropwise to the azo compound. The temperature is then raised to 90°C for 4 hours. The mixture is cooled to room temperature and filtered to give a pale brown solid. The compound is purified by crystallization. Yield, 7.9 g, 21.4 mmol, 51%. T_m = 155°C. MS (APCI): 370.1 (M+1). The material has a λ_{max} emission of 478 nm in solution.

Example 17



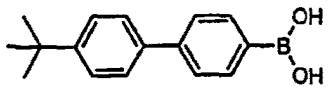
a) 4-Bromoaniline, 23.63 g, 137.4 mmol, is dissolved in water, 250 ml, using HCl, 31 ml, 372 mmol. The mixture i cooled to 0°C and sodium nitrite, 9.48 g, 137 mmol, in water, 30 ml, is dded dropwise over 30 minutes. After 45 minutes, the diazonium salt is added via cannula to a mixture of Tobias acid, 30.66 g, 137.4 mmol, and sodium carbonate, 25.1 g, 234 mmol, in water, 600 ml, at 0°C. After 2 hours, the red precipitate is filtered and washed with water (2 x 300 ml). The product is dried in vacuo to give a red solid. The compound is triturated in methanol, 175 ml, overnight. Filtration and removal of volatiles in vacuo give a red solid, pure by TLC. The red dye is used directly for the next step. MS (EI): 325 (M^+). ^{1}H NMR (ppm, $CDCl_3$): 8.74 (d, 1H), 7.68 (d, 2H), 7.59 (d, 2H), 7.53 (m, 2H), 7.47 (t, 1H), 7.27 (t, 1H), 6.77 (d, 1H).



B4

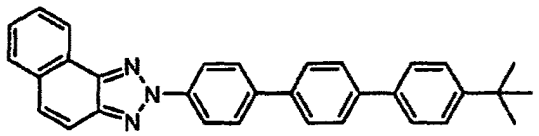
b) The product from a), 10.00 g, 30.66 mmol, and copper(II) acetate, 50 mg, 0.28 mmol, are placed in a 250 ml flask with a stir bar. tert-Amyl alcohol, 100 ml, is added and the mixture is heated to 80°C. tert-Butyl hydroperoxide, 13.7 ml, 100 mmol, is slowly added and the reaction is monitored by TLC. The flask is cooled to room temperature and the product is filtered. Washing with tert-amyl alcohol and removal of volatiles in vacuo give a pale rose solid. Yield, 7.82 g, 24.1 mmol, 79%. MS (EI): 323 (M^+). ^{1}H NMR (ppm, $CDCl_3$): 8.49 (d, 1H), 8.15 (d, 2H), 7.76 (d, 1H), 7.64 (m, 2H), 7.55 (m, 4H).

Example 18



a) Magnesium turnings, 1.67 g, 68.7 mmol, are dry stirred under argon for one hour. Ether, 32 ml, is added, followed by 2 drops of dibromoethane. 4-Bromo-4'-tert-butylbiphenyl (Murphy, S., et. al. *J. Org. Chem.* **1995**, *60*, 2411.) 10.0 g, 34.6 mmol, in ether, 20 ml, and

THF, 25 ml, is added dropwise over 1 hour. The mixture is refluxed for 2 hours at 37°C. In a separate flask, triisopropylborate, 9.4 ml, 7.7 g, 41 mmol, and THF, 30 ml, are cooled to -78°C under argon. The above Grignard reagent is added via cannula and the reaction is allowed to stir at -78°C for 1 hour. The flask is warmed to room temperature and stirred for an additional hour. The mixture is poured into a flask containing HCl, water and is stirred for 2 hours. The beige product is filtered and washed with water. Removal of volatiles in vacuo give an off-white solid. Yield, 5.67 g, 22.3 mmol, 64%. T_m = 192°C. ^{1}H NMR (ppm, $(CD_3)_2SO$): 7.80 (d, 2H), 7.55 (two overlapping doublets, 4H), 7.41 (d, 2H), 1.25 (s, 9H).



B5

b) The product from a), 2.00 g, 6.13 mmol, the product from example 19, 2.54 g, 9.99 mmol, potassium carbonate, 2.36 g, 17.1 mmol, and toluene, 50 ml, are stirred under argon for 30 minutes. Allyl, tricyclohexylphosphinyl palladium chloride (WO01/16057), 40 mg, is added, followed by heating at 110°C for 24 hours. The mixture is cooled to room temperature and adsorbed onto silica gel. The product is purified by column chromatography using hexanes:ethyl acetate, 9:1, to give a tan solid, 0.90 g, 1.98 mmol, 32%. T_m = 245°C. The product has a λ_{max} emission of 414 nm in solution, with a quantum efficiency of 70%.

Application Example 1 (Device)

The following device structure is prepared:

ITO (anode, ITO is indium tin oxide)

CuPC (copper phthalocyanine; hole injection material)

NPD (4,4'-bis-(1-naphthyl-phenylamino) biphenyl; hole transporting material)

DPVBi (4,4'-bis-(2,2-diphenyl-1-vinyl) biphenyl) (host)/Compound of example16 (2.6%, guest)

Alq3 (tris-8-quinolinato aluminum; electron transporting material)

LiF/Al (cathode).

Using this device structure, a maximum brightness of 816 cd/m^2 was observed at 9V (0.89 cd/A) with an emission λ_{max} at 489 nm, similar to the guest material in solution.

Application Example 2 (Device)

The following device structure is prepared:

ITO (anode, ITO is indium tin oxide)

CuPC (copper phthalocyanine; hole injection material)
NPD (4,4'-bis-(1-naphthyl-phenylamino) biphenyl; hole transporting material)
DPVBi (4,4'-bis-(2,2-diphenyl-1-vinyl) biphenyl) (host)/Compound of example 15 (2.2%, guest)
Alq3 (tris-8-quinolinato aluminum; electron transporting material)
LiF/Al (cathode).

Using this device structure, a maximum brightness of 3120 cd/m^2 was observed at 11V (1.8 cd/A) with an emission λ_{max} at 493 nm, similar to the guest material in solution.

Application Example 3 (Device)
The following device structure is prepared:
ITO (anode, ITO is indium tin oxide)
CuPC (copper phthalocyanine; hole injection material)
NPD (4,4'-bis-(1-naphthyl-phenylamino) biphenyl; hole transporting material)
Compound of example 12
Alq3 (tris-8-quinolinato aluminum; electron transporting material)
LiF/Al (cathode).

Using this device structure, a maximum brightness of 1230 cd/m^2 was observed at 15V (1.1 cd/A) with an emission λ_{max} at 471 nm.

Application Example 4 (Device)
The following device structure is prepared:
ITO (anode, ITO is indium tin oxide)
CuPC (copper phthalocyanine; hole injection material)
NPD (4,4'-bis-(1-naphthyl-phenylamino) biphenyl; hole transporting material)
Compound of example 11
Alq3 (tris-8-quinolinato aluminum; electron transporting material)
LiF/Al (cathode).

Using this device structure, a maximum brightness of 720 cd/m^2 was observed at 10V (0.71 cd/A) with an emission λ_{max} at 432 nm.

Application Example 5 (Device)
The following device structure is prepared:

ITO (anode, ITO is indium tin oxide)
CuPC (copper phthalocyanine; hole injection material)
NPD (4,4'-bis-(1-naphthyl-phenylamino) biphenyl; hole transporting material)
DPVBI (4,4'-bis-(2,2-diphenyl-1-vinyl) biphenyl) (host)/Compound of example 7 (3.1%, guest)
Alq3 (tris-8-quinolinato aluminum; electron transporting material)
LiF/Al (cathode).

Using this device structure, a maximum brightness of 4130 cd/m^2 was observed at 14V (2.1 cd/A) with an emission λ_{max} at 461 nm, similar to the guest material in solution.

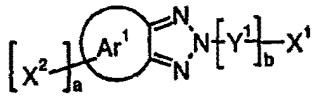
The organic EL device obtained in the Example of the present invention show an excellent light emission brightness and achieved a high light emission efficiency. When the organic EL devices obtained in the above Examples are allowed to continuously emit light at 3 (mA/cm^2), all the organic EL devices remain stable. Since the light-emitting materials of the present invention have a very high fluorescence quantum efficiency, the organic EL devices using the light-emitting materials achieved light emission with a high brightness in a low electric current applied region, and when the light-emitting layer additionally uses a doping material, the organic EL devices are improved in maximum light emission brightness and maximum light emission efficiency. Further, by adding a doping material having a different fluorescent color to the light-emitting material of the present invention, there are obtained light-emitting devices having a different light emission color.

The organic EL devices of the present invention accomplish improvements in light emission efficiency and light emission brightness and a longer device life, and does not impose any limitations on a light-emitting material, a dopant, a hole-injecting material, an electron-injecting material, a sensitizer, a resin and an electrode material used in combination and the method of producing the device.

The organic EL device using the material of the present invention as a light-emitting material achieves light emission having a high brightness with a high light emission efficiency and a longer life as compared with conventional devices. According to the light-emitting material of the present invention and the organic EL device of the present invention, there can be achieved an organic EL device having a high brightness, a high light emission efficiency and a long life.

Claims

1. An electroluminescent device, comprising a 2H-benzotriazole compound, especially a compound of the formula

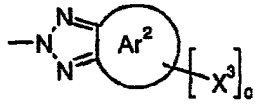


(I),

a is 0, or 1,

b is 0, or 1,

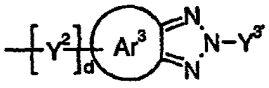
X^1 is a group of formula



, if b is 1, or Y^3, if b is 0, wherein

c is 0, or 1

X^2 and X^3 are independently of each other a group of formula



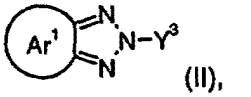
, wherein d is 0, or 1,

Ar^1, Ar^2, and Ar^3 are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted,

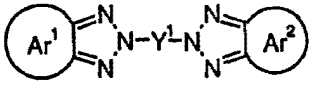
Y^1 and Y^2 are independently of each other a divalent linking group, and

Y^3 and $Y^{3'}$ are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted.

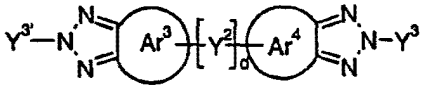
2. An electroluminescent device according to claim 1, comprising a 2H-benzotriazole compound of the formula



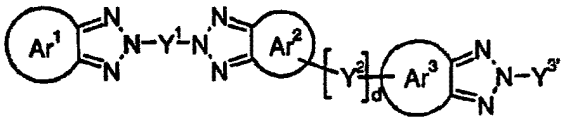
(II),



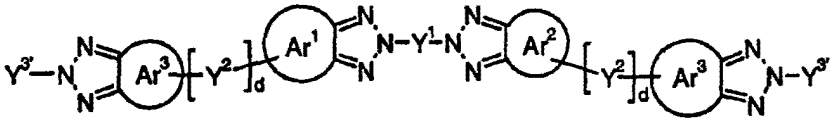
(III),



(IV),



(V), and/or



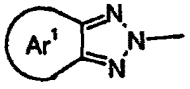
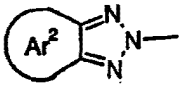
(VI), wherein

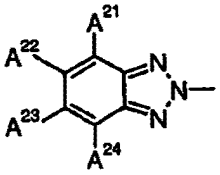
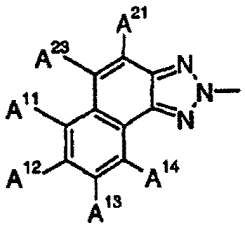
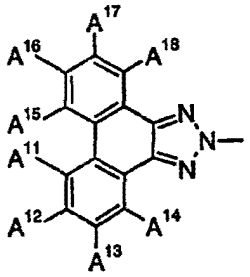
d, Ar^1, Ar^2, Ar^3, Y^1 and Y^2 are defined as in claim 1,

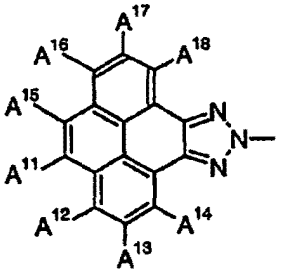
Ar^4 stand for C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted, and

Y^3 and $Y^{3'}$ are independently of each other C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted.

3. An electroluminescent device according to claim 2, wherein

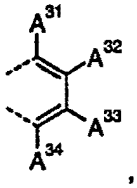
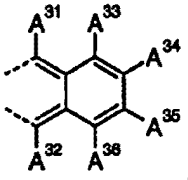
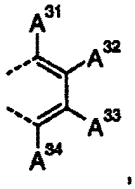
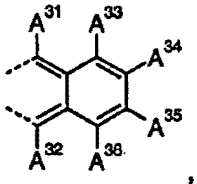
 and  in formula II or III are independently of each other a group of formula

 ,  ,  , or

 , wherein

A^{21}, A^{22}, A^{23}, A^{24}, A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17} and A^{18} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or $-NR^{25}$-, $-NR^{25}R^{26}$, C_1-C_{24}alkylthio, $-PR^{32}R^{32}$, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is

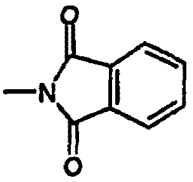
substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28}, or

A^{22} and A^{23} or A^{11} and A^{23} are a group  , or  , or two groups A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17} and A^{18}, which are neighbouring to each other, are a group  , or  , wherein A^{31}, A^{32}, A^{33}, A^{34}, A^{35}, A^{36} and A^{37} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28},

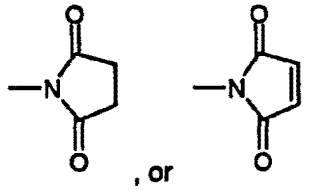
D is -CO-; -COO-; -S-; -SO-; -SO_2-; -O-; -NR^{25}-; -$SiR^{30}R^{31}$-; -POR^{32}-; -CR^{23}=CR^{24}-; or -C≡C-; and

E is -OR^{29}; -SR^{29}; -$NR^{25}R^{26}$; -COR^{28}; -$COOR^{27}$; -$CONR^{25}R^{26}$; -CN; -$OCOOR^{27}$; or halogen; wherein

R^{23}, R^{24}, R^{25} and R^{26} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-; or



R^{25} and R^{26} together form a five or six membered ring, in particular ,



, or ,

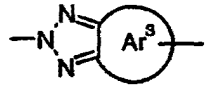
R^{27} and R^{28} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

R^{29} is H; C_6-C_{18}aryl; C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

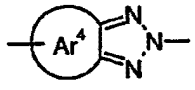
R^{30} and R^{31} are independently of each other C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, and

R^{32} is C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl.

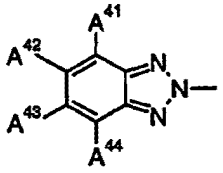
4. An electroluminescent device according to claim 2, wherein



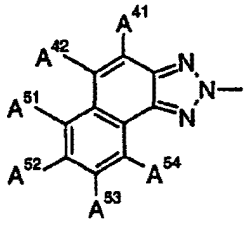
and



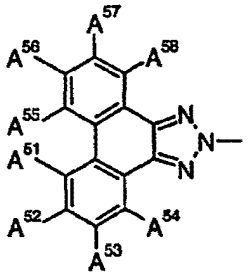
in formula IV are independently of each other a group of formula



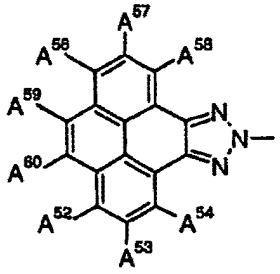
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,

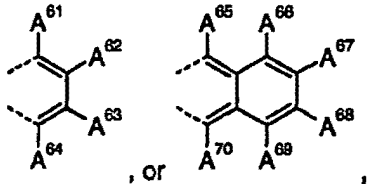
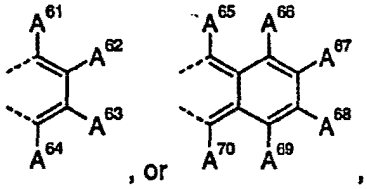


, or



, wherein

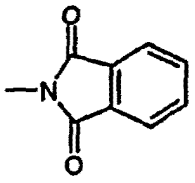
A^{41}, A^{42}, A^{43}, A^{44}, A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59} and A^{60} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, $NR^{25}R^{26}$, C_1-C_{24}alkylthio, -$PR^{32}R^{32}$, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28}, or

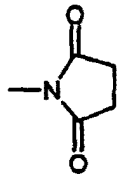
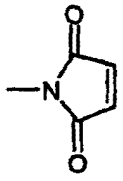
A^{42} and A^{43} or A^{42} and A^{51} are a group  , two groups A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59} and A^{60}, which are neighbouring to each other, are a group  , wherein A^{61}, A^{62}, A^{63}, A^{64}, A^{65}, A^{66}, A^{67}, A^{68}, A^{69} and A^{70} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28},

D is -CO-; -COO-; -S-; -SO-; -SO_2-; -O-; -NR^{25}-; -$SiR^{30}R^{31}$-; -POR^{32}-; -CR^{23}=CR^{24}-; or -C≡C-; and

E is -OR^{29}; -SR^{29}; -$NR^{25}R^{26}$; -COR^{28}; -$COOR^{27}$; -$CONR^{25}R^{26}$; -CN; -$OCOOR^{27}$; or halogen; wherein

R^{23}, R^{24}, R^{25} and R^{26} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-; or

R^{25} and R^{26} together form a five or six membered ring, in particular  ,

 , or  ,

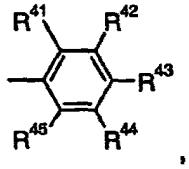
R^{27} and R^{28} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

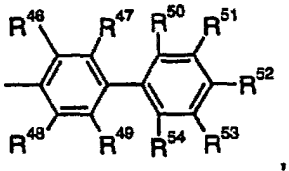
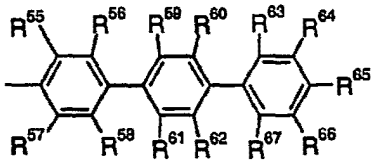
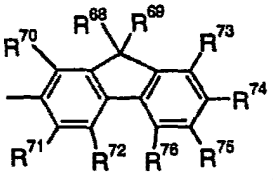
R^{29} is H; C_6-C_{18}aryl; C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

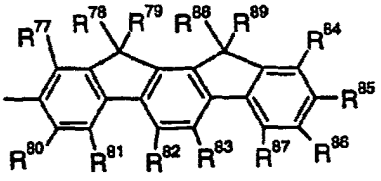
R^{30} and R^{31} are independently of each other C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, and

R^{32} is C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, wherein one of the substituents A^{41}, A^{42}, A^{43}, A^{44}, A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59}, A^{60}, A^{61}, A^{62}, A^{63}, A^{64}, A^{65}, A^{66}, A^{67}, A^{68}, A^{69} and A^{70} represents a single bond.

5. An electroluminescent device according to claim 2, 3 or 4, wherein

Y^3 and $Y^{3'}$ are independently of each other a group of formula  ,

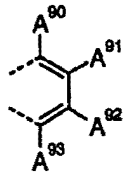
 ,  ,  , or

 , wherein

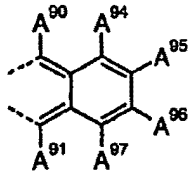
R^{41}, R^{42}, R^{43}, R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, R^{52}, R^{53}, R^{54}, R^{55}, R^{56}, R^{57}, R^{58}, R^{59}, R^{60}, R^{61}, R^{62}, R^{63}, R^{64}, R^{65}, R^{66}, R^{67}, R^{70}, R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{77}, R^{80}, R^{81}, R^{82}, R^{83}, R^{84}, R^{85}, R^{86}, and R^{87} are independently of each other H, C_1-C_{24}alkyl, which is

optionally substituted by E and/or interrupted by D, C_1-C_{24}alkenyl, which is optionally substituted by E, C_5-C_{12}cycloalkyl, which is optionally substituted by E, C_5-C_{12}cycloalkoxy, which is optionally substituted by E, C_6-C_{18}aryl, which is optionally substituted by E, C_1-C_{24}alkoxy, which is optionally substituted by E and/or interrupted by D, C_6-C_{18}aryloxy, which is optionally substituted by E, C_7-C_{18}arylalkoxy, which is optionally substituted by E, C_1-C_{24}alkylthio, which is optionally substituted by E and/or interrupted by D, C_1-C_{24}alkylselenium, which is optionally substituted by E and/or interrupted by D, C_1-C_{24}alkyltellurium, which is optionally substituted by E and/or interrupted by D, C_2-C_{20}heteroaryl which is substituted by E, or C_6-C_{18}aralkyl, which is optionally substituted by E, or

two groups R^{41}, R^{42}, R^{43}, R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, R^{52}, R^{53}, R^{54}, R^{55}, R^{56}, R^{57}, R^{58}, R^{59}, R^{60}, R^{61}, R^{62}, R^{63}, R^{64}, R^{65}, R^{66}, R^{67}, R^{70}, R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{77}, R^{80}, R^{81}, R^{82}, R^{83}, R^{84}, R^{85}, R^{86}, and R^{87}, which are neighbouring to each other, are a group



, or

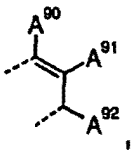


, wherein A^{90}, A^{91}, A^{92}, A^{93}, A^{94}, A^{95}, A^{96} and A^{97} are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28},

R^{68}, R^{69}, R^{78}, R^{79}, R^{88} and R^{89} are independently of each other C_1-C_{18} alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, or C_7-C_{25}aralkyl, or

R^{68} and R^{69}, R^{78} and R^{79}, and/or R^{88} and R^{89} form a ring, especially a five- or six-membered ring, or

R^{68} and R^{70}, R^{69} and R^{73}, R^{77} and R^{78} and/or R^{84} and R^{89} are a group

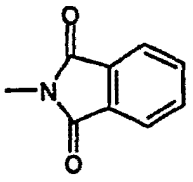


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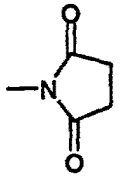
D is -CO-; -COO-; -S-; -SO-; -SO_2-; -O-; -NR^{25}-; -$SiR^{30}R^{31}$-; -POR^{32}-; -CR^{23}=CR^{24}-; or -C≡C-; and

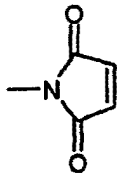
E is -OR^{29}; -SR^{29}; -$NR^{25}R^{26}$; -COR^{28}; -$COOR^{27}$; -$CONR^{25}R^{26}$; -CN; -$OCOOR^{27}$; or halogen; wherein

R^{23}, R^{24}, R^{25} and R^{26} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-; or



R^{25} and R^{26} together form a five or six membered ring, in particular ,



, or  ,

R^{27} and R^{28} are independently of each other H; C_6-C_{18}aryl; C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

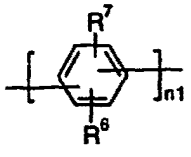
R^{29} is H; C_6-C_{18}aryl; C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy; C_1-C_{24}alkyl; or C_1-C_{24}alkyl which is interrupted by –O-,

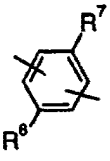
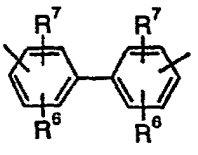
R^{30} and R^{31} are independently of each other C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, and

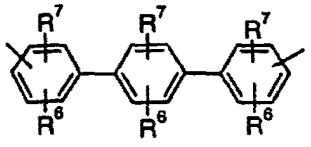
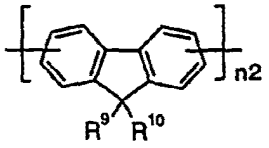
R^{32} is C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl.

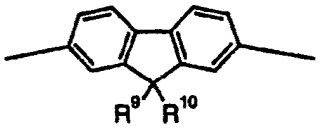
6. An electroluminescent device according to any of claims 1 to 5, wherein

Y^1 and Y^2 are independently of each other

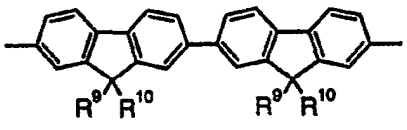


, especially  ,  ,

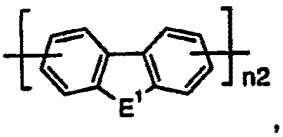
 ,  , especially



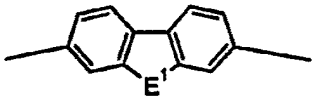
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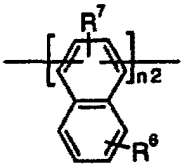
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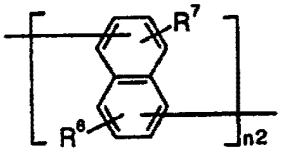
, especially



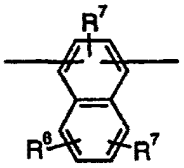
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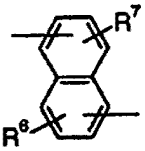
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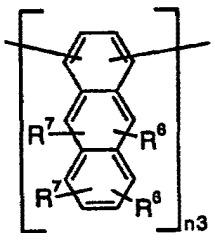
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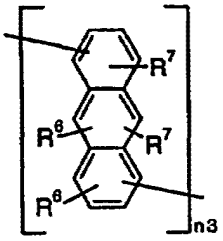
, or



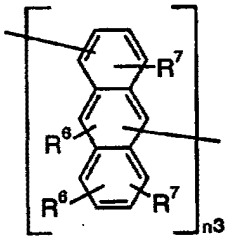
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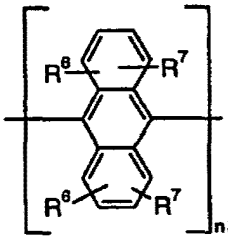
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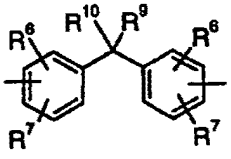
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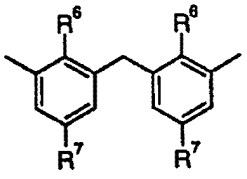
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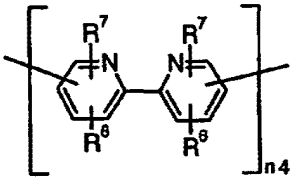
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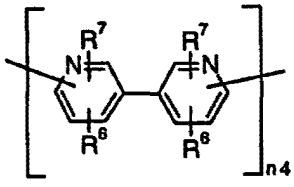
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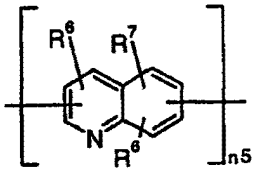
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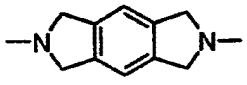
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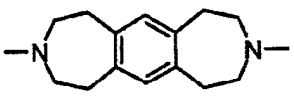
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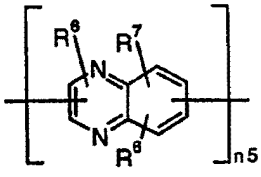
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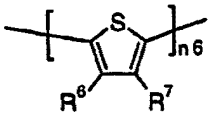
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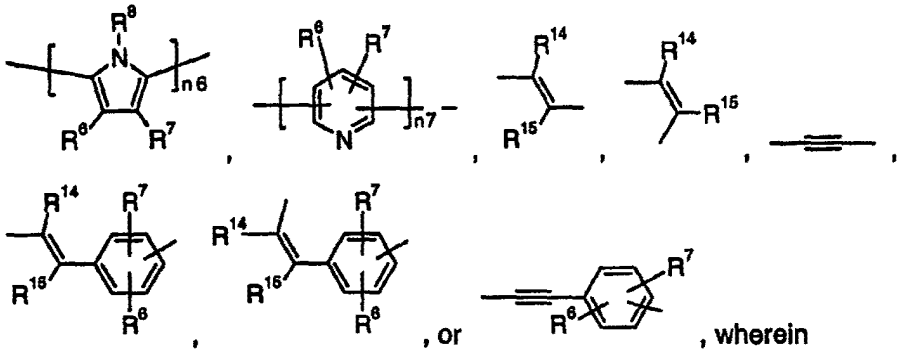
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,



,



, wherein

n1, n2, n3, n4, n5, n6 and n7 are 1, 2, or 3, in particular 1,

E^1 is -S-, -O-, or -$NR^{25'}$-, wherein $R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl,

R^6 and R^7 are independently of each other H, halogen, hydroxy, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_1-C_{24}perfluoroalkyl, C_5-C_{12}cycloalkyl, C_5-C_{12}cycloalkyl which is substituted by E and/or interrupted by S-, -O-, or -NR^{25}-, C_5-C_{12}cycloalkoxy, C_5-C_{12}cycloalkoxy which is substituted by E, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, C_7-C_{25}aralkyl, C_7-C_{25}aralkyl, which is substituted by E, C_7-C_{25}aralkoxy, C_7-C_{25}aralkoxy which is substituted by E, or -CO-R^{28},

R^8 is C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24} aryl, or C_7-C_{25}aralkyl,

R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, C_2-C_{20}heteroaryl which is substituted by E, C_2-C_{24}alkenyl, C_2-C_{24}alkynyl, C_1-C_{24}alkoxy, C_1-C_{24}alkoxy which is substituted by E and/or interrupted by D, or C_7-C_{25}aralkyl, or

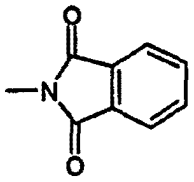
R^9 and R^{10} form a ring, especially a five- or six-membered ring,

R^{14} and R^{15} are independently of each other H, C_1-C_{24}alkyl, C_1-C_{24}alkyl which is substituted by E and/or interrupted by D, C_6-C_{24}aryl, C_6-C_{24}aryl which is substituted by E, C_2-C_{20}heteroaryl, or C_2-C_{20}heteroaryl which is substituted by E,

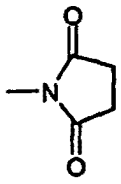
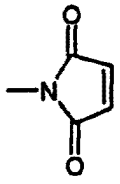
D is -CO-, -COO-, -S-, -SO-, -SO_2-, -O-, -NR^{25}-, -$SiR^{30}R^{31}$-, -POR^{32}-, -CR^{23}=CR^{24}-, or -C≡C-, and

E is -OR^{29}, -SR^{29}, -$NR^{25}R^{26}$, -COR^{28}, -$COOR^{27}$, -$CONR^{25}R^{26}$, -CN, -$OCOOR^{27}$, or halogen, wherein

R^{23}, R^{24}, R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkyl, or C_1-C_{24}alkyl which is interrupted by –O-, or



R^{25} and R^{26} together form a five or six membered ring, in particular ,

 , or  ,

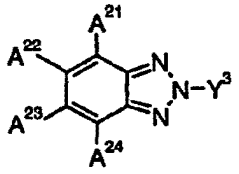
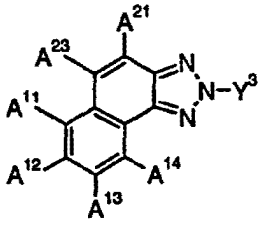
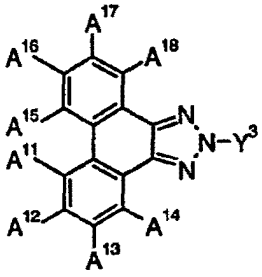
R^{27} and R^{28} are independently of each other H, C_6-C_{18}aryl, C_6-C_{18}aryl which is substituted by C_1-C_{24}alkyl, or C_1-C_{24}alkoxy, C_1-C_{24}alkyl, or C_1-C_{24}alkyl which is interrupted by –O-,

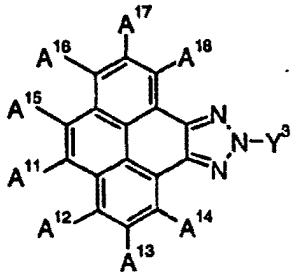
R^{29} is H, C_6-C_{18}aryl, C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkyl, or C_1-C_{24}alkyl which is interrupted by –O-,

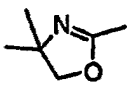
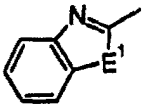
R^{30} and R^{31} are independently of each other C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl, and

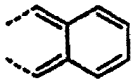
R^{32} is C_1-C_{24}alkyl, C_6-C_{18}aryl, or C_6-C_{18}aryl, which is substituted by C_1-C_{24}alkyl.

7. An electroluminescent device according to claim 2, 3, or 5, wherein the 2H-benzotriazole compound is a compound of formula

 (IIa),  (IIb),  (IIc), or

 (IId), wherein

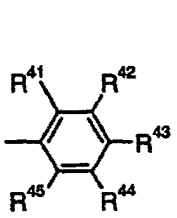
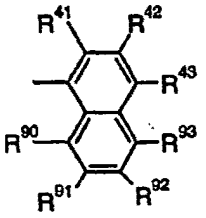
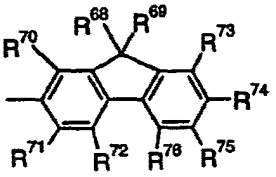
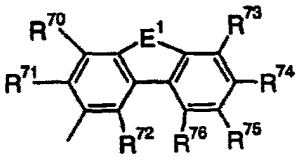
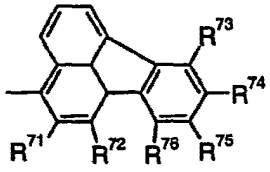
A^{21}, A^{22}, A^{23} and A^{24} are independently of each other hydrogen, halogen, C_1-C_{24}alkyl, C_1-C_{24}perfluoroalkyl, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl, especially a group of formula  or  , or

A^{22} and A^{23} or A^{11} and A^{23} are a group of formula  , or  ,

A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17}, and A^{18} are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, C_6-C_{18}aryl, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or C_2-C_{10}heteroaryl, wherein

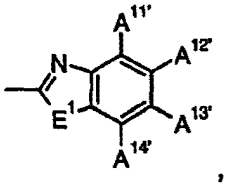
R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl,

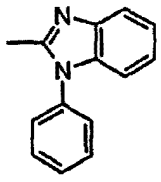
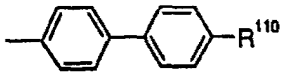
R^{27} is C_1-C_{24}alkyl, and

Y^3 is a group of formula  ,  ,  ,  or  , wherein

R^{41} is hydrogen, C_1-C_{24}alkoxy, or OC_7-C_{18}aralkyl,

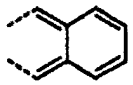
R^{42} is hydrogen, or C_1-C_{24}alkyl,

R^{43} is hydrogen, halogen, -$CONR^{25}R^{26}$, -$COOR^{27}$,  ,

especially  , or  , wherein

E^1 is -S-, -O-, or -$NR^{25'}$-, wherein $R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl,

R^{110} is H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, -$NR^{25}R^{26}$, -$CONR^{25}R^{26}$, or -$COOR^{27}$, or

R^{42} and R^{43} are a group of formula  , or  ,

R^{44} is hydrogen, or C_1-C_{24}alkyl,

R^{45} is hydrogen, or C_1-C_{24}alkyl,

$A^{11'}$, $A^{12'}$, $A^{13'}$, and $A^{14'}$ are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, $-NR^{25}R^{26}$, $-CONR^{25}R^{26}$, or $-COOR^{27}$,

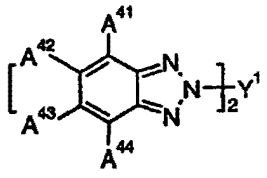
R^{68} and R^{69} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, especially hexyl, heptyl, 2-ethylhexyl, and octyl, which can be interrupted by one or two oxygen atoms,

R^{70}, R^{71}, R^{72}, R^{73}, R^{74}, R^{75}, R^{76}, R^{90}, R^{91}, R^{92}, and R^{93} are independently of each other H, CN, C_1-C_{24}alkyl, C_6-C_{10}aryl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, $-NR^{25}R^{26}$, $-CONR^{25}R^{26}$, or $-COOR^{27}$,

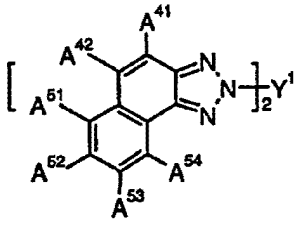
R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl, and

R^{27} is C_1-C_{24}alkyl.

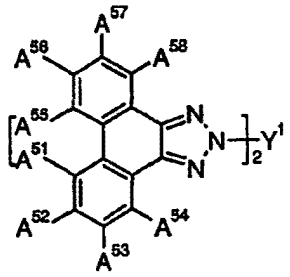
8. An electroluminescent device according to claim 2, 3, or 6, wherein the 2H-benzotriazole compound is a compound of formula



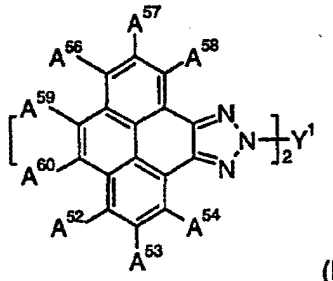
(IIIa),



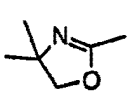
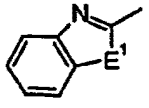
(IIIb),

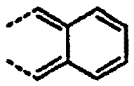


(IIIc), or



(IIId), wherein

A^{41}, A^{42}, A^{43} and A^{44} are independently of each other hydrogen, halogen, C_1-C_{24}alkyl, C_1-C_{24}perfluoroalkyl, C_6-C_{18}aryl, $-NR^{25}R^{26}$, $-CO\,NR^{25}R^{26}$, or $-COOR^{27}$, or C_2-C_{10}heteroaryl, especially a group of formula  or  , or

A^{42} and A^{43} are a group of formula  , or  ,

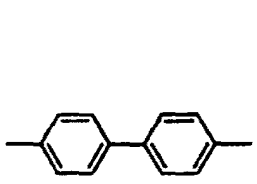
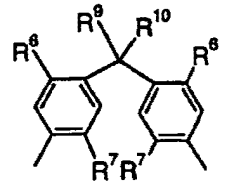
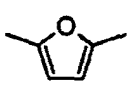
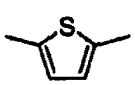
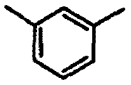
A^{51}, A^{52}, A^{53}, A^{54}, A^{55}, A^{56}, A^{57}, A^{58}, A^{59} and A^{60} are independently of each other H, CN, C_1-C_{24}alkyl, C_1-C_{24}alkoxy, C_1-C_{24}alkylthio, C_6-C_{18}aryl, $-NR^{25}R^{26}$, $-CONR^{25}R^{26}$, or $-COOR^{27}$, or C_2-C_{10}heteroaryl, wherein

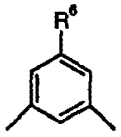
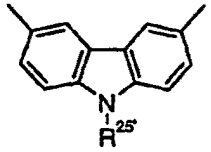
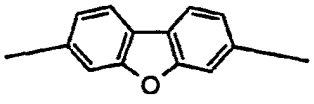
E^1 is O, S, or $-NR^{25'}-$,

R^{25} and R^{26} are independently of each other H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl,

R^{27} is C_1-C_{24}alkyl, and

Y^1 is a group of formula

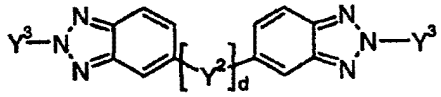
 ,  ,  ,  ,  ,

 ,  and  , wherein

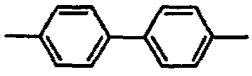
R^6 is C_1-C_{24}alkoxy, or $-O-C_7$-C_{25}aralkyl, R^7 is H, or C_1-C_{24}alkyl, R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms, and

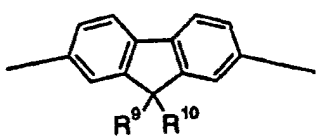
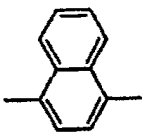
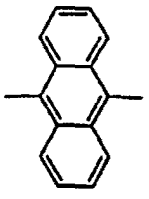
$R^{25'}$ is C_1-C_{24}alkyl, or C_6-C_{10}aryl.

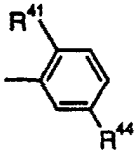
9. An electroluminescent device according to claim 2, 4, 5 or 6, wherein the 2H-benzotriazole compound is a compound of formula



(VIa), wherein d is 0, or 1,

Y^2 is a group of formula -O-, -S-, $-NR^{25}-$,  ,  ,

 ,  , or  ,



Y^3 is a group of formula , wherein

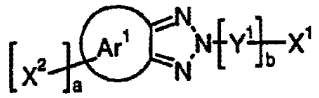
R^9 and R^{10} are independently of each other C_1-C_{24}alkyl, especially C_4-C_{12}alkyl, which can be interrupted by one or two oxygen atoms,

R^{25} is H, C_6-C_{18}aryl, C_7-C_{18}aralkyl, or C_1-C_{24}alkyl,

R^{41} is C_1-C_{24}alkoxy, or C_7-C_{15}phenylalkoxy, and

R^{44} is is H, or C_1-C_{24}alkyl.

10. A 2H-benzotriazole compound of the formula

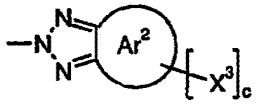


(I),

a is 0, or 1,

b is 0, or 1,

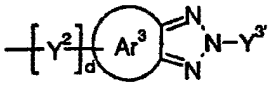
X^1 is a group of formula



, if b is 1, or Y^3, if b is 0, wherein

c is 0, or 1

X^2 and X^3 are independently of each other a group of formula



, wherein d is 0, or 1,

Ar^1, Ar^2, and Ar^3 are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted,

Y^1 and Y^2 are independently of each other a divalent linking group, and

Y^3 and $Y^{3'}$ are independently of each other aryl or heteroaryl, which can optionally be substituted, especially C_6-C_{30}aryl or a C_2-C_{26}heteroaryl, which can optionally be substituted.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 03/05698

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H05B33/14 H01L51/20 C09K11/06 C07D403/10 C07D405/14

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 7 H05B H01L C09K C07D

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 866 110 A (TOYO INK MFG CO) 23 September 1998 (1998-09-23) cited in the application * Table 3, page 38, compound 41 *	1,2,10
A	* the entire document *	3,5,7
X	US 5 104 740 A (SHINKAI MASANAO ET AL) 14 April 1992 (1992-04-14) cited in the application * column 10, compound No. 90 *	1-3,10
A	* the entire document *	5,7
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 05, 31 May 1999 (1999-05-31) & JP 11 040355 A (TOYO INK MFG CO LTD), 12 February 1999 (1999-02-12) * page 18, compound No. 66, abstract *	1,2,10

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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

"E" earlier document 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	Date of mailing of the international search report
9 September 2003	17.11.03

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Nemes, C.

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

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 518 824 A (FUNHOFF DIRK ET AL) 21 May 1996 (1996-05-21) cited in the application * column 5, benzotriazole compound *	1-3,10
X	EP 0 764 712 A (BAYER AG) 26 March 1997 (1997-03-26) cited in the application * page 4, Table 1, compounds 6-10 *	1-3,10
X	TSUTSUI ET AL.: "Revisit on the Role of Oxadiazole Hole Blocking Layer in Organic Multilayer Electroluminescent Devices" SYNTHETIC METALS, vol. 85, 1997, pages 1201-1204, XP002253648 cited in the application * page 1202, Figure 1, quencher compound TIN *	1-3,10
X	US 5 629 389 A (ROITMAN DANIEL B ET AL) 13 May 1997 (1997-05-13) cited in the application * column 2, lines 51-52 *	1-3,10

INTERNATIONAL SEARCH REPORT

tional application No.
PCT/EP 03/05698

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

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 an additional fee, this Authority did not invite payment of any additional fee.

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.:
1 (part), 2 (part), 3 (part), 5 (part), 7, 10 (part)

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: -

The initial phase of the search revealed a very large number of documents relevant to the issue of novelty. So many documents were retrieved that it is impossible to determine which parts of claim 10 may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, a meaningful search over the whole breadth of claim 10 is impossible. Consequently, in case of claim 10 the search has been restricted to 2H-benzotriazoles of formula (I) comprised in an electroluminescent device.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1 (part), 2 (part), 3 (part), 5 (part), 7, 10 (part)

An electroluminescent device, comprising a 2H-benzotriazole compound of the formula (II) and the compound of the formula (II).

---

2. claims: 1 (part), 2 (part), 3 (part), 5 (part), 6 (part), 8, 9, 10 (part)

An electroluminescent device, comprising a 2H-benzotriazole compound of the formula (III), (V), (VI) and a 2H-benzotriazole compound of the formula (III), (V), (VI).

---

3. claims: 1 (part), 2 (part), 4, 5 (part), 6 (part), 10 (part)

An electroluminescent device, comprising a 2H-benzotriazole compound of the formula (IV) and a 2H-benzotriazole compound of the formula (IV).

INTERNATIONAL SEARCH REPORT

ormation on patent family members

International Application No
P(EP 03/05698

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0866110 A	23-09-1998	JP 10251633 A	22-09-1998
		EP 0866110 A1	23-09-1998
		EP 0934992 A1	11-08-1999
		US 6280859 B1	28-08-2001
		US 2001033944 A1	25-10-2001
US 5104740 A	14-04-1992	JP 3000792 A	07-01-1991
		JP 5029675 B	06-05-1993
JP 11040355 A	12-02-1999	NONE	
US 5518824 A	21-05-1996	DE 4325885 A1	09-02-1995
		CN 1103230 A	31-05-1995
		DE 59407212 D1	10-12-1998
		EP 0637899 A1	08-02-1995
		ES 2122108 T3	16-12-1998
		JP 7114987 A	02-05-1995
EP 0764712 A	26-03-1997	DE 19535063 A1	27-03-1997
		CA 2185878 A1	22-03-1997
		CN 1159131 A	10-09-1997
		EP 0764712 A2	26-03-1997
		JP 9125054 A	13-05-1997
US 5629389 A	13-05-1997	JP 9106889 A	22-04-1997

Form PCT/ISA/210 (patent family annex) (July 1992)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 November 2003 (13.11.2003)

PCT

(10) International Publication Number
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(51) International Patent Classification[7]: C09K 11/06, H05B 33/14, H01L 51/20

(21) International Application Number: PCT/GB03/01932

(22) International Filing Date: 2 May 2003 (02.05.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0210203.6 3 May 2002 (03.05.2002) GB

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(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **KATHIRGAMANATHAN, Poopathy** [GB/GB]; The Little Lancaster House, 1 Lancaster Road, North Harrow HA2 7NN (GB).

(74) Agent: **COHEN, Alan, Nicol**; 2 Grove Place, Tatsfield, Westerham, Kent TN16 2BB (GB).

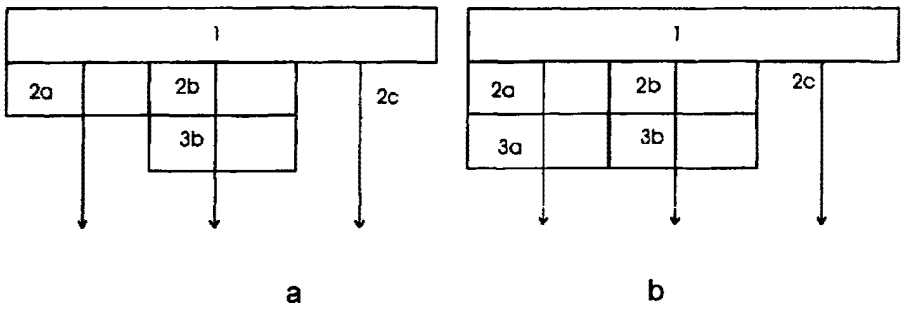
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

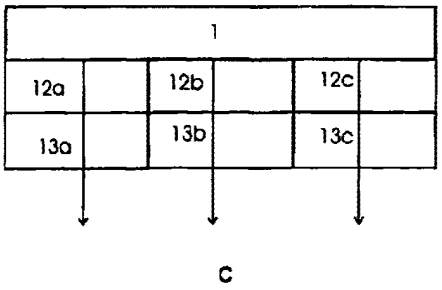
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ELECTROLUMINESCENT DEVICES





(57) Abstract: An electroluminescent device has a layer which emits light in the blue, purple/blue or ultraviolet section of the spectrum and a layer which contains a fluorescent material and optionally a layer comprising one or more colour filters so that light emitted by the electroluminescent layer excites the fluorescent material causing light to be emitted at a longer wavelength.

WO 03/093394 A1

Electroluminescent Devices

The present invention relates to an electroluminescent device which can emit light of different colours.

Materials which emit light when an electric current is passed through them are well known and used in a wide range of display applications. Liquid crystal devices and devices which are based on inorganic semiconductor systems are widely used, however these suffer from the disadvantages of high energy consumption, high cost of manufacture, low quantum efficiency and the inability to make flat panel displays.

Typical electroluminescent devices comprise an anode, normally of an electrically light transmitting material, a layer of a hole transporting material, a layer of the electroluminescent material, optionally a layer of an electron transmitting material and a metal cathode. There can be other layers, such as buffer layers and the layers can be combined using mixtures of one or more of the hole transporting material, electroluminescent material and the electron transmitting material.

Patent application WO98/58037 describes a range of lanthanide complexes which can be used in electroluminescent devices which have improved properties and give better results. Patent Applications PCT/GB98/01773, PCT/GB99/03619, PCT/GB99/04030, PCT/GB99/04028, PCT/GB00/00268 describe electroluminescent complexes, structures and devices using rare earth chelates.

For some applications light in several colours is required to be emitted e.g. red, green and blue of specified wavelengths. One way of accomplishing this is to have three electroluminescent structures side by side each of electroluminescent structures emits light of the appropriate wavelength, however such devices are difficult to make and operate.

We have now devised a device which can emit light at several wavelengths which uses one electroluminescent structure.

According to the invention there is provided an electroluminescent device which comprises (i) an electroluminescent structure which emits light in the blue, purple/blue or ultraviolet section of the spectrum (ii) a fluorescent layer comprising one or more fluorescent sections side by side each of which sections incorporates a fluorescent material and optionally (iii) a layer comprising one or more colour filters in which device light emitted by the electroluminescent structure excites a fluorescent material in the fluorescent layer causing light to be emitted at a longer wavelength.

For example the fluorescent layer can comprise a first section which contains a fluorescent material which will fluoresce in the red region of the spectrum when excited by ultra-violet or blue light, a second section which contains a fluorescent material which will fluoresce in the green region of the spectrum and a third section which contains a fluorescent material which will fluoresce in the blue region of the spectrum when the incident light is in the ultra-violet but which need not incorporate any fluorescent material if the blue light emitted by the electroluminescent structure is of the appropriate wavelength.

If, due to the nature of the fluorescent materials, the wavelengths emitted by these materials needs further modification there can be a colour filter through which the light passes.

When the emitted light is in the blue spectrum preferably the peak wavelength of the light is 430 to 440 nm e.g. 440 nm and when the emitted light is in the lighter blue region of the spectrum the emitted light has a peak wavelength of about 470 nm.

The colour of light is subjective and colours can be defined by co-ordinates on a two dimensional chart in which colours are areas on the chart and in the present invention

the blue and purple blue spectrum is defined as the area bounded by the co-ordinates in the colour chart CIE I931. Suitable complexes emit light within the co-ordinates (0, 0) (0, 0.3) (0.3, 0).

Compounds which emit light in the blue or purple blue region of the spectrum include lithium quinolate.

Patent Application WO 00/32717 discloses the use of lithium quinolate as an electroluminescent material in electroluminescent devices. Lithium quinolate emits light in the blue spectrum and has greater electron mobility, of the order of 45%, than the widely used aluminium quinolate and aluminium quinolate derivatives which can make it a more effective electroluminescent material.

As described in this patent application the lithium quinolate is preferably synthesised by the reaction, in an inert solvent, e.g. acetonitrile, of 8-hydroxyquinoline with a lithium alkyl e.g. n-butyl lithium. The lithium quinolate is an off white or white solid at room temperature.

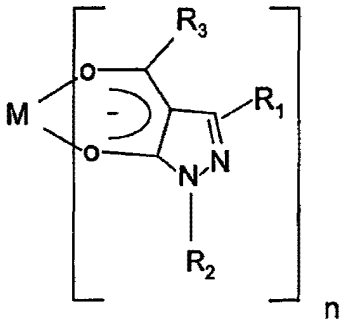
An article by C. Schmitz, H Scmidt and M. Thekalakat entitled Lithium Quinolate Complexes as Emitter and Interface Materials in Organic Light-Emitting Diodes in Chem. Mater, 2000, 12, 3012-3019 discloses the use of a layer of lithium quinolate together with hole transporting materials in electroluminescent devices.

As well as the lithium salt of 8-hydroxyquinoline, the term quinolate in this specification includes salts of substituted 8-hydroxyquinoline.

The blue colour emitted by lithium quinolate can be made a deeper blue if there is a layer of lithium quinolate mixed with the hole transporting compound α-NPB.

Other compounds which emit light in the blue region of the spectrum are non rare earth metal chelates such as the metal tris-(1,3-diphenyl-1-l-propanedione) (DBM) complexes where the metal can include aluminium, scandium, magnesium, zinc etc. For example $Al(DBM)_3$, $Zn(DBM)_2$ and $Mg(DBM)_2$, $Sc(DBM)_3$ etc. Such complexes are described in patent Application PCT/GB02/02722.

Other metal complexes which can emit light in the blue region of the spectrum are



where M is a metal; n is the valency of M; R_1, R_2 and R_3 which may be the same or different are selected from hydrogen, hydrocarbyl groups, substituted and unsubstituted aliphatic groups substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups or nitrile; R_1, and R_3 can also be form ring structures and R_1, R_2 and R_3 can be copolymerisable with a monomer e.g. styrene.

Preferably M is aluminium, beryllium or boron.

Such complexes are described in Patent Application PCT/GB02/0032163.

Other complexes are described in WO 00/26321, these complexes are TMHD (Tris(2,2,6,6-tetramethyl-3,5-heptanedionato), tripyridyl, bathophen (4,7-diphenyl-

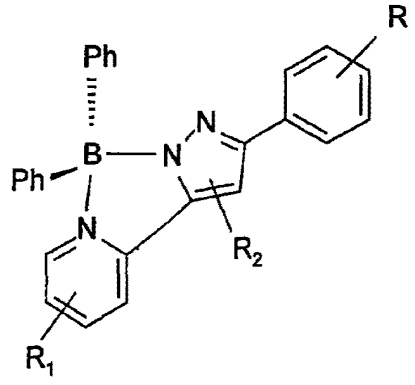
1,1-phenanthroline) complexes of metals such as thorium (IV), yttrium (III), gadolinium (III), europium (II), terbium(IV), cerium(IV) and cerium (III). A mixture of metals can be used to form mixed chelates.

Preferred complexes are $Eu(II)(TMHD)_2$.

Compounds which emit light in the ultra-violet region of the spectrum are described in WO 00/44851 and preferably are organic complexes of gadolinium in the III state. The preferred complexes are complexes with ligands such as ethylene diamine tetramine EDTA, DCTA, DTPA and TTHA the formulae of which are shown in figure 1 of the drawings.

Particularly preferred mixed complexes are the gadolinium complexes e.g. $Gd[Eu(EDTA)]_3$ and $Na[Gd(EDTA)_3]$.

Other electroluminescent complexes which emit light in the blue region of the spectrum include boron complexes of formula



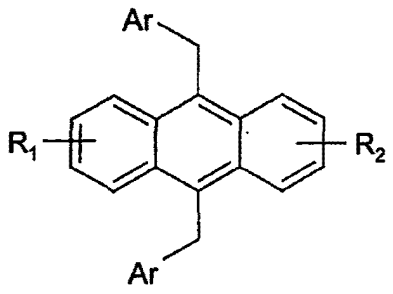
where Ph is an unsubstituted or substituted phenyl group where the substituents can be the same or different and are selected from hydrogen, and substituted and

unsubstituted hydrocarbyl groups such as substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups; R, R_1 and R_2 can be hydrogen or substituted or unsubstituted hydrocarbyl groups, such as substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorine, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups or nitrile.

Examples of R and/or R_1 and/or R_2 and/or R_3 include aliphatic, aromatic and heterocyclic alkoxy, aryloxy and carboxy groups, substituted and substituted phenyl, fluorophenyl, biphenyl, phenanthrene, anthracene, naphthyl and fluorene groups alkyl groups such as t-butyl, heterocyclic groups such as carbazole.

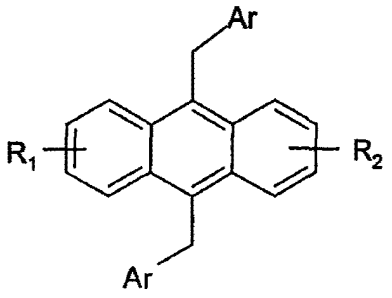
These complexes are described in GB Patent Application GB0306097.7.

Other blue emitters are anthracene compounds of formula

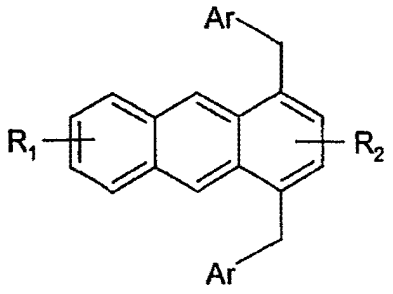


(A)

or

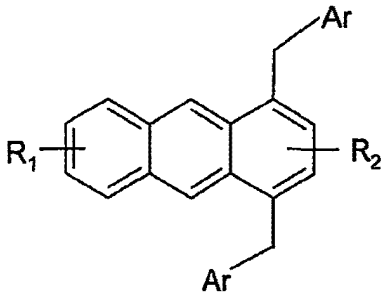


(B)



(C)

or



(D)

where Ar is an aromatic or a substituted aromatic group or a tertiary alkyl group such as t-butyl and R_1 and R_2 are the same or different and are selected from hydrogen, and substituted and unsubstituted hydrocarbyl groups such as substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups; R_1 and R_2 can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures and can be copolymerisable with a monomer e.g. styrene.

These complexes are described in GB Patent Application 0227376.1.

Compounds which fluoresce in the red and green region of the spectrum when excited by blue or ultra-violet light are well known for red light; one class includes europium complexes and for green light one class includes terbium complexes.

The electroluminescent structure preferably comprises sequentially a first electrode which functions as the cathode, a layer of an electroluminescent material which emits light in the blue, purple/blue or ultraviolet section of the spectrum and a second electrode which functions as the anode.

Preferably the anode is transparent and light is emitted through the anode and layer (ii) is adjacent the anode.

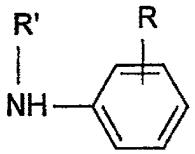
Preferably there is a layer of an electron injecting material between the cathode and the electroluminescent material layer; the electron injecting material is a material which will transport electrons when an electric current is passed through electron injecting materials include a metal complex such as a metal quinolate e.g. an aluminium quinolate, lithium quinolate, a cyano anthracene such as 9,10 dicyano anthracene, cyano substituted aromatic compounds, tetracyanoquinidodimethane a polystyrene sulphonate or a compound with the structural formulae shown in figures

3 or 4 of the drawings in which the phenyl rings can be substituted with substituents R as defined above. Instead of being a separate layer the electron injecting material can be mixed with the electroluminescent material and co-deposited with it.

Preferably there is a layer of a hole transporting material between the anode and the layer of the electroluminescent compound.

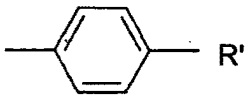
The hole transporting material can be any of the hole transporting materials used in electroluminescent devices.

The hole transporting material can be an amine complex such as poly (vinylcarbazole), N, N'-diphenyl-N, N'-bis (3-methylphenyl) -1,1' -biphenyl -4,4'-diamine (TPD), an unsubstituted or substituted polymer of an amino substituted aromatic compound, a polyaniline, substituted polyanilines, polythiophenes, substituted polythiophenes, polysilanes etc. Examples of polyanilines are polymers of



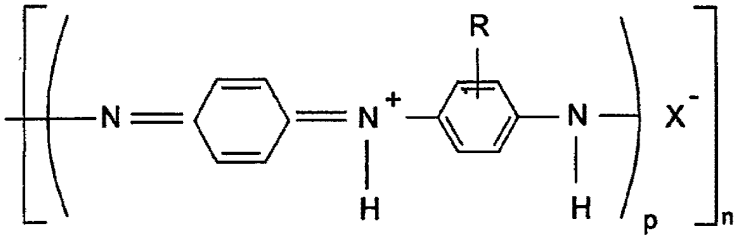
(XXVI)

where R is in the ortho – or meta-position and is hydrogen, C1-18 alkyl, C1-6 alkoxy, amino, chloro, bromo, hydroxy or the group



where R is alky or aryl and R' is hydrogen, C1-6 alkyl or aryl with at least one other monomer of formula I above.

Or the hole transporting material can be a polyaniline, polyanilines which can be used in the present invention have the general formula



(XXVII)

where p is from 1 to 10 and n is from 1 to 20, R is as defined above and X is an anion, preferably selected from Cl, Br, SO_4, BF_4, PF_6, H_2PO_3, H_2PO_4, arylsulphonate, arenedicarboxylate, polystyrenesulphonate, polyacrylate alkysulphonate, vinylsulphonate, vinylbenzene sulphonate, cellulose sulphonate, camphor sulphonates, cellulose sulphate or a perfluorinated polyanion.

Examples of arylsulphonates are p-toluenesulphonate, benzenesulphonate, 9,10-anthraquinone-sulphonate and anthracenesulphonate, an example of an arenedicarboxylate is phthalate and an example of arenecarboxylate is benzoate.

We have found that protonated polymers of the unsubstituted or substituted polymer of an amino substituted aromatic compound such as a polyaniline are difficult to evaporate or cannot be evaporated. However we have surprisingly found that if the unsubstituted or substituted polymer of an amino substituted aromatic compound is deprotonated then it can be easily evaporated i.e. the polymer is evaporable.

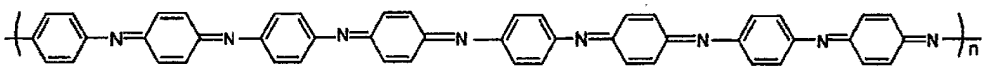
Preferably evaporable deprotonated polymers of unsubstituted or substituted polymer of an amino substituted aromatic compound are used. The de-protonated unsubstituted or substituted polymer of an amino substituted aromatic compound can be formed by deprotonating the polymer by treatment with an alkali such as ammonium hydroxide or an alkali metal hydroxide such as sodium hydroxide or potassium hydroxide.

The degree of protonation can be controlled by forming a protonated polyaniline and de-protonating. Methods of preparing polyanilines are described in the article by A. G. MacDiarmid and A. F. Epstein, Faraday Discussions, Chem Soc.88 P319 1989.

The conductivity of the polyaniline is dependant on the degree of protonation with the maximum conductivity being when the degree of protonation is between 40 and 60% e.g. about 50% for example.

Preferably the polymer is substantially fully deprotonated.

A polyaniline can be formed of octamer units i.e. p is four e.g.



The polyanilines can have conductivities of the order of 1 x 10^{-1} Siemen cm^{-1} or higher.

The aromatic rings can be unsubstituted or substituted e.g. by a C1 to 20 alkyl group such as ethyl.

The polyaniline can be a copolymer of aniline and preferred copolymers are the copolymers of aniline with o-anisidine, m-sulphanilic acid or o-aminophenol, or o-

toluidine with o-aminophenol, o-ethylaniline, o-phenylene diamine or with amino anthracenes.

Other polymers of an amino substituted aromatic compound which can be used include substituted or unsubstituted polyaminonapthalenes, polyaminoanthracenes, polyaminophenanthrenes, etc. and polymers of any other condensed polyaromatic compound. Polyaminoanthracenes and methods of making them are disclosed in US Patent 6,153,726. The aromatic rings can be unsubstituted or substituted e.g. by a group R as defined above.

Other hole transporting materials are conjugated polymer and the conjugated polymers which can be used can be any of the conjugated polymers disclosed or referred to in US 5807627, PCT/WO90/13148 and PCT/WO92/03490.

The preferred conjugated polymers are poly (p-phenylenevinylene)-PPV and copolymers including PPV. Other preferred polymers are poly(2,5 dialkoxyphenylene vinylene) such as poly (2-methoxy-5-(2-methoxypentyloxy-1,4-phenylene vinylene), poly(2-methoxypentyloxy)-1,4-phenylenevinylene), poly(2-methoxy-5-(2-dodecyloxy-1,4-phenylenevinylene) and other poly(2,5 dialkoxyphenylenevinylenes) with at least one of the alkoxy groups being a long chain solubilising alkoxy group, poly fluorenes and oligofluorenes, polyphenylenes and oligophenylenes, polyanthracenes and oligo anthracenes, ploythiophenes and oligothiophenes.

In PPV the phenylene ring may optionally carry one or more substituents e.g. each independently selected from alkyl, preferably methyl, alkoxy, preferably methoxy or ethoxy.

Any poly(arylenevinylene) including substituted derivatives thereof can be used and the phenylene ring in poly(p-phenylenevinylene) may be replaced by a fused ring

system such as anthracene or naphthlyene ring and the number of vinylene groups in each polyphenylenevinylene moiety can be increased e.g. up to 7 or higher.

The conjugated polymers can be made by the methods disclosed in US 5807627, PCT/WO90/13148 and PCT/WO92/03490.

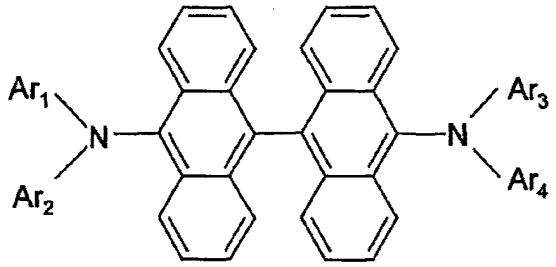
The thickness of the hole transporting layer is preferably 20nm to 200nm.

The polymers of an amino substituted aromatic compound such as polyanilines referred to above can also be used as buffer layers with or in conjunction with other hole transporting materials.

The structural formulae of some other hole transporting materials are shown in Figures 2, and 5 - 8 of the drawings, where R_1, R_2 and R_3 can be the same or different and are selected from hydrogen, and substituted and unsubstituted hydrocarbyl groups such as substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups; R_1, R_2 and R_3 can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures and can be copolymerisable with a monomer e.g. styrene. X is Se, S or O, Y can be hydrogen, substituted or unsubstituted hydrocarbyl groups, such as substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorine, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups or nitrile.

Examples of R_1 and/or R_2 and/or R_3 include aliphatic, aromatic and heterocyclic alkoxy, aryloxy and carboxy groups, substituted and substituted phenyl, fluorophenyl, biphenyl, phenanthrene, anthracene, naphthyl and fluorene groups alkyl groups such as t-butyl, heterocyclic groups such as carbazole.

Other hole transporting materials are diamino dianthracenes of formula



where Ar_1, Ar_2, Ar_3 and Ar_4 are the same or different substituted or unsubstituted aromatic groups including substituted or unsubstituted monocyclic or polycyclic aromatic groups such as phenyl, naphthyl, phenanthrenyl etc.

The preferred groups Ar_1, Ar_2, Ar_3 and Ar_4 are substituted and unsubstituted phenyl, bisphenyl, naphthyl, anthracenyl, and fused rings where Ar_1 and Ar_2 or Ar_3 and Ar_4 form heterocyclic ring with the nitrogen atom. The substituents can be selected from hydrogen, and alkyl, aliphatic, aromatic and heterocyclic alkoxy, aryloxy and carboxy groups, such as t-butyl and heterocyclic groups such as carbazole and trimethyl fluorine.

Optionally the hole transporting material can be mixed with the electroluminescent material and co-deposited with it.

The hole transporting materials, the electroluminescent material and the electron injecting materials can be mixed together to form one layer, which simplifies the construction.

The anode is preferably a transparent substrate such as a conductive glass or plastic material which acts as the anode. Preferred substrates are conductive glasses such as indium tin oxide coated glass, but any glass which is conductive or has a conductive layer such as a metal or conductive polymer can be used. Conductive polymers and conductive polymer coated glass or plastics materials can also be used as the

substrate.

The cathode is preferably a low work function metal e.g. aluminium, calcium, lithium, silver/magnesium alloys, rare earth metal alloys, magnesium/aluminium, magnesium/ indium, titanium/aluminium, etc., aluminium is a preferred metal. A metal fluoride such as an alkali metal, rare earth metal or their alloys can be used as the second electrode for example by having a metal fluoride layer formed on a metal.

An electroluminescent structure is shown in fig. 9 in which (1) is an aluminium cathode, (2) is an electron transmitting layer, (3) is a layer of an electroluminescent compound which emits light in the blue, purple blue or ultra-violet region of the spectrum, (4) is a layer of a hole transporting material and (5) is an indium tin oxide coated glass anode.

Devices according to the invention are described in figs. 10a to 10c of the drawings in which (1) is an electroluminescent structure shown in fig. 9; in fig. 10a (1) emits light in the blue region of the spectrum at about 470nm (2a) is a layer containing a red fluorescent, (2b) is a green fluorescent and (3b) is a green filter.

The electroluminescent structure is turned on so that it emits blue light of the required wavelength, the light is incident on (2a), which causes it to emit red light, and on (2b) so that it emits green light. The red light emitted has the required wavelength so no filter is needed, but the filter (3c) ensures that the green light has the required wavelength. The light is emitted at the three required wavelengths to give red, green and blue light.

In fig. 10b the red fluorescent light is not at the required wavelength so a red filter (3a) is added.

In fig. 10c the electroluminescent structure (1) emits light in the ultra-violet region of the spectrum by having a layer of $Na[Gd(EDTA)_3]$. as layer (3) in fig. 9.

Layer (12a) incorporates a compound which fluoresces red when excited by ultra-violet light, (12b) incorporates a compound which fluoresces green when excited by ultra-violet light and (12c) incorporates a compound which fluoresces in the blue spectrum when excited by ultra-violet light. Filters (13a), (13b) and (13c) which are red, green and blue filters respectively can adjust the wavelength of the emitted if required.

Claims

1. An electroluminescent device which comprises (i) an electroluminescent structure which emits light in the blue, purple/blue or ultraviolet section of the spectrum and (ii) a fluorescent layer comprising one or more fluorescent sections each of which sections incorporates a fluorescent material in which device light emitted by the electroluminescent structure excites a fluorescent material in the fluorescent layer causing light to be emitted by the fluorescent material.

2. An electroluminescent device as claimed in claim 1 in which there are a plurality of fluorescent layers side by side.

3. An electroluminescent device as claimed in claim 1 or 2 in which there is a layer (iii) which is a layer comprising one or more colour filters.

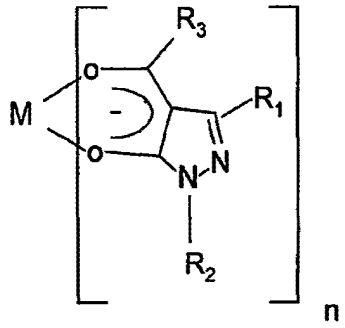
4. An electroluminescent device as claimed in any one of claims 1 to 3 in which the electroluminescent structure comprises sequentially a first electrode which functions as the cathode, a layer of an electroluminescent material which emits light in the blue, purple/blue or ultraviolet section of the spectrum and a second electrode which functions as the anode.

5. An electroluminescent device as claimed in claim 4 in which the electroluminescent material is lithium quinolate.

6. An electroluminescent device as claimed in claim 4 in which the lithium quinolate is mixed with the hole transporting compound α-NPB.

7. An electroluminescent device as claimed in claim 4 in which the electroluminescent material is $Al(DBM)_3$, $Zn(DBM)_2$ and $Mg(DBM)_2$ or $Sc(DBM)_3$.

8. An electroluminescent device as claimed in claim 4 in which the electroluminescent material is



where M is a metal; n is the valency of M; R_1, R_2 and R_3 which may be the same or different are selected from hydrogen, hydrocarbyl groups, substituted and unsubstituted aliphatic groups substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons such as trifluoryl methyl groups, halogens such as fluorine or thiophenyl groups or nitrile; R_1, and R_3 can also be form ring structures and R_1, R_2 and R_3 can be copolymerisable with a monomer e.g. styrene.

9. An electroluminescent device as claimed in claim 8 in which M is aluminium.

10. An electroluminescent device as claimed in claim 4 in which the electroluminescent material is selected from tripyridyl and bathophen (4,7-diphenyl-1,1-phenanthroline) complexes of one or more of thorium (IV), yttrium (III), gadolinium (III), europium (II), terbium(IV), cerium(IV) and cerium (III).

11. An electroluminescent device as claimed in claim 4 in which the electroluminescent material which emits light in the ultra-violet region of the spectrum is a gadolinium complex of EDTA, DCTA, DTPA and TTHA.

12. An electroluminescent device as claimed in claim 4 in which the electroluminescent material which emits light in the ultra-violet region of the spectrum is $Gd[Eu(EDTA)]_3$ or $Na[Gd(EDTA)_3]$.

13. An electroluminescent device as claimed in any one of the preceding claims in which the fluorescent compound is a europium complex which fluoresces in the red region of the spectrum when excited by blue or ultra-violet light.

14. An electroluminescent device as claimed in any one of the preceding claims in which the compound is a terbium complex which fluoresces in the green region of the spectrum when excited by blue or ultra-violet light.

15. An electroluminescent device as claimed in any one of the preceding claims in which the electroluminescent structure comprises sequentially a first electrode which functions as the cathode, a layer of a hole transporting material, a layer of an electroluminescent material which emits light in the blue, purple/blue or ultraviolet section of the spectrum, a layer of an electron transmitting material and a second electrode which functions as the anode.

16. An electroluminescent device as claimed in claim 15 in which the electron transmitting material is a metal quinolate, a cyano anthracene, 9,10 dicyano anthracene, a polystyrene sulphonate or a compound of formulae as shown in fig. 3 or 4.

17. An electroluminescent device as claimed in claim 16 in which the metal quinolate is lithium, sodium, potassium, zinc, magnesium or aluminium quinolate.

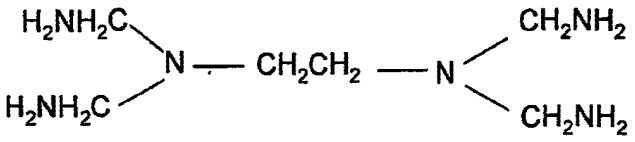
18. An electroluminescent device as claimed in claim 15 in which the hole transporting layer is an aromatic amine complex.

19. An electroluminescent device as claimed in claim 15 in which the hole transporting layer is formed from a poly(vinylcarbazole), N,N'-diphenyl-N,N'-bis (3-methylphenyl) -1,1' -biphenyl -4,4'-diamine (TPD), polyaniline, or a substituted polyaniline.

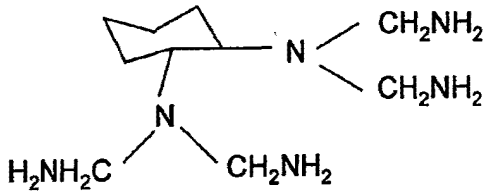
20. An electroluminescent device as claimed in claim 15 in which the hole transporting material has the formula of any of figures 1, 2 and 5 – 8.

21. An electroluminescent device as claimed in any one of the preceding claims in which the fluorescent layer comprises two fluorescent sections side by side, one of which incorporates a fluorescent material which fluoresces in the red region of the spectrum and one of which one incorporates a material which fluoresces in the green region of the spectrum and in which there is a green filter, whereby light emitted by the green fluorescent material passes through the green filter.

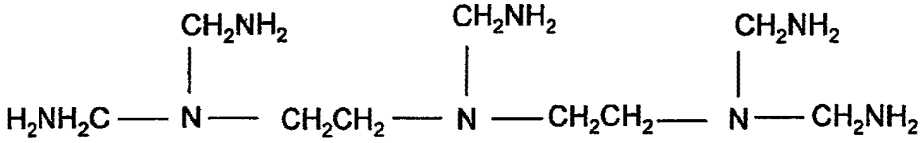
22. An electroluminescent device as claimed in any one of any one of the preceding claims in which the fluorescent layer comprises two fluorescent sections side by side, one of which incorporates a fluorescent material which fluoresces in the red region of the spectrum and one of which incorporates a material which fluoresces in the green region of the spectrum and in which there are filters whereby light emitted by the red fluorescent material passes through a red filter and light emitted by the green fluorescent material passes through a green filter.



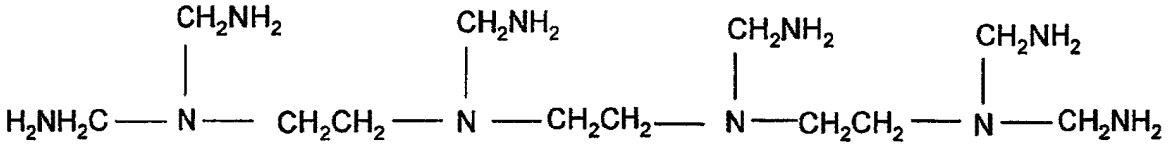
EDTA



DCTA



DTPA



TTHA

Fig. 1

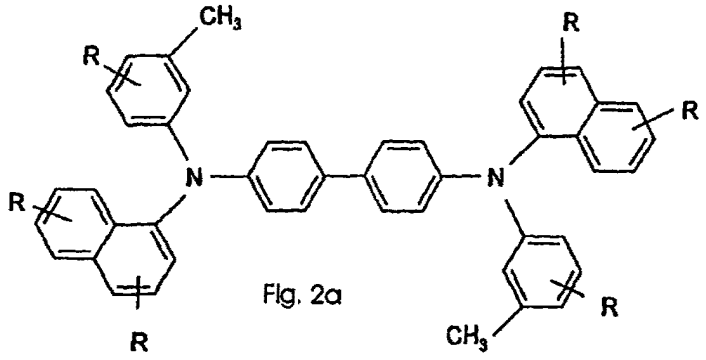


Fig. 2a

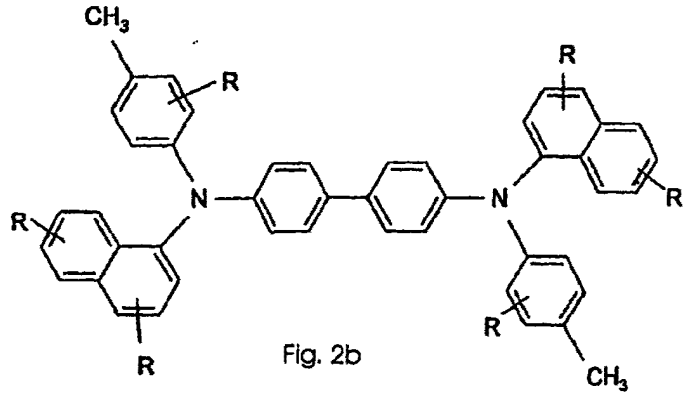


Fig. 2b

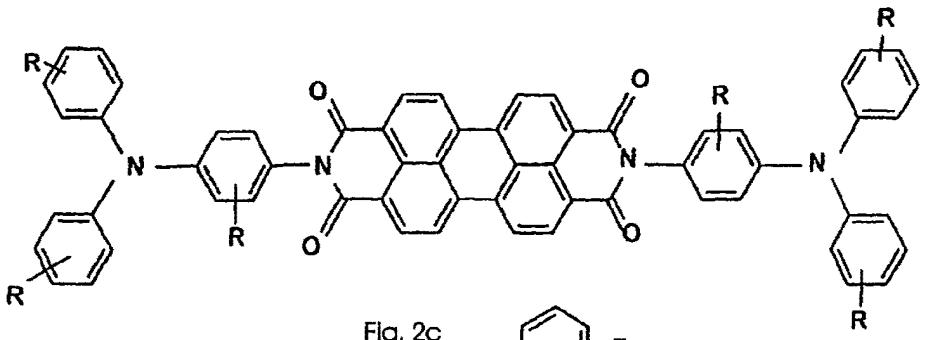


Fig. 2c

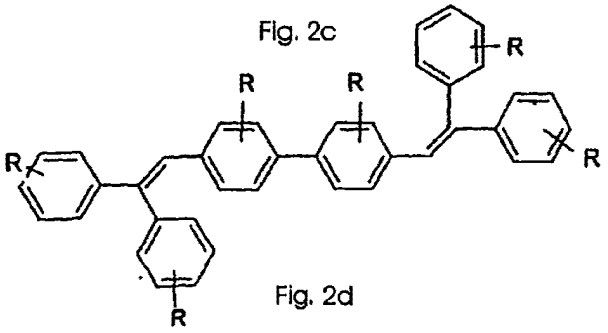
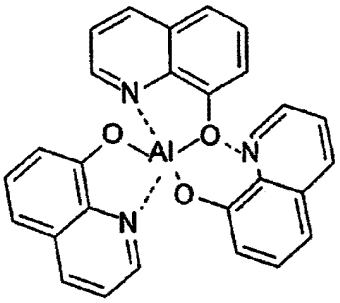
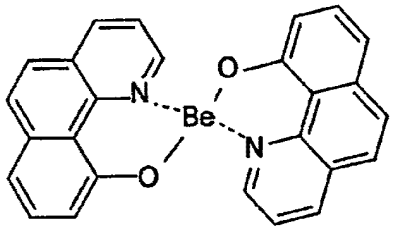


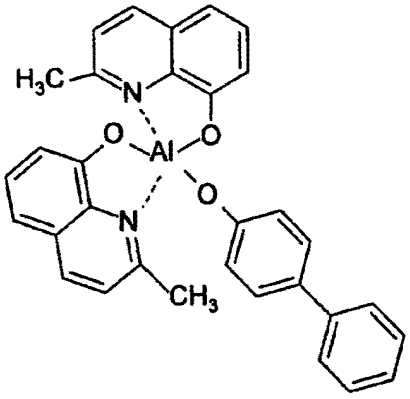
Fig. 2d



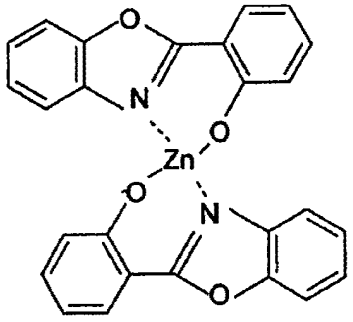
Alq



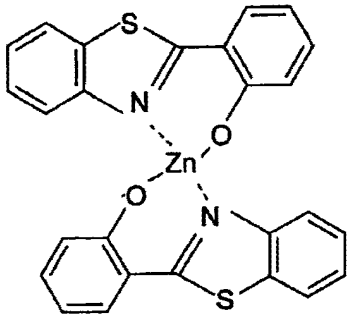
Bebq



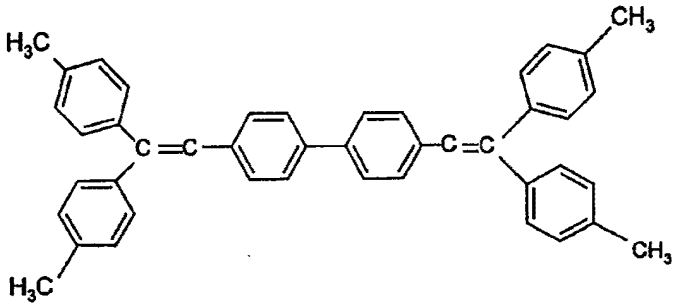
BAlq1



ZnPBO

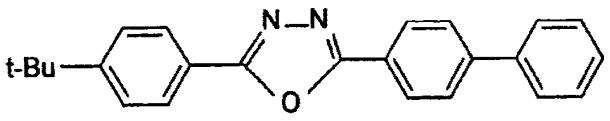


ZnPBT

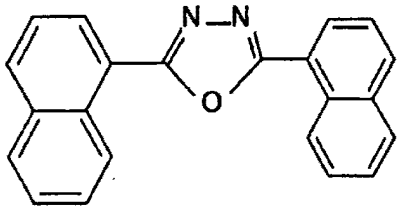


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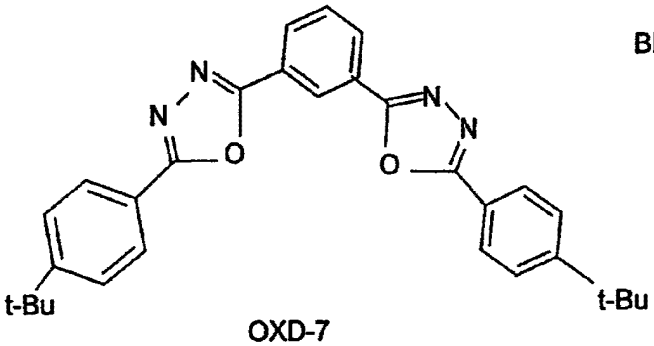
Fig. 3



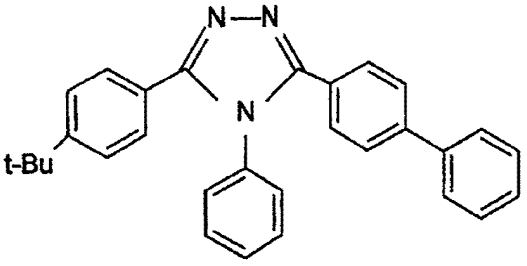
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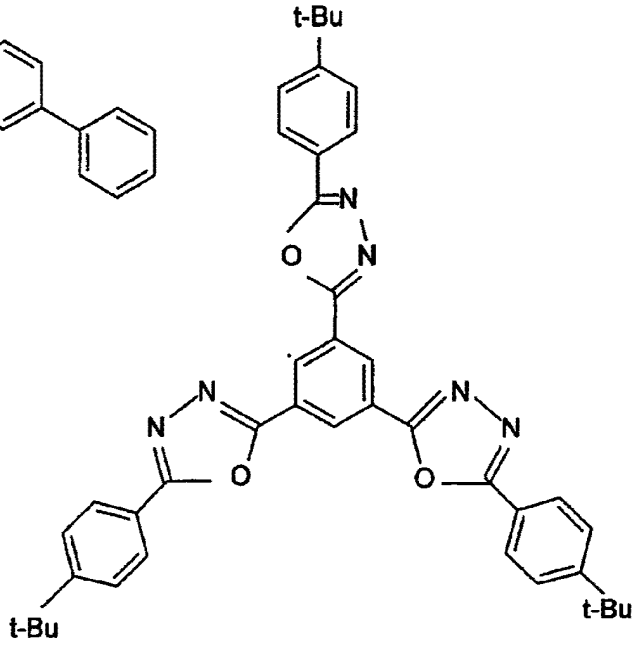
BND



OXD-7



TAZ



OXD- Star

Fig. 4

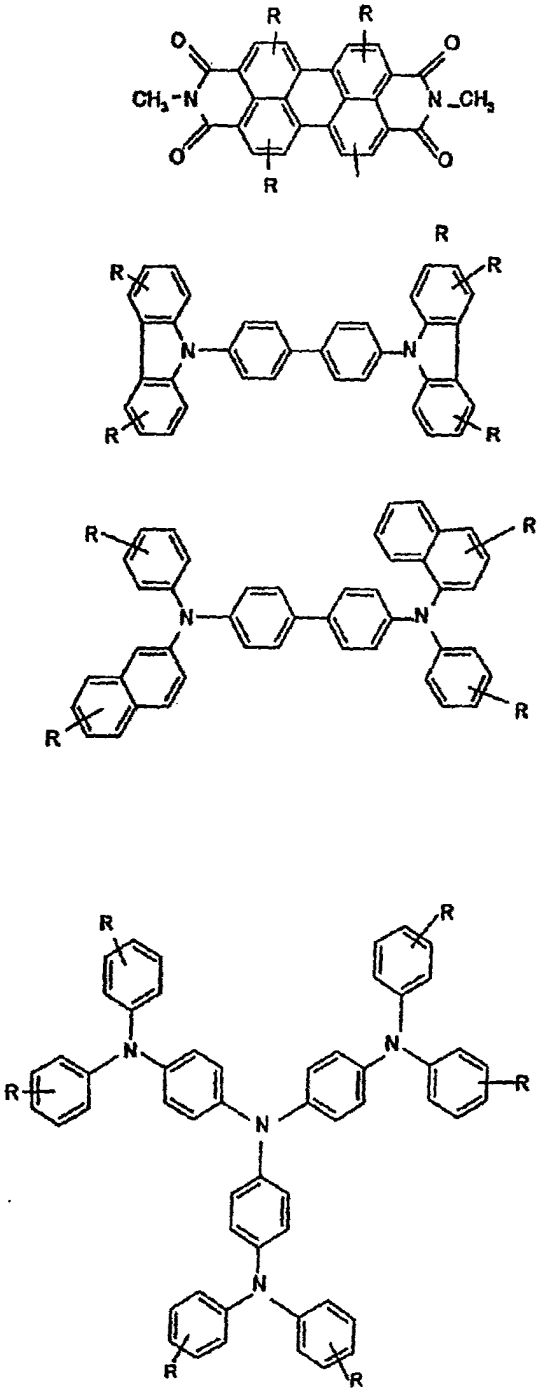
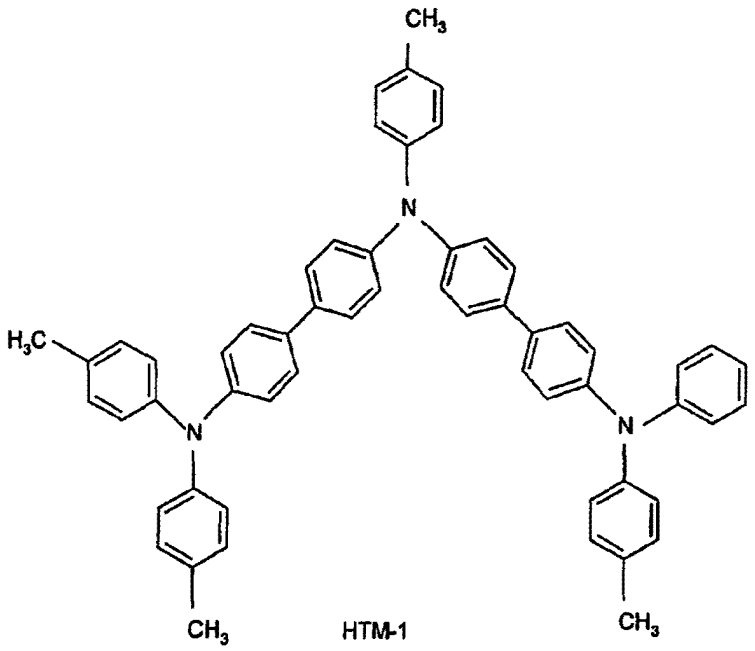
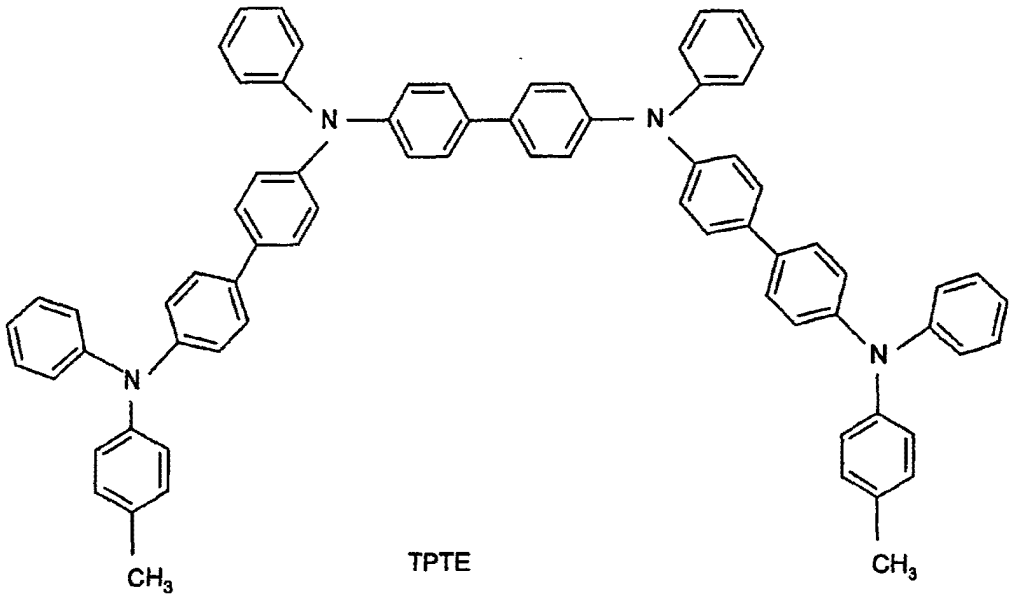


Fig. 5



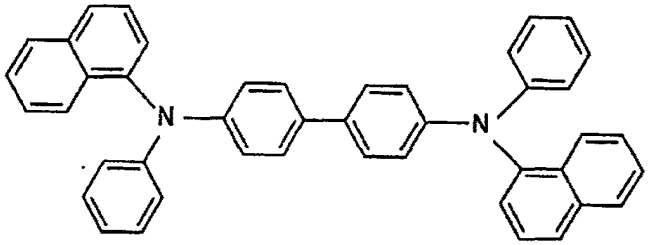
HTM-1

Fig. 15a



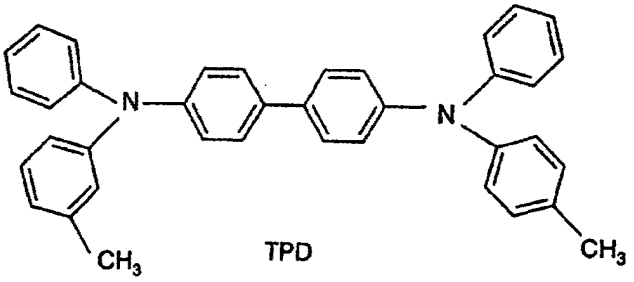
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Fig. 6



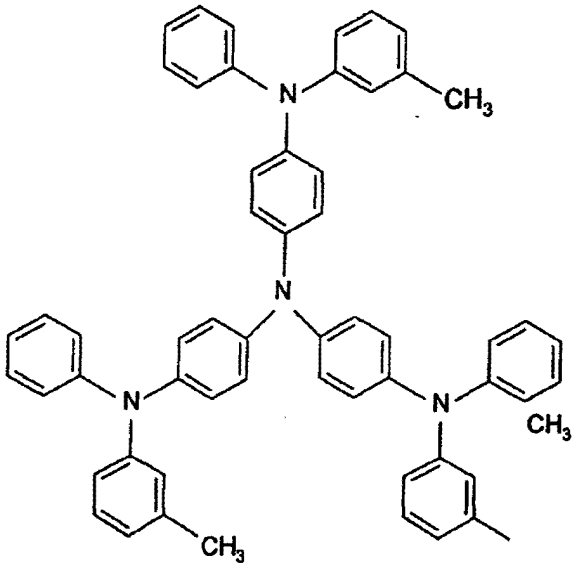
α -NPB

Fig. 7a



TPD

Fig. 7b



mTADATA

Fig. 7c

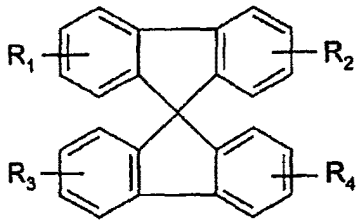


Fig. 8a

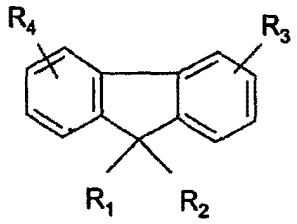
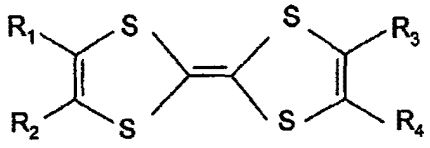


Fig. 8b



or

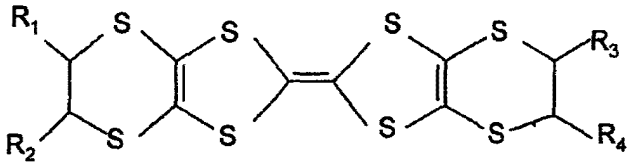


Fig. 8c

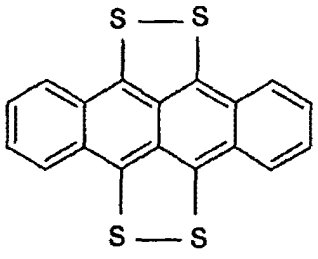


Fig. 8d

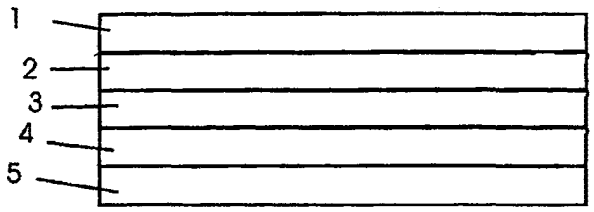


Fig. 9

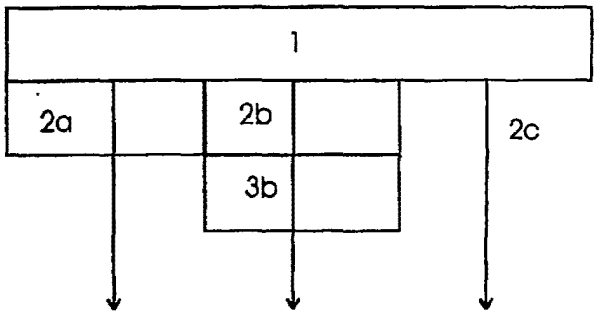


Fig. 10a

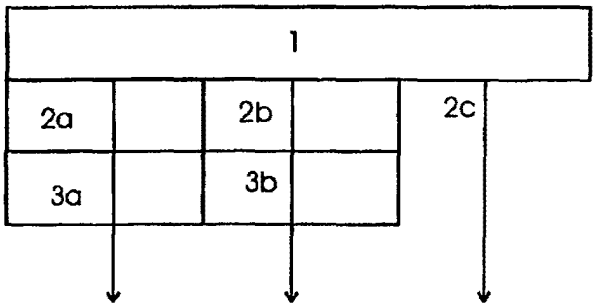


Fig. 10b

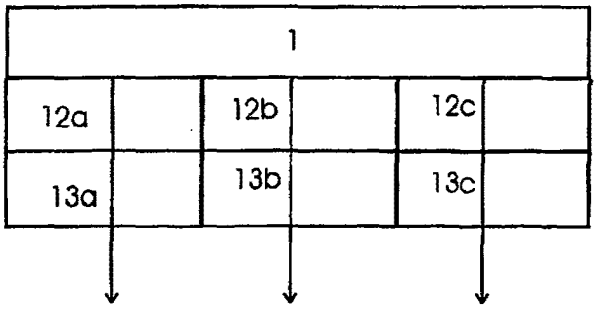


Fig. 10c

INTERNATIONAL SEARCH REPORT

Interna ⁻ l Application No
PCT/GB 03/01932

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C09K11/06 H05B33/14 H01L51/20

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 7 C09K H05B H01L

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	GB 2 333 897 A (FUJI ELECTRIC CO LTD) 4 August 1999 (1999-08-04) the whole document	1-4,6, 15-19, 21,22

-/--

[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
25 July 2003	06/08/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax (+31–70) 340–3016	Lehnert, A

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INTERNATIONAL SEARCH REPORT

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PCT/GB 03/01932

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	EP 1 074 600 A (SUMITOMO CHEMICAL CO) 7 February 2001 (2001-02-07) page 21, line 19 - line 21 ---	1-4
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INTERNATIONAL SEARCH REPORT

Interna al Application No
PCT/GB 03/01932

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INTERNATIONAL SEARCH REPORT

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Interna[illegible]al Application No
PCT/GB 03/01932

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PATENT APPLICATION SERIAL NO._____

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01 FC:2631	150.00 OP
02 FC:2642	200.00 OP
03 FC:2633	100.00 OP

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(71) Applicant *(for all designated States except US)*: **THE INTERACTIVE INSTITUTE II AB** [SE/SE]; Box 24081, S-104 50 Stockholm (SE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GUSTAFSSON, Anton** [SE/SE]; Sommarogatan 1, S-632 26 Eskilstuna (SE). **GYLLENSWÄRD, Magnus** [SE/SE]; Polhemsgatan 34, S-112 30 Stockholm (SE). **ÖHMAN, Christina** [SE/SE]; Kadettbacken 4, S-132 47 Saltsjö-Boo (SE). **ILSTEDT-HJELM, Sara** [SE/SE]; Norrstigen 41, S-181 31 Lidingö (SE).

(74) Agents: **HAGSTRÖM, Hans** et al.; Bergenstråhle & Lindvall AB, Box 17704, S-118 93 Stockholm (SE).

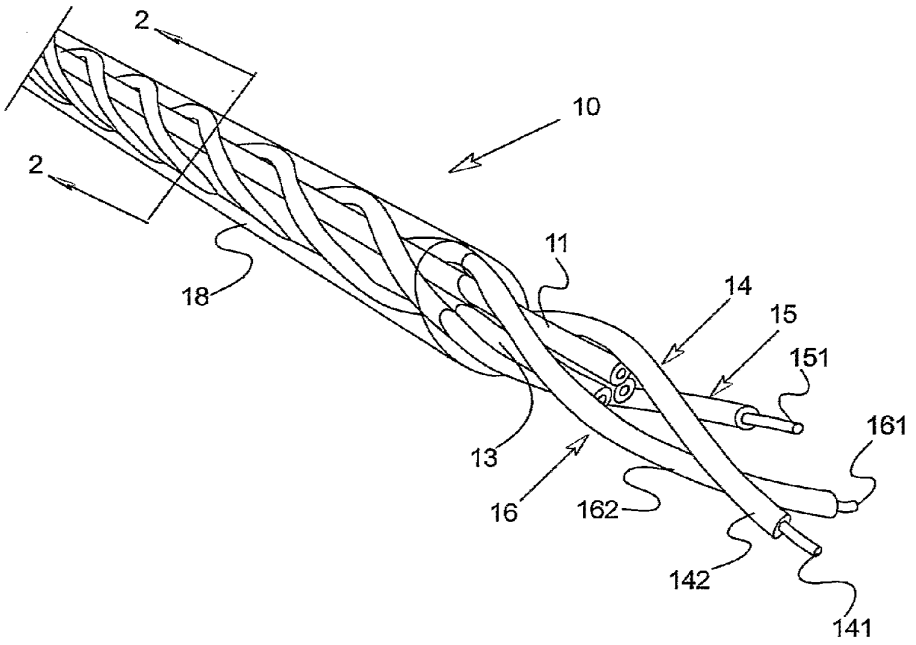
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) **Title:** VISUALISATION ARRANGEMENT



(57) **Abstract:** The present invention relates to a method and an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator (14, 15, 16) and a controller (34, 40) which controls at least one illumination characteristic of said illuminator with respect to said electrical feature.

WO 2006/096115 A1

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Visualisation Arrangement

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a visualisation arrangement, especially formed as a cable or wire surrounding, for visualisation of current and/or power consumption.

BACKGROUND OF THE INVENTION

Electricity is an invisible phenomenon. Usually, the state of the electrical equipment is indicated using some form of illuminator such as LEDs arranged in a housing. The light from the illuminator indicates whether the equipment is on or off.

US 6,347,172 describes an optically observable cable and a method of manufacturing the same. The optically observable cable includes a conduit for conducting signals and a side-emitting optical fiber disposed on a periphery of the conduit and extending along a length of the conduit, and a cable jacket encapsulating the conduit and the side-emitting optical fiber, wherein the cable jacket is at least partially translucent such that the side-emitting optical fiber is optically exposed through the cable jacket. A method of detecting individual cables from amongst a plurality of signal transmission cables each having a side-emitting optical fiber includes positioning a light source at an interface which houses and end of a cable to be detected, transmitting light from the light source into the interface, and observing light emitted from an axis of a cable to be detected. This invention aims to solve the problem of identifying different cables in a large number of cable structures.

In the prior art, materials emitting light when an electric current passes through them are well known and used in a wide range of display applications. Typical electroluminescent devices comprise an anode, normally of an electrically light transmitting material, a layer of a hole transporting material, a layer of the electroluminescent material, optionally a layer of an electron transmitting material and a metal cathode. There can be other layers, such as buffer layers and the layers can be combined using mixtures of one or more of the hole transporting material, electroluminescent material and the electron transmitting material.

For example, WO 03/093394 relates to an electroluminescent device having a layer which emits light in the blue, purple/blue or ultraviolet section of the spectrum and a layer which contains a fluorescent material and optionally a layer comprising one or more color filters so that light emitted by the electroluminescent layer excites the fluorescent material causing light to be emitted at a longer wavelength.

US 2002/0039666 relates to an electric luminescence fiber, which can be maintained in any desired shape and can be used in wider applications. The invention provides a flexible luminescence substance produced by arranging electrode wires in electric luminescence powder, said electric luminescence substance is coated with thermoplastic resin, thermosetting resin, or UV-setting resin. The coated resin is hardened and stabilized in linear or other desired shape, and the electric luminescence substance inside the coated resin is maintained in the desired shape.

SUMMARY OF THE INVENTION

The present invention provides a novel method and arrangement for indicating the level of current and/or power consumption of one or several apparatuses. Mainly, the invention provides an arrangement and method for indicating the load a power cable is exposed to.

For these reasons, an arrangement is provided for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator and a controller which is adapted to control at least one illumination characteristic of the illuminator with respect to the electrical feature. Preferably, the wire shaped illuminator is arranged along the conductor. According to one embodiment, the wire shaped illuminator is electroluminescent. According to another embodiment, the wire shaped illuminator is an optical fibre.

Preferably, the controller is further adapted to measure the electrical quantity and adopt a control signal to control the illuminator. The controller may comprise a processing arrangement and a measuring arrangement and a driver for driving the illuminator receiving control signals from the processing arrangement.

According to preferred embodiments, the illumination feature is one or several of intensity, colour or frequency.

The invention also relates to a cord comprising at least one electric wire and an illuminating arrangement, at least partly arranged along extension of said electric wire, said illuminating arrangement having means for illumination when energized. The cord further comprising a substantially translucent coating, covering said wire and illuminating arrangement. According to one embodiment, the illuminating arrangement is electroluminescent wire. According to another embodiment the illuminating arrangement is an optical fibre. The illuminating arrangement indicates current and/or power consuming through said electric wire.

The invention also relates to a method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention will be further described in a non-limiting way with reference to the accompanying drawings in which:

Fig. 1 schematically illustrates a part of an arrangement according to a preferred embodiment of the invention in perspective,

Fig. 2 is a cross sectional view through a cord arrangement of Fig. 1 along line 2-2,

Fig. 3 is a schematic illustration of a cord, according to the invention, connected to a distributor, and

Fig. 4 is an exemplary block diagram of a controlling arrangement.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Figs. 1 and 2 illustrate an exemplary embodiment of the invention comprising a cord arrangement 10 including three ordinary electrical wires 11, 12 and 13 arranged around a centre axis. The electrical wires may extend parallel to the centre axis, as shown in Fig. 1, but may also be arranged in a twisted configuration around the centre axis. According to the present example, the three wires may be arranged as power, ground and neutral. The invention can be realised by twisting a number of illuminating wires 14, 15 and 16, which include conductors 141, 151 and 161 coated by an illuminating coating 142, 152 and 162, respectively.

The illuminating wires may be of the type known as electroluminescents, such as described in US 2005037233, WO 031/05538, US 2004067387, WO 03/093394, US 2002/0039666, US 5,485,355 etc. The illuminating wires may also comprise of wires manufactured under trademark Lytec ® by ELAM ltd.

The illuminating wires may also comprise optical fibres, preferably side-emitting optical fibres.

The twisted electrical wires and illuminating wires are covered by a light transparent or semi transparent coating 18, for example made of silicon, rubber etc.

It is appreciated by a skilled person that the present invention is not limited to three illuminating wires and the invention may be applied using any number of illuminating wires and/or electrical wires.

Fig. 3 illustrates one application of the invention as a cord 30 of a distributor 31. The distributor 31 is connected to a wall socket 32. An electric equipment (not shown) is connected to the distributor through a plug 33. The cord is provided with the illuminating wires as mentioned earlier. It is also possible to provide the distributor and the wall plug itself with illuminating wires and consequently using them as part of the indicator.

The illuminating wires are connected to a controlling arrangement 34, in this case arranged inside the distributor.

An exemplary controlling arrangement is described in the following in conjunction with the block diagram of Fig. 4.

Power to the controlling arrangement 40 is supplied through a power supply 41, which is connected to, for example, a wall socket through the cord 30. The power is adapted to the power level of the electronics in the controlling arrangement. The power supplier converts the power from AC to DC. A processing unit 42, such as a micro computer is arranged to process the information on power level or current amount received from a measuring arrangement 43.

The measuring arrangement 43 is arranged between the wall socket and before connection to an electric equipment so that the power and/or current consumption can be measured. The measuring arrangement may sample current and voltage cautiously and provide data to the micro computer. The power is product of current multiplied with voltage. In the event of stable voltage, the phase shift can be ignored and the current can be measured and used to approximate the power. Thus, the difference between the visualisation of current consumption and power consumption can be minimized.

The micro computer controls, in this example, three pulse width modulators (PWMs) 44a-44c for controlling analog circuits with a processor's digital outputs. The number of PWMs corresponds to the number of illuminating wires. The PWMs are connected to drivers 45a-45c, which operate in a suitable range, e.g. 0-110 V, 8 KHz. The illuminating wires are connected to the drivers and thus operate in the output range of the inverter modules. The drivers may be inverter modules.

In case of optical fibers, the drivers may be connected to intensity and/or pulse controlled light sources, such as light emitting diodes (LED) connected to one end of the fibers.

Depending on the current/voltage through the electrical wires, the micro computer will output suitable control signal to the drivers, which feeds the illuminating wires with varying current, voltage and frequency corresponding to the consumed current/voltage through the electrical wires.

In a preferred embodiment, the electroluminescent wires includes a central copper wire coated with a phosphorus material coating and two tiny transmitter wires wrapped around it, and covered by a PVC coating and finally a colored vinyl coat. The driver takes the voltage from a DC power source and inverts it to, e.g. 110 volts AC. When connected to a power source and driver, the charge creates a glow in the wire, e.g. very similar to neon.

Thus, the controlling arrangement controls the illuminating characteristics, e.g. intensity, color and/or pulsing (frequency) of the illuminating wires in relation to the consumed power and/or current through the electric wires. This allows obtaining a simultaneous characteristic change, shifting the pulsing in the wires to obtain visual effects such as flowing light, etc.

It should be appreciated by a skilled person that the aforementioned controlling arrangement, and input and output values are given as an example and other types of controlling arrangement operating with different electrical values may occur.

The invention is not limited to applications in cables and cords, especially distributor cords; the invention may likewise be applied in household appliance for providing visual indication of poser consumption of different appliances. In industrial and construction site applications, the visualization may be used for indicating overload. Especially, if many apparatuses are connected, it is possible to track a particular apparatus being overloaded or consuming high power by following the visually indicating cable. The visualization allows finding cables in limited sight situations.

The invention is not limited to the shown embodiments but can be varied in a number of ways without departing from the scope of the appended claims and the arrangement and the method can be implemented in various ways depending on application, functional units, needs and requirements etc.

CLAIMS

1. An arrangement (10, 30) for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor (11, 12, 13), characterised in
that the arrangement comprises a substantially wire shaped illuminator (14, 15, 16) and a controller (34, 40) adapted to control at least one illumination characteristic of said illuminator with respect to said electrical feature.

2. The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. The arrangement of claim 1 or 2, wherein said wire shaped illuminator is electroluminescent (14, 15, 16).

4. The arrangement of claim 1 or 2, wherein said wire shaped illuminator is an optical fibre.

5. The arrangement of claim 1, wherein said controller (34, 40) is further adapted to measure said electrical quantity and adopt a control signal to control said illuminator.

6. The arrangement of claim 3, wherein said electroluminescent includes a central conductive wire (141, 151, 161) coated with a phosphorus material coating (141, 152, 162) and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. The arrangement according to any of preceding claims, wherein said controller (40) comprises a processing arrangement (42) and a measuring arrangement (43) and a driver (45a-45c) for driving said illuminator receiving control signals from said processing arrangement.

8. The arrangement according to any of preceding claims, wherein said illumination feature is one or several of intensity, colour or frequency.

9. A cord (10) comprising at least one electric wire (11, 12, 13) and an illuminating arrangement (14, 15, 16), at least partly arranged along extension of said electric wire, said illuminating arrangement having means (142, 152, 162) for illumination when energized.

10. The cord of claim 9, further comprising a substantially translucent coating (18), covering said wire and illuminating arrangement.

11. The cord of claim 9, wherein said illuminating arrangement is electroluminescent wire.

12. The cord of claim 9, wherein said illuminating arrangement is an optical fibre.

13. The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

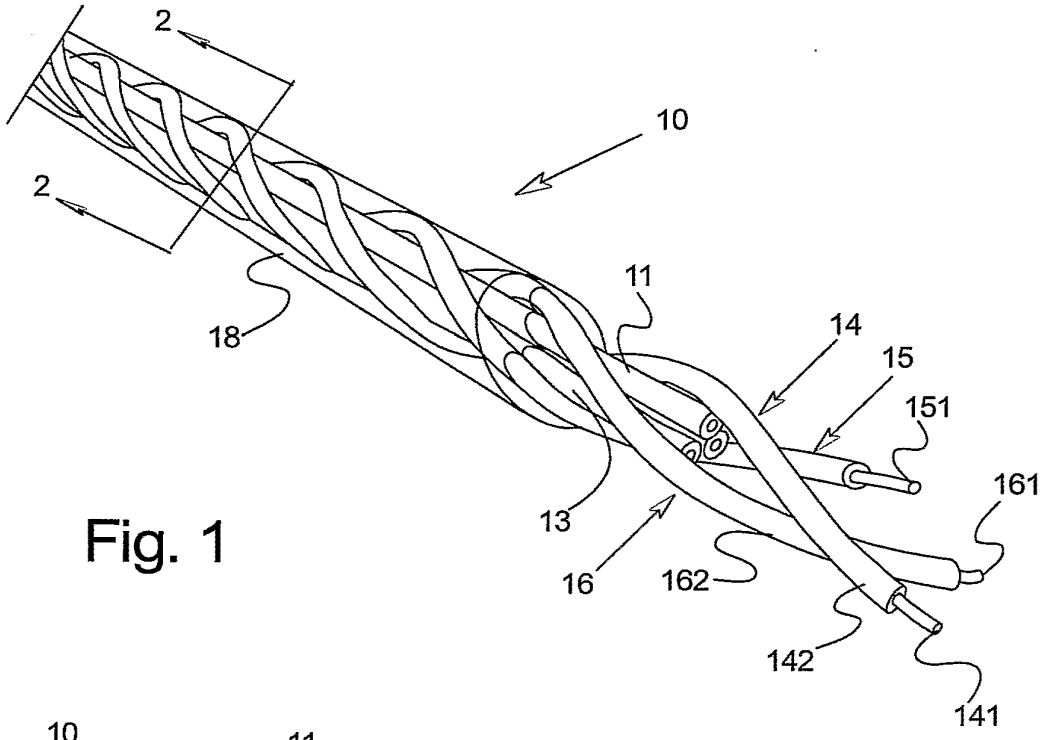

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Fig. 1

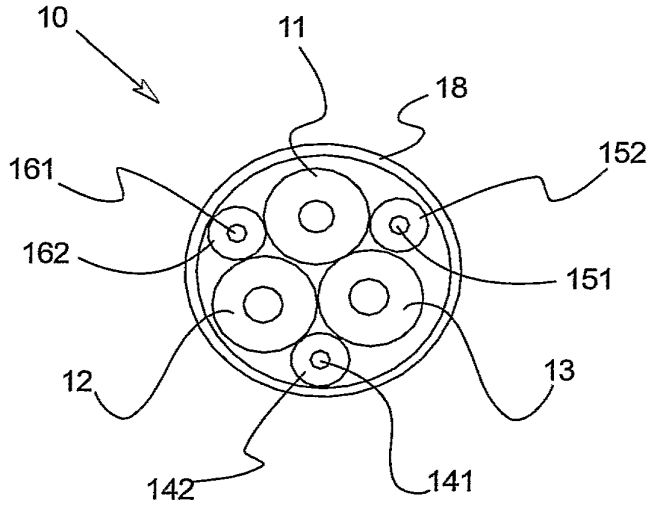

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Fig. 2

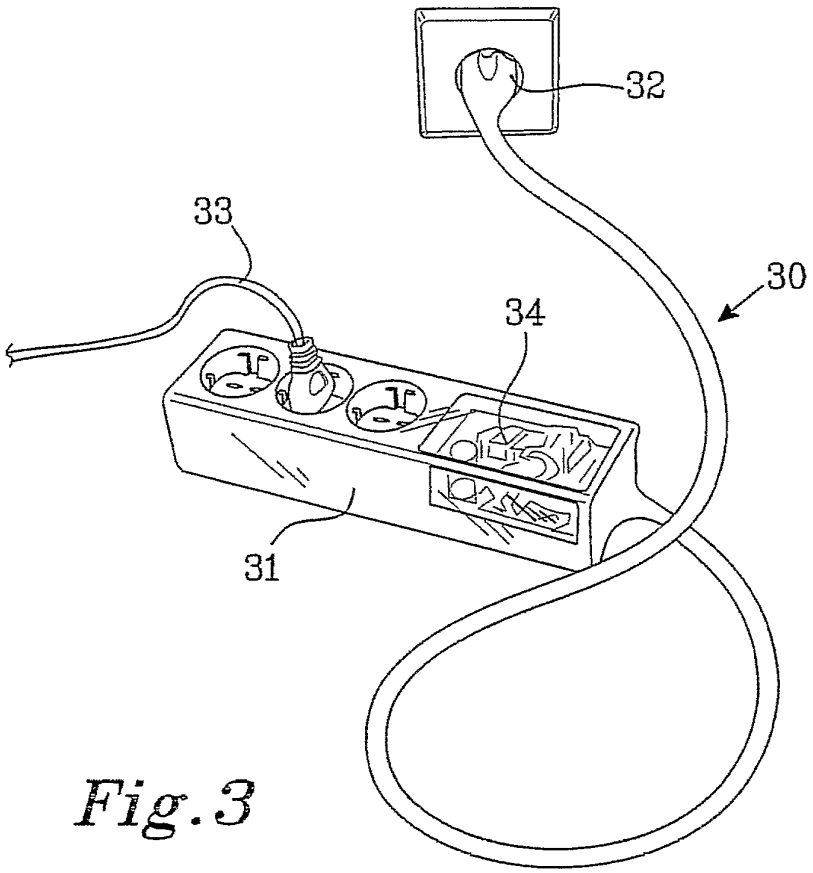


Fig. 3

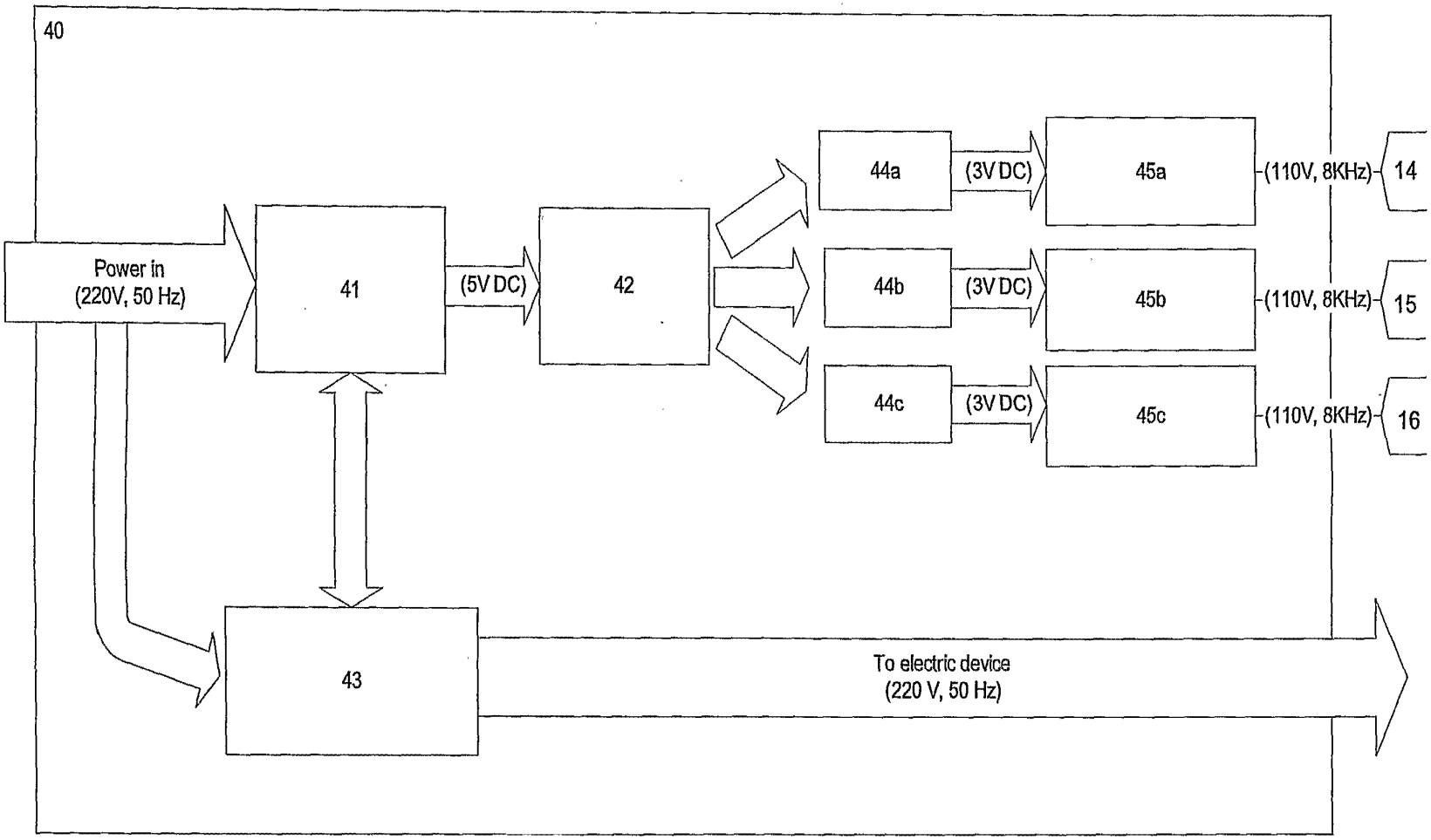

40
Power in
(220V, 50 Hz)
41
(5V DC)
42
44a
(3V DC)
45a
(110V, 8KHz)
14
44b
(3V DC)
45b
(110V, 8KHz)
15
44c
(3V DC)
45c
(110V, 8KHz)
16
43
To electric device
(220 V, 50 Hz)

Fig. 4

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TITLE

Visualisation Arrangement

TECHNICAL FIELD OF THE INVENTION

The present invention relates to a visualisation arrangement, especially formed as a cable or wire surrounding, for visualisation of current and/or power consumption.

BACKGROUND OF THE INVENTION

Electricity is an invisible phenomenon. Usually, the state of the electrical equipment is indicated using some form of illuminator such as LEDs arranged in a housing. The light from the illuminator indicates whether the equipment is on or off.

US 6,347,172 describes an optically observable cable and a method of manufacturing the same. The optically observable cable includes a conduit for conducting signals and a side-emitting optical fiber disposed on a periphery of the conduit and extending along a length of the conduit, and a cable jacket encapsulating the conduit and the side-emitting optical fiber, wherein the cable jacket is at least partially translucent such that the side-emitting optical fiber is optically exposed through the cable jacket. A method of detecting individual cables from amongst a plurality of signal transmission cables each having a side-emitting optical fiber includes positioning a light source at an interface which houses and end of a cable to be detected, transmitting light from the light source into the interface, and observing light emitted from an axis of a cable to be detected. This invention aims to solve the problem of identifying different cables in a large number of cable structures.

In the prior art, materials emitting light when an electric current passes through them are well known and used in a wide range of display applications. Typical electroluminescent devices comprise an anode, normally of an electrically light transmitting material, a layer of a hole transporting material, a layer of the electroluminescent material, optionally a layer of an electron transmitting material and a metal cathode. There can be other layers, such as buffer layers and the layers can be

combined using mixtures of one or more of the hole transporting material, electroluminescent material and the electron transmitting material.

For example WO 03/093394 relates to an electroluminescent device having a layer which emits light in the blue, purple/blue or ultraviolet section of the spectrum and a layer which contains a fluorescent material and optionally a layer comprising one or more color filters so that light emitted by the electroluminescent layer excites the fluorescent material causing light to be emitted at a longer wavelength.

US 2002/0039666 relates to an electric luminescence fiber, which can be maintained in any desired shape and can be used in wider applications. The invention provides a flexible luminescence substance produced by arranging electrode wires in electric luminescence powder, said electric luminescence substance is coated with thermoplastic resin, thermosetting resin, or UV-setting resin. The coated resin is hardened and stabilized in linear or other desired shape, and the electric luminescence substance inside the coated resin is maintained in the desired shape.

SUMMARY OF THE INVENTION

The present invention provides a novel method and arrangement for indicating the level of current and/or power consumption of one or several apparatuses. Mainly, the invention provides an arrangement and method for indicating the load a power cable is exposed to.

For these reasons, an arrangement is provided for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator and a controller which controls at least one illumination characteristic of the illuminator with respect to the electrical feature. Preferably, the wire shaped illuminator is arranged along the conductor. According to one embodiment, the wire shaped illuminator is electroluminescent. According to another embodiment, the wire shaped illuminator is an optical fibre.

Preferably, the controller measures the electrical quantity and adopts a control signal to control the illuminator. The controller comprises a processing arrangement and a

measuring arrangement and a driver for driving the illuminator receiving control signals from the processing arrangement.

According to preferred embodiments, the illumination feature is one or several of intensity, colour or frequency.

The invention also relates to cord comprising at least one electric wire and an illuminating arrangement, at least partly arranged along extension of said electric wire, said illuminating arrangement having means for illumination when energized. The cord further comprising a substantially translucent coating, covering said wire and illuminating arrangement. According to one embodiment, the illuminating arrangement is electroluminescent wire. According to another embodiment the illuminating arrangement is an optical fibre. The illuminating arrangement indicates current and/or power consuming through said electric wire.

The invention also relates to a method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention will be further described in a non-limiting way with reference to the accompanying drawings in which:

Fig. 1 schematically illustrates a part of an arrangement according to a preferred embodiment of the invention in perspective,

Fig. 2 is a cross sectional view through a cord arrangement of Fig. 1 along line 2-2,

Fig. 3 is a schematic illustration of a cord, according to the invention, connected to a distributor, and

Fig. 4 is an exemplary block diagram of a controlling arrangement.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Figs. 1 and 2 illustrate an exemplary embodiment of the invention comprising a cord arrangement 10 including three ordinary electrical wires 11, 12 and 13 twisted around a centre axis. According to this example the three wires may be arranged as power, ground and neutral. The invention is realised by twisting a number of illuminating wires 14, 15 and 16, which consist of a conductors 141, 151 and 161 coated by an illuminating coating 142, 152 and 162.

The illuminating wires may be of the type known as electroluminescents, such as described in US 2005037233, WO 031/05538, US 2004067387, WO 03/093394, US 2002/0039666, US 5,485,355 etc. The illuminating wires may also comprise of wires manufactured under trademark Lytec ® by ELAM ltd.

The illuminating wires may also comprise of optical fibres, preferably side-emitting optical fibres.

The twisted electrical wires and illuminating wires are covered by a light transparent or semi transparent coating 18, for example made of silicon, rubber etc.

It is appreciated by a skilled person that the invention is not limited to three wires and the invention may be applied on any numbers of wires.

Fig. 3 illustrates one application of the invention as a cord 30 of a distributor 31. The distributor 31 is connected to a wall socket 32. An electric equipment (not shown) is connected to the distributor through a plug 33. The cord is provided with the illuminating wires as mentioned earlier. It is also possible to provide the distributor and the wall plug itself with illuminating wires and consequently using them as part of the indicator.

The illumination weirs are connected to a controlling arrangement 34, in this case arranged inside the distributor.

An exemplary controlling arrangement is described in the following in conjunction with the block diagram of Fig. 4.

Power to the controlling arrangement 40 is supplied through a power supply 41, which is connected to, for example a wall socket through the cord 30. The power is adapted to the power level of the electronics in the controlling arrangement. The power supplier converts the power from AC to DC. A processing unit 42, such as a micro computer is arranged to process the information on power level or current amount received from a measuring arrangement 43.

The measuring arrangement 43 is arranged between the wall socket and before connection to an electric equipment so that the power and/or current consumption can be measured. The measuring arrangement may sample current and voltage cautiously and provide data to the micro computer. The power is product of current multiplied with voltage. In the event of stable voltage, the phase shift can be ignored and the current can be measured and used to approximate the power. Thus, the difference between the visualisation of current consumption and power consumption can be minimized.

The micro computer controls, in this example, three pulse width modulators (PWMs) 44a-44c for controlling analog circuits with a processor's digital outputs. The number of PWMs corresponds to the number of illuminating wires. The PWMs are connected to drivers 45a-45c, which operate in a suitable range, e.g. 0-110 V, 8 KHz. The illuminating wires are connected to the drivers and thus operate in the output range of the inverter modules. The drivers may be inverter modules.

In case of optical fibers, the drivers may be connected to intensity and/or pulse controlled light sources, such as light emitting diodes (LED) connected to one end of the fibers.

Depending on the current/voltage through the electrical wires, the micro computer will output suitable control signal to the drivers, which feeds the illuminating wires with varying current, voltage and frequency corresponding to the consumed current/voltage through the electrical wires.

In a preferred embodiment, the electroluminescent wires consists of a central copper wire coated with a phosphorus material coating and two tiny transmitter wires wrapped around it, and covered by a PVC coating and finally a colored vinyl coat. The driver

takes the voltage from a DC power source and inverts it to, e.g. 110 volts AC. When connected to a power source and driver, the charge creates a glow in the wire, e.g. very similar to neon.

Thus, the controlling arrangement controls the illuminating characteristics, e.g. intensity, color and/or pulsing (frequency) of the illuminating wires in relation to the consumed power and/or current through the electric wires. This allows obtaining a simultaneous characteristic change, shifting the pulsing in the wires to obtain visual effects such as flowing light, etc.

It should be appreciated by a skilled person that the aforementioned controlling arrangement, and input and output values are given as an example and other types of controlling arrangement operating with different electrical values may occur.

The invention is not limited to applications in cables and cords, especially distributor cords; the invention may likewise be applied in household appliance for providing visual indication of poser consumption of different appliances. In industrial and construction site applications, the visualization may be used for indicating overload. Especially, if many apparatuses are connected, it is possible to track a particular apparatus being overloaded or consuming high power by following the visually indicating cable. The visualization allows finding cables in limited sight situations.

The invention is not limited to the shown embodiments but can be varied in a number of ways without departing from the scope of the appended claims and the arrangement and the method can be implemented in various ways depending on application, functional units, needs and requirements etc.

CLAIMS

1. An arrangement (10, 30) for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor (11, 12, 13), characterised in
that the arrangement comprises a substantially wire shaped illuminator (14, 15, 16) and a controller (34, 40) which controls at least one illumination characteristic of said illuminator with respect to said electrical feature.

2. The arrangement of claim 1, wherein said wire shaped illuminator is arranged along said conductor.

3. The arrangement of claim 1 or 2, wherein said wire shaped illuminator is electroluminescent (14, 15, 16).

4. The arrangement of claim 1 or 2, wherein said wire shaped illuminator is an optical fibre.

5. The arrangement of claim 1, wherein a said controller (34, 40) measure said electrical quantity and adopts a control signal to control said illuminator.

6. The arrangement of claim 3, wherein said electroluminescent consists of a central conductive wire (141, 151, 161) coated with a phosphorus material coating (141, 152, 162) and transmitter wires wrapped around it, and covered by a coating and a colored vinyl coat.

7. The arrangement according to any of preceding claims, wherein said controller (40) comprises a processing arrangement (42) and a measuring arrangement (43) and a driver (45a-45c) for driving said illuminator receiving control signals from said processing arrangement.

8. The arrangement according to any of preceding claims, wherein said illumination feature is one or several of intensity, colour or frequency.

9. A cord (10) comprising at least one electric wire (11, 12, 13) and an illuminating arrangement (14, 15, 16), at least partly arranged along extension of said electric

wire, said illuminating arrangement having means (142, 152, 162) for illumination when energized.

10. The cord pf claim 9, further comprising a substantially translucent coating (18), covering said wire and illuminating arrangement.

11. The cord of claim 9, wherein said illuminating arrangement is electroluminescent wire.

12. The cord of claim 9, wherein said illuminating arrangement is an optical fibre.

13. The cord of claim 9, wherein said illuminating arrangement indicates current and/or power consuming through said electric wire.

14. A method of visually indicating an electrical quantity, being one or several of power, current and/or voltage through a conductor, the method comprising the steps of energizing a substantially wire shaped illuminator and controlling at least one illumination characteristic of said illuminator with respect to said electrical feature.

ABSTRACT

The present invention relates to a method and an arrangement for visual indication of an electrical quantity, being one or several of power, current and/or voltage through a conductor. The arrangement comprises a substantially wire shaped illuminator (14, 15, 16) and a controller (34, 40) which controls at least one illumination characteristic of said illuminator with respect to said electrical feature.

(Fig. 1)

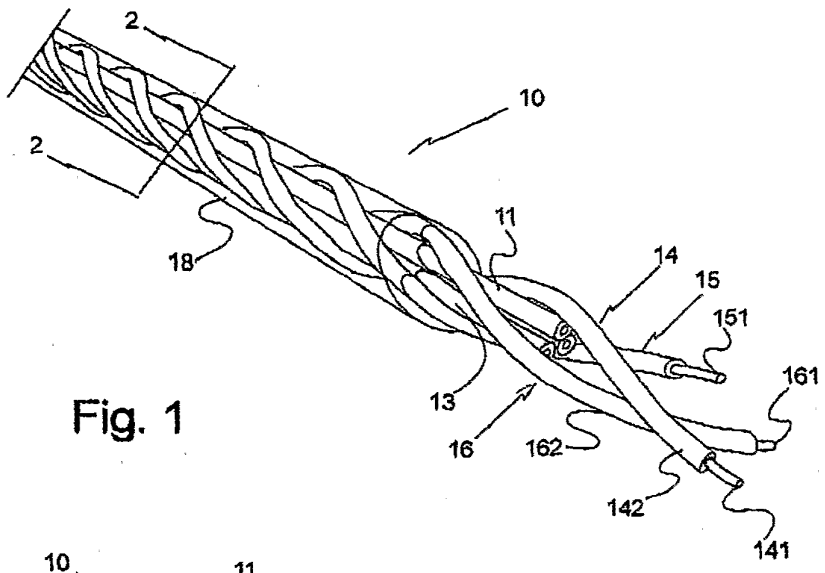

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Fig. 1

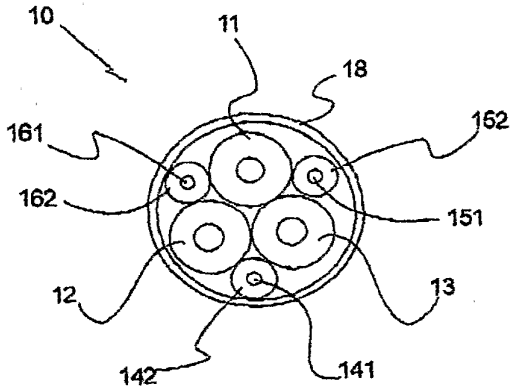

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Fig. 2

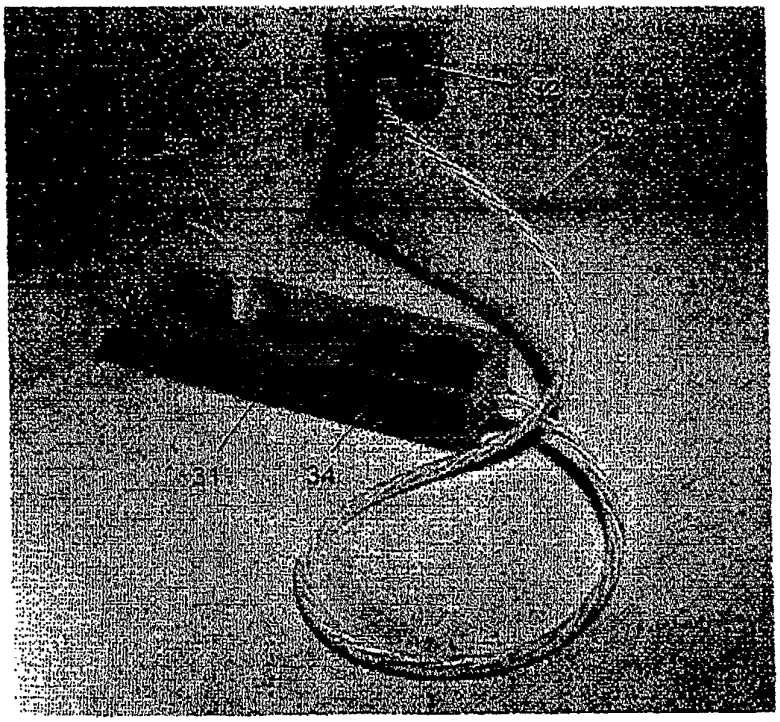


Fig. 3

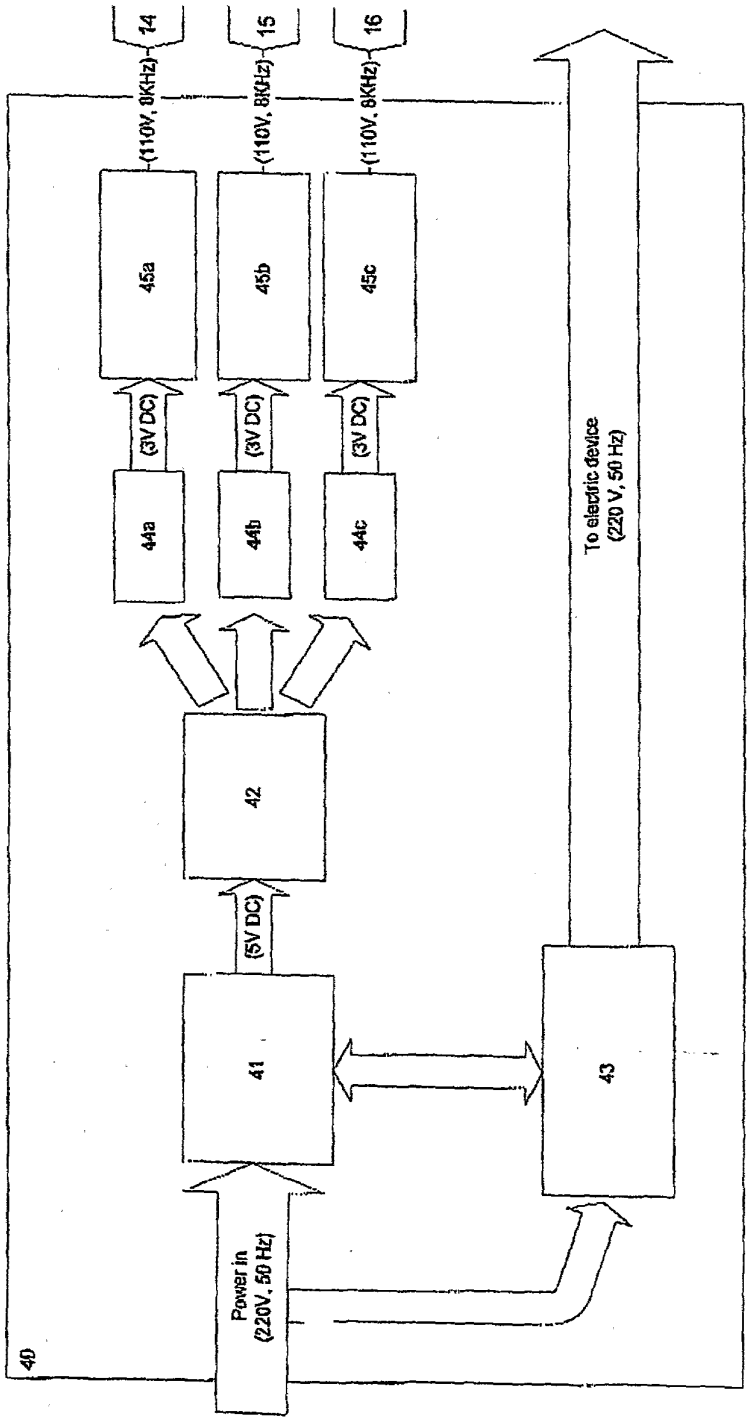

14
15
16
(110V, 8KHz)
(110V, 8KHz)
(110V, 8KHz)
45a
45b
45c
(3V DC)
(3V DC)
(3V DC)
44a
44b
44c
42
(5V DC)
41
43
To electric device
(220 V, 50 Hz)
Power in
(220V, 50 Hz)
40

Fig. 4