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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	09/10/2019	10410316	094060-0034	6051

1923 7590 08/21/2019

MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

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 124 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):

Edgard Baudry, Nantes Cedex, FRANCE;
MyScript, Nantes Cedex 3, FRANCE;
Bertrand Gourraud, Nantes Cedex, FRANCE;

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.

GOODNOTES EXHIBIT 1004 (IPR2026-00388)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

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

By fax, send to: (571)-273-2885

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

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

1923 7590 05/01/2019
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

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

Cinnamon Francis	(Typed or printed name)
/Cinnamon Francis/	(Signature)
7/31/2019 Filed By EFS	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

TITLE OF INVENTION: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/01/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
CHOW, JEFFREY J	2612	345-619000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

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

McDermott Will & Emery LLP
1 _____
2 _____
3 _____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: MyScript

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Nantes Cedex, France

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

4a. Fees submitted: ☒ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

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

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

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

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature /Thomas M. DaMario/ Date 7/31/2019

Typed or printed name Thomas M. DaMario Registration No. 77,142

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	14978081
Filing Date:	22-Dec-2015
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Filer:	Thomas Michael DaMario/Olga Melendez
Attorney Docket Number:	094060-0034

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**500**

Electronic Acknowledgement Receipt

EFS ID:	36747374
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Thomas Michael DaMario/Olga Melendez
Filer Authorized By:	Thomas Michael DaMario
Attorney Docket Number:	094060-0034
Receipt Date:	31-JUL-2019
Filing Date:	22-DEC-2015
Time Stamp:	18:00:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$500
RAM confirmation Number	E20197UI01085107
Deposit Account	
Authorized User	

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

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)	094060-0034_Issue_Fee_Transmittal_Final.pdf	120174 8b46d001a2faec7cbf4bb67740457bc4e4c98783	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30390 87d97733c33564024e166408ba475ca76b92ba98	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	150564		

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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14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

1923 7590 06/18/2019

MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

EXAMINER
CHOW, JEFFREY J

ART UNIT	PAPER NUMBER
2612	

NOTIFICATION DATE	DELIVERY MODE
06/18/2019	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):

mweipdocket@mwe.com

Corrected ***Notice of Allowability***	**Application No.** 14/978,081	**Applicant(s)** Baudry et al.	
	Examiner JEFFREY J CHOW	**Art Unit** 2612	**AIA (FITF) Status** Yes

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

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

1. ☑ This communication is responsive to 10 April 2019.
   ☐ 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 19-20,22-24,26-28 and 30 . 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 areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

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

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

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

Attachment(s)

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

/JEFFREY J CHOW/
Primary Examiner, Art Unit 2612

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	**Art Unit**
	JEFFREY J CHOW	2612

CPC								
Symbol							**Type**	**Version**
G06T	/	3	/	0075			F	2013-01-01
G06F	/	3	/	04883			I	2013-01-01
G06K	/	9	/	00402			I	2013-01-01
G06T	/	7	/	60			I	2013-01-01
G06K	/	9	/	222			I	2013-01-01

CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
	/		/							

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	9	
/JEFFREY J CHOW/ Primary Examiner, Art Unit 2612	12 June 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	23	17B

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	**Art Unit**
	JEFFREY J CHOW	2612

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06T3/00	/	3	/	00
G06F3/0488	/	3	/	0488
G06K9/00	/	9	/	00
G06T7/60	/	7	/	60
G06K9/22	/	9	/	22

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	9	
/JEFFREY J CHOW/ Primary Examiner, Art Unit 2612	12 June 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	23	17B

U.S. Patent and Trademark Office — Part of Paper No.: 20190612

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	**Art Unit**
	JEFFREY J CHOW	2612

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

CLAIMS

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

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 9	
/JEFFREY J CHOW/ Primary Examiner, Art Unit 2612 (Primary Examiner)	12 June 2019 (Date)	O.G. Print Claim(s) 23	O.G. Print Figure 17B

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

1923 7590 05/01/2019
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

EXAMINER
CHOW, JEFFREY J

ART UNIT	PAPER NUMBER
2612	

DATE MAILED: 05/01/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

TITLE OF INVENTION: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/01/2019

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

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Commissioner for Patents
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Washington, DC 20001

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

TITLE OF INVENTION: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

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CHOW, JEFFREY J	2612	345-619000

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1 _____
2 _____
3 _____

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

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

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

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

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

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

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Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

1923 7590 05/01/2019

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EXAMINER	
CHOW, JEFFREY J	
ART UNIT	PAPER NUMBER
2612	

DATE MAILED: 05/01/2019

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

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

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

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

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 14/978,081	Applicant(s) Baudry et al.	
	Examiner JEFFREY J CHOW	Art Unit 2612	AIA (FITF) Status Yes

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

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

1. ☑ This communication is responsive to 10 April 2019.
   ☐ 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 19,22-24,26-28 and 30 . 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 areply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

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

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

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

Attachment(s)

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

/JEFFREY J CHOW/
Primary Examiner, Art Unit 2612

Notice of Pre-AIA or AIA Status

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

DETAILED ACTION

Examiner's Amendment

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

Authorization for this examiner's amendment was given in a telephone interview with Thomas DaMario (77,142) on 25 April 2019.

The application has been amended as follows:

Please cancel claims 1 – 18 and 31 – 33.

Allowable Subject Matter

Claims 19, 22-24, 26-28, and 30 are allowed.

The following is an examiner's statement of reasons for allowance: are not taught or rendered obvious by the cited prior art.

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

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY J CHOW whose telephone number is (571)272-8078. The examiner can normally be reached on 11AM-7PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ke Xiao can be reached on (571) 272-7776. 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.

/JEFFREY J CHOW/
Primary Examiner, Art Unit 2612

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	**Art Unit**
	JEFFREY J CHOW	2612

CPC								
Symbol							**Type**	**Version**
G06T	/	3	/	0075			F	2013-01-01
G06F	/	3	/	04883			I	2013-01-01
G06K	/	9	/	00402			I	2013-01-01
G06T	/	7	/	60			I	2013-01-01
G06K	/	9	/	222			I	2013-01-01

CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
	/		/							

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	8	
/JEFFREY J CHOW/ Primary Examiner, Art Unit 2612	25 April 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	23	17B

U.S. Patent and Trademark Office — Part of Paper No.: 20190425

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	**Art Unit**
	JEFFREY J CHOW	2612

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06T3/00	/	3	/	00
G06F3/0488	/	3	/	0488
G06K9/00	/	9	/	00
G06T7/60	/	7	/	60
G06K9/22	/	9	/	22

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	8	
/JEFFREY J CHOW/ Primary Examiner, Art Unit 2612	25 April 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	23	17B

U.S. Patent and Trademark Office — Part of Paper No.: 20190425

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	**Art Unit**
	JEFFREY J CHOW	2612

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

CLAIMS

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

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 8	
/JEFFREY J CHOW/ Primary Examiner, Art Unit 2612 (Primary Examiner)	25 April 2019 (Date)	O.G. Print Claim(s) 23	O.G. Print Figure 17B

U.S. Patent and Trademark Office

Part of Paper No.: 20190425

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	Art Unit
	JEFFREY J CHOW	2612

CPC - Searched*		
Symbol	Date	Examiner
G06F3/04883, 3/03545, 3/0488	9/30/2017	JJC
G06K2209/01, 9/222, 9/00442, 9/00402, 9/32	9/30/2017	JJC
Above Updated	4/12/2018	JJC
Above Updated	01/04/2019	JJC
Above Updated	04/25/2019	JJC

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	9/30/2017	JJC
Inventor Name Search	9/30/2017	JJC
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	4/12/2018	JJC
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	01/04/2019	JJC
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	04/25/2019	JJC

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	Art Unit
	JEFFREY J CHOW	2612

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	See attached Interference Search Report	4/13/2018	JJC
	See attached Interference Search Report	01/04/2019	JJC
	See attached Interference Search Report	04/25/2019	JJC

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	78675	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2019/04/25 15:42
L2	35517	(cursor) near6 (character letter block box word region)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2019/04/25 15:42
L3	2781	L1 and L2	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2019/04/25 15:42
L4	1091	L3 AND ((G06K2209/01 OR G06K9/222 OR G06K9/00442 OR G06K9/00402 OR G06K9/32 OR G06F3/04883 OR G06F3/03545 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2019/04/25 15:42
L5	48	(handwrit$4 hand adj writ$4) with align$4 near3 (reference line)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2019/04/25 15:42

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	1391	((cursor) near6 (character letter block box word region)).clm.	USPAT	OR	ON	2019/04/25 15:42
L7	32881	(handwrit$4 hand adj writ$4)	USPAT	OR	ON	2019/04/25 15:42
L8	105	L6 and L7	USPAT	OR	ON	2019/04/25 15:42

4/ 25/ 2019 3:50:41 PM
C:\ Users\ jchow\ Documents\ EAST\ Workspaces\ 14978081 Aligning Handwritten Characters using Ratio Beautifying Ink.wsp

PTO/SB/06 (07)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/978,081	Filing Date 12/22/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $210 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/10/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 30	Minus	** 30	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 6	Minus	*** 3	= 3		x $230 =	690
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	690

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

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

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

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

Attorney Docket No. 094060-0034 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	:	Customer Number: 1923
Edgard BAUDRY, et al.	:	Confirmation No.: 6051
Application No.: 14/978,081	:	Art Unit: 2612
Filed: December 22, 2015	:	Examiner: Jeffrey J. Chow
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	

RESPONSE TO OFFICE ACTION MAILED JANUARY 10, 2019

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

Examiner Chow:

This is in response to the Non-final Office Action ("Office Action") mailed January 10, 2019. The original period of response to the Office Action is a shortened statutory period of three (3) months from the mailing date, *i.e.*, April 10, 2019.

Applicant respectfully requests reconsideration and allowance of the pending claims in the present Application in view of the Amendments and Remarks below.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of the Claims will replace all prior versions and listings of the claims in this patent application.

1. (Withdrawn) A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, an alignment structure of the display interface;

cause display of, on the display interface of a computing device, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of the alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. (Withdrawn) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. (Withdrawn) A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. (Withdrawn) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. (Withdrawn) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. (Withdrawn) A system according to claim 1, wherein the alignment structure is a line pattern.

7. (Withdrawn) A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, an alignment structure of the display interface;

displaying, on the display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. (Withdrawn) A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. (Withdrawn) A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. (Withdrawn) A method according to claim 7, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. (Withdrawn) A method according to claim 7, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. (Withdrawn) A method according to claim 7, wherein the alignment structure is a line pattern.

13. (Withdrawn) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computer device, an alignment structure of the display interface;

displaying, on the display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. (Withdrawn) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. (Withdrawn) A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. (Withdrawn) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. (Withdrawn) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. (Withdrawn) A non-transitory computer readable medium according to claim 13, wherein the alignment structure is a line pattern.

19. (Previously Presented) A system for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink;

cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges; and

cause said display of the input cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

20. (Original) A system according to claim 19, wherein the elements of the digital ink include text characters, the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

21. (Canceled)

22. (Previously Presented) A system according to claim 19, wherein the geometrical features include height and width of the determined ranges.

23. (Previously Presented) A method for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink;

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges; and

causing said display of the editing cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

24. (Original) A method according to claim 23, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

25. (Canceled)

26. (Previously Presented) A method according to claim 23, wherein the geometrical features include height and width of the determined ranges.

27. (Previously Presented) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for providing editing of digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink;

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges; and

causing said display of the editing cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

28. (Original) A non-transitory computer readable medium according to claim 27, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

29. (Canceled)

30. (Previously Presented) A non-transitory computer readable medium according to claim 27, wherein the geometrical features include height and width of the determined ranges.

31. (Withdrawn) A system according to claim 1, wherein the alignment structure is displayed on the display interface prior to display of first digital ink.

32. (Withdrawn) A method according to claim 7, wherein displaying the alignment structure occurs prior to displaying first digital ink.

33. (Withdrawn) A non-transitory computer readable medium according to claim 13, wherein displaying the alignment structure occurs prior to displaying first digital ink.

REMARKS

Claims 1-33 are currently pending in the present Application. In the Office Action, Examiner rejected claims 1-18 and 31-33 under 35 U.S.C. § 103 over U.S. Publication No. 2016/0147723 ("Lee") in view of U.S. Patent No. 5,953,735 ("Forcier"). Examiner has indicated that claims 19, 20, 22-24, 26-28, and 30 are allowed. By this Reply, claims 1-18 and 31-33 have been withdrawn. Applicant reserves the right to continue prosecution of claims 1-18 and 31-33 in an appropriate continuation, continuation-in-part, or divisional application.

If any questions remain, or should the present response not place the claims in condition for allowance, Examiner is cordially invited to contact the undersigned attorney so that any such matters may be promptly resolved.

Any remarks in support of patentability of one claim should not be imputed to any other claim, even if similar terminology is used. Any remarks referring to only a portion of a claim should not be understood to base patentability on that portion; rather, patentability rests on each claim taken as a whole. The absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be other reasons for patentability of any or all claims that have not been expressed. Finally, nothing in this paper should be construed as intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment or cancellation of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment or cancellation.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 13-0206 and please credit any excess fees to such deposit account.

Respectfully submitted,

Dated: April 10, 2019

By: /Amol A. Parikh/

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DM_US 159133964-1.094060.0034

Electronic Acknowledgement Receipt

EFS ID:	35685682
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Olga Melendez
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	10-APR-2019
Filing Date:	22-DEC-2015
Time Stamp:	15:34:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		094060-0034_Response_to_NFOA.pdf	117690 44ef2bebfaed40fcd004536c684a860b96c228b3	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	9
Warnings:			
Information:			
	Total Files Size (in bytes):	117690	

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

1923 7590 01/10/2019

MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

EXAMINER
CHOW, JEFFREY J

ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
01/10/2019	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):

mweipdocket@mwe.com

Office Action Summary	Application No. 14/978,081	Applicant(s) Baudry et al.	
	Examiner JEFFREY J CHOW	Art Unit 2617	AIA Status Yes

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 17 October 2018.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 1-20,22-24,26-28 and 30-33 is/are pending in the application.

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

6) ☑ Claim(s) 19-20,22-24,26-28 and 30 is/are allowed.

7) ☑ Claim(s) 1-18 and 31-33 is/are rejected.

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

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

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

Application Papers

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

11)☑ The drawing(s) filed on 21 March 2018 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☑ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

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

DETAILED ACTION

Response to Arguments

Applicant's arguments regarding claims 1 - 18, filed 17 October 2018, have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Claim Rejections - 35 USC § 103

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

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims the examiner presumes that the subject matter of the various claims was commonly owned as of the effective filing date of the claimed invention(s) absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and effective filing dates of each claim that was not commonly owned as of the effective filing date of the later invention in order for the examiner to consider the applicability of 35 U.S.C. 102(b)(2)(C) for any potential 35 U.S.C. 102(a)(2) prior art against the later invention.

Claims 1 – 18 and 31 – 33 is/are rejected under 35 U.S.C. 103 as being unpatentable over Lee et al. (US 2016/0147723) in view of Forcier (US 5,953,735).

Regarding independent claim 1, Lee teaches a system for beautifying digital ink on computing devices (Figure 23), each computing device comprising a processor (Figure 23: Processor 1300) and at least one non-transitory computer readable medium (Figure 23: Memory 1700) for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on the display interface, first digital ink in accordance with the handwriting input (Figure 1: left display comprising handwritten input);

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of the alignment structure of the display interface, a structuring transformation of the first digital ink (paragraph 102: the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height); and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation (Figure 1: right display comprising transformation of the handwritten input into an amended handwritten input).

Lee does not expressly disclose cause display, on a display interface of a computing device, an alignment structure of the display interface, however Lee does disclose the use of an alignment structures (Figures 11A – 11E, and 14 – 16). Forcier discloses document display screen 30 with reference lines that later receives handwritten input (column 8, lines 8 – 18, column 11, line 54 – column 12, line 4 and Figure 7) and later aligns the handwritten input to one of the reference lines (column 43, lines 46 - 60). It would have been obvious for one of ordinary skill in the art at the time of the invention or at the time of the effective filing date of the application to modify Lee's system to display reference lines prior to handwritten input for users to handwrite along the reference lines, which would later the handwritten input would be more aligned to one of the reference lines. One would be motivated to do so because this would help the user to produce more legible handwritten prior to alignment by the computer.

Regarding dependent claim 2, Lee teaches to determine the structuring transformation from at least two comparisons of the first and second geometrical information (paragraph 102: horizontal width of the handwritten character and height of the handwritten character).

Regarding dependent claim 3, Lee teaches wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values (paragraph 102: the device 1000 may

change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height).

Regarding dependent claim 4, Lee teaches to determine the structuring transformation to scale the first digital ink to produce the second digital ink (paragraph 102: change the size of a horizontal width of a handwritten character).

Regarding dependent claim 5, Lee teaches to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink (Figures 8A – 8C and 11A – 11E).

Regarding dependent claim 6, Lee teaches wherein the alignment structure is a line pattern (Figures 8A – 8C and 11A – 11E).

Regarding dependent claim 31, the combination of Lee's and Forcier's systems teaches wherein the alignment structure is displayed on the display interface prior to display of first digital ink (column 8, lines 8 – 18, column 11, line 63 – column 12, line 4 and Figure 7: document display screen 30 with reference lines that later receives handwritten input).

Regarding claims 7 – 18, 32, and 33, claims 7 – 18, 32, and 33 are similar in scope as to claims 1 – 6 and 31, thus the rejections for claims 1 – 6 and 31 hereinabove are applicable to claims 7 – 18, 32, and 33.

Allowable Subject Matter

Claims 19, 20, 22 - 24, 26 - 28, and 30 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY J CHOW whose telephone number is (571)272-8078. The examiner can normally be reached on 11AM-7PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Tryder can be reached on 571-270-7365. 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.

/JEFFREY J CHOW/
Primary Examiner, Art Unit 2617

Notice of References Cited	Application/Control No. 14/978,081	Applicant(s)/Patent Under Reexamination Baudry et al.	
	Examiner JEFFREY J CHOW	Art Unit 2617	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20170103046-A1	04-2017	Schroder; Holden	G06F17/214	1/1
*	B	US-5953735-A	09-1999	Forcier; Mitchell D.	G06F3/0488	715/273
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	Art Unit
	JEFFREY J CHOW	2617

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06F3/04883, 3/03545, 3/0488	9/30/2017	JJC
G06K2209/01, 9/222, 9/00442, 9/00402, 9/32	9/30/2017	JJC
Above Updated	4/12/2018	JJC
Above Updated	01/04/2019	JJC

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

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

Search Notes		
Search Notes	**Date**	**Examiner**
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	9/30/2017	JJC
Inventor Name Search	9/30/2017	JJC
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	4/12/2018	JJC
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	01/04/2019	JJC

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	Art Unit
	JEFFREY J CHOW	2617

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	See attached Interference Search Report	4/13/2018	JJC
	See attached Interference Search Report	01/04/2019	JJC

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14/978,081	Baudry et al.
	Examiner	Art Unit
	JEFFREY J CHOW	2617

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

CLAIMS

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

CLAIM		DATE								
Final	Original	10/01/2017	04/12/2018	01/04/2019						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	✓	✓						
	15	✓	✓	✓						
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	26	✓	=	=						
	27	✓	=	=						
	28	✓	=	=						
	29	✓	-	-						
	30	✓	=	✓						
	31			✓						
	32			✓						
	33			✓						

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	77258	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2019/01/04 13:48
L5	34871	(cursor) near6 (character letter block box word region)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2019/01/04 13:48
L6	2737	L4 and L5	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2019/01/04 13:48
L7	1064	L6 AND ((G06K2209/01 OR G06K9/222 OR G06K9/00442 OR G06K9/00402 OR G06K9/32 OR G06F3/04883 OR G06F3/03545 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2019/01/04 13:48
L8	77617	(cursor point$3) near6 (character letter)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2019/01/04 13:48
L9	4726	L4 and L8	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2019/01/04 13:48

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1371	((cursor) near6 (character letter block box word region)).clm.	USPAT	OR	ON	2019/01/04 13:48
L2	32223	(handwrit$4 hand adj writ$4)	USPAT	OR	ON	2019/01/04 13:48
L3	104	L1 and L2	USPAT	OR	ON	2019/01/04 13:48

1/4/2019 2:38:30 PM
C:\Users\jchow\Documents\EAST\Workspaces\14978081 Aligning Handwritten Characters using Ratio Beautifying Ink.wsp

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/978,081	Filing Date 12/22/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT **10/17/2018**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 30	Minus	** 30	= 0	X $50 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $230 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

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

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

LIE
ANTHONY WILLIAMS

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/30EFS (02-18)
Approved for use through 12/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	14978081	Filing Date	2015-12-22	Docket Number (if applicable)	094060-0034	Art Unit	2617
First Named Inventor	Edgard Baudry			Examiner Name	Jeffery J. Chow		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 130206

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

X Patent Practitioner Signature

Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	/Thomas DaMario/	Date (YYYY-MM-DD)	2018-10-17
Name	Thomas DaMario	Registration Number	77142

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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

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

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

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

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

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

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

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

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

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

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

PTO/AIA/22 (03-13)
Approved for use through 11/30/2020. OMB 0651-0031
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.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): 094060-0034

Application Number: 14978081

Filed: December 22, 2015

For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

Art Unit: 2617

Examiner: Jeffery J. Chow

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	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 700.00
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

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

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 130206.

☑ Payment made via EFS-Web.

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.

☑ attorney or agent of record. Registration number 77142.

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

/Thomas DaMario/ — Signature

October 17, 2018 — Date

Thomas DaMario — Typed or printed name

3123722000 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	14978081
Filing Date:	22-Dec-2015
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Filer:	Thomas Michael DaMario/Cinnamon Francis
Attorney Docket Number:	094060-0034

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
RCE- 1ST REQUEST	2801	1	650	650
		Total in USD ($)		**1350**

Electronic Acknowledgement Receipt

EFS ID:	34032596
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Thomas Michael DaMario/Cinnamon Francis
Filer Authorized By:	Thomas Michael DaMario
Attorney Docket Number:	094060-0034
Receipt Date:	17-OCT-2018
Filing Date:	22-DEC-2015
Time Stamp:	13:01:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1350
RAM confirmation Number	101718INTEFSW00010874130206
Deposit Account	130206
Authorized User	Thomas DaMario

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

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

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		094060-0034_Response_10-17-18.pdf	141621 1020e8a30d439eb8ef41d1cdc522b5296bff24ab	yes	11
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment Submitted/Entered with Filing of CPA/RCE		1	1	
	Claims		2	7	
	Applicant Arguments/Remarks Made in an Amendment		8	11	
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	RCE_094060-0034_10-17-18.pdf	1349938 cebdbd58d10ca2b4981d13fa7659f1cc6af4dc60	no	3
Warnings:					
Information:					
3	Extension of Time	Extension094060-0034.pdf	148853 435264d635db962e26b0c903f90aaebd6925e2dc	no	2
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32438 7d0e938c5797f17c77b132483575856c412c7548	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1672850		

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.

Docket No.: 094060-0034 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Customer Number: 1923
Edgard BAUDRY et al.	:	Confirmation Number: 6051
Application No.: 14/978,081	:	Group Art Unit: 2617
Filed: December 22, 2015	:	Examiner: Jeffrey J. Chow
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	

RESPONSE TO OFFICE ACTION MAILED APRIL 18, 2018

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

Sir:

This Reply is in response to the Office Action mailed April 18, 2018. A request for a three-month extension of time is attached herewith.

This Reply should be considered a submission in a Request for Continued Examination (RCE) under 37 C.F.R. 1.114 (see attached *Transmittal*). The Commissioner is hereby authorized to charge the cost of this request in accordance with §1.17(e) to Deposit Account No. 13-0206. Reconsideration of the referenced application, including all pending claims, is respectfully requested in light of the amendments and remarks set forth below.

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

AMENDMENTS TO CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in this application.

1. (Currently Amended) A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, an alignment structure of the display interface;

cause display of, on [[a]]the display interface ~~of a computing device~~, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of [[an]]the alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. (Original) A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. (Original) A system according to claim 1, wherein the alignment structure is a line pattern.

7. (Currently Amended) A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, an alignment structure of the display interface;

displaying, on [[a]]the display interface ~~of a computing device~~, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. (Original) A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. (Original) A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. (Original) A method according to claim 7, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. (Original) A method according to claim 7, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. (Original) A method according to claim 7, wherein the alignment structure is a line pattern.

13. (Currently Amended) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computer device, an alignment structure of the display interface;

displaying, on [[a]]the display interface ~~of a computing device~~, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. (Original) A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. (Original) A non-transitory computer readable medium according to claim 13, wherein the alignment structure is a line pattern.

19. (Previously Presented) A system for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink;

cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges; and

cause said display of the input cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

20. (Original) A system according to claim 19, wherein the elements of the digital ink include text characters, the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

21. (Canceled)

22. (Previously Presented) A system according to claim 19, wherein the geometrical features include height and width of the determined ranges.

23. (Previously Presented) A method for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink;

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges; and

causing said display of the editing cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

24. (Original) A method according to claim 23, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

25. (Canceled)

26. (Previously Presented) A method according to claim 23, wherein the geometrical features include height and width of the determined ranges.

27. (Previously Presented) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for providing editing of digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink;

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges; and

causing said display of the editing cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

28. (Original) A non-transitory computer readable medium according to claim 27, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

29. (Canceled)

30. (Previously Presented) A non-transitory computer readable medium according to claim 27, wherein the geometrical features include height and width of the determined ranges.

31. (New) A system according to claim 1, wherein the alignment structure is displayed on the display interface prior to display of first digital ink.

32. (New) A method according to claim 7, wherein displaying the alignment structure occurs prior to displaying first digital ink.

33. (New) A non-transitory computer readable medium according to claim 13, wherein displaying the alignment structure occurs prior to displaying first digital ink.

REMARKS

Claims 1-20, 22-24, 26-28 and 30 are pending in this Application. By this Reply, Applicant has amended Claims 1, 7, and 13. New claims 31-33 have been added. Support for the new claims is found in the original disclosure, including, for example, in the specification at paragraphs 0067. No new matter has been added herein.

The Examiner rejected claims 1-18 under 35 USC 102(a)(2) as being anticipated by Lee et al. (US 2016/0147723) ("Lee"). Further the Examiner has indicated that claims 19, 20, 22-24, 26-28, and 30 are in condition for allowance. The Examiner is thanked for his consideration of the arguments present in Applicant's response to Non-Final Office Action dated October 5, 2017. Finally, Applicant notes that the Examiner has withdrawn the previously listed drawing objections contained in the Non-Final Office Action dated October 5, 2017. The Examiner is thanked for his consideration of the replacement drawings.

Entry of various comments regarding the claims and/or the art, in the Office Action, should not be construed as any acquiescence or agreement by Applicant with the stated reasoning, regardless of whether or not these remarks specifically address any particular comment from the Office Action. Reconsideration of this application for allowance of all pending claims is hereby respectfully requested in view of the amendments to the claims and following remarks.

35 U.S.C. §102 Rejections

The Office Action rejected claims 1-18 under 35 USC 102(a)(2) as being anticipated by Lee et al. (US 2016/0147723) ("Lee").

Amended claim 1 recites, in part:

> "A system for beautifying digital ink on computing devices . . . configured to: cause display of, on a display interface of a computing device, an alignment

> structure of the display interface; [and] determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of the alignment structure of the display interface, a structuring transformation of the first digital ink . . . ."

Similar features are found in Claims 7 and 13.

Applicant asserts that Lee does not anticipate amended claims 1, 7, or 13, or any of the claims dependent therefrom. Anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed, either expressly or inherently in a single prior art reference. *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471, 1479 (Fed. Cir. 1986); *Scaltech Inc. v. Retec/Tetra, LLC*, 178 F.3d 1378, 1384 (Fed. Cir. 1999) (noting that "inherency may not be established by probabilities or possibilities"). Furthermore, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970). Based on the following, it is submitted that the cited prior art does not anticipate claim 1 or any claim dependent therefrom.

Applicant respectfully submits that Lee does not teach, disclose or suggest each and every claimed feature of the claims of the present application. Specifically, Lee is silent regarding at least: "caus[ing] display of, on a display interface of a computing device, an alignment structure of the display interface . . . ."

Lee discloses, at paragraph [0102] as cited in the Office Action, "The device 1000 may change the horizontal widths of enlarged or shrunk handwritten characters by comparing the enlarged or shrunk handwritten characters with electronic characters corresponding to the handwritten characters. For example, the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height thereof." In other words, Lee discloses

recognizing a hand-written input as an electronic character, ascertaining a width of the hand-written input, retrieving a ratio of a width and a height of the recognized electronic character, and then scaling the height and/or width of the hand-written input such that a ratio of the height and width of the hand-written input is the same as the ratio of the height and width of the recognized electronic character.

This disclosure is distinct from the claimed features. Nowhere does Lee describe an "alignment structure" *of a display*. Lee is additionally silent regarding any sort of determination based on such an alignment structure of a display. Furthermore, Lee does not disclose causing display of the alignment structure on the display interface. Though a user may input handwriting anywhere within the capture area, the specification provides numerous advantages to displaying an alignment structure on the display interface, including at least providing guidance of user input and alignment of digital and typeset ink objects. *See* Specification at ¶ 0067. Lee is wholly silent regarding "alignment structures," let alone any advantages to displaying alignment structures. Accordingly, Applicant indicates that claims 1, 7, and 13 are patentable over Lee and respectfully requests withdrawal of the rejections under 35 U.S.C. § 102.

As independent claims 1, 7, and 13 are patentable for at least the reasons set forth above, it is respectfully submitted that all claims dependent on the independent claims are also patentable. It is also respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination. Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims. *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987).

Accordingly, Applicant respectfully believes all pending claims in this application to be in condition for allowance. Applicant therefore requests that the rejections of all claims under 35 U.S.C. § 102 be withdrawn.

CONCLUSION

In light of the foregoing reasons, Applicant respectfully requests reconsideration and allowance of all pending claims. The Commissioner is authorized to charge any additional fees or credit any overpayments associated with this Amendment to Deposit Account 13-0206. Applicant further invites the Examiner to contact the undersigned representative at the telephone number below to discuss any matters pertaining to the present Application.

Respectfully submitted,

Dated: October 17, 2018

By: /Thomas DaMario/

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DM_US 156181000-1.094060.0034



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

1923 7590 04/18/2018
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

EXAMINER
CHOW, JEFFREY J

ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
04/18/2018	ELECTRONIC

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

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

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

mweipdocket@mwe.com

Office Action Summary	Application No. 14/978,081	Applicant(s) BAUDRY ET AL.	
	Examiner JEFFREY CHOW	Art Unit 2617	AIA (First Inventor to File) Status Yes

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *21 March 2018*.

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

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

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

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

Disposition of Claims*

5)☒ Claim(s) *1-20,22-24,26-28 and 30* is/are pending in the application.

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

6)☒ Claim(s) *19,20,22-24,26-28 and 30* is/are allowed.

7)☒ Claim(s) *1-18* is/are rejected.

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

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

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

Application Papers

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

11)☒ The drawing(s) filed on *22 December 2015* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

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

DETAILED ACTION

Response to Arguments

Applicant's arguments regarding claims 1 - 18, filed 21 March 2018, have been fully considered but they are not persuasive.

Applicant argues Lee et al. (US 2016/0147723) does not disclose determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink, with the reason Lee disclosure of proportion/ratio is just a number is not readily visible for display (pages 9 - 11). Lee discloses horizontal width and height of a character, which maps to claimed first geometrical information, and a ratio of the horizontal width to a height of the character, which reads on the claimed second geometrical information of an alignment structure, and that the ratios between the handwritten character and the electronic character is identical, which reads on the claimed structuring transformation (paragraphs 102). Furthermore, it's clearly evident in the Figures that theirs is a transformation and alignment from handwritten characters to electronic characters (Figure 1). Therefore Lee disclosed the above claimed limitation.

Applicant's arguments regarding claims 19, 20, 22 - 24, 26 - 28, and 30 have been fully considered and are persuasive. The previous prior art rejections have been withdrawn.

The drawing objections have been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

Claim(s) 1 – 18 is/are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Lee et al. (US 2016/0147723).

Regarding independent claim 1, Lee teaches a system for beautifying digital ink on computing devices (Figure 23), each computing device comprising a processor (Figure 23: Processor 1300) and at least one non-transitory computer readable medium (Figure 23: Memory 1700) for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input (Figure 1: left display comprising handwritten input);

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink (paragraph 102: the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height); and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation (Figure 1: right display comprising transformation of the handwritten input into an amended handwritten input).

Regarding dependent claim 2, Lee teaches to determine the structuring transformation from at least two comparisons of the first and second geometrical information (paragraph 102: horizontal width of the handwritten character and height of the handwritten character).

Regarding dependent claim 3, Lee teaches wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values (paragraph 102: the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height).

Regarding dependent claim 4, Lee teaches to determine the structuring transformation to scale the first digital ink to produce the second digital ink (paragraph 102: change the size of a horizontal width of a handwritten character).

Regarding dependent claim 5, Lee teaches to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink (Figures 8A – 8C and 11A – 11E).

Regarding dependent claim 6, Lee teaches wherein the alignment structure is a line pattern (Figures 8A – 8C and 11A – 11E).

Regarding claims 7 – 18, claims 7 – 18 are similar in scope as to claims 1 – 6, thus the rejections for claims 1 – 6 hereinabove are applicable to claims 7 – 18.

Allowable Subject Matter

Claims 19, 20, 22 - 24, 26 - 28, and 30 are allowed.

Conclusion

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

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY CHOW whose telephone number is (571)272-8078. The examiner can normally be reached on Monday - Friday 10:00AM - 5:00PM (EST).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Tryder can be reached on (571)-270-7365. 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.

/JEFFREY CHOW/
Primary Examiner, Art Unit 2617

Notice of References Cited	Application/Control No. 14/978,081	Applicant(s)/Patent Under Reexamination BAUDRY ET AL.	
	Examiner JEFFREY CHOW	Art Unit 2617	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2016/0292501 A1	10-2016	Higashi; Hideto	G06T7/73	1/1
*	B	US-2014/0300609 A1	10-2014	Kang; Jaewoo	G06F3/04883	345/467
*	C	US-2009/0161958 A1	06-2009	MARKIEWICZ; JAN-KRISTIAN	G06F3/0237	382/186
*	D	US-8,879,845 B2	11-2014	Rowley; Henry A.	G06F3/017	345/179
*	E	US-5,850,477 A	12-1998	Takada; Yuji	G06F3/04883	382/186
*	F	US-7,137,077 B2	11-2006	Iwema; Marieke	G06F3/0481	715/863
	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	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

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

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14978081	BAUDRY ET AL.
	Examiner	Art Unit
	JEFFREY CHOW	2617

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/04883, 3/03545, 3/0488	9/30/2017	JJC
G06K2209/01, 9/222, 9/00442, 9/00402, 9/32	9/30/2017	JJC
Above Updated	4/12/2018	JJC

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

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

SEARCH NOTES		
Search Notes	Date	Examiner
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	9/30/2017	JJC
Inventor Name Search	9/30/2017	JJC
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	4/12/2018	JJC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	See attached Interference Search Report	4/13/2018	JJC

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S22	599	S21 and ratio	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S21	1289	S20 AND ((G06K2209/01 OR G06K9/222 OR G06K9/00442 OR G06K9/00402 OR G06K9/32 OR G06F3/04883 OR G06F3/03545 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S20	4963	S18 and S19	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S19	140618	(align$5 fit$4 snap$4) with (S18 character word sentence text)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S18	73984	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S17	126	S15 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S16	1047	(cursor) with (character) with (between)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S15	73984	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 16:31
S24	20	(cursor) with (overlap$4 near3 (bounding box))	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 19:56
S23	0	(cursor) with (character) with (overlap$4 near3 (bounding box))	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 19:56
S25	108	(cursor) with (character letter) with (overlap$4)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 19:57
S26	252	(cursor) with (character letter) same (overlap$4 italic)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 20:02

S30	1790	S29 AND ((G06K2209/01 OR G06K9/222 OR G06K9/00442 OR G06K9/00402 OR G06K9/32 OR G06F3/04883 OR G06F3/03545 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 20:06
S29	4595	S27 and S28	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 20:06
S28	75305	(cursor point$3) near6 (character letter)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 20:06
S27	73984	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 20:06
S33	987	S32 AND ((G06K2209/01 OR G06K9/222 OR G06K9/00442 OR G06K9/00402 OR G06K9/32 OR G06F3/04883 OR G06F3/03545 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2018/04/12 20:51
S32	2643	S27 and S31	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 20:51
S31	33293	(cursor) near6 (character letter block box word region)	US-PGPUB; USPAT; USOCR; EPO	OR	ON	2018/04/12 20:51

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S36	99	S34 and S35	USPAT	OR	ON	2018/04/12 21:18
S35	30709	(handwrit$4 hand adj writ$4)	USPAT	OR	ON	2018/04/12 21:18
S34	1319	((cursor) near6 (character letter block box word region)).clm.	USPAT	OR	ON	2018/04/12 21:18

4/ 13/ 2018 10:45:10 PM
C:\ Users\ jchow\ Documents\ EAST\ Workspaces\ 14978081 Aligning Handwritten Characters using Ratio Beautifying Ink.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14978081	BAUDRY ET AL.
	Examiner	**Art Unit**
	JEFFREY CHOW	2617

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

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

CLAIM		DATE								
Final	Original	10/01/2017	04/12/2018							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
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	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
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	27	✓	=							
	28	✓	=							
	29	✓	-							
	30	✓	=							

Docket No.: 094060-0034 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Customer Number: 1923
Edgard BAUDRY et al.	:	Confirmation Number: 6051
Application No.: 14/978,081	:	Group Art Unit: 2617
Filed: December 22, 2015	:	Examiner: Jeffrey J. Chow
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	

RESPONSE TO OFFICE ACTION MAILED OCTOBER 5, 2017

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

Sir:

This Reply is in response to the Office Action mailed October 5, 2017. A request for a three-month extension of time is attached herewith. Reconsideration of the referenced application, including all pending claims, is respectfully requested in light of the amendments and the remarks set forth below.

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 8 of this paper.

AMENDMENTS TO CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in this application.

1. (Original) A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. (Original) A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. (Original) A system according to claim 1, wherein the alignment structure is a line pattern.

7. (Original) A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. (Original) A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. (Original) A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. (Original) A method according to claim 7, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. (Original) A method according to claim 7, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. (Original) A method according to claim 7, wherein the alignment structure is a line pattern.

13. (Original) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. (Original) A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. (Original) A non-transitory computer readable medium according to claim 13, wherein the alignment structure is a line pattern.

19. (Currently Amended) A system for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; [[and]]

cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges[[.]]; and

cause said display of the input cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

20. (Original) A system according to claim 19, wherein the elements of the digital ink include text characters, the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

21. (Canceled)

22. (Currently Amended) A system according to claim [[21]]19, wherein the geometrical features include height and width of the determined ranges.

23. (Currently Amended) A method for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; [[and]]

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges[[.]]; and

causing said display of the editing cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

24. (Original) A method according to claim 23, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

25. (Canceled)

26. (Currently Amended) A method according to claim 23[[25]], wherein the geometrical features include height and width of the determined ranges.

27. (Currently Amended) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for providing editing of digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; [[and]]

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges[[.]]; and

causing said display of the editing cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink.

28. (Original) A non-transitory computer readable medium according to claim 27, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

29. (Canceled)

30. (Currently Amended) A non-transitory computer readable medium according to claim 27[[29]], wherein the geometrical features include height and width of the determined ranges.

REMARKS

Claims 1-2, 22-24, 26-28 and 30 are pending in this Application. By this Reply, Applicant has amended Claims 19, 22, 23, 26, 27 and 30. No new claims have been added herein.

The Examiner rejected claims 1-18 under 35 USC 102(a)(2) as being anticipated by Lee et al. (US 2016/0147723) ("Lee"). Further the Examiner rejected claims 19-30 under 35 USC 103 as being unpatentable over Lee in view of Clary (US 2010/0309131) ("Clary").

Entry of various comments regarding the claims and/or the art, in the Office Action, should not be construed as any acquiescence or agreement by Applicant with the stated reasoning, regardless of whether or not these remarks specifically address any particular comment from the Office Action. Reconsideration of this application for allowance of all pending claims is hereby respectfully requested in view of the amendments to the claims and following remarks.

Drawing Objections

The drawings were objected to for allegedly failing to include descriptions in illustrated boxes. Solely to expedite prosecution, and without conceding the appropriateness of any objections, the drawings have been amended. In particular, replacement sheets 1-3 are filed with this response in accordance with the Office Action's comments. Applicant thus respectfully requests the withdrawal of these objections.

35 U.S.C. §102/103 Rejections

The Office Action rejected claims 1-18 under 35 USC 102(a)(2) as being anticipated by Lee et al. (US 2016/0147723) ("Lee"). The Office Action rejected Claims 1-19 under 35 U.S.C. 103 as being unpatentable over Lee in view of Clary (US 2010/0309131).

Claim 1 recites, in part:

> "…determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink; and
>
> cause display of, on the display interface, second digital ink in accordance with the structuring transformation."

Similar features are found in Claims 7 and 13.

Solely to expedite prosecution, and without conceding the appropriateness of any rejections, Claim 19 is amended and recites, in part:

> "…cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges; and
>
> cause said display of the input cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink."

Similar features are found in Claims 23 and 27.

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed, either expressly or inherently (noting that "inherency may not be established by probabilities or possibilities", *Scaltech Inc. v. Retec/Tetra*, 178 F.3d 1378 (Fed. Cir. 1999)), in a single prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986), based on the following, it is submitted that the cited prior art does not anticipate Claim 1 or any claim dependent thereon. Further, "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970).

A proper *prima facie* case of obviousness requires that a prior art reference, or references when combined, provide all of the claim limitations and must establish that it would be obvious for one of ordinary skill in the art to combine the references in a way that would successfully result in the claimed invention. Applicant respectfully traverses the § 103 rejections and further submits that a *prima facie* case of obviousness has not been established by the Office Action's rejections for at least the reasons below.

Applicant respectfully submits that the cited references, taken alone or in combination, do not teach, disclose or suggest each and every claimed feature of the claims of the present application. In particular, Applicant submits that the cited references, taken alone or in combination, do not teach or disclose at least the above-cited portions of Claims 1 and 19, and similar portions of Claims 7, 13, 23 and 27.

Initially, the references are silent regarding at least:

> "…determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input **and second geometrical information of an alignment structure of the display interface**, a structuring transformation of the first digital ink; and
>
> cause display of, on the display interface, second digital ink **in accordance with the structuring transformation**." (Emphasis Added)

Lee discloses, at paragraph [0102] as cited in the Office Action, "The device 1000 may change the horizontal widths of enlarged or shrunk handwritten characters by comparing the enlarged or shrunk handwritten characters with electronic characters corresponding to the handwritten characters. For example, the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height thereof." In other words, Lee discloses recognizing a hand-written input as an electronic character, ascertaining a width of the hand-

written input, retrieving a ratio of a width and a height of the recognized electronic character, and then scaling the height and/or width of the hand-written input such that a ratio of the height and width of the hand-written input is the same as the ratio of the height and width of the recognized electronic character.

This is clearly distinct from the claimed features. Initially, nowhere does Lee describe an "alignment structure" of a display. Further, Lee is silent regarding any sort of determination based on such an alignment structure of a display. Instead, Lee describes a comparison between a height/width ratio of a recognized electronic stock character and a height/width ratio of a handwritten input. This is completely different from the claimed **alignment structure** of a **display**. The proportions of the recognized stock electronic character are not part of, displayed on, visible on or incorporated with the display. Instead, such proportions are never displayed on the display and the height/width ratio of the recognized character merely exists as an electronically-stored number.

Thus, no determination of a structuring transformation in Lee is made from any alignment structure of a display, as claimed. It also logically follows that no display of second digital ink is made "in accordance with the structuring transformation" as is also claimed.

Turning now to the rejections of Claims 19-30, the cited references do not teach or disclose at least "…cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges; and cause said display of the input cursor within a region of overlap of ranges of elements of the digital ink determined in the step of determining ranges of elements of the digital ink." Cited paragraph [0066] of Clary reads, in part:

> "Depending upon the location of the cursor relative to the bounding boxes 902 that surround each stroke 904, the pen-enabled computing device 100 may shift the cursor 912 position somewhat. In this regard, the central processing unit 320, in cooperation with the computer program product 500, determines if the

> cursor 912 position is located within a bounding box 902. If the cursor 912 position is located within one or more bounding boxes 902, the pen-enabled computing device 100 determines the x coordinate of the center of the largest bounding box 902. If the cursor position is at an x position greater than the x position of the center of the largest bounding box, the central processing unit 320 shifts the cursor 912 position to correspond to or be slightly larger than the largest x value 900 b associated with the bounding box 902, i.e., shifts the cursor 912 to the right side of the largest bounding box. Alternatively, if the cursor 912 position has an x value that is less than the x position of the center of the largest bounding box 902, the central processing unit 320 shifts the cursor 912 position to an x position that is equal to the smallest x value 900 a associated with the bounding box 902, i.e., shifts the cursor 912 position to the left of the smallest bounding box 902."

Accordingly, the reference describes an adjustment of a position of a cursor based on its selected position relative to bounding boxes, and adjusting the cursor position (for example, the X-value) accordingly. However, the reference **does not describe or disclose any overlapping bounding boxes**. Further, the reference does not disclose or describe displaying a cursor "within a region of **overlap of ranges of elements** of the digital ink" as claimed. Emphasis added. Accordingly, Applicant respectfully submits that the cited references, taken alone or in combination, are silent regarding at least this feature.

As the independent claims are patentable for at least the reasons set forth above, it is respectfully submitted that all claims dependent on the independent claims are also patentable. It is also respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination. Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, Hartness International Inc. v. Simplimatic Engineering Co., 819 F.2d at 1100, 1108 (Fed. Cir. 1987).

Accordingly, Applicant respectfully believes all pending claims in this application to be in condition for allowance. Applicant therefore requests that the rejections of all claims under 35 U.S.C. § 102 and 103 be withdrawn.

CONCLUSION

In light of the foregoing reasons, Applicant respectfully requests reconsideration and allowance of all pending claims. The Commissioner is authorized to charge any additional fees or credit any overpayments associated with this Amendment to Deposit Account 13-0206. Applicant further invites the Examiner to contact the undersigned representative at the telephone number below to discuss any matters pertaining to the present Application.

Respectfully submitted,

Dated: March 21, 2018

By: /Amol A. Parikh/

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DM_US 89391406-1.094060.0034

Replacement Sheet

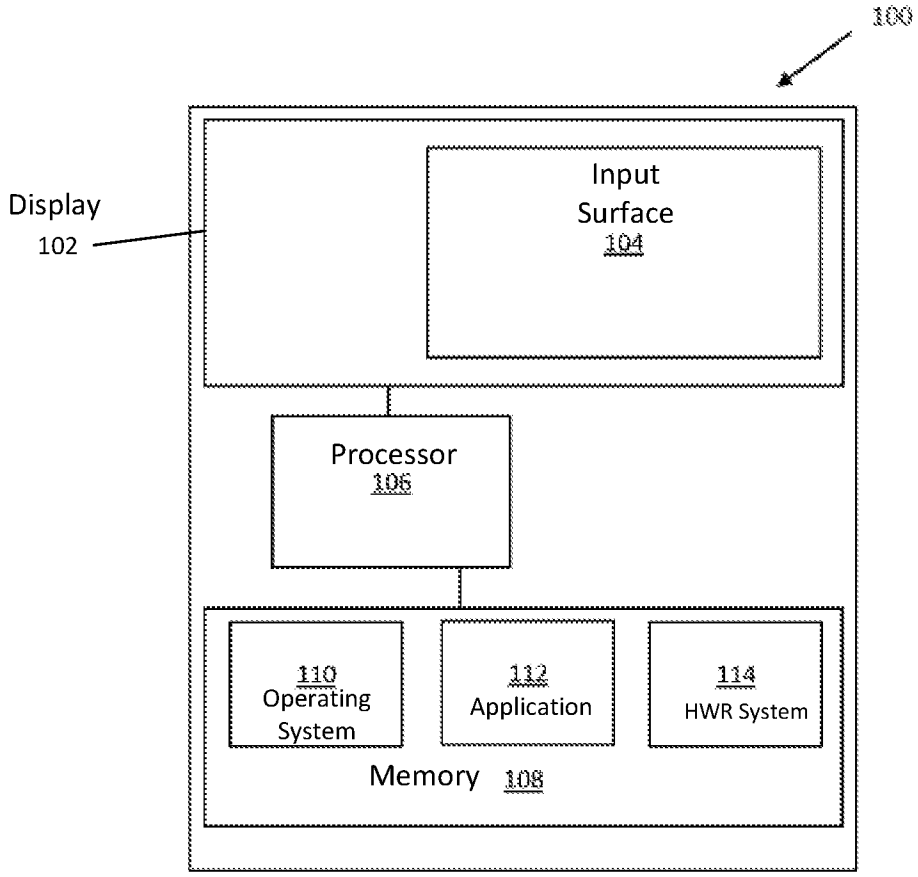


FIG. 1

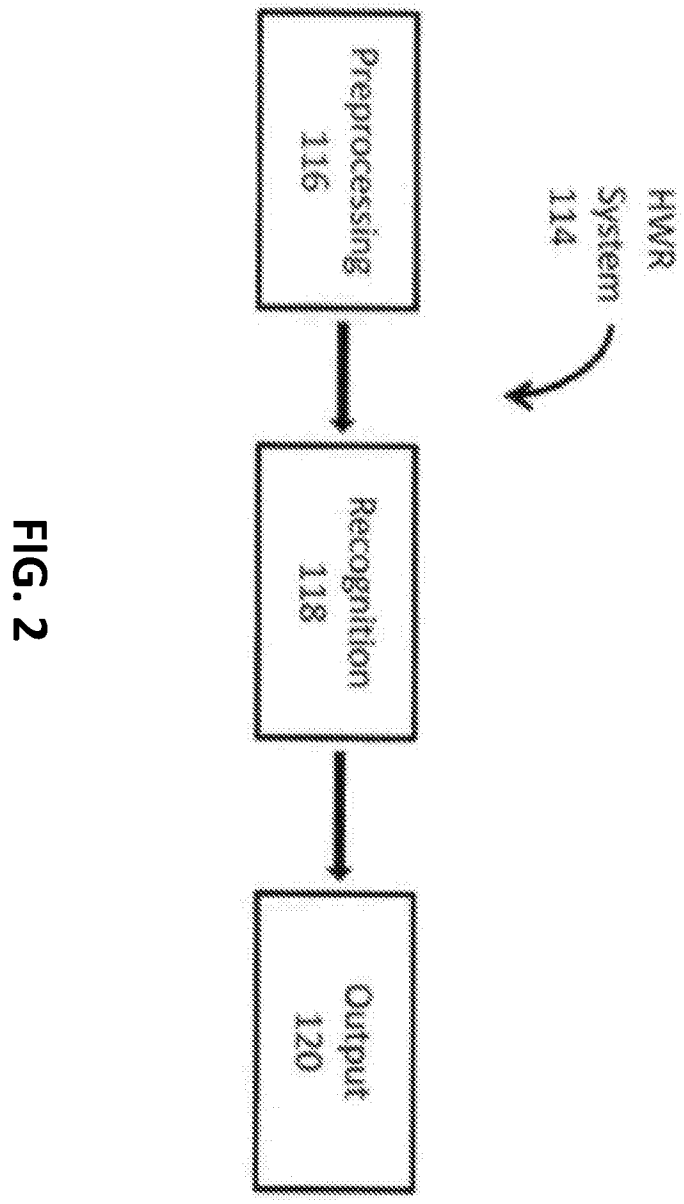
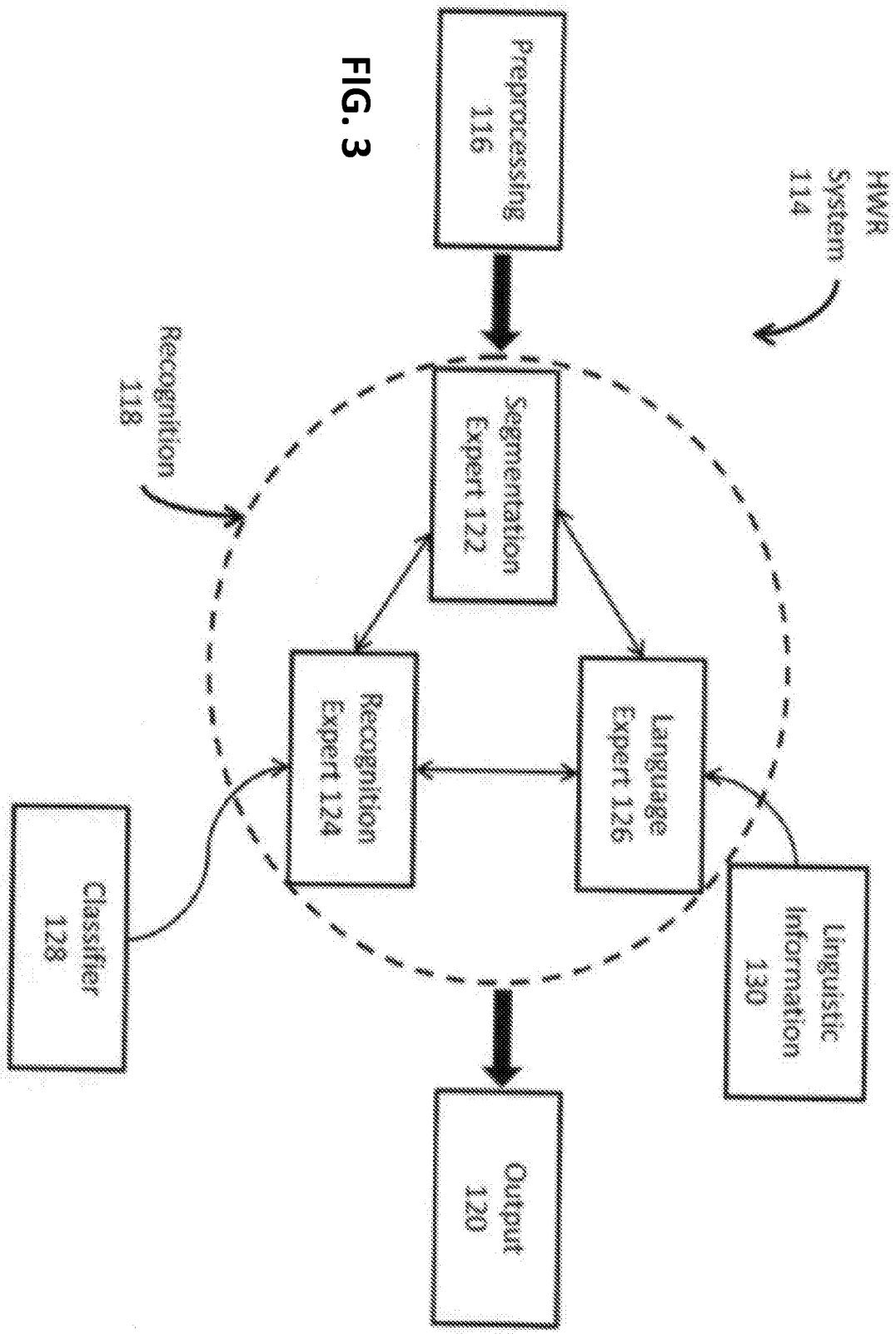

Preprocessing
116
HWR
System
114
Recognition
118
Output
120

FIG. 2

FIG. 3


HWR System 114
Preprocessing 116
Recognition 118
Segmentation Expert 122
Recognition Expert 124
Language Expert 126
Classifier 128
Linguistic Information 130
Output 120

PTO/AIA/22 (03-13)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): 094060-0034

Application Number: 14/978,081

Filed: December 22, 2015

For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

Art Unit: 2617

Examiner: Jeffrey J. Chow

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	Micro Entity Fee	
☐	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☑	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$ 700
☐	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
☐	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

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

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ 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 130206.

☑ Payment made via EFS-Web.

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.

☑ attorney or agent of record. Registration number 60,671.

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

/Amol A. Parikh/ — Signature

March 21, 2018 — Date

Amol A. Parikh — Typed or printed name

312-372-2000 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. 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: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	14978081
Filing Date:	22-Dec-2015
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Filer:	Amol A. Parikh/Masako Kozawa
Attorney Docket Number:	094060-0034

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	2253	1	700	700
Miscellaneous:				
			Total in USD ($)	**700**

Electronic Acknowledgement Receipt

EFS ID:	32119608
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Masako Kozawa
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	21-MAR-2018
Filing Date:	22-DEC-2015
Time Stamp:	16:28:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$700
RAM confirmation Number	032218INTEFSW00002396130206
Deposit Account	130206
Authorized User	Amol Parikh

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

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

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		094060-0034AmendmentAsFiled.pdf	126525 25359a6339792e1dd01ae4cb37f7e5e2effbec4d	yes	13
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	1	
	Claims		2	7	
	Amendment/Argument after Patent Board Decision		8	13	
Warnings:					
Information:					
2	Drawings-only black and white line drawings	094060-0034ReplacementDrawingsAsFiled.pdf	237105 517ed48c860babea1fa1d9b1fe58687a37765d62	no	3
Warnings:					
Information:					
3	Extension of Time	094060-0034EOTwAmendmentAsFiled.pdf	130057 5b610d18ecf433acea0a7696d2df73e07ef9b3af	no	2
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30986 90050b5e99ad0554065aa2e8eb0701c76f12c4c6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	524673		

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/978,081	Filing Date 12/22/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

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

		(Column 1)		(Column 2)	(Column 3)		
	03/21/2018	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 27	Minus	** 30	= 0	X $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

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

LIE
Chantae Dessau

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.
14/978,081	12/22/2015	Edgard Baudry	094060-0034	6051

1923 7590 10/05/2017

MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

EXAMINER
CHOW, JEFFREY J

ART UNIT	PAPER NUMBER
2617	

NOTIFICATION DATE	DELIVERY MODE
10/05/2017	ELECTRONIC

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

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

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

mweipdocket@mwe.com

Office Action Summary	Application No. 14/978,081	Applicant(s) BAUDRY ET AL.	
	Examiner JEFFREY CHOW	Art Unit 2617	AIA (First Inventor to File) Status Yes

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

Period for Reply

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

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

Status

1)☒ Responsive to communication(s) filed on *22 December 2015*.

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

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

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

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

Disposition of Claims*

5)☒ Claim(s) *1-30* is/are pending in the application.

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

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-30* is/are rejected.

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

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

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

Application Papers

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

11)☒ The drawing(s) filed on *22 December 2015* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

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

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a) because they fail to show a brief description of each boxes in Figures 1 – 3 as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

Claim(s) 1 – 18 is/are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Lee et al. (US 2016/0147723).

Regarding independent claim 1, Lee teaches a system for beautifying digital ink on computing devices (Figure 23), each computing device comprising a processor (Figure 23: Processor 1300) and at least one non-transitory computer readable medium (Figure 23: Memory 1700) for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input (Figure 1: left display comprising handwritten input);

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink (paragraph 102: the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height); and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation (Figure 1: right display comprising transformation of the handwritten input into an amended handwritten input).

Regarding dependent claim 2, Lee teaches to determine the structuring transformation from at least two comparisons of the first and second geometrical information (paragraph 102: horizontal width of the handwritten character and height of the handwritten character).

Regarding dependent claim 3, Lee teaches wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values (paragraph 102: the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height).

Regarding dependent claim 4, Lee teaches to determine the structuring transformation to scale the first digital ink to produce the second digital ink (paragraph 102: change the size of a horizontal width of a handwritten character).

Regarding dependent claim 5, Lee teaches to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink (Figures 8A – 8C and 11A – 11E).

Regarding dependent claim 6, Lee teaches wherein the alignment structure is a line pattern (Figures 8A – 8C and 11A – 11E).

Regarding claims 7 – 18, claims 7 – 18 are similar in scope as to claims 1 – 6, thus the rejections for claims 1 – 6 hereinabove are applicable to claims 7 – 18.

Claim Rejections - 35 USC § 103

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

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims the examiner presumes that the subject matter of the various claims was commonly owned as of the effective filing date of the claimed invention(s) absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and effective filing dates of each claim that was not commonly owned as of the effective filing date of the later invention in order for the examiner to consider the applicability of 35 U.S.C. 102(b)(2)(C) for any potential 35 U.S.C. 102(a)(2) prior art against the later invention.

Claims 19 – 30 is/are rejected under 35 U.S.C. 103 as being unpatentable over Lee et al. (US 2016/0147723) in view of Clary (US 2010/0309131).

Regarding independent claim 19, Lee teaches a system for providing editing of digital ink on computing devices (Figure 23), each computing device comprising a processor (Figure 23: Processor 1300) and at least one non-transitory computer readable medium (Figure 23: Memory 1700) for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input (Figure 20: left display comprising handwritten input);

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink (paragraph 102: the device 1000 may change the size of a horizontal width of a handwritten character such that a ratio of the horizontal width of the handwritten character to a height thereof is identical with a

ratio of a horizontal width of an electronic character corresponding to the handwritten character to a height).

Lee does not expressly disclose cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges, however Lee does disclose a user input of utilizing a selected area for correction (Figure 20). Clary discloses a user positioning a cursor between two handwritten characters (paragraph 66). It would have been obvious for one of ordinary skill in the art at the time of the invention or at the time of the effective filing date of the application to modify Lee's system to incorporate a cursor. One would be motivated to do so because this would allow the user to know the location of where inputs to be inserted or to know where corrections should be made.

Regarding dependent claim 20, the combination of Lee's and Clary's inventions teaches wherein the elements of the digital ink include text characters (Lee, Figure 20), the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters (Clary, paragraph 66: cursor between two handwritten characters).

Regarding dependent claim 21, the combination of Lee's and Clary's inventions teaches wherein the determined ranges of the first and second characters overlap (Lee, paragraph 125: input handwritten characters partially overlap with each other), the at least one non-transitory computer readable medium configured to:

compare geometrical features of the determined ranges of the first and second characters (Lee, paragraph 102: horizontal width of the handwritten character and height of the handwritten character); and

cause said display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison (Clary, paragraph 66: cursor placement on a border of a bounding box of a character).

Regarding dependent claim 22, the combination of Lee's and Clary's inventions teaches wherein the geometrical features include height and width of the determined ranges (Lee, paragraph 102: horizontal width of the handwritten character and height of the handwritten character).

Regarding claims 23 – 30, claims 23 – 30 are similar in scope as to claims 19 – 22, thus the rejections for claims 19 – 22 hereinabove are applicable to claims 23 – 30.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY CHOW whose telephone number is (571)272-8078. The examiner can normally be reached on Monday - Friday 10:00AM - 5:00PM (EST).

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

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Tryder can be reached on (571)-270-7365. 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.

/JEFFREY CHOW/
Primary Examiner, Art Unit 2617

Notice of References Cited	Application/Control No. 14/978,081	Applicant(s)/Patent Under Reexamination BAUDRY ET AL.	
	Examiner JEFFREY CHOW	Art Unit 2617	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2016/0147723 A1	05-2016	LEE; Dong-hyuk	G06F17/242	715/268
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

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

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BIB DATA SHEET

CONFIRMATION NO. 6051

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/978,081	12/22/2015	345	2617	094060-0034

APPLICANTS
MyScript, Nantes Cedex 3, FRANCE;

INVENTORS
Edgard Baudry, Nantes Cedex, FRANCE;
Bertrand Gourraud, Nantes Cedex, FRANCE;

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

** **FOREIGN APPLICATIONS** **********
EUROPEAN PATENT OFFICE (EPO) 15290303.5 12/08/2015

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** ** SMALL ENTITY **
01/08/2016

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged / / Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		FRANCE	12	18	3

ADDRESS

MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001
UNITED STATES

TITLE

SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

FILING FEE RECEIVED		
800	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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/J.J.C/	1	7751623		2010-07-06	Simmons et al.	

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/J.J.C/	1	0720084	EP		1996-07-03	Sharp		

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

/J.J.C/	1	INTERNATIONAL SEARCH REPORT for Related Application No. PCT/EP2016/001446, 2016-11-29, EPO-International, WPI Data.
/J.J.C/	2	"MyScript - The Power of Handwriting", 2014-12-11, Pages 1-3. URL: https://www.youtube.com/watch?v=yojFiBhPMUo

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EXAMINER SIGNATURE

Examiner Signature	/JEFFREY J CHOW/	Date Considered	09/30/2017

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Amol A. Parikh/	Date (YYYY-MM-DD)	2017-02-14
Name/Print	Amol A. Parikh	Registration Number	60671

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

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

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

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

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

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

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

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

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

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard Baudry, Conf. No. 6051
Art Unit	2668
Examiner Name	To be assigned
Attorney Docket Number	094060-0034

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/J.J.C/	1	6408092		2002-06-18	Sites	
/J.J.C/	2	7284200		2007-10-16	Bernstein et al.	

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Examiner Signature	/JEFFREY J CHOW/	Date Considered	09/30/2017

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☒ A certification statement is not submitted herewith.

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Signature	/Zachary Getzelman/	Date (YYYY-MM-DD)	2016-05-12
Name/Print	Zachary Getzelman	Registration Number	71292

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Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

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/J.J.C/	1	5396566		1995-03-07	Bruce et al.	

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/J.J.C/	1	20070003142		2007-01-04	Simard et al.	

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Attorney Docket Number	094060-0034

/J.J.C/	1	INTERNATIONAL SEARCH REPORT for related International Patent Application No. PCT/EP2016/002046, dated February 2, 2017.
/J.J.C/	2	"Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 33, No. 4, April 2011.

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EXAMINER SIGNATURE

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Signature	/Amol A. Parikh/	Date (YYYY-MM-DD)	2017-03-22
Name/Print	Amol A. Parikh	Registration Number	60671

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	4	14/500997 ("20140247276" "20110199297").pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/09/30 19:00
S3	71574	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/09/30 19:11
S5	4806	S3 and S4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/09/30 19:13
S4	135164	(align$5 fit$4 snap$4) with (S3 character word sentence text)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/09/30 19:13
S6	1234	S5 AND ((G06K2209/01 OR G06K9/222 OR G06K9/00442 OR G06K9/00402 OR G06K9/32 OR G06F3/04883 OR G06F3/03545 OR G06F3/0488).CPC.)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/09/30 19:55
S10	581	S6 and ratio	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/09/30 20:22
L2	1030	(cursor) with (character) with (between)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/10/01 23:13
L1	71574	(handwrit$4 hand adj writ$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/10/01 23:13
L3	126	1 and 2	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/10/01 23:14
L4	1	"20100309131".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	OR	ON	2017/10/01 23:27

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14978081	BAUDRY ET AL.
	Examiner	Art Unit
	JEFFREY CHOW	2617

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/04883, 3/03545, 3/0488	9/30/2017	JJC
G06K2209/01, 9/222, 9/00442, 9/00402, 9/32	9/30/2017	JJC

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Class	Subclass	Date	Examiner

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SEARCH NOTES		
Search Notes	Date	Examiner
EAST (US-PGPUB, US-PAT, USOCR, EPO, JPO, DERWENT, IBM_TDB)See Search History Printout	9/30/2017	JJC
Inventor Name Search	9/30/2017	JJC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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	JEFFREY CHOW	2617

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

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

CLAIM		DATE								
Final	Original	10/01/2017								
	1	✓								
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	4	✓								
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/J.J.C/	1	4731857		1988-03-15	Tappert	

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/J.J.C/	1	20100309131		2010-12-09	Clary	

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/J.J.C/	1	International Search Report issued for PCT/EP2016/002046 mailed April 24, 2017.
/J.J.C/	2	Written Opinion of the International Searching Authority issued for PCT/EP2016/002046 mailed April 24, 2017.

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A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Amol A. Parikh/	Date (YYYY-MM-DD)	2017-05-19
Name/Print	Amol A. Parikh	Registration Number	60671

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

PUBLICATION NOTICE

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000091943529

Title:SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

Publication No.US-2017-0161866-A1
Publication Date:06/08/2017

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 (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, 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

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	BAUDRY, Edgard, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J.
Attorney Docket Number	094060-0034

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	4731857		1988-03-15	Tappert	

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20100309131		2010-12-09	Clary	

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

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	BAUDRY, Edgard, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J.
Attorney Docket Number	094060-0034

	1	International Search Report issued for PCT/EP2016/002046 mailed April 24, 2017.
	2	Written Opinion of the International Searching Authority issued for PCT/EP2016/002046 mailed April 24, 2017.

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	BAUDRY, Edgard, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J.
Attorney Docket Number	094060-0034

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Amol A. Parikh/	Date (YYYY-MM-DD)	2017-05-19
Name/Print	Amol A. Parikh	Registration Number	60671

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

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

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

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

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

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

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

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

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

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
M 6558WO - hb		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP2016/002046	6 December 2016 (06-12-2016)	8 December 2015 (08-12-2015)
Applicant		
MYSCRIPT		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [X] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2015/002046

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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 fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/002046

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06K9/00 G06K9/22
ADD.

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)
G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ESPANA-BOQUERA S ET AL: "Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE COMPUTER SOCIETY, USA, vol. 33, no. 4, 1 April 2011 (2011-04-01), pages 767-779, XP011373534, ISSN: 0162-8828, DOI: 10.1109/TPAMI.2010.141 abstract sections 2.2, 2.4, 4.1; figures 2, 3 ----- -/--	1-18

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent 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
13 April 2017	24/04/2017

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, Fax: (+31-70) 340-3016	Bouganis, Alexandros

3

Form PCT/ISA/210 (second sheet) (April 2005)

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 2007/003142 A1 (SIMARD PATRICE Y [US] ET AL) 4 January 2007 (2007-01-04) abstract paragraphs [0005] - [0009], [0026] - [0035]; figure 3	1,2,4-8, 10-14, 16-18
A	US 5 396 566 A (BRUCE WILKER S [US] ET AL) 7 March 1995 (1995-03-07) column 3 - column 10	1-18
X	US 2010/309131 A1 (CLARY GREGORY J [US]) 9 December 2010 (2010-12-09) abstract paragraphs [0003] - [0004], [0015] - [0016], [0046], [0050], [0063], [0064], [0066] figures 8, 9	19-30
A	US 4 731 857 A (TAPPERT CHARLES C [US]) 15 March 1988 (1988-03-15) abstract column 3, line 7 - column 4, line 58	19,23,27

3

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007003142 A1	04-01-2007	AU 2006265665 A1	11-01-2007
		BR PI0613132 A2	11-01-2011
		CA 2613715 A1	11-01-2007
		CN 101536012 A	16-09-2009
		EP 1899895 A2	19-03-2008
		JP 2009500748 A	08-01-2009
		KR 20080030573 A	04-04-2008
		US 2007003142 A1	04-01-2007
		WO 2007005775 A2	11-01-2007
US 5396566 A	07-03-1995	CN 1099500 A	01-03-1995
		JP H076204 A	10-01-1995
		JP 2641388 B2	13-08-1997
		US 5396566 A	07-03-1995
US 2010309131 A1	09-12-2010	US 7091959 B1	15-08-2006
		US 2006233441 A1	19-10-2006
		US 2010309131 A1	09-12-2010
US 4731857 A	15-03-1988	NONE	

International Application No. PCT/ EP2016/ 002046

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-18

a method for "beautifying" handwritten text by aligning the said text to an alignment structure of the user interface and normalizing its size; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

---

2. claims: 19-30

a method that enables the user to edit digital ink at a character level, using segmentation information of the digital ink for determining the position of an editing cursor; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
PCT/EP2016/002046

TITLE: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

APPLICANT: MYSCRIPT

IPC CLASSIFICATION: G06K9/00, G06K9/22

EXAMINER: Bouganis, Alexandros

CONSULTED DATABASES: NPL, EPODOC, DOSYS

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: G06K9/00402, 09-AP 00402 BEAUTIFYING DIGITAL INK (G06K), G06K9/222

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
method for "beautifying" handwritten text by aligning said text to an alignment structure of the user interface and normalizing its size; method for editing digital ink, determining the position of an editing cursor by (i) segmenting said ink, (ii) detecting bounding boxes of characters in said ink and (iii) comparing geometrical properties of said boxes

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2016/002046	06.12.2016	08.12.2015

International Patent Classification (IPC) or both national classification and IPC
INV. G06K9/00 G06K9/22

Applicant
MYSCRIPT

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Bouganis, Alexandros Telephone No. +31 70 340-0

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2016/002046

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2016/002046

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:

   ☒ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☒ all parts.

   ☐ the parts relating to claims Nos.

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3, 9, 15
	No:	Claims	1, 2, 4-8, 10-14, 16-30
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-30
Industrial applicability (IA)	Yes:	Claims	1-30
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Reference is made to the following documents:

D1 ESPANA-BOQUERA S ET AL: "Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE COMPUTER SOCIETY, USA, vol. 33, no. 4, 1 April 2011 (2011-04-01), pages 767-779, XP011373534, ISSN: 0162-8828, DOI: 10.1109/TPAMI.2010.141

D2 US 2007/003142 A1 (SIMARD PATRICE Y [US] ET AL) 4 January 2007 (2007-01-04)

D3 US 5 396 566 A (BRUCE WILKER S [US] ET AL) 7 March 1995 (1995-03-07)

D4 US 2010/309131 A1 (CLARY GREGORY J [US]) 9 December 2010 (2010-12-09)

D5 US 4 731 857 A (TAPPERT CHARLES C [US]) 15 March 1988 (1988-03-15)

Re Item IV

Lack of unity of invention

1 This Authority considers that the application does not meet the requirements of unity of invention and that there are 2 (groups of) inventions covered by the claims indicated as follows:

1.1 Group of inventions: 1 (claims 1-18)

A method for "beautifying" handwritten text by aligning the said text to an alignment structure of the user interface and normalizing its size; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

1.2 Group of inventions: 2 (claims 19-30)

A method that enables the user to edit digital ink at a character level, using segmentation information of the digital ink for determining the position of an editing cursor; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

2 The single general concept linking the two groups of inventions is:

- the processing of digital ink on computing devices, with each device comprising a processor and at least one non-transitory medium for recognizing handwriting input under control of the processor;

- the at least one non-transitory computer readable medium configured to cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input.

3 The said single general concept is notoriously known in the art; see, for example, document D1 ("Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models", Espana-Boquera S et al, IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, 2011) at abstract, section 4.1 and Figure 2. As a consequence, there are two groups of inventions which are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT.

Re Item VIII

Certain observations on the international application

The application does not meet the requirements of Article 6 PCT for the reasons discussed below.

1 In **claim 1**, the relative term "*beautifying*" has no well-recognized meaning and leaves the reader in doubt as to the meaning of the technical feature to which it refers. In this opinion, it is assumed that said term refers to size normalisation and alignment of digital ink.

2 In **claim 1,** the term "*geometrical information*" can be interpreted as the slope of the handwriting input. However, this interpretation is not supported by the description, and therefore, objection of lack of support arises.

3 In **claim 1**, it is unclear what is meant by "*structuring transformation*"; in this opinion it is assumed that the said transformation refers to geometrical transformation.

4 In **claims 2** and **3**, the skilled person would not be able to understand what type of geometrical information is being compared, and how the minimum of two ratio values of such information can provide the "*structuring transformation*". Based on paragraphs [0077]-[0082] of the description, it is assumed in this opinion that the said geometrical information refers to offsets/ vertical distances of reference lines in the handwriting input and to offsets/ vertical distances of corresponding reference lines in the "*alignment structure of the display interface*".

5 **Claims 4** and **5** attempt to define their subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

6 **Claims 8-9** and **14-15** refer to a "*second geometrical information*" which has not been respectively defined in **claims 7** and **13**. Similarly, **claims 11-12** and **17-18** refer to an "*alignment structure*" which has not been defined in **claims 7** and **13**. In this opinion, it is assumed that **claims 7** and **13** determine "*second geometrical information of an alignment structure of the display interface*", as it is the case in **claim 1**.

7 In **claim 24**, it is unclear how the "*input cursor*" relates to the "*editing cursor*" of **claim 23**; in this opinion, it is assumed that the "*input cursor*" of **claim 24** refers to the "*editing cursor*" of **claim 23.** The same objection applies to **claim 28**.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Claims 1-18:

1.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claim 1** is not new in the sense of Article 33(2) PCT.

1.1.1 Specifically, D1 discloses (the references in parentheses apply to this document):

A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor (see abstract), *the at least one non-transitory computer readable medium configured to:*
cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input (see Figure 2(a));
determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input (see sections 2.2 and 2.4 where three areas, i.e. main body area, ascender area and descender area, are being recognised in the handwriting input) *and second geometrical information of an alignment structure of the display interface* (see section 2.2, last 3 lines and section 2.4, last 7 lines, where alignment zones are defined in the normalized image for the main body area, ascender area and descender area of the handwritten characters), *a structuring transformation of the first digital ink* (see section 2.2, last 3 lines and section 2.4, last 7 lines); *and*
cause display of, on the display interface, second digital ink in accordance with the structuring transformation (see Figure 2(e) and Figure 2(h)).

1.1.2 As a consequence, the subject-matter of **claim 1** lacks novelty over the disclosure of D1 according to Article 33(2) PCT.

1.2 D1 scales the handwriting input for normalizing its size (see section 2.4). The normalization process is carried out by comparing the size of the three zones (i.e., main body area, ascender area and descender area) recognized in the handwriting input with their respective target size in the normalized image (see section 2.4, last 7 lines). Therefore, the subject-matter of **claims 2, 4** and **6** is not new in the sense of Article 33(2) PCT.

1.3 In D1, a scaling factor is computed for each individual zone of handwriting input for fitting the said zone to the corresponding zone of the normalized image. In this process, a different scaling factor is applied to each zone of the handwriting input, and as a result, the handwriting input is not rigidly transformed. With the aim of maintaining the rigidity of the handwriting input, the skilled person would apply a single scaling factor to all zones, and a natural choice for the said scaling factor would be the minimum scaling factor of the individual zones, so that all of them will fit to their corresponding zones in the normalized image. Thus, **claim 3** does not involve an inventive step over the disclosure of D1 according to Article 33(3) PCT.

1.4 A slope removal process is applied in D1 (see section 2.2 and Figure 2(e)) for aligning the handwriting input to a horizontal line, and therefore, the subject-matter of **claim 5** is not new in the sense of Article 33(2) PCT.

1.5 The subject-matter of **claims 7-18** corresponds to that of **claims 1-6**. Therefore, the objections that have been raised above for **claims 1-6** also apply mutatis mutandis to **claims 7-18**.

1.6 It is noted that the subject-matter of **claims 1-2, 4-8, 10-14, 16-18** lacks novelty over the disclosure of D2 according to Article 33(2) PCT, as their features are disclosed in said document (see abstract, paragraphs [0005]-[0009], [0026]-[0035] and Figure 3).

2 **Claims 19-30:**

2.1 The subject-matter of **claim 19** is not new over the disclosure of D4 in the sense of Article 33(2) PCT.

2.1.1 Specifically, D4 discloses (the references in parentheses apply to this document):

A system for providing editing of digital ink on computing devices (see abstract and paragraph [0015]), *each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor* (see paragraph [0004] at lines 1-8, paragraph [0016] at lines 16-23, paragraph [0050] at lines 9-20), *the at least one non-transitory computer readable medium configured to:*
cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input (see paragraph [0066], lines 1-5); *determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink* (see paragraphs [0063]-[0064], where D4 recognises strokes in the handwriting input and determines bounding boxes based on said strokes); *and cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges* (see paragraph [0066]).

2.1.2 As a consequence, the subject-matter of **claim 19** lacks novelty over the disclosure of D4 according to Article 33(2) PCT.

2.2 In D4, the user selects with the pen the position where he wants to edit the text data. If the position selected is within bounding boxes of text characters, the cursor is shifted to the border of said bounding boxes (see paragraphs [0064], [0066] and Figures 8-9 of D4). The same document also discloses that in case the position selected by the user is within multiple overlapping bounding boxes in the handwriting input, then the cursor is shifted to the borders of the largest bounding box (see paragraph [0066]). Thus, the subject-matter of **claims 20-22** lacks novelty in the sense of Article 33(2) PCT.

2.3 The subject-matter of **claims 23-30** corresponds to that of **claims 19-22**. Therefore, the objections that have been raised above for **claims 19-22** also apply mutatis mutandis to **claims 23-30**.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO/ISA)

General information

For all international applications, the competent International Searching Authority **(ISA)** will establish an international search report **(ISR)** accompanied by a written opinion of the International Searching Authority **(WO/ISA)**. The **WO/ISA** may be responded to by

- filing informal comments with the **International Bureau of WIPO (IB)** (where no demand for international preliminary examination **(demand)** is filed)
- filing amendments under Art. 19 PCT (this can be done whether or not a **demand** is filed)
- filing amendments under Art. 34 PCT and/or formal observations in response to objections raised in the **WO/ISA** (where a **demand** *is* actually filed)

This document explains these possibilities.

Filing informal comments

After receipt of the **ISR and WO/ISA**, the applicant may file informal comments on the **WO/ISA, directly with the IB** (see International Search and Preliminary Examination Guidelines 2.15). These will be communicated to the designated/elected Offices, together with the International Preliminary Report on Patentability **(IPRP)** at 30 months from the priority date.

Amending claims under Art. 19 PCT

The applicant may file **amended claims** under Art. 19 PCT, **directly with the IB** by the later of the following dates:

- 2 months from the date of mailing of the **ISR** and the **WO/ISA**
- 16 months from the priority date

However, any such amendment received by the **IB** after the expiration of the applicable time limit shall be **considered to have been received on time** by the **IB**, if it reaches it **before** the technical preparations for international publication have been completed (the 15th day prior to the date of publication, see PCT Applicant's Guide, International Phase, 9.013).

For further information, please see Rule 46 PCT as well as form PCT/ISA/220.

Please also note that, when filing amended claims under Art. 19 PCT, such amendments shall be **accompanied by a letter** identifying the amendments made and also the basis for the amendments in the application as originally filed (Rule 46.5(b) PCT). Where a **demand** is filed, failure to comply with this requirement may result in the amendments being ignored in the International Preliminary Examination Report **(IPER)**, see Rule 70.2(c-*bis*) PCT.

BNSDOCID: <XS_____200704010CK_I_>

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XS CPRTENFRDE

BNSDOCID: <XS_____2006100103CF_I_>

Electronic Acknowledgement Receipt

EFS ID:	29261325
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Masako Kozawa
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	19-MAY-2017
Filing Date:	22-DEC-2015
Time Stamp:	15:02:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	094060-0034IDS4AsFiled.pdf	1035140 8628ee64ce779846ef8d90e4a2135997ad72f0ad	no	4

Warnings:

Information:					
2	Other Reference-Patent/App/Search documents	PCTEP2016002046_ISR.pdf	476304 6f18bcfd6e30a7a160a2160ee40b59e6ba7b7e51	no	7
Warnings:					
Information:					
3	Other Reference-Patent/App/Search documents	PCTEP2016002046_WO.pdf	998306 076ffb050b7aeff76619fc6007b211f834ea1444	no	13
Warnings:					
Information:					
		Total Files Size (in bytes):	2509750		

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.

Attorney Docket No. 094060-0034 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re: U.S. Patent Application of Edgard Baudry et al.	)	Examiner: Unassigned
Application No. 14/978,081	)	Group Art Unit 2668
Filed: December 22, 2015	)	Confirmation No. 6051
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	)	

PRELIMINARY AMENDMENT

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

Dear Examiner:

Applicant respectfully requests entry of this paper prior to examination of this application on its merits.

The Commissioner is authorized to charge any additional fees or credit any overpayments to Deposit Account No. 13-0206.

Amendments to the Specification begin on page of 2 this paper.

Remarks begin on page 3 of this paper.

Electronic Acknowledgement Receipt

EFS ID:	28812896
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Sarah Goodnight
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	03-APR-2017
Filing Date:	22-DEC-2015
Time Stamp:	13:16:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		PreliminaryAmendment.pdf	75418 8ee21ce42b871f80472ff47614502fe88ab3b79d	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	3	3
	Specification	2	2
	Preliminary Amendment	1	1

Warnings:	
Information:	
Total Files Size (in bytes):	75418

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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.

REMARKS

Applicant has amended Paragraph [0067] of the specification to replace the application number of a referenced application Applicant discussed in the specification with its publication number. No new matter has been added.

Applicant authorizes the Commissioner to charge any additional fees or credit any overpayments to Deposit Account No. 13-0206.

Respectfully submitted,

Date: April 3, 2017

By: /Michael J. Stern/

Michael J. Stern, Reg. No. 70,734
Amol A. Parikh, Reg. No. 60,671
Customer No. 1923
McDermott Will & Emery LLP
227 West Monroe Street
Chicago, Illinois 60606-5096
(312) 372-2000

AMENDMENTS TO THE SPECIFICATION

Please amend Paragraph [0067] as follows:

[0067] FIG. 4 shows a schematic view of an example visual rendering of an ink input or capture area 400 on a portion of the input surface 104 of an example computing device 100. The input area 400 is provided as a constraint-free canvas that allows users to create object blocks (blocks of text, drawings, etc.) anywhere without worrying about sizing or alignment. However, as can be seen an alignment structure in the form of a line pattern background 410 can be provided for guidance of user input and the alignment of digital and typeset ink objects. In any case, as users may input handwriting that is not closely aligned to the line pattern, or may desire to ignore the line pattern and write in a unconstrained manner, such as diagonally or haphazardly, the recognition of the handwriting input is performed by the HWR system 114 without regard to the line pattern. An example alignment pattern is described in United States Patent Application Publication No. ~~14/886,195~~ 2017/0060819 titled "System and Method of Digital Note Taking" filed in the name of the present Applicant and Assignee, the entire content of which is incorporated by reference herein.

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5396566		1995-03-07	Bruce et al.	

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

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20070003142		2007-01-04	Simard et al.	

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

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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NON-PATENT LITERATURE DOCUMENTS Remove

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

	1	INTERNATIONAL SEARCH REPORT for related International Patent Application No. PCT/EP2016/002046, dated February 2, 2017.
	2	"Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 33, No. 4, April 2011.

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Amol A. Parikh/	Date (YYYY-MM-DD)	2017-03-22
Name/Print	Amol A. Parikh	Registration Number	60671

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

Privacy Act Statement

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

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

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

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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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.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

INVITATION TO PAY ADDITIONAL FEES AND, WHERE APPLICABLE, PROTEST FEE

(PCT Article 17(3)(a) and Rule 40.1 and 40.2(e))

To:
Huber, Michael
Müller-Boré & Partner
Patentanwälte PartG mbB
Friedenheimer Brücke 21
80639 München
ALLEMAGNE

Eingegangen
06. Feb. 2017
Müller-Boré & Partner
Patentanwälte PartG mbB

Applicant's or agent's file reference M 6558WO - hb	Date of mailing *(day/month/year)* 2 February 2017 (02-02-2017) **PAYMENT DUE** within **ONE MONTH** from the above date of mailing
International application No. PCT/EP2016/002046	International filing date *(day/month/year)* 6 December 2016 (06-12-2016)
Applicant MYSCRIPT	

1. This International Searching Authority

(i) considers that there are 2 *(number of)* inventions claimed in the international application covered by the claims indicated on an extra sheet:

(ii) therefore considers that **the international application does not comply with the requirements of unity of invention** (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet:

(iii) [X] has carried out a partial international search (see Annex) [ ] will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

see extra sheet

(iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby **invited to pay**, within the time limit indicated above, the amount indicated below:

EUR 1.875,00	x	1	=	EUR 1.875,00
Fee per additional invention		number of additional inventions		currency/total amount of additional fees

3. The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest**, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.

Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 875,00 *(currency/amount)*

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so declare.

4. [ ] Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	DE JONG, Coen Tel: +31 (0)70 340-2015

Form PCT/ISA/206 (April 2005)
Registered Mail

INVITATION TO PAY ADDITIONAL FEES

International application No.
PCT/EP2016/002046

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-18

a method for "beautifying" handwritten text by aligning the said text to an alignment structure of the user interface and normalizing its size; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

---

2. claims: 19-30

a method that enables the user to edit digital ink at a character level, using segmentation information of the digital ink for determining the position of an editing cursor; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

This Authority considers that the application does not meet the requirements of unity of invention and that there are 2 (groups of) inventions covered by the claims indicated as follows:

Group of inventions: 1 (claims 1-18)
A method for "beautifying" handwritten text by aligning the said text to an alignment structure of the user interface and normalizing its size; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

Group of inventions: 2 (claims 19-30)
A method that enables the user to edit digital ink at a character level, using segmentation information of the digital ink for determining the position of an editing cursor; a system comprising means for carrying out the said method and a computer readable medium comprising a computer program that is adapted to perform the said method.

The single general concept linking the two groups of inventions is:
- the processing of digital ink on computing devices, with each device comprising a processor and at least one non-transitory medium for recognizing handwriting input under control of the processor;
- the at least one non-transitory computer readable medium configured to cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input.

The said single general concept is notoriously known in the art; see, for example, document D1 ("Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models", Espana-Boquera S et al, IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, 2011) at abstract, section 4.1 and Figure 2. As a consequence, there are two groups of inventions which

INVITATION TO PAY ADDITIONAL FEES

International application No.
PCT/EP2016/002046

are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT.

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International Application No: PCT/EP2016/002046

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
see 'Invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ESPANA-BOQUERA S ET AL: "Improving Offline Handwritten Text Recognition with Hybrid HMM/ANN Models", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, IEEE COMPUTER SOCIETY, USA, vol. 33, no. 4, 1 April 2011 (2011-04-01), pages 767-779, XP011373534, ISSN: 0162-8828, DOI: 10.1109/TPAMI.2010.141 abstract sections 2.2, 2.4, 4.1; figures 2, 3	1-18
X	US 2007/003142 A1 (SIMARD PATRICE Y [US] ET AL) 4 January 2007 (2007-01-04) abstract paragraphs [0005] - [0009], [0026] - [0035]; figure 3	1,2,4-8, 10-14, 16-18
A	US 5 396 566 A (BRUCE WILKER S [US] ET AL) 7 March 1995 (1995-03-07) column 3 - column 10	1-18

☐ Further documents are listed in the continuation of box C.

☒ 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

Form PCT/ISA/206 (Annex, first sheet) (July 1992; reprint January 2004)

Patent Family Annex

Information on patent family members

International Application No PCT/EP2016/002046

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007003142 A1	04-01-2007	AU 2006265665 A1	11-01-2007
		BR PI0613132 A2	11-01-2011
		CA 2613715 A1	11-01-2007
		CN 101536012 A	16-09-2009
		EP 1899895 A2	19-03-2008
		JP 2009500748 A	08-01-2009
		KR 20080030573 A	04-04-2008
		US 2007003142 A1	04-01-2007
		WO 2007005775 A2	11-01-2007
US 5396566 A	07-03-1995	CN 1099500 A	01-03-1995
		JP H076204 A	10-01-1995
		JP 2641388 B2	13-08-1997
		US 5396566 A	07-03-1995

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
PCT/EP2016/002046

TITLE: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

APPLICANT: MYSCRIPT

IPC CLASSIFICATION: G06K9/00, G06K9/22

EXAMINER: Bouganis, Alexandros

CONSULTED DATABASES: NPL, EPODOC, DOSYS

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: G06K9/00402, 09-AP 00402 BEAUTIFYING DIGITAL INK (G06K)

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
a method for "beautifying" handwritten text by aligning the said text to an alignment structure of the user interface and normalizing its size

European Patent Organisation

Account details

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Electronic Acknowledgement Receipt

EFS ID:	28702117
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Sarah Goodnight
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	22-MAR-2017
Filing Date:	22-DEC-2015
Time Stamp:	11:47:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SuppIDS-3-22-2017.pdf	1035226 158112192f7f21043a75cdb290ce6bc33e0ff557	no	4

Warnings:

Information:					
2	Other Reference-Patent/App/Search documents	InternationalSearchReport.pdf	611641 27140feee30aed3e081d01d7bbcdb25ef17f76d0	no	8
Warnings:					
Information:					
3	Non Patent Literature	NonPatentLit-1.pdf	2659984 c9bff50888d8c48a4786b4cfe09917491b16f8d8	no	14
Warnings:					
Information:					
			Total Files Size (in bytes):	4306851	

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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/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7751623		2010-07-06	Simmons et al.	

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	1	0720084	EP		1996-07-03	Sharp		

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	Art Unit	2617
	Examiner Name	Chow, Jeffrey J
	Attorney Docket Number	094060-0034

	1	INTERNATIONAL SEARCH REPORT for Related Application No. PCT/EP2016/001446, 2016-11-29, EPO-International, WPI Data.
	2	"MyScript - The Power of Handwriting", 2014-12-11, Pages 1-3. URL: https://www.youtube.com/watch?v=yojFiBhPMUo

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

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Filing Date	2015-12-22
First Named Inventor	Edgard BAUDRY, Conf. No. 6051
Art Unit	2617
Examiner Name	Chow, Jeffrey J
Attorney Docket Number	094060-0034

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Amol A. Parikh/	Date (YYYY-MM-DD)	2017-02-14
Name/Print	Amol A. Parikh	Registration Number	60671

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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 720 084 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.07.1996 Bulletin 1996/27

(51) Int. Cl.[6]: **G06F 3/033**, G06K 9/22

(21) Application number: **95120734.9**

(22) Date of filing: **29.12.1995**

(84) Designated Contracting States:
DE FR GB

(30) Priority: **29.12.1994 JP 340091/94**

(71) Applicant: **SHARP KABUSHIKI KAISHA**
Osaka 545 (JP)

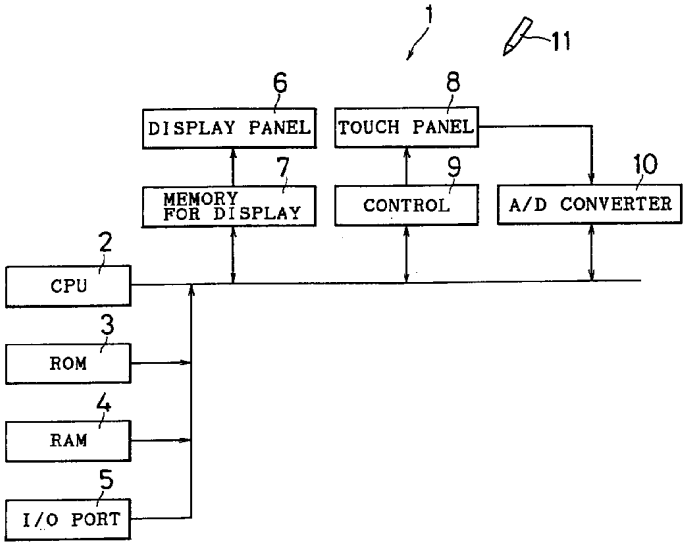
(72) Inventor: **Takada, Yuji**
Nara-shi, Nara (JP)

(74) Representative: **TER MEER - MÜLLER - STEINMEISTER & PARTNER**
Mauerkircherstrasse 45
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(54) Input and display apparatus for handwritten characters

(57) It is an object of the invention to present an input and display apparatus for handwritten characters capable of freely editing input handwritten characters. A handwritten character entered on a touch panel (8) by using a pen (11) is registered as one stroke data. The registered one stroke data is divided in two stroke data by using the pen (11), or two stroke data are combined into one stroke data. By combination of stroke data division and combination, partial deletion in stroke data, blank insertion in stroke data, and insertion of other stroke data into stroke data are realized.

Fig. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an input and display apparatus (hereinafter described as input/display apparatus) for handwritten characters preferably used in electronic pocket notebooks, word processors, personal computers, etc.

2. Description of the Related Art

Input/display apparatuses for handwritten characters capable of inputting and displaying handwritten characters have been already commercialized. In such input/display apparatuses for handwritten characters of prior art, characters entered on an input board realized by a tablet or the like are inputted in an input/display apparatus for handwritten characters as a set of coordinate points on the input board, and the handwritten characters inputted as a set of coordinate points are registered and displayed in the size and shape as they have been inputted.

Alternatively, there is also an input/display apparatus for handwritten characters in which handwritten characters are handled on stroke data undergoing so-called stroke processing on the basis of the coordinate points composing the handwritten characters, and the input stroke data is displayed at a cursor position by normalizing to a specific height. Other prior art includes Japanese Unexamined Patent Publication JPA 62-229365 (1987). In this publication, the handwriting information of handwriting input is edited by cutting out in specified edit processing unit. When handling stroke data, by cutting out in every specific stroke data according to a predetermined rule, the cut stroke data is handled as one block, and editing is done in the block unit of minimum unit that cannot be subdivided any more.

When handling stroke data in a conventional input/display apparatus for handwritten characters, the extent from start till end of a stroke is handled as one block unit, but once inputted and the data is registered in the apparatus, it cannot be subdivided into smaller blocks. For example, when it is attempted to divide stroke data "My name is Richard Miller" into "My name is" and "Richard Miller" by manipulation such as pressing of touch panel on the display screen by using an input pen or the like (hereinafter called pen manipulation) and copy only "Richard Miller," the data cannot be cut out because it is registered in the apparatus in one block of "My name is Richard Millller".

If attempted to delete "River" of stroke data "the Hudson River" by pen manipulation, only a specific portion in one block cannot be deleted, and therefore after deleting the entire block of "The Hudson River," it is necessary to input "The Hudson" newly.

It may be also desired to combine two stroke data into one stroke data. For example, it may be to combine stroke data "Richard" and stroke data "Miller" into one stroke data "Richard Miller," and copy or move display position in this data block unit. The conventional apparatus, however, has no function of combining two stroke data into one stroke data by pen manipulation or other instruction. Therefore, once stroke data "Richard" and "Miller" must be deleted, and then "Richard Miller" must be newly inputted.

Furthermore, in the case of input of stroke data "Weare," it is registered in the apparatus as a block of stroke data "Weare," and if desired to change to new stroke data by inserting a space (blank) of desired width between "We" and "are" by pen manipulation or the like, such editing function is not provided. In such a case, the stroke data must be once erased, and newly entered again.

Similarly, in the case of input of stroke data "this a pen," if desired to insert a block "is" between "this" and "a pen" by pen manipulation or the like, such editing function is not provided. In this case, too, one the input stroke data must be erased, and newly entered again.

SUMMARY OF THE INVENTION

It is hence a primary object of the invention to provide an input/display apparatus for handwritten characters capable of freely editing input handwritten characters.

The present invention provides an input/display apparatus for handwritten characters,

including display means provided with a display surface in which orthogonal coordinates are defined, and input means having a light transmitting input surface in which orthogonal coordinates are defined, which outputs coordinate points indicated by special indicating means, on the input surface disposed so as to overlap with the display surface, and

displaying the coordinate points on the display surface of the display means, corresponding to a plurality of coordinates points indicated at the time of input in handwriting when the input surface discontinuously indicate by the indicating means, the input/display apparatus for handwritten characters comprising:

cursor display means for displaying a cursor indicating the position for input/display on the display surface of the display means,

stroke data preparing means for preparing stroke data consisting of coordinate points which are extracted after the end of input in handwriting from among a plurality of coordinate points outputted from the input means at the time of input in handwriting on the basis of a predetermined reference,

storage means for storing stroke data,

first editing means for dividing coordinate points composing one stroke data into plural coordinate point groups, and creating plural stroke data composed of coordinate point groups, and

normalizing display means for setting rectangular coordinates of specific size after a cursor position displayed on a display surface of the display means, and displaying stroke data on the rectangular coordinates.

The invention is characterized in that the first editing means is replaced by:

second editing means for dividing the coordinate points composing one stroke data into plural coordinate point groups, erasing coordinate point groups selected from the coordinate point groups, and creating stroke data composed of the remaining coordinate point groups.

Further the invention is characterized in that the first editing means is replaced by:

third editing means for adding coordinate points for composing other stroke data after coordinate points for composing one stroke data of two stroke data, and creating one stroke data composed of coordinate points composing one and other stroke data.

Further the invention is characterized in that the first editing means is replaced by:

fourth editing means for dividing coordinate points composing one stroke data into two coordinate point groups, and creating one stroke data by correcting the coordinates of coordinate points composing either one coordinate point group of the two divided coordinate point groups, so as to be a blank region when displayed in the display means.

Further the invention is characterized in that the first editing means is replaced by:

fifth editing means for dividing coordinate points composing one stroke data into two coordinate point groups, inserting coordinate points composing other stroke data between divided coordinate point groups, and creating one stroke data composed of coordinate points composing the divided plural coordinate point groups and other stroke data.

Further the invention is characterized in that the editing means:

sets a first rectangular region including stroke data to be divided;

deduces a coordinate point in the first rectangular region, corresponding to the coordinate point on the input board designated by the indicating means;

divides the first rectangular region by a division boundary line including the deduced coordinate point into two second rectangular regions,

when the stroke data traverses the division boundary line with a pen up, considers a start point AS of the pen up line segment A crossing the division boundary line as an end point of the stroke data in one of the two second rectangular regions including the start point AS, and an end point AE of the line segment A as a start point of the stroke data in the other of the two second rectangular regions including the end point AE,

when the stroke data traverses the division boundary line with a pen down, divides the pen down line segment B crossing the division boundary line into a pen down line segment B1 in which a start point BS of the pen down line segment B is a start point B1S and the intersecting point BC between the line segment B and the division boundary line is an end point B1E, a pen up line segment B2 in which the intersecting point BC is a start point B2S and an end point B2E (=B2S), and a pen down segment B3 in which the intersecting BC is a start point B3S and the end point BE of the line segment B is an end point B3E, and

divides the coordinate points composing one stroke data into plural coordinate point groups, considering the start point B2S of the line segment B2 as the end point of the stroke data in the one second rectangular region including the start point B2S, and the end point B2E of the line segment B2 as the start point of the stroke data in the other second rectangular region including the end point B2E.

Further the invention is characterized in that the second editing means, after dividing stroke data into plural coordinate point groups, deletes the coordinate group selected by designation of the indicating means.

Further the invention is characterized in that, the third editing means creates a pen up line segment E of a predetermined length, in which the end point of one stroke data C of two stroke data C and D is a start point ES and the start point of the other stroke data D is an end point EE, adds the created pen up line segment E to the end of the stroke data C, and additionally adds the stroke data D.

Further the invention is characterized in that the third editing means creates one stroke data by conforming the sizes of the rectangular regions of two stroke data to each other.

Further the invention is characterized in that the stroke data includes attribute data indicating the width and type of character line, and

the third editing means creates one stroke data by conforming the attribute data of two stroke data.

Further the invention is characterized in that the fourth editing means after dividing stroke data into stroke data F and G of two coordinate groups, creates a pen up line segment H of a length which forms a blank region of a predetermined size, considering the end point of the one stroke data F as a start point HS, and the start point of the other stroke

data G as an end point HE, adds the created pen up line segment H to the end of the stroke data F, and additionally adds the stroke data G.

Further the invention is characterized in that the fifth editing means, after dividing stroke data into stroke data I and J of two coordinate point groups, creates a pen up line segment L of a predetermined length, in which the start point of the stroke data K to be inserted is an end point LE, adds the created pen up line segment L to the end of the stroke data I, additionally creates stroke data M by adding the stroke data K,

creates a pen up line segment N of a predetermined length, in which the end point of the stroke data M is a start point NS, and the start point of the other stroke data J as an end point NE, adds the created pen up line segment N to the end of the stroke data M, and additionally creates one stroke data by adding the stroke data J.

According to the invention, by continuously instructing the input surface of input means by instructing means, that is, by handwriting input, instructed plural coordinate points of the input surface in which rectangular coordinates are preliminarily set are outputted, the coordinate points of the display surface of the display means coinciding with the coordinate points come in display state. On the display surface of the display means, rectangular coordinates are preliminarily set, and the input surface having light permeability of the input means is disposed so as to overlay the display surface.

On the display surface of the display means, a cursor showing an input display position is displayed, and by handwriting input as mentioned above, stroke data composed of coordinate points extracted on the basis of a predetermined standard from plural coordinate points outputted from the input means is created, and stored. The created stroke data is displayed on the rectangular coordinates of specific size being set after the cursor display position. By the first editing means, the coordinate points composing one stroke data are divided into plural coordinate point groups, and plural stroke data composed of coordinate points are created. Thus created plural stroke data are also displayed on the rectangular coordinates of specific size being set after the cursor display position.

It is therefore possible to divide one stroke data created by one operation of handwriting input and handle as plural stroke data. For example, only one of the plural stroke data divided and created can be moved or displayed, or copied and displayed.

According to the invention, by the second editing means provided instead of the first editing means, the coordinate points composing one stroke data are divided into plural coordinate point groups, coordinate point groups selected from the coordinate point groups are erased, and stroke data is composed of the remaining coordinate point groups. Thus created stroke data is also displayed as mentioned above. Therefore, part of one stroke data created by one operation of handwriting input can be erased.

According to the invention, by the third editing means provided instead of the first editing means, coordinate points composing other stroke data are added after coordinate points for composing one stroke data of two stroke data, and one stroke data composed of coordinate points composing one and other stroke data is created. Thus created stroke data is also displayed as mentioned above. Therefore, two stroke data created by different operations of handwriting input can be handled as one stroke data. For example, two stroke data created by different operations of handwriting input can be simultaneously moved and displayed, or copied and displayed as one stroke data.

According to the invention, by the fourth editing means provided instead of the first editing means, coordinate points composing one stroke data are divided into two coordinate point groups, and coordinates of coordinate points composing either one coordinate point group of the two divided coordinate point groups are corrected, so that it may be a blank region when displayed in the display means, thereby creating one stroke data. Thus created stroke data is also displayed as mentioned above. It is therefore possible to insert and display a blank region in one stroke data created by one operation of handwriting input.

According to the invention, by the fifth editing means provided instead of the first editing means, the coordinate points for composing one stroke data are divided into two coordinate point groups, coordinate points composing other stroke data are inserted between the divided coordinate point groups, thereby creating one stroke data composed of divided plural coordinate point groups and coordinate points composing other stroke data. Therefore, stroke data created by different operation of handwriting input can be inserted and displayed in one stroke data created by one operation of handwriting input.

According to the invention, the first editing means sets the first rectangular region including stroke data to be divided at the time of dividing the stroke data, deduces the coordinate point in the first rectangular region, corresponding to the coordinate point on the input board designated by the indicating means, and divides the first rectangular region by a division boundary line including the deduced coordinate point into one second rectangular region and other rectangular region.

When the stroke data traverses the division boundary line with a pen up, considering a start point AS of the pen up line segment A crossing the division boundary line as an end point of the stroke data in one of the two second rectangular regions including the start point AS, one stroke data including the start point of the stroke data before dividing and the end point is created. Additionally, considering an end point AE of the line segment A as a start point of the stroke data in other of the two second rectangular regions including the end point AE, the other stroke data including the end point of the stroke data before dividing and the start point is created.

When the stroke data traverses the division boundary line with a pen down, first the pen down line segment B is divided into three line segments B1 to B3, namely, a pen down line segment B1 in which a start point BS of the pen down line segment B crossing the division boundary line is considered as a start point B1S and the intersecting point BC between the line segment B and the division boundary line is considered as an end point B1E, a pen up line segment B2 in which the intersecting point BC is considered as a start point B2S and as an end point B2E (=B2S), and a pen down segment B3 in which the intersecting BC is considered as a start point B3S and the end point BE of the line segment B is considered an end point B3E.

Next, considering the start point B2S of the line segment B2 as the end point of the stroke data in the one second rectangular region including the start point B2S, the one stroke data including the start point of the stroke data before dividing and the end point is created. Additionally, considering the end point B2E of the line segment B2 as the start point of the stroke data in the other second rectangular region including the end point B2E, the other stroke data including the end point of the stroke data before dividing and the start point is created.

In such a manner, the coordinate points composing one stroke data is divided into plural coordinate groups. Further, the second, fourth and fifth editing means also divide the coordinate points composing one stroke data into plural coordinate groups in such a manner. Accordingly one stroke data created at a single input of handwritten characters is divided to process as plural stroke data.

Further, according to the invention, the second editing means divides stroke data into plural coordinate groups, for example, in the above-mentioned manner, and then deletes the coordinate group selected by designation by the indicating means. Accordingly, one stroke data created at a single input of handwritten characters can be divided and the stroke data of characters designated by an operator can be selectively deleted, resulting in improving the operability.

Further, according to the invention, the third editing means adds the pen up line segment E to the end of the stroke data C and additionally adds the stroke data D. The pen up line segment E is the line segment of a predetermined length in which the end point of the stroke data C is considered as the start point ES and the start point of the stroke data D as the end point EE. The length is selected so that, for example, the characters of the stroke data C and the characters of the stroke data D can be continuously displayed. In such a manner, the stroke data created at different inputs of handwritten characters can be processed as one stroke data with the result that the operability is remarkably improved.

Further, according to the invention the third editing means creates one stroke data by conforming the size of the rectangular region including each of two stroke data to each other. Accordingly the characters of the two stroke data can be displayed in a conformed size.

Further, according to the invention, the third editing means creates one stroke data by conforming the attribute data of two stroke data. The stroke data includes attribute data indicating the width and type of character line. Accordingly the two stroke data can be displayed in a conformed attribute.

Further, according to the invention, the fourth editing means, after dividing stroke data into two stroke data F and G of two coordinate groups, for example, in the above-mentioned manner, creates the pen up line segment H, adds the created line segment H to the end of the stroke data F, and additionally adds the stroke data G. The pen up line segment H is the line segment of a predetermined length, in which the end point of the stroke data F is the start point HS and the start point of the other stroke data G is the end point HE. In such a manner, the stroke data into which a blank was inserted can be processed as one stroke data with the result that the operability is remarkably improved.

Further, according to the invention, the fifth editing means, after dividing stroke data into two stroke data I and J of two coordinate groups, for example, in the above-mentioned manner, creates the pen up line segment L, adds the created pen up line segment L to the end of the stroke data I, and additionally adds the stroke data K to form the stroke data M. The pen up line segment L is the line segment of a predetermined length, in which the end point of the stroke data I is the start point LS and the start point of the stroke data K to be inserted is the end point LE. The length is selected so that, for example, the characters of the stroke data I and the characters of the stroke data K can be continuously displayed.

Next the pen up line segment N is created, which is added to the end of the stroke data M, and additionally the stroke data J is added. The pen up line segment N is the line segment of a predetermined length, in which the end point of the stroke data M is the start point NS and the start point of the other stroke data J is the end point NE. The length is selected so that, for example, the characters of the stroke data M and the characters of the stroke data J can be continuously displayed. In such a manner, the stroke data created at different inputs of handwritten characters can be inserted to be processed as one stroke data with the result that the operability is remarkably improved.

Thus, according to the invention, one stroke data is divided and handled as plural stroke data, and part of one stroke data can be moved or copied and displayed. Moreover, part of one stroke data can be erased. Still more, two stroke data can be handled as one stroke data, and can be simultaneously moved or copied, and displayed. It is further possible to insert and display a blank region in one stroke data. In this way, the input/display apparatus for handwritten characters of the invention can freely edit input handwritten characters, and is hence very convenient. Therefore, editing process is easy, and time and labor required for processing can be curtailed.

BRIEF DESCRIPTION OF THE DRAWINGS

Other and further objects, features, and advantages of the invention will be more explicit from the following detailed description taken with reference to the drawings wherein:

Fig. 1 is a block diagram showing a constitution of an handwritten character input/display apparatus 1 of an embodiment of the invention;
Fig. 2 is a diagram for explaining an example of stroke data;
Fig. 3 is a diagram showing a rectangular region 31 of stroke data;
Fig. 4 is a diagram showing a data composition example of stroke data;
Fig. 5 is a diagram showing an initial screen 26 of the handwritten character input/display apparatus 1;
Figs. 6A to 6D are diagrams explaining input operations of the handwritten character input/display apparatus 1;
Fig. 7 is a diagram showing a display example of stroke data;
Fig. 8 is a diagram showing an example of stroke data display coordinates table;
Fig. 9 is a diagram showing other example of stroke data display coordinates table;
Fig. 10 is a diagram explaining procedure of creating stroke data display coordinates table shown in Fig. 9;
Fig. 11 is a flowchart for judging which is the stroke data touched by a pen;
Figs. 12A to 12C are diagrams showing operating procedure when dividing stroke data into two;
Fig. 13 is a diagram showing operating procedure when dividing stroke data into two;
Figs. 14A, 14B are diagrams showing operating procedure when dividing stroke data into two;
Figs. 15A to 15C are diagrams showing operating procedure when dividing stroke data into two;
Fig. 16 is a diagram showing operating procedure when dividing stroke data into two;
Fig. 17 is a flowchart explaining the process when dividing stroke data into two;
Fig. 18 is a diagram showing stroke data display coordinates table of the stroke data to be divided;
Figs. 19A, 19B are diagrams showing respective stroke data display coordinates tables of divided stroke data A and stroke data B;
Fig. 20 is a flowchart showing detail of processing of step b2 in Fig. 17;
Figs. 21A to 21E are diagrams showing procedure of deleting part of stroke data;
Figs. 22A, 22B are diagrams explaining the process when combining stroke data;
Fig. 23 is a diagram explaining the process when combining stroke data;
Fig. 24 is a flowchart showing the process when combining two stroke data;
Figs. 25A, 25B are diagrams showing respective stroke data display coordinates tables of two stroke data to be combined;
Fig. 26 is a diagram showing stroke data display coordinates table of combined stroke data;
Figs. 27A to 27C are diagrams explaining an operation example when inserting a blank space in stroke data;
Figs. 28A to 28C are diagrams showing externally the process when inserting a blank space in stroke data; and
Figs. 29A to 29E are diagrams showing operation example of inserting other stroke data into one stroke data.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now referring to the drawings, preferred embodiments of the invention are described below.

Fig. 1 is a block diagram showing the electric structure of the hand written character input/display apparatus 1 for handwritten characters which is an embodiment of the present invention. The handwritten character input/display apparatus 1 is constructed by including a central processing unit (hereinafter referred to as "CPU") 2, a read only memory (hereinafter referred to as "ROM") 3, a random access memory (hereinafter referred to as "RAM") 4, an I/O (input/output) port 5, a display panel 6, a memory 7 for display, a touch panel 8, a control circuit 9, an A/D (analog/digital) converter 10 and an input pen 11.

The CPU 2 controls the motion of the handwritten character input/display apparatus 1 according to the program written in the ROM 3. In the ROM 3, a readout program of input position, a data storing/readout program for processing into stroke data to be described later and program for normalization, for example, are stored in advance. Instead of the ROM 3, a program may be installed in a memory device such as magnetic disk device, and when required the program may be written into the reading RAM from the disk device, and the program may be executed. The RAM 4 is used in working area such as program saving region, data saving region, and buffer of input data. The I/O port 5 is used as communication port.

In the memory 7 for display, data to be displayed on the display panel 6 realized, for example, with a liquid crystal display element is written. The control circuit 9 controls the voltage to be applied to the touch panel 8 stacked on the display panel 6. As the touch panel 8, for example, a panel of a transparent resistance film type is selected and the prescribed voltage is applied respectively in the X-axis direction and in the Y-axis direction of the orthogonal coordinates set in advance on the input surface so as to output analog coordinate signals representing the coordinate point indicated

with the input pen 11 which is the predetermined indicating means. The A/D converter 10 converts the analog coordinate signals into digital signals available for processing by the CPU 2.

Unless otherwise specified, the inputting motion made by the operator in this embodiment is performed by indicating the input surface of the touch panel 8 with the input pen 11. The light transmitting touch panel 8 of a resistance film type having translucency is constructed by forming resistance films realized with ITO (indium tin oxide) on a pair of flexible and translucent printed circuit boards or the like and disposing the resistance films in a way to oppose each other at a certain distance from each other. To the resistance film on one side, the prescribed voltage is applied. This applied voltage varies continuously from the input terminal side to the output terminal side. The resistance film on the other side, which is not grounded, is used for detection of voltage.

When the touch panel 8 is touched with the input pen 11, the resistance films at the touched position get in contact with each other and voltage is detected from the side of the other resistance film. Putting the direction of input and output terminals of the resistance film on one side as, for example, the x-axis direction on the orthogonal coordinates, this voltage becomes a value expressing the coordinate point in the X-axis direction. In the same way, when a prescribed voltage is applied in the Y-axis direction orthogonal to the X-axis direction on the orthogonal coordinates and a voltage is detected from the side of the resistance film on one side, the coordinate point inputted with pen in the Y-axis direction can be obtained.

By switching those motions at the prescribed timing, the coordinate point by pen input is detected as required. In the coordinates set on the input surface of the touch panel 8, the left top on the input surface is taken as the reference point and an X-axis is set in the right direction while a Y-axis is set in the downward direction. In this embodiment, explanation is given of the example of the touch panel 8 of a resistance film type but the touch panel 8 is not limited to a resistance film type and it can also be of either an electromagnetic induction type or a static induction type.

On the display surface of the display panel 6, orthogonal coordinates are set in advance. When some pen input has been made in the input/display area 20 for characters on the screen to be described below, a plurality of coordinates points agreeing with the plurality of coordinates points sampled with pen input of the touch panel 8 are selected and displayed first. Next, the plurality of sampled coordinates points of the touch panel 8 are changed into image data and the stroke data obtained by submitting those image data to processing for turning into stroke data are normalized and displayed in the prescribed size at the prescribed display position of the display panel 6. At that time, the display of the display panel 6 agreeing with the sampled coordinates points is erased. Moreover, when some pen input has been made in the display position somewhere other than the input/display area for characters, for example, in the display position of various buttons, operations corresponding to the indicated key are executed.

Fig. 2 is a diagram for explaining stroke data. For example, a character as shown in Fig. 2 is written on the touch panel 8 of the handwritten character input/display apparatus 1, the coordinate values of the position of the pen 11 at its XY coordinates are obtained in the above procedure. That is, when stroking along the written character, coordinate values of coordinate points S1 to S36 are sequentially obtained. These coordinate values consist of contact-free moving of the pen 11 and touch panel (called pen up hereinafter), and moving while contacting with the pen 11 (called pen down hereinafter). For example, all moves of coordinate points S1, S2, S3 are pen down, and moves from coordinate point S6 to coordinate point S7 are pen up. A set of such coordinate data and additional information when moving the coordinates such as up and down of pen 11 is called stroke data. By storing the stroke data, the move of the pen 11 can be easily reproduced on the display panel 6. Reproduction on display is moving along the coordinate points S1 to Sn by straight line, that is, it is to approximate traces of handwritten character by straight line.

The coordinate values of coordinate points S1 to Sn are expressed either by absolute coordinates defining a certain point as the origin (hereinafter called absolute coordinate expression), or by difference from preceding coordinate points (hereinafter called relative coordinate expression). For example, when coordinate point Sm is present at a position of +3 in the X-coordinate and -2 in the Y-coordinate from coordinate point Sm-1, it is a vector expression having a moving stroke of +3 in the X-coordinate and -2 in the Y-coordinate in the relative coordinate expression. The relative coordinate expression is easier to magnify and reduce as compared with the absolute coordinate expression, and it is generally employed widely. The absolute coordinate expression and relative coordinate expression can be mutually transformed. The invention does not depend on the method of expression of coordinate values of stroke data.

Stroke data can be displayed in a rectangle (quadrangle) 31 for circumscribing the stroke data. This rectangle 31 is expressed as rectangular region of stroke data, and the dimensions of the rectangle 31 in X and Y direction may be stored by adding to the stroke data. The origin of coordinates stroke data is often set at one of four corners of the rectangle 31.

Fig. 4 is a diagram showing a data composition example of stroke data. Start point coordinate (X) 32 and start point coordinate (Y) 33 show coordinates of the start point of stroke data. The coordinates show, by defining the origin preliminarily, for example, so as to show the coordinates on the XY coordinates on the origin of the lower left corner of the rectangular region of the stroke data shown in Fig. 3, the moving length of the pen 11 to the start position by departing from the input surface, from this origin. By the start point coordinates (X), (Y) 32, 33, the coordinate point S1 shown in Fig. 2 is specified. Pen information 34 is composed of information whether the pen 11 moves away from the touch panel 6 or moves in contact with the input surface, information showing thickness of the pen, or information showing final

coordinate point. The relative coordinate (X) 35 and relative coordinate (Y) 36 show the relative moving length of the pen 11 from one coordinate point before in the X-direction and Y-direction as converted to the rectangular coordinates of the input surface. The coordinate points S2 to Sn are specified by the pen information 34 and relative coordinates (X), (Y) 35, 36.

At the end of stroke data, a mark (flag) showing that this coordinate point is final is set in the pen information 34. In the case of data in absolute coordinate expression, meanwhile, only the coordinates are expressed by the coordinate values on the XY coordinates with the origin at the lower left corner of the rectangular region of the stroke data.

Fig. 5 is a plan view showing the initial picture displayed on the display panel 6. Figs. 6A to 6D are plan views showing in progressive steps an example of the display image at the time of inputting and displaying of handwritten characters. In the initial picture 26, a plurality of buttons 12 to 19, 24, 25 are displayed in addition to the input/display area 20 for characters. In the input/display area 20 for characters, a plurality of ruled lines 22 are displayed at equal intervals. A line 23 exists between adjacent ruled lines 22 and a plurality of lines 23 are formed with a plurality of ruled lines 22. At the forefront position of the first line 23a (left top of the input/display area 20 for characters in the picture in Fig. 5), the cursor 21 indicating the input display position is displayed. In the input/display area 20 for characters, characters are input in handwriting using the input pen 11. The image data inputted in handwriting is submitted to processing for turning into stroke data and then submitted to normalization to be inputted in the right direction in the picture in Fig. 5 from the position where the cursor 21 is displayed.

For example, when a phrase "today, by Shinkansen" is inputted in the input/display area 20 for characters by using the input pen 11, the characters inputted in the input position are displayed as shown in Fig. 6A. This is executed by detecting the input position with the touch panel 8 and selecting and displaying the display position of the display panel 6 corresponding to the input position detected.

When, after inputting characters in handwriting, for example, the W button is indicated with the input pen 11, the image data is submitted to processing for turning into stroke data and also submitted to normalization, and the characters are displayed in the right direction in the picture in Fig. 6B from the position of the cursor 21 displayed in the forefront position as shown in Fig. 6B. The cursor 21 is displayed after the characters displayed. Moreover, the characters which were displayed in the input position are erased. The processing for turning into stroke data is one made for reducing the data volume by detecting the necessary image data only from among the sample image data. In addition, normalization means processing for converting characters inputted in handwriting to a size corresponding to the width of the line 23.

Next, when characters are inputted in handwriting as "at 13:00" in the same way, the inputted characters are displayed in the input position as shown in Fig. 6C. When the W button 12 is indicated next, the image data is submitted to processing for turning into stroke data and also submitted to normalization, and the characters are displayed in the right direction in the picture in Fig. 6 from the position of the cursor 21 as shown in Fig. 6D. The cursor 21 is displayed after the characters displayed. Moreover, the characters which were displayed in the input position are erased.

In this embodiment, the image data inputted during the period from the end of processing for turning into stroke data to the next processing for turning into stroke data is treated as forming one block data. In the case where characters are inputted in handwriting in the initial picture 26, the image data inputted during the period from the showing of the initial picture to the first processing for turning into stroke data is treated as forming one block data. In the examples of input of characters mentioned above, "today, by Sinkansen" and "at 13:00" become single block data respectively and are displayed as block 41 and block 42. The processing for turning into stroke data and the processing for normalization are performed for each block.

In the examples mentioned before, processing for turning into stroke data and processing for normalization are performed by indicating the W button 12. When the W button 12 is not indicated, however, processing for turning into stroke data and processing for normalization are performed by measuring the time after the end of input in handwriting when there is no input even with the passing of a prescribed time. Moreover, processing for turning into stroke data and processing for normalization are performed when the inputted image data is away from the image data inputted immediately before by no less than the predetermined distance.

When, after indicating the cursor button 13 with the input pen 11, a desired position in the input/display area 20 for characters is indicated, the cursor 21 moves to the indicated position. When, after indicating the line feed button 14 with the input pen 11, a desired position inside the block displayed in the input/display area 20 for characters is indicated, a line feed code is inputted before the block data of the indicated block and a line feed is made at that position. When, after indicating the eraser button 15 with the input pen 11, a desired position inside the block displayed in the input/display area 20 for characters is indicated, the block data of the indicated block is erased. The erased area becomes blank. Here, the eraser button 15 is converted to the pencil button which is not illustrated.

When, after indicating the delete button 16 with the input pen 11, a desired position inside the block displayed in the input/display area 20 for characters is indicated, the block data of the indicated block is deleted. The blocks after the erased block are displayed by eliminating the erased space. In the case where there is no block to display in the position indicated by the input pen 11 after indication by the input pen 11 of the delete button 16, a blank of the predetermined size is deleted. Here, the delete button 16 is converted to the pencil button which is not illustrated. When the pencil

button is indicated with the input pen 11, the eraser button 15 or the delete button 16 appears to enable input in handwriting of characters again.

When the registration button 17 is indicated with the input pen 11, a plurality of block data and line feed code, etc. are registered as an independent data in the RAM 4 together with the date of input, for example. After the registration is over, the independent data registered in the immediately previous position is read out and displayed in the input/display area 20 for characters. When there is no independent data in the immediately previous position, no processing is made. When the registration button 18 is indicated with the input pen 11, a plurality of block data and line feed code, etc. are registered as an independent data in the RAM 4 together with the date of input, etc. After the registration is over, the independent data registered in the next position is read out and displayed in the input/display area 20 for characters. When there is no independent data in the next position, the initial picture 26 is displayed.

When the upper button 24 or the lower scroll button 25 is indicated with the input pen 11, the line 23 in the input/display area 20 for characters is sequentially fed and displayed. Namely, the input/display area 20 for characters is constructed with a plurality (6 in this embodiment) of lines 23a to 23f as shown in Fig. 5 and,
if the upper scroll button 24 is indicated with the input pen 11 when the input/display area 20 for characters is being displayed, for example, the input/display area 20 for characters constructed with 6 lines or the 2nd line 23b to the 6th line 23f and the 7th line following the 6th line 23f, is displayed. When the button 24 is indicated in succession, the input/display area 20 for characters constructed with the 3rd line 23c to the 8th line is displayed. Moreover, when the lower scroll button 25 is indicated when the input/display area 20 for characters constructed with the 2nd line 23b to the 7th line is being displayed, the input/display area 20 for characters constructed with the first line 23a to the 6th line 23f is displayed. The number of lines for one scrolling may be either 1 line or 2 or more lines.

Concerning each stroke data, by storing the size and place of display in separate memory places, when specifying specific stroke data by touching the touch panel 6 by the pen 11, it is possible to judge which stroke data is displayed in the touched position from the touched coordinate values. The data used in such judging action is called the stroke data display coordinate table.

Suppose plural stroke data are displayed in the display screen 37 as shown in an display example in Fig. 7. As an example of stroke data display coordinate table, as shown in Fig. 8, coordinate position 46, X-direction size 44, and Y-direction size 45 displayed in each displayed stroke data are stored. The coordinate position 46 is an upper left coordinate point of rectangular regions 38 to 43 expressed in the X,Y direction size 44, 45.
As shown in Fig. 9, X-coordinate X1 at right end, X-coordinate X2 at left end, Y-coordinate Y1 at upper end, and Y-coordinate Y2 at lower end of the rectangular region 31 (see Fig. 10) displaying stroke data are stored. By touching the touch panel with the pen 11, the coordinate values can be judged, and therefore the stroke data containing the coordinates touched by the pen can be easily specified on the basis of the stroke data display coordinate tables 47, 48.

Fig. 11 is a flowchart for judging which stroke data has been touched by the pen. In this flowchart, an example of using the stroke data display coordinate table 48 shown in Fig. 9 is explained. At step s1, the coordinates Xp, Yp touched by the pen are obtained. At step a2, parameter i =1 is set.

At step a3, it is judge if coordinate Xp is contained in a range from left end to right end of the i-th stroke data or not. The process moves to step a4 when contained, or to step a5 when not contained.

At step a4, it is judge if coordinate Yp is contained in a range from upper end to lower end of the i-th stroke data or not. When contained, the instructed stroke data is judged to be data DSi, or the process moves to step a5 when not contained.

At step a5, 1 is added to parameter i, and the process moves to step a6. At step a6, it is judged if parameter i is larger than number n of the displayed stroke data. If judged negatively, the process returns to step a3, and if judged affirmatively, it is judged that the pen 11 does not touch any stroke data.

In this way, if the pen 11 touches any stroke data, its stroke data number can be obtained. The instructed stroke data number is supposed to be SDn, the display coordinates to be (xn, yn), the size of the rectangular region in X-direction to be Wxn, and the size in Y-direction to be Wyn.

Fig. 12 is a diagram for explaining a case of dividing stroke data into two sections. In the case of characters written horizontally, when necessary to divide, it is often needed to divide into right and left side, and an example of dividing laterally is described below. For the sake of simplicity of explanation, each stroke data is supposed to be displayed in the input size, and the coordinates and size to be displayed in the state of original data. If the display is magnified or reduced from the original data in order to standardize the display size, calculation is possible by taking into consideration the magnifying rate or reducing rate.

First, the user specifies the stroke data to be divided. Several methods of specifying may be considered, and herein, as shown in Fig. 12A, the top of the display input screen displaying the stroke data 51 is touched by the pen 11. At this time, the rectangular region 52 containing the specified stroke data 51 is, for example, highlighted, so that the completion of specifying may be seen by the user.

Consequently, as shown in Fig. 12B, by manipulation of touching the boundary portion to be divided on the display input screen of the specified stroke data 51 by the pen 11, the stroke data 51 can be divided into two stroke data 53, 54 as shown in Fig. 12C. The dividing boundary line is a vertical line including the touched coordinates.

Referring now to Fig. 13, the coordinates (Zx, Zy) touched for specifying the division boundary line can be judged on the basis of the signal from the touch panel in the same procedure as above. According to the coordinates (Zx, Zy) and the stroke data display coordinate tables 47, 48, the relative X-coordinate Kx of the division boundary line from the origin of the rectangular region 52 can be easily determined as

$$Kx = xn - Zx.$$

Therefore, supposing the origin to be in the upper left corner of the rectangular region 52 of the objective stroke data 51, it is divided into stroke data A from 0 to Kx, and stroke data B from Kx to Wx, relating to the X-axis direction. Herein, Wx is the size of the objective stroke data 51 in the X-direction of the rectangular region 52.

(Division of stroke data)

Referring next to Fig. 14, a specific example of dividing stroke data into stroke data A and stroke data B is described below. Among plural line segments composing stroke data, there is only one line segment crossing the boundary line to be divided by pen touch in one case, and there are a plurality in other case, and the single case is described first. Incidentally, if each coordinate of stroke data is expressed by the relative coordinate from the preceding coordinate, the absolute coordinate is determined by defining the origin in the upper left corner of the rectangular region of the stroke data.

First, among line segments composing stroke data 55, a line segment intersecting with the boundary line Kx is searched. That is, taking note of each absolute X-coordinate of start point (Xsn, Ysn) and end point (Xen, Yen) of line segment Sn, the line segment Sn satisfying

$$Kx - Xsn > 0, \text{ and } Xen - Kx > 0,$$

or the line segment Sn satisfying

$$Kx - Xen > 0, \text{ and } Xsn - Kx > 0$$

is searched. In the case of stroke data 55 shown in Fig. 14A, it corresponds to line segment S10.

As shown in Fig. 14B, when the searched line segment Sn is pen up, the start point (Xsn, Ysn) of the line segment Sn is the end point of stroke data A, and its end point (Xen, Yen) is start point of stroke data B. Rectangular regions 57, 58 of stroke data A, B are newly created. The start point (Xen, Yen) of stroke data B must be converted to the coordinate values having the origin in the stroke data B because the upper left corner of the rectangular region 58 of the newly created stroke data B is the origin. The coordinates may be calculated as follows:

$$\text{X-coordinate of start point of stroke data B} = Xen - Kx$$

$$\text{Y-coordinate of start point of stroke data B} = Yen$$

When the line segment Sn crossing the boundary line Kx, and end point of stroke data A and start point of stroke data B are known, the relative coordinate data may be used again. The data after the line segment S (n+1) as constituent element of stroke data B may be directly used as data of stroke data B as far as the coordinate values are relative.

As shown in Fig. 15A, when the line segment Sn is pen down, this line segment Sn is divided into three line segments as shown in Fig. 15B for the sake of convenience, that is:

pen down line segment S1n of start point (Xsn, Ysn) and end point (Kx, Kyn)

pen up line segment S2n of start point (Kx, Kyn) and end point (Kx, Kyn) (start point and end point are same position)

pen down line segment S3n of start point (Kx, Kyn) and end point (Xen, Yen)

The coordinates are absolute coordinates. Herein, the coordinate Kyn is determined by:

$$Kyn = Ysn - (Ysn - Yen) \times (|Kx - Xsn|/|Xsn - Xen|)$$

where (Kx, Kyn) denote coordinates of the intersecting place of line segment and boundary line. Next, assuming the pen up line segment S2n to be a line segment crossing the division boundary line Kx, same as in the case of pen up line segment, the coordinates (Kx, Kyn) are processed as end point of stroke data A and start point of stroke data B, and stroke data A and B are obtained as shown in Fig. 15C.

Fig. 16 shows a case of a plurality of line segments crossing the division boundary line. The line segments are expressed by reference numerals Sc1, Sc2, ..., Scn. The system of coordinates may be either relative coordinates or

absolute coordinates unless otherwise specified. In the example shown in Fig. 16, the crossing direction of boundary line is same in all odd-numbered line segments Sc1, Sc3, Sc5, etc., and same in all even-numbered line segments Sc2, Sc4, Sc6, etc.

The extent from line segment S0 to line segment S(c1-1) is processed as being belonging to the stroke data A side, and between

line segment Sc1: start point (Xsc1, Ysc1) and end point (Xec1, Yec1), and

line segment Sc2: start point (Xsc2, Ysc2) and end point (Xec2, Yec2),

the data from line segment S(c1+1) to line segment S(c2-1) is processed as being belonging to stroke data B. Besides, in stroke data A, a new pen up line segment of

line segment S11: start point (Xsc1, Ysc1) and end point (Xec2,Yec2)

is inserted. That is, the stroke data A is a line segment row of line segments S1 to S(c1-1), Sq1, S(c2+1), and so forth.

As for stroke data B, the data from line segment S(c1+1) to line segment S(c2-1) is data of stroke data B, and start point (Xec1, Yec1) is the start point of stroke data B. Next, as for

line segment Sc2: start point (Xsc2, Ysc2) and end point (Xec2, Yec2)

line segment Sc3: start point (Xsc3, Ysc3) and end point (Xec3, Yec3)

the pen up line segment of

line segment Sq2: start point (Xsc2, Ysc2) and end point (Xec3, Yec3)

is added next to the line segment S(c2-1) of stroke data B. That is, stroke data B is a line segment row of line segments S(c1+1) to S(c2-1), Sq2, S(c3+1), and so forth.

As for stroke data A, the data from line segment S(c2+1) to line segment S(c3-1) is data of stroke data A. That is, stroke data A is a line segment row of line segments S1 to S(c1-1), Sq1, S(c2+1) to S9c3-1). Next, as for

line segment Sc3: start point (Xsc3, Ysc3) and end point (Xec3, Yec3)

line segment Sc4: start point (Xsc4, Ysc4) and end point (Xec4, Yec4)

the pen up line segment of

line segment Sq3: start point (Xsc3, Ysc3) and end point (Xec4, Yec4)

is added next to the line segment S(c3-1) of stroke data A. That is, stroke data A is a line segment row of line segments S1 to S(c1-1), Sq1, S(c2+1) to S(c3-1), Sq3, S(c3+1), and so forth.

Moreover, as for stroke data B, data from line segment S(c3+1) to line segment S(c4-1) is data of stroke data B. Such processing is repeated up to line segment Scn.

Concerning the final line segment Scn: start point (Xscn, Yscn) and end point (Xecn, Yecn), the end point (Xenc, Yecn) is the final point of all strokes at the strong data side to which the point belongs.

In this processing, the stroke data can be divided into stroke data row A: S1 to S(c1-1), Sq1, S(c2+1) to S(c3-1), Sq3, S(c4+1), ..., and stroke data row B: S(c1+1) to S(c2-1), Sq2, S(d3+1), S(c4-1), Sq4, S(c5+1), ...

What is explained so far is the case of surpassing the boundary line in the pen up state, and in the case of surpassing the boundary line in pen down state, same as mentioned above, by dividing into three line segments,

line segment S1n of start point (Xsn, Ysn) and end point (Kx, Kyn)

line segment S2n of start point (Kx, Kyn) and end point (Kx, Kyn) (pen up line segment with start point and end point at same position)

line segment S3n of start point (Kx, Kyn) and end point (Xen, Yen)

$$Kyn = Ysn - (Ysn - Yen) \times (|Kx - Xsn|/|Xsn - Xen|)$$

where (Kx, Kyn) are coordinate values at the intersecting place of line segment and boundary line, the data can be divided into stroke data A and stroke data B in the same process as above (see Fig. 15). The coordinates are absolute coordinates.

Fig. 17 is a flowchart explaining division process of stroke data. Herein, master stroke data shown in Fig. 18 is divided into stroke data A and stroke data B shown respectively in Figs. 19A and 19B. In the master stroke data in Fig. 18, both numerical values of relative coordinates X1, Y1 and absolute coordinates X2, Y2 are prepared by prior processing for the ease of handling. The master stroke data in Fig. 18 is divided by boundary line Kx, crossing over the division boundary line Kx in the pen up state only, in the case explained below.

Step b1 is for initial setting. The X absolute coordinate value of the division boundary line is set in coordinate Kx. The start point XA0, YA0 of stroke data A is set at start point X0, Y0 of master stroke data. Parameters i, j are both set at 1, and parameter m is set at 0, and parameter ST showing to which data the stroke data belongs is set at A.

At step b2, it is judged if line segment Si has crossed the division boundary line or not. The process moves to step b3 if not crossing, or advances to step b8 if crossing. Specific processing at step b2 is shown in Fig. 20. Referring to Fig. 20, at step b21, it is judged if the absolute coordinate value X2(i) of end point of line segment Si is greater than coordinate value Kx, and if the absolute coordinate value X2(i-1) of end point of line segment S(i-1) is smaller than coordinate value Kx. If judged affirmatively, it is estimated that the line segment Si has crossed the division boundary line. If judged negatively at step b21, the process moves to step b22. At step b22, it is judged if the absolute coordinate

value X2(i) of end point of line segment Si is smaller than coordinate value Kx, and if the absolute coordinate value X2(i-1) of end point of line segment S(i-1) is greater than coordinate value Kx. If judged affirmatively, it is estimated that the line segment Si has crossed the division boundary line. If judged negatively, it is estimated that the line segment Si has not crossed the division boundary line.

Referring back to Fig. 17, at step b3, it is judged if parameter ST is A or not. If judged affirmatively, the process moves to step b4, and if judged negatively, the process moves to step b5.

At step b4, relative coordinate values X1(i), Y1(i) and pen information Z(i) of end point about line segment Si are stored respectively as relative coordinate values XA(j), YA(j), and ZA (j) of end point about line segment SAj for composing stroke data A, and 1 is added to parameter j, and the process moves to step b6.

At step b5, relative coordinate values X1(i), Y1(i) and pen information Z(i) of end point about line segment Si are stored respectively as relative coordinate values XB(m), YB(m), and ZB (m) of end point about line segment SBm for composing stroke data B, and 1 is added to parameter m, and the process moves to step b6.

At step b6, 1 is added to parameter i, and at step b7, it is judged if parameter i is greater than the number n of line segments for composing the master stroke data. If greater, the process is over, and if not greater, the process returns to step b2, and next line segment is processed similarly.

At step b2, if the line segment Si is crossing the division boundary line, the process moves to step b8, and it is judged if parameter ST is A or not. If parameter ST = A, the process moves to step b9, and if parameter ST is not A but B, the process advances to step b15.

At step b9, setting parameter ST = B, the process moves to step b10. At step b10, it is judged if parameter m is 0. If parameter m = 0, the process moves to step b11, and if not parameter = 0, the process moves to step b13. At step b11, the start point XB0, YB0 of stroke data B is set. More specifically, the value subtracting the coordinate value Kx from the absolute X-coordinate X2 (i) of end point of line segment Si is set at X-coordinate XB0 of start point of stroke data B, and absolute Y-coordinate Y2(i) of end point of line segment Si is set at Y-coordinate YB0 of start point. At step b12, parameter m is set at 1, and the process moves to step b14.

At step b10, if not parameter m = 0, the process moves to step b13. At step b13, relative coordinates XB(m), YB(m), and pen information ZB(m) of end point about line segment SBm for composing stroke data B are set, 1 is added to parameter m, and the process moves to step b14. More specifically, the relative X-coordinate value XB(m) of end point of line segment SBm is set at a value of subtracting the coordinate value Xp set at subsequent step b14 from the absolute X-coordinate value X2(i) at end point of line segment Si. The relative Y-coordinate value YB(m) of end point of line segment SBm is set at a value of subtracting the coordinate value Yp set at subsequent step b14 from the absolute Y-coordinate value Y2(i) at end point of line segment Si. The pen information ZB(m) of line segment SBm is set at "up."

At step b14, the coordinate value Xp is set at absolute X-coordinate value X2(i-1) of end point of line segment S(i-1), and the coordinate value Yp is set at absolute Y-coordinate value Y2(i-10) of end point of line segment S(i-1), and the process moves to step b6.

At step b8, if not parameter ST = A, advancing to step b15, the parameter ST = A is set, and the process moves to step b16. At step b16, relative coordinates XA(j), YA(j), and pen information ZA(j) of end point about line segment SAj for composing stroke data A are set, 1 is added to parameter j, and the process moves to step b14. More specifically, the relative X-coordinate value XA(j) of end point of line segment SAj is set at a value of subtracting the coordinate value Xp set at preceding step b14 from the absolute X-coordinate value X2(i) at end point of line segment Si. The relative Y-coordinate value YA(j) of end point of line segment SAj is set at a value of subtracting the coordinate value Yp set at preceding step b14 from the absolute Y-coordinate value Y2(i) at end point of line segment Si. The pen information ZA(j) of line segment SAj is set at "up."

By this processing, the master stroke data shown in Fig. 18 is divided into stroke data A and stroke data B as shown respectively in Figs. 19A and 19B. Afterwards, the stroke data is displayed again on the display screen. In this case, a slight gap may be formed between stroke data A and stroke data B so that the vision may be easier to see by the user.

(Partial deletion of stroke data)

Fig. 21 is a diagram for explaining the process of deleting part of stroke data. This explanation is an example of deletion action, and it is not limited by this operation only.

Herein, by prior display button or key manipulation or other pen manipulation, it is supposed that the manipulation to be done is instructed to be deletion action in the input/display apparatus 1. First, as shown in Fig. 21A, the objective stroke data 71 is specified by the pen 11. The coordinates of the position touched by the pen 11 in the stroke data 71 specified by the pen 11 are determined. This is realized in the same method as in the foregoing embodiment. When the objective stroke data 71 is judged, it is noticed by the user by, for example, highlighting the stroke data 71 as shown in Fig. 21B.

Next, as shown in Fig. 21C, by moving the pen 11 while stroking either to right or to left, from the boundary line of the position 72 touched by the pen 11 in the objective stroke data 71, it is instructed whether the deleting area is at the

right or left side of the boundary line. As the pen 11 moves on the touch panel while stroking, the input/display apparatus for handwritten characters 1 sequentially samples the positions of the pen 11, so that the direction may be easily judged.

When the pen manipulation is thus over, the coordinate points touched by the pen 11 are the boundary line, the stroke data 71 is divided and displayed as two stroke data 73, 74 according to the division method of stroke data mentioned above as shown in Fig. 21D. Consequently, either specified side of divided stroke data 73, 74, for example, stroke data 74 is deleted, and when next stroke data 75 is displayed successively to the deleted stroke data 74, it may be displayed by filling up the vacancy as shown in Fig. 21E.

(Combination of stroke data)

Fig. 22 is a diagram for explaining a combining method of stroke data. In the first place, stroke data A and stroke data B to be combined are specified by touching by the pen 11 or other method. Herein, stroke data A and stroke data B are supposed to be identical in size in Y-direction of the rectangular regions. If not of same size, either stroke data A or B, or both must be integrated, and the Y-direction must be preliminarily reduced or magnified to a specific size. This integration process can be easily done as far as the stroke data is expressed in the system of relative coordinates.

As shown in Fig. 22A, a new pen up line segment Ssp is defined so as to link end point (Xan, Yan) (absolute coordinates) of stroke data A, and start point (Xb1, Yb1) (absolute coordinates) of stroke data B (however, the origin of coordinates being different from stroke data A) (see Fig. 22B).

The relative coordinates of this line up segment Ssp are, as shown in Fig. 23, as follows:

relative X-coordinate: (length L1 of Xan and rectangular right end of stroke data A) + (length L2 of Xb1 and rectangular left end of stroke data B)

relative Y-coordinate: (coordinate Yan - coordinate Yb1 (length L3))

This line segment Ssp is added to the end of the stroke data A.

Consequently, line segment Sb1 to line segment Sbm of stroke data B are added. This processing is easy as far as expressed in the system of relative coordinates. The new stroke data combined with line segment Ssp and stroke data B is the intended stroke data. Afterwards, it is displayed again on the display screen.

Fig. 24 is a flowchart explaining the combining process of stroke data. As assumed herein, stroke data A and stroke data B shown in Figs. 25A and 25B are combined into stroke data shown in Fig. 26. In each stroke data, for the ease of handling, it is supposed that the rectangular X-direction size WAX of stroke data has been calculated by prior processing.

At step c1, relative coordinates XA0, YA0 of start point of stroke data A are respectively set as start point coordinates X0, Y0 of combined stroke data. At step c2, parameter i = 1 is set. At step c3, relative coordinate values XA(i), YA(i), and pen information ZA(i) of end point about line segment SAi for composing stroke data A are respectively set as relative coordinate values X(i), Y(i), and pen information Z(i) of end point about line segment Si for composing the combined stroke data. Adding 1 to parameter i, the process moves to step c4.

At step c4, it is judged if parameter i is greater than the number n1 of line segments for composing stroke data A. If not greater, returning to step c3, the line segment SAi of stroke data A is set at line segment Si of combined stroke data. If greater, that is, if parameter i = n1 + 1 , the process moves to step c5.

At step c5, in order to combine stroke data A and stroke data B, line segment Ssp to be newly added is calculated and set. The relative X-coordinate X(i) of the end point of line segment Si (i = n1+1) is set at a value of

(X-direction size WAX of rectangular region of stroke data A) - (absolute X-coordinate X1An1 of end point of line segment SAn1) + (relative X-coordinate XB0 of start point of stroke data B)

The relative Y-coordinate Y(i) of end point of line segment Si is set at a value of

(relative Y-coordinate YB0 of start point of stroke data B) - (absolute Y-coordinate Y1An1 of end point of line segment SAn1)

The pen information Z(i) is set at "up." Adding 1 to parameter i, the process moves to step c6.

At step c6, parameter j = 1 is set. At step c7, relative coordinate values XB(j), YB(j), and pen information ZB(j) of end point about line segment SBj for composing stroke data B are respectively set as relative coordinate values X(i), Y(i), and pen information Z(i) of end point about line segment Si for composing the combined stroke data. Adding 1 to parameters i and j, the process moves to step c9.

At step c9, it is judged if parameter j is greater than the number n2 of line segments for composing stroke data B. If parameter j is not greater than n2, returning to step c7, the line segment SBj for composing stroke data B is sequentially set as line segment Si for composing new stroke data. Processing is over when parameter j is greater than n2.

Integration process when the size of stroke data A and B differs in the rectangular region as mentioned above is executed as follows. In the rectangular region of stroke data A, the X-direction length is supposed to be Wxa and the Y-direction length to be Wya. Similarly, in the rectangular region of stroke data B, the X-direction length is supposed to be Wxb, and the Y-direction length to be Wyb. Moreover, Wxa is not equal to Wxb, and Wya is not equal to Wyb. Suppose stroke data B is integrated into stroke data A. The reducing or magnifying rate is determined on the basis of the Y-direction length. That is, Wya/Wyb is determined. By accumulating this ratio in the X-direction length Wxb and Y-direction length Wyb in the rectangular region of stroke data B, stroke data B is integrated into stroke data A. When integrating stroke data A into stroke data B, it is similarly realized, or the stroke data A and B may be reduced or magnified at different ratio, and integrated.

When combining different stroke data, size of character or type of line of stroke data can be matched. That is, the stroke data is composed by containing attribute data as additional information, that is, data showing thickness of characters and data showing type of line, aside from the coordinate data and additional information showing the pen state as explained in Fig. 2. Therefore, when combining, attribute data of either one stroke data should be matched with attribute data of other stroke data.

(Insertion of blank in stroke data)

Fig. 27 is a diagram for explaining the action for inserting a blank in the stroke data. Herein, it is supposed that the manipulation to be done here is instructed to be blank insertion action to the input/display apparatus 1 preliminarily by display button or key manipulation or other manipulation. The blank size to be inserted is too be specified preliminarily by numerals in dot units.

As shown in Fig. 27A, first, the objective stroke data 81 is specified by the pen 11, and then, as shown in Fig. 27B, the place for inserting the blank is specified again by pen touch in the stroke data 81. As a result, as shown in Fig. 27C, specified blank is inserted in specified position of the specified stroke data 81, and hence it is changed and displayed as new stroke data 82.

As internal processing, the coordinates of the stroke data 81 specified by the pen 11 and the point 83 touched by the pen 11 are determined. This is realized by the same method as in the foregoing embodiments, and the objective stroke data 81 and the point 83 in the stroke data can be determined. Defining the coordinates of the pen touched by the pen 11 as boundary line, the stroke data 81 is divided into stroke data A and stroke data B as shown in Fig. 28A according to the division method of stroke data mentioned above. For the sake of simplicity of explanation, the divided data is supposed to be transformed into relative coordinates. The stroke data A contains the start point of the stroke data 81.

Consequently, as shown in Fig. 28B, a new pen up segment Ssp is defined so as to link the end point (Xan, Yan) (absolute coordinates) of the divided stroke data A, and the start point (Xb1,Yb1) (absolute coordinates, however, the origin of coordinate being different from stroke data A) of stroke data B. However, the relative coordinates of this pen up line segment Ssp are defined as follows:

relative X-coordinate: (length of coordinate Xan and rectangular right end of stroke data A) + (length of Xb1 and rectangular left end of stroke data B) + (specified blank dot size)

relative Y-coordinate: (coordinate Yb1 - coordinate Yan)

This line segment Ssp is added to the end of stroke data A.

Next, line segments Sb1 to Sbm of stroke data B are added. Being expressed in relative coordinates, it is easy to add. The new stroke data 84 combined with the line segment Ssp and stroke data B is the intended stroke data in which the blank is inserted. Afterwards, the new stroke data is displayed again on the display screen, and is depicted as shown in Fig. 28C.

(Insertion of stroke data)

Fig. 29 is a diagram for explaining insertion processing of stroke data. Creation of new stroke data by inserting other stroke data into certain stroke data is realized by combining the division processing and combination processing of stroke data mentioned above. First, as shown in Fig. 29A, stroke data D to be inserted is specified. Then inserting stroke data C is specified. Stroke data can be specified in the same method as above. The specified stroke data D, C are read out from the RAM 4, normalized, and temporarily stored in the memory region.

Next, the inserting position of the inserting stroke data C is specified by using the pen 11. In the same process as when dividing stroke data, the insertion position in the objective stroke data can be obtained.

In succession, as shown in Fig. 29B, the stroke data D is divided into stroke data A and stroke data B, and the inserting stroke data C is moved in between the stroke data A and stroke data B as shown in Fig. 29C, and first as shown

in Fig. 29D, the stroke data A and stroke data C are combined to make up stroke data E, then, as shown in Fig. 29E, the combined new stroke data E and stroke data B are further combined to make up stroke data F. As a result, the stroke data C is inserted into the stroke data D.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and the range of equivalency of the claims are therefore intended to be embraced therein.

Claims

1. An input and display apparatus for handwritten characters:
   including display means (6) provided with a display surface in which orthogonal coordinates are defined, and input means (8) having a light transmitting input surface in which orthogonal coordinates are defined, which outputs coordinate points indicated by special indicating means (11), on the input surface disposed so as to overlap with the display surface, and
   displaying the coordinate points on the display surface of the display means (6), corresponding to a plurality of coordinates points indicated at the time of input in handwriting when the input surface discontinuously indicate by the indicating means (11), the input/display apparatus for handwritten characters comprising:
   cursor display means for displaying a cursor indicating the position for input/display on the display surface of the display means (6);
   stroke data preparing means (2) for preparing stroke data consisting of coordinate points which are extracted after the end of input in handwriting from among a plurality of coordinate points outputted from the input means (8) at the time of input in handwriting on the basis of a predetermined reference;
   storage means (4) for storing stroke data;
   first editing means (2) for dividing coordinate points composing one stroke data into plural coordinate point groups, and creating plural stroke data composed of coordinate point groups; and
   normalizing display means (2) for setting rectangular coordinates of a predetermined size after a cursor position displayed on a display surface of the display means (6), and displaying stroke data on the rectangular coordinates.

2. The input and display apparatus for handwritten characters of claim 1, wherein the first editing means is replaced by:
   second editing means (2) for dividing the coordinate points composing one stroke data into plural coordinate point groups, erasing coordinate point groups selected from the coordinate point groups, and creating stroke data composed of the remaining coordinate point groups.

3. The input and display apparatus for handwritten characters of claim 1, wherein the first editing means is replaced by:
   third editing means (2) for adding coordinate points for composing other stroke data after coordinate points for composing one stroke data output two stroke data, and creating one stroke data composed of coordinate points composing one and other stroke data.

4. The input and display apparatus for handwritten characters of claim 1, wherein the first editing means is replaced by:
   fourth editing means (2) for dividing coordinate points composing one stroke data into two coordinate point groups, and creating one stroke data by correcting the coordinates of coordinate points composing either one coordinate point group of the two divided coordinate point groups, so as to be a blank region when displayed in the display means (6).

5. The input and display apparatus of claim 1, wherein the first editing means is replaced by:
   fifth editing means (2) for dividing coordinate points composing one stroke data into two coordinate point groups, inserting coordinate points composing other stroke data between divided coordinate point groups, and creating one stroke data composed of coordinate points composing the divided plural coordinate point groups and other stroke data.

6. The input and display apparatus for handwritten characters of any one of claims 1, 2, 4 and 5, wherein the editing means (2):
   sets a first rectangular region including stroke data to be divided;
   deduces a coordinate point in the first rectangular region, corresponding to the coordinate point on the input board designated by the indicating means (11);
   divides the first rectangular region by a division boundary line including the deduced coordinate point into two second rectangular regions;

when the stroke data traverses the division boundary line with a pen up, considers a start point AS of the pen up line segment A crossing the division boundary line as an end point of the stroke data in one of the two second rectangular regions including the start point AS, and an end point AE of the line segment A as a start point of the stroke data in the other of the two second rectangular regions including the end point AE;

when the stroke data traverses the division boundary line with a pen down, divides the pen down line segment B crossing the division boundary line into a pen down line segment B1 in which a start point BS of the pen down line segment B is a start point B1S and the intersecting point BC between the line segment B and the division boundary line is an end point B1E, a pen up line segment B2 in which the intersecing point BC is a start point B2S and an end point B2E (=B2S), and a pen down segment B3 in which the intersecting BC is a start point B3S and the end point BE of the line segment B is an end point B3E; and

divides the coordinate points composing one stroke data into plural coordinate point groups, considering the start point B2S of the line segment B2 as the end point of the stroke data in the one second rectangular region including the start point B2S, and the end point B2E of the line segment B2 as the start point of the stroke data in the other second rectangular region including the end point B2E.

7. The input and display apparatus for handwritten characters of claim 2, wherein the second editing means, after dividing stroke data into plural coordinate point groups, deletes the coordinate group selected by designation of the indicating means (11).

8. The input and display apparatus for handwritten characters of claim 3, wherein the third editing means creates a pen up line segment E of a predetermined length, in which the end point of one stroke data C of two stroke data C and D is a start point ES and the start point of the other stroke data D is an end point EE, adds the created pen up line segment E to the end of the stroke data C, and additionally adds the stroke data D.

9. The input and display apparatus of claim 3, wherein the third editing means (2) creates one stroke data by conforming the sizes of the rectangular regions of two stroke data to each other.

10. The input and display apparatus for handwritten characters of claim 3, wherein the stroke data includes attribute data indicating the width and type of character line, and

the third editing means (2) creates one stroke data by conforming the attribute data of two stroke data.

11. The input and display apparatus for handwritten characters of claim 4, wherein the fourth editing means (2), after dividing stroke data into stroke data F and G of two coordinate groups, creates a pen up line segment H of a length which forms a blank region of a predetermined size, considering the end point of the one stroke data F as a start point HS, and the start point of the other stroke data G as an end point HE, adds the created pen up line segment H to the end of the stroke data F, and additionally adds the stroke data G .

12. The input and display apparatus for handwritten characters, whrerein the fifth editing means, after dividing stroke data into stroke data I and J of two coordinate point groups, creates a pen up line segment L of a predetermined length, in which the start point of the stroke data K to be inserted is an end point LE, adds the created pen up line segment L to the end of the stroke data I, additionally creates stroke data M by adding the stroke data K,

creates a pen up line segment N of a predetermined length, in which the end point of the stroke data M is a start point NS, and the start point of the other stroke data J as an end point NE, adds the created pen up line segment N to the end of the stroke data M, and additionally creates one stroke data by adding the stroke data J.

Fig. 1

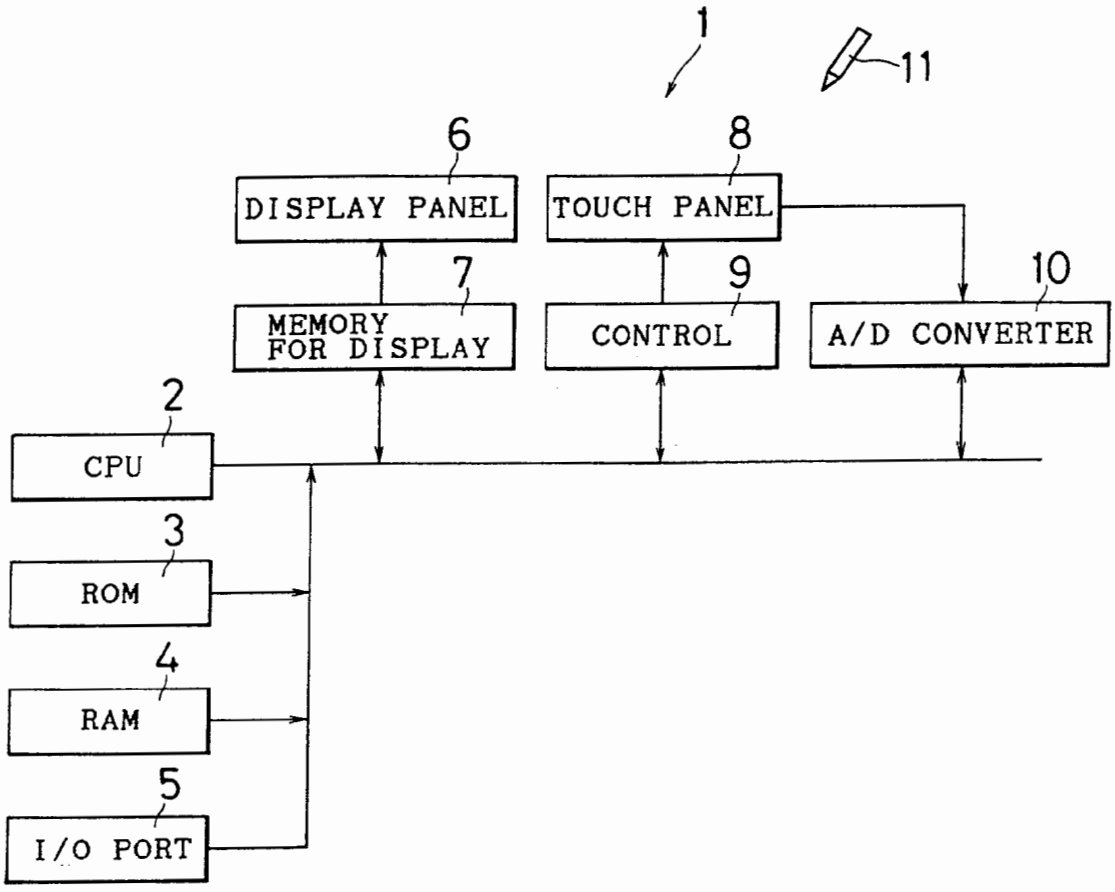

1
11
6
DISPLAY PANEL
8
TOUCH PANEL
7
MEMORY FOR DISPLAY
9
CONTROL
10
A/D CONVERTER
2
CPU
3
ROM
4
RAM
5
I/O PORT

FIG. 2

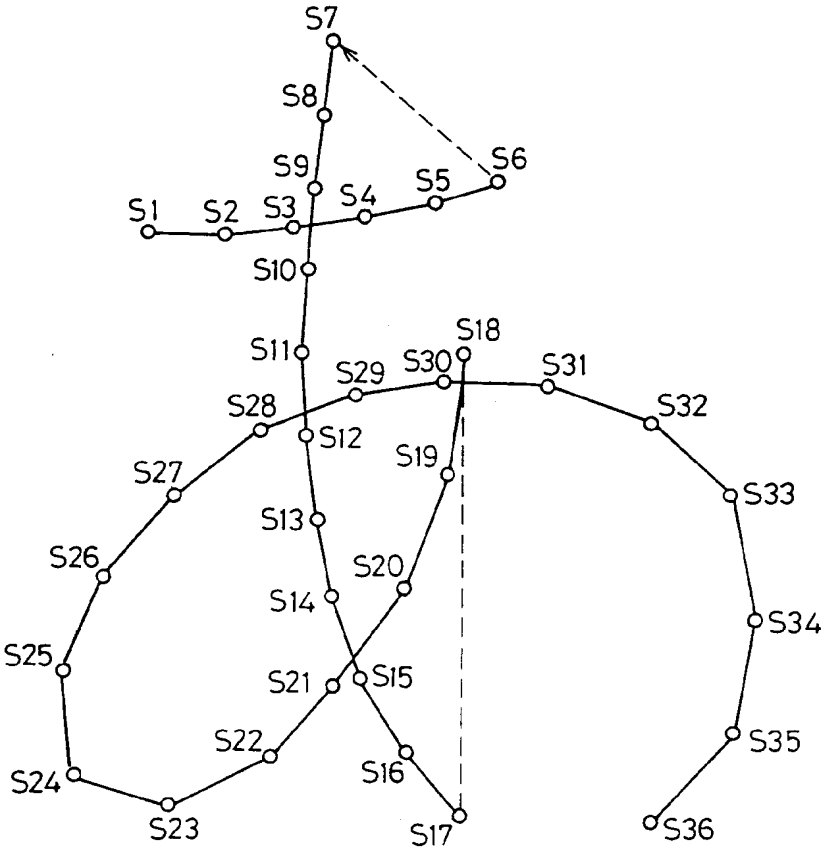
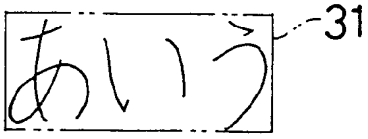

S7
S8
S9
S6
S5
S1
S2
S3
S4
S10
S18
S11
S29
S30
S31
S28
S32
S12
S19
S27
S33
S13
S26
S20
S14
S34
S25
S21
S15
S22
S35
S24
S16
S23
S17
S36

FIG. 3


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FIG. 4

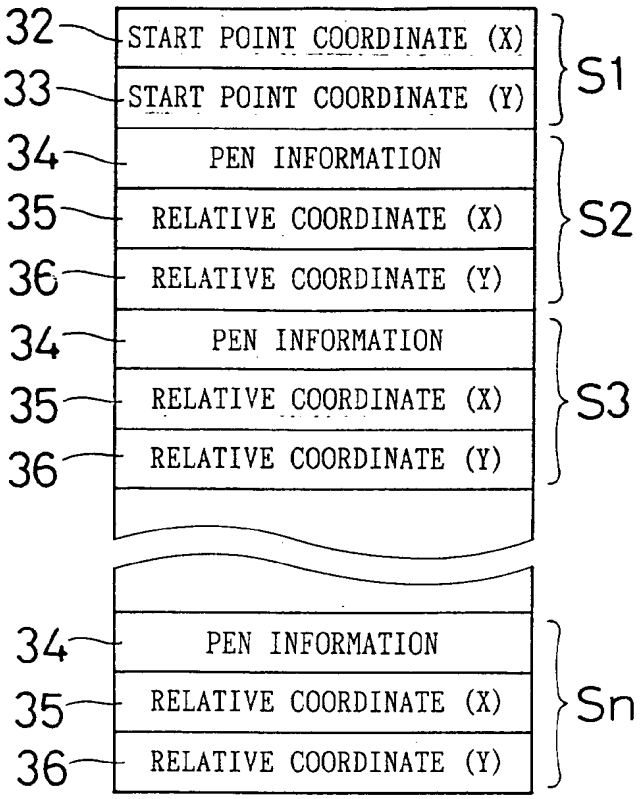


FIG. 5

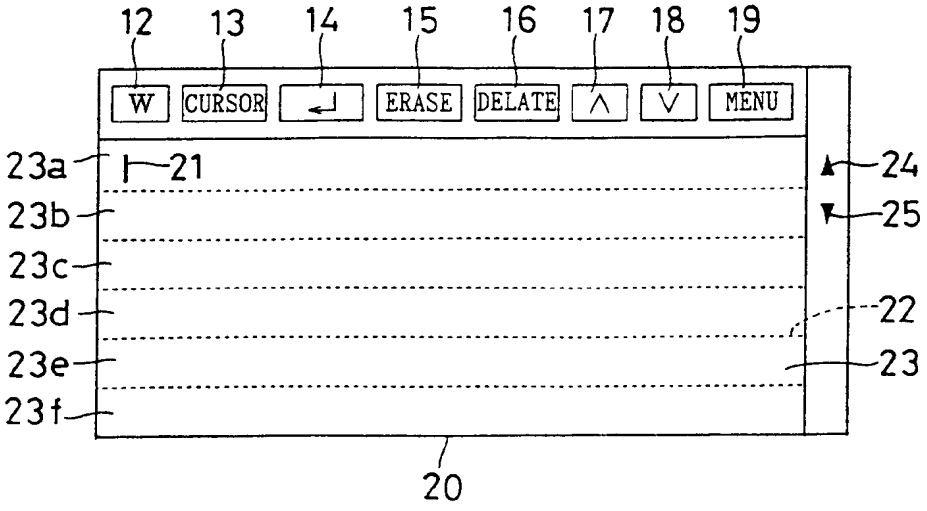


Fig. 6A

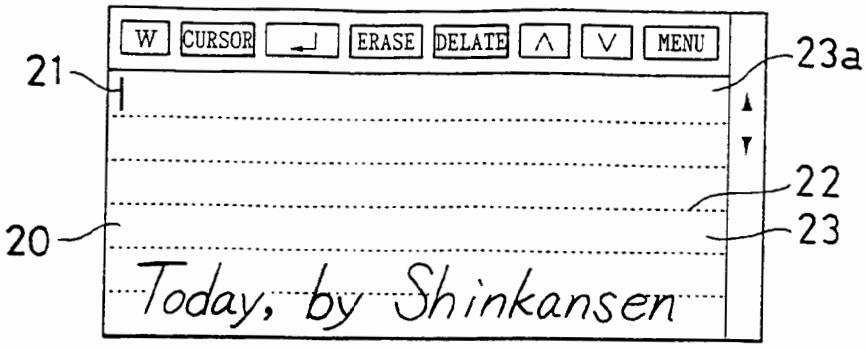


Fig. 6B

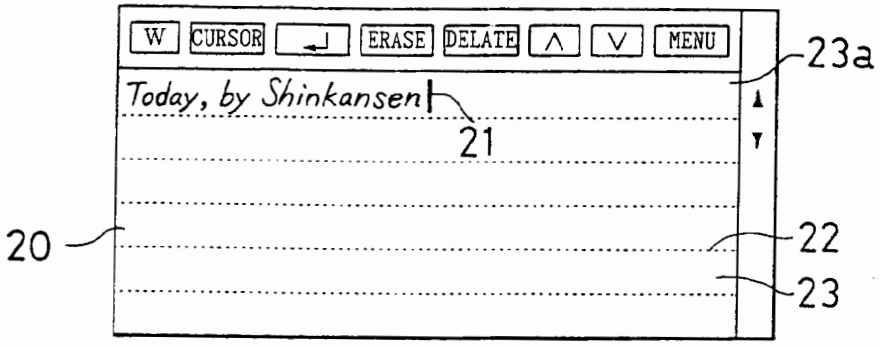


Fig. 6C

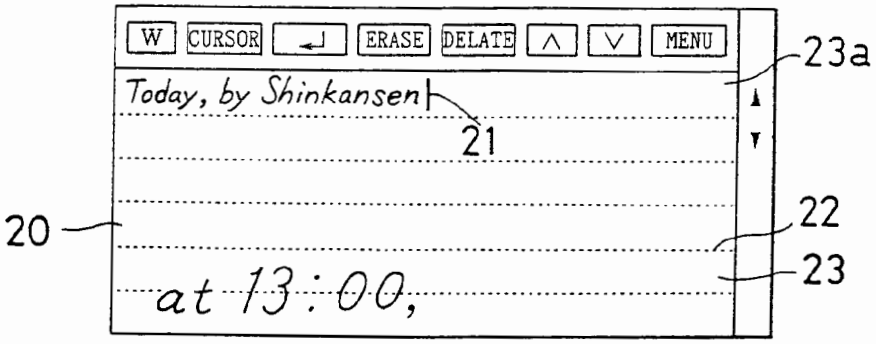


Fig. 6D

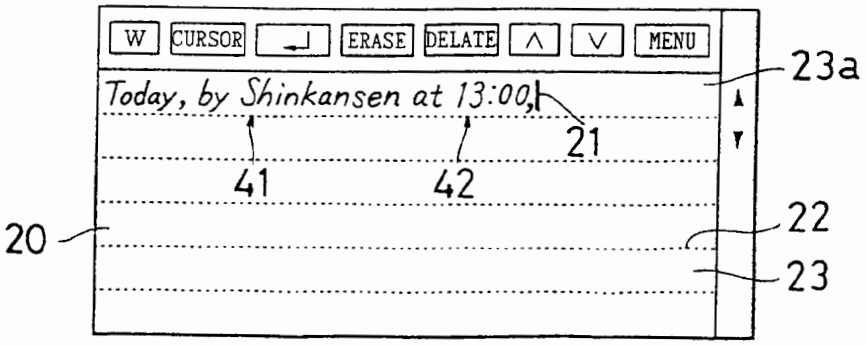


FIG. 7

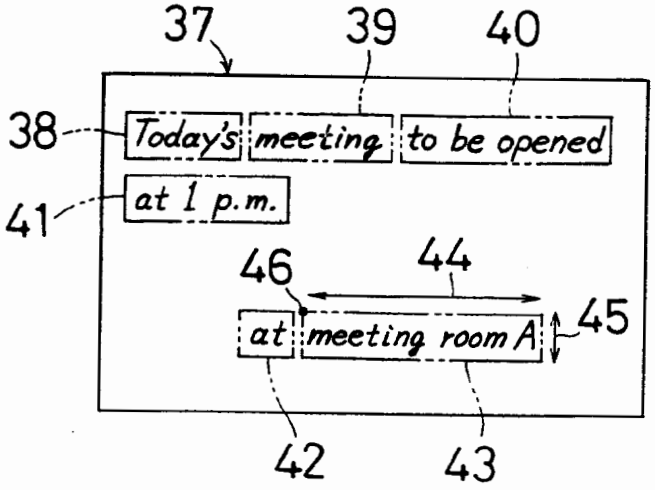


FIG. 8

47

	X-POS.	Y-POS.	RECT. X-DIR. SIZE	RECT. Y-DIR. SIZE
STROKE DATA 38				
STROKE DATA 39				
STROKE DATA 43				

FIG. 9

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DATA NO.	X-DIR.		Y-DIR.	
	X1	X2	Y1	Y2
SD1	X1(1)	X2(1)	Y1(1)	Y2(1)
SD2	X1(2)	X2(2)	Y1(2)	Y2(2)
SD3	X1(3)	X2(3)	Y1(3)	Y2(3)
⟨	⟨	⟨	⟨	⟨
SDn	X1(n)	X2(n)	Y1(n)	Y2(n)

STROKE DATA DISPLAY COORDINATE TABLE

FIG. 10

X1 : RECT. LEFT END X-COORDINATE

X2 : RECT. RIGHT END X-COORDINATE

Y1 : RECT. UPPER END Y-COORDINATE

Y2 : RECT. LOWER END Y-COORDINATE

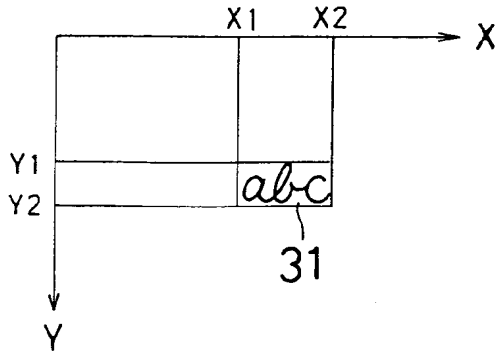


FIG. 11

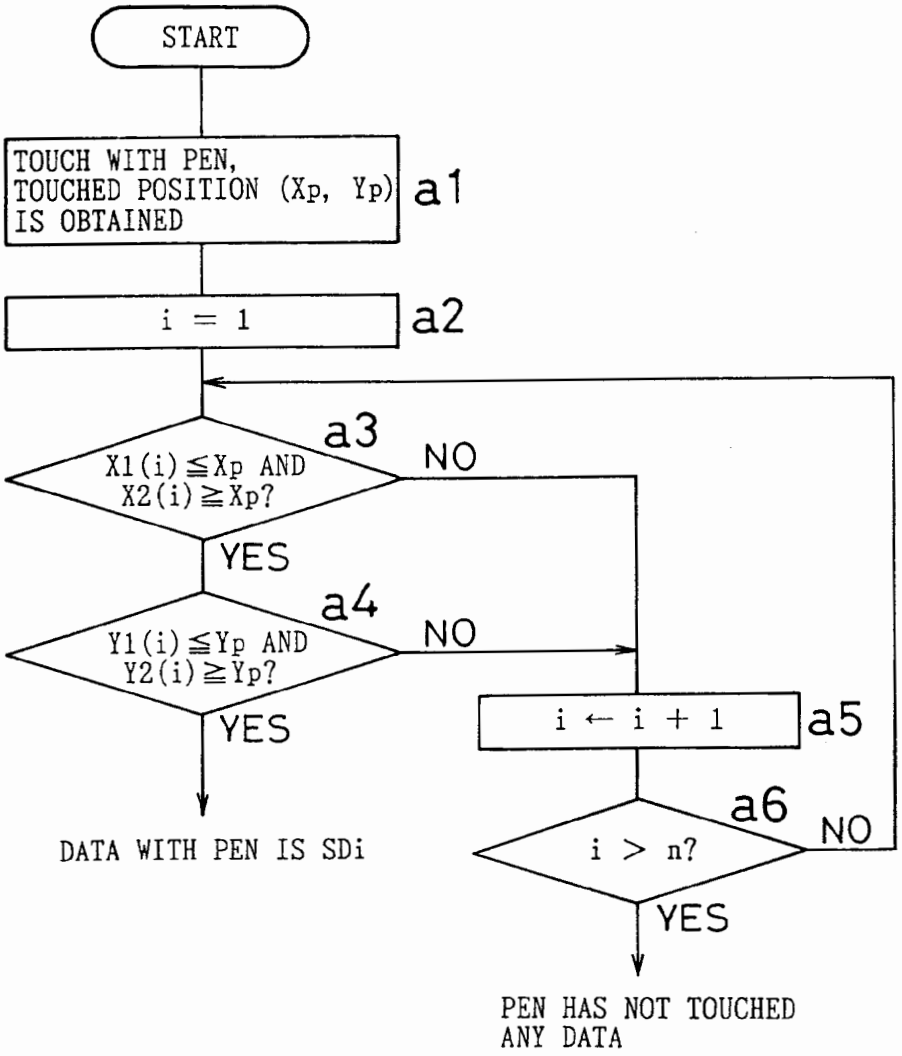

START
TOUCH WITH PEN, TOUCHED POSITION (Xp, Yp) IS OBTAINED
a1
i = 1
a2
a3
X1(i) ≦ Xp AND X2(i) ≧ Xp?
NO
YES
a4
Y1(i) ≦ Yp AND Y2(i) ≧ Yp?
NO
YES
i ← i + 1
a5
a6
i > n?
NO
YES
DATA WITH PEN IS SDi
PEN HAS NOT TOUCHED ANY DATA

FIG. 12A

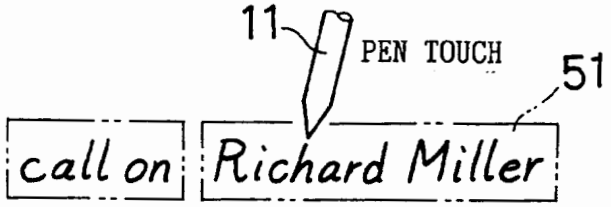


FIG. 12B

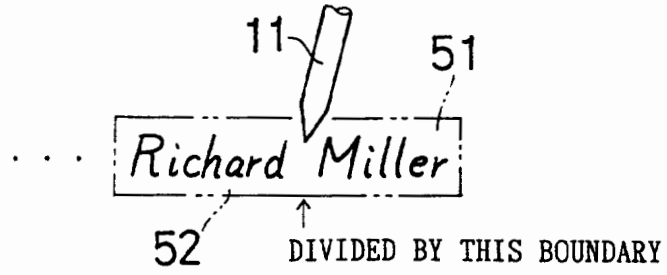


FIG. 12C

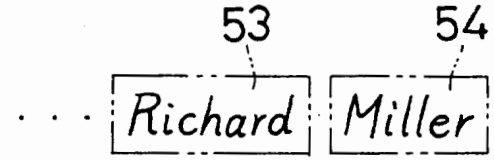


FIG. 13

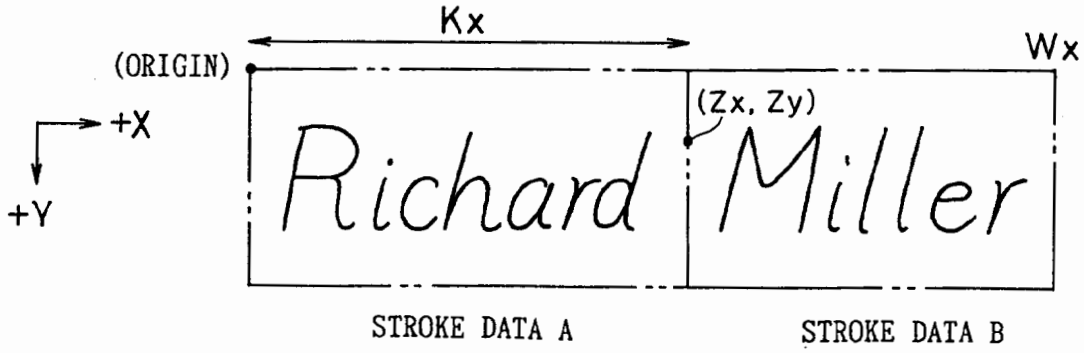


FIG. 14A

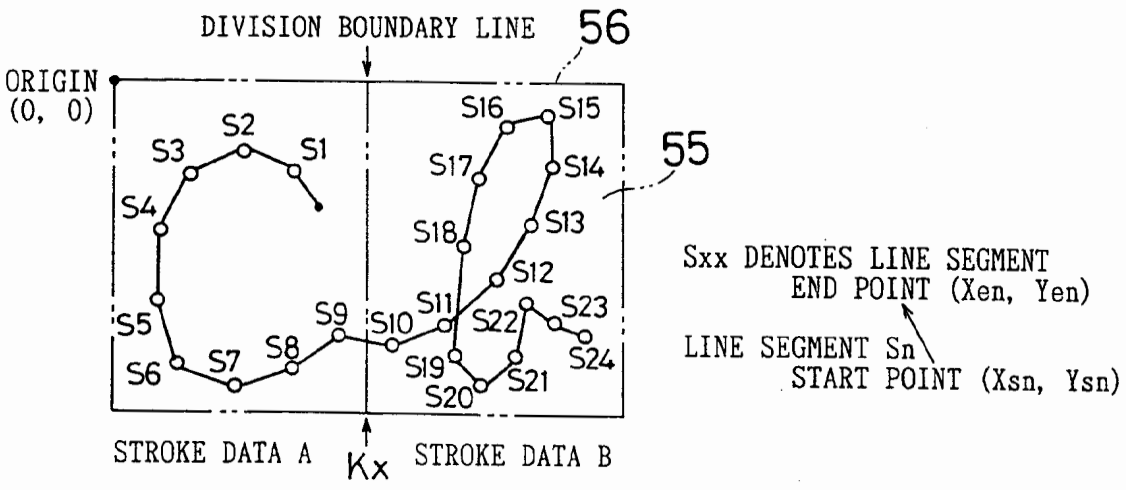


FIG. 14B

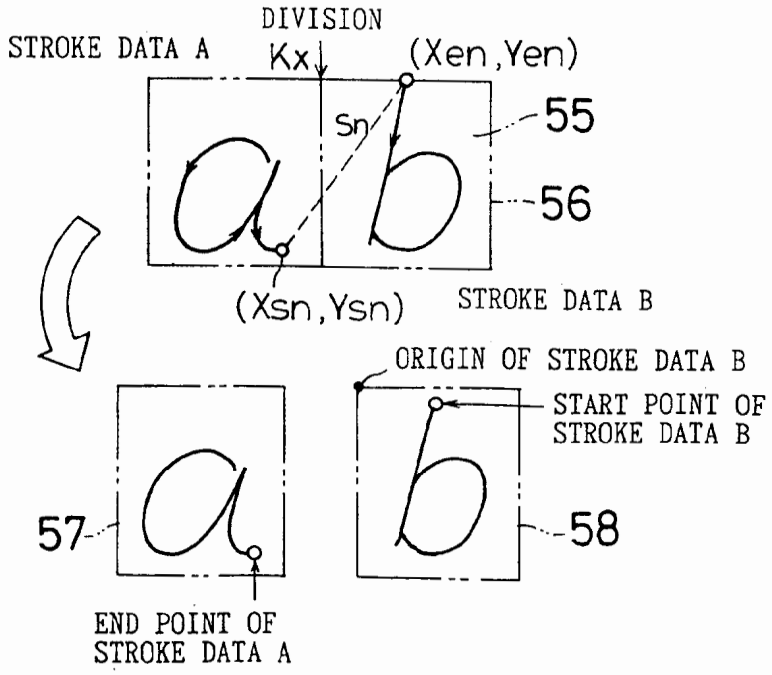


FIG. 15A

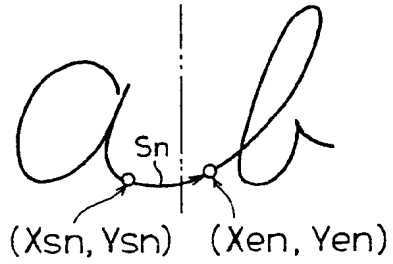


FIG. 15B

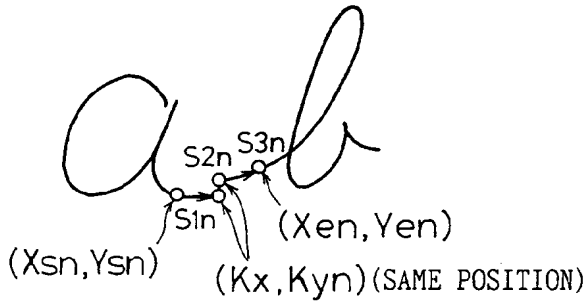


FIG. 15C

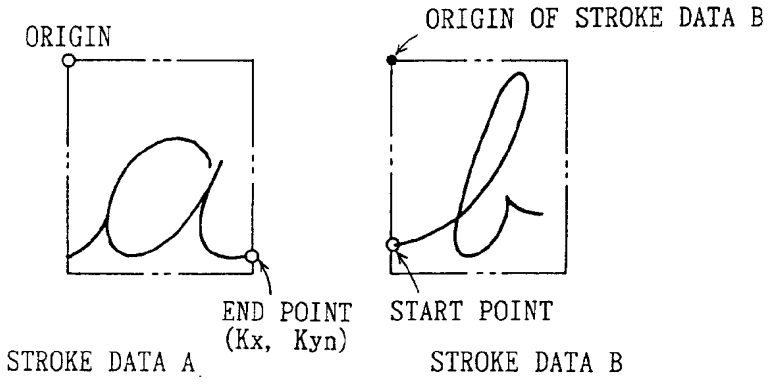


FIG. 16

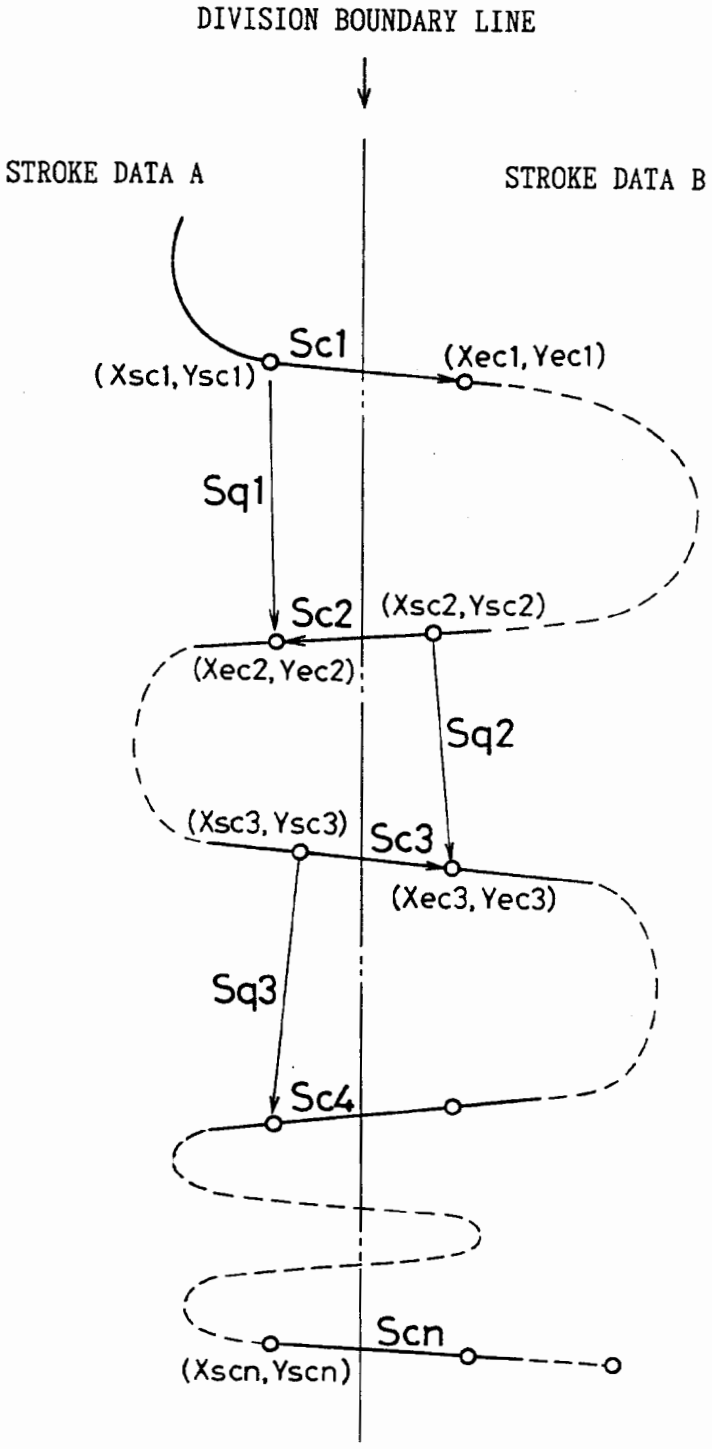

DIVISION BOUNDARY LINE
STROKE DATA A
STROKE DATA B
Sc1
(Xsc1, Ysc1)
(Xec1, Yec1)
Sq1
Sc2
(Xsc2, Ysc2)
(Xec2, Yec2)
Sq2
(Xsc3, Ysc3)
Sc3
(Xec3, Yec3)
Sq3
Sc4
Scn
(Xscn, Yscn)

FIG. 17

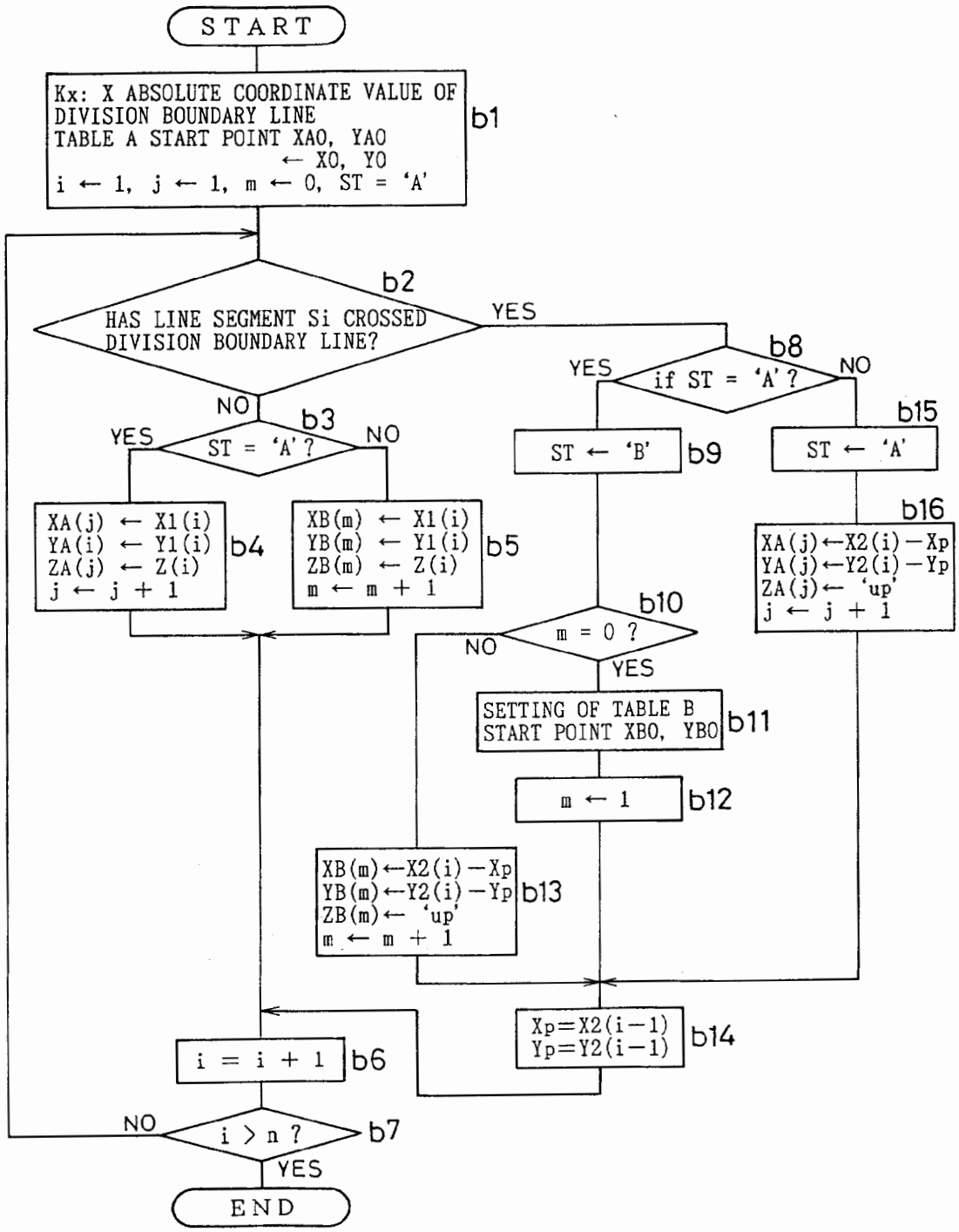

START
Kx: X ABSOLUTE COORDINATE VALUE OF DIVISION BOUNDARY LINE
TABLE A START POINT XA0, YA0 ← X0, Y0
i ← 1, j ← 1, m ← 0, ST = 'A'
b1
HAS LINE SEGMENT Si CROSSED DIVISION BOUNDARY LINE?
b2
YES
NO
ST = 'A' ?
b3
YES
NO
XA(j) ← X1(i)
YA(i) ← Y1(i)
ZA(j) ← Z(i)
j ← j + 1
b4
XB(m) ← X1(i)
YB(m) ← Y1(i)
ZB(m) ← Z(i)
m ← m + 1
b5
if ST = 'A' ?
b8
YES
NO
ST ← 'B'
b9
ST ← 'A'
b15
XA(j)←X2(i)−Xp
YA(j)←Y2(i)−Yp
ZA(j)← 'up'
j ← j + 1
b16
m = 0 ?
b10
NO
YES
SETTING OF TABLE B START POINT XB0, YB0
b11
m ← 1
b12
XB(m)←X2(i)−Xp
YB(m)←Y2(i)−Yp
ZB(m)← 'up'
m ← m + 1
b13
Xp=X2(i−1)
Yp=Y2(i−1)
b14
i = i + 1
b6
NO
i > n ?
b7
YES
END

FIG. 18

LINE SEGMENT	REL. COORDINATES OF END POINT OF LINE SEGMENT		ABSOL. COORDINATES OF END POINT OF LINE SEGMENT		PEN UP/DOWN
	X1	Y1	X2	Y2	
(START POINT)	X0	Y0	—	—	
S1	X1(1)	Y1(1)	X2(1)	Y2(1)	Z(1)
S2	X1(2)	Y1(2)	X2(2)	Y2(2)	Z(2)
S3	X1(3)	Y1(3)	X2(3)	Y2(3)	Z(3)
⟨	⟨	⟨	⟨	⟨	⟨
Sn	X1(n)	Y1(n)	X2(n)	Y2(n)	Z(n)

FIG. 19A

LINE SEGMENT	REL. COORDINATES		PEN
	X	Y	UP/DOWN
(START POINT)	XA0	YA0	
SA1	XA(1)	YA(1)	ZA(1)
SA2	XA(2)	YA(2)	ZA(2)
SA3	XA(3)	YA(3)	ZA(3)
⟨	⟨	⟨	⟨
SAn1	XA(n1)	YA(n1)	ZA(n1)

FIG. 19B

LINE SEGMENT	REL. COORDINATES		PEN
	X	Y	UP/DOWN
(START POINT)	XB0	YB0	
SB1	XB(1)	YB(1)	ZB(1)
SB2	XB(2)	YB(2)	ZB(2)
SB3	XB(3)	YB(3)	ZB(3)
⟨	⟨	⟨	⟨
SBn2	XB(n2)	YB(n2)	ZB(n2)

FIG. 20

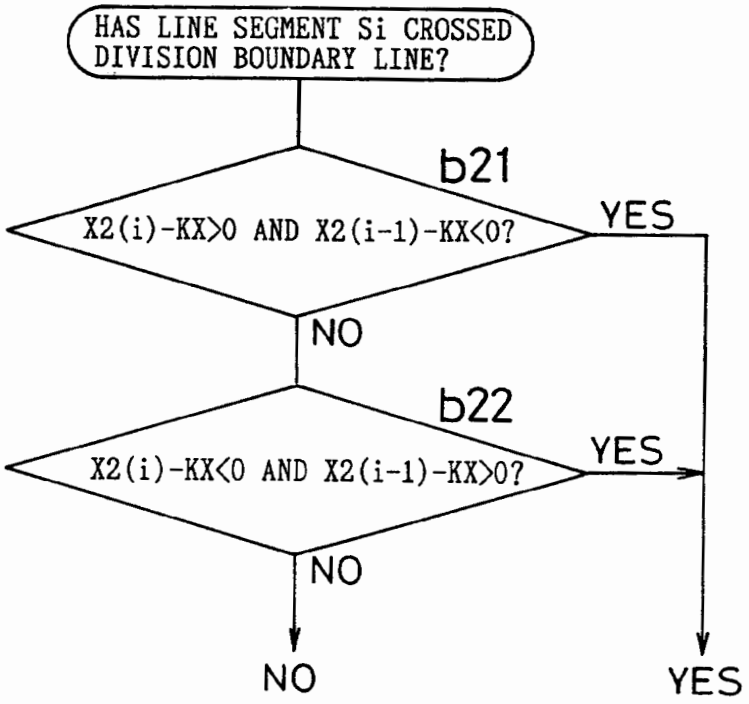

HAS LINE SEGMENT Si CROSSED DIVISION BOUNDARY LINE?
b21
X2(i)-KX>0 AND X2(i-1)-KX<0?
YES
NO
b22
X2(i)-KX<0 AND X2(i-1)-KX>0?
YES
NO
NO
YES

FIG. 21A

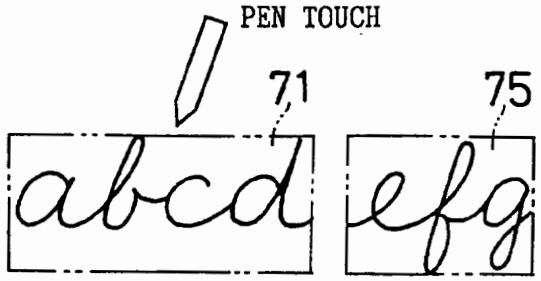


FIG. 21B

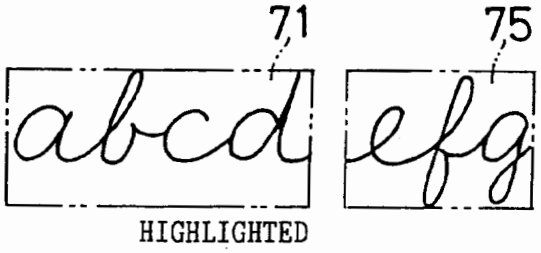


FIG. 21C

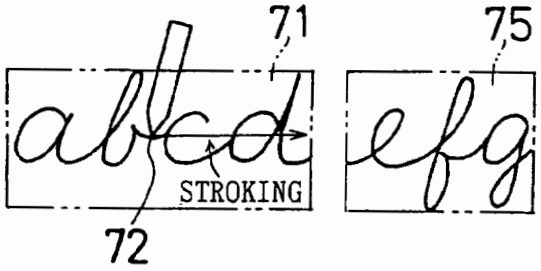


FIG. 21D

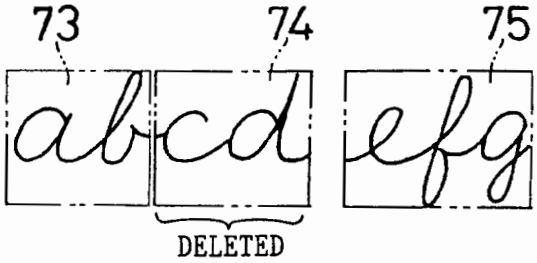


FIG. 21E

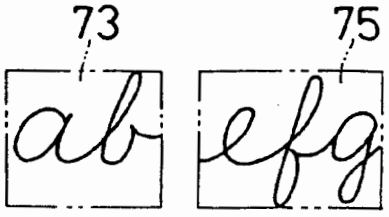


FIG. 22A

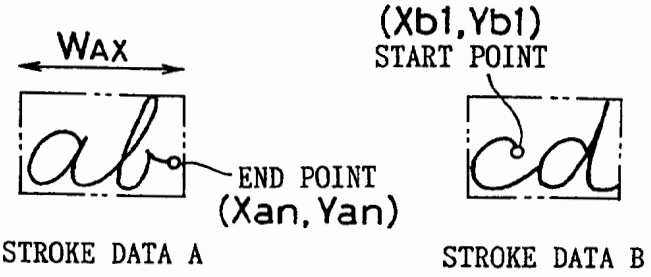


FIG. 22B



FIG. 23

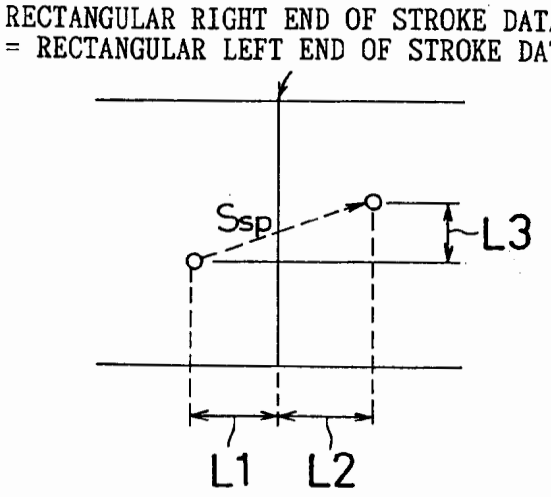


FIG. 24

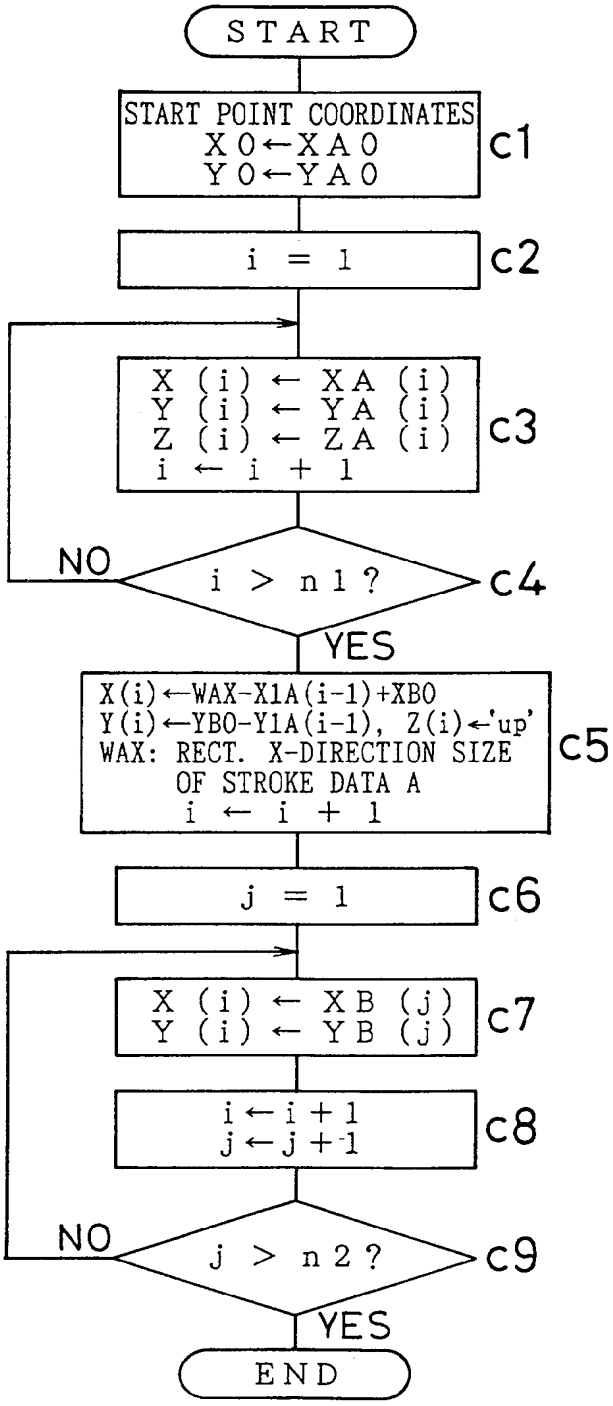

START
START POINT COORDINATES
X0←XA0
Y0←YA0
c1
i = 1
c2
X (i) ← XA (i)
Y (i) ← YA (i)
Z (i) ← ZA (i)
i ← i + 1
c3
NO
i > n1 ?
c4
YES
X(i)←WAX-X1A(i-1)+XB0
Y(i)←YB0-Y1A(i-1), Z(i)←'up'
WAX: RECT. X-DIRECTION SIZE
OF STROKE DATA A
i ← i + 1
c5
j = 1
c6
X (i) ← XB (j)
Y (i) ← YB (j)
c7
i←i+1
j←j+1
c8
NO
j > n2 ?
c9
YES
END

FIG. 25A

LINE SEGMENT	REL. COORDINATES		PEN	ABSOL. COORDINATES	
	X	Y	UP/DOWN	X	Y
(START POINT)	XA0	YA0	—	—	—
SA1	XA(1)	YA(1)	ZA(1)	X1A(1)	Y1A(1)
SA2	XA(2)	YA(2)	ZA(2)	X1A(2)	Y1A(2)
SA3	XA(3)	YA(3)	ZA(3)	X1A(3)	Y1A(3)
⌇	⌇	⌇	⌇	⌇	⌇
SAn1	XA(n1)	YA(n1)	ZA(n1)	X1A(n1)	Y1A(n1)

FIG. 25B

LINE SEGMENT	REL. COORDINATES		PEN
	X	Y	UP/DOWN
(START POINT)	XB0	YB0	
SB1			
SB2			
SB3			
⌇			
SBn2			

FIG. 26

LINE SEGMENT	REL. COORDINATES		PEN UP/DOWN
	X	Y	
	X0	Y0	
S1	X(1)	Y(1)	Z(1)
S2	X(2)	Y(2)	Z(2)
S3	X(3)	Y(3)	Z(3)
⟨	⟨	⟨	⟨
S(n1+n2+1)	X(n1+n2+1)	Y(n1+n2+1)	Z(n1+n2+1)

FIG. 27A

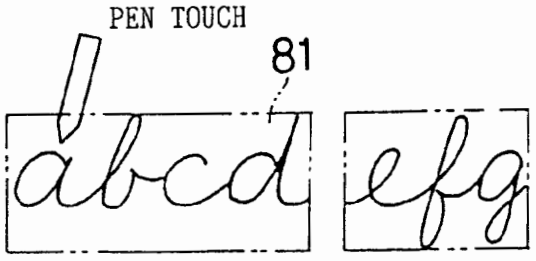


FIG. 27B

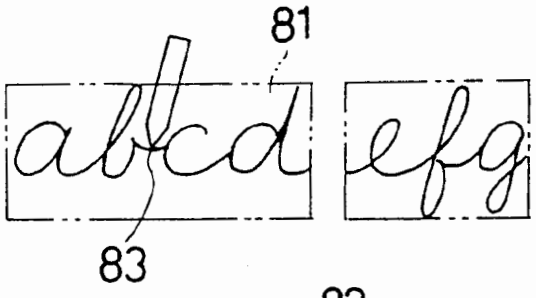


FIG. 27C

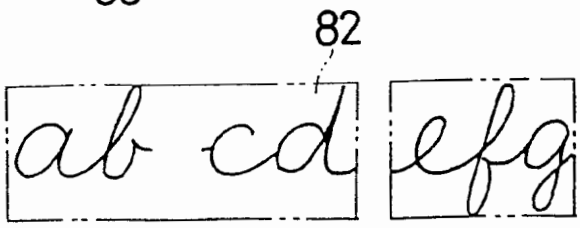


FIG. 28A

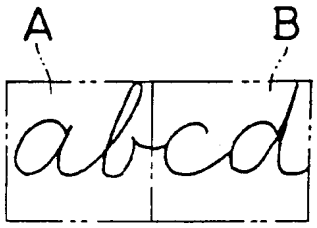


FIG. 28B

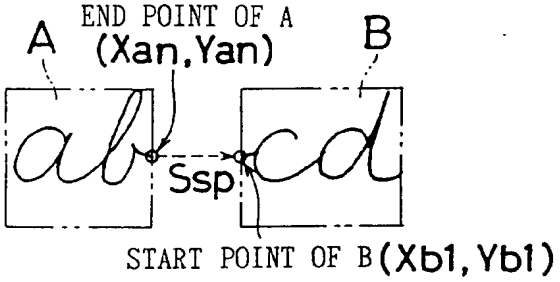


FIG. 28C

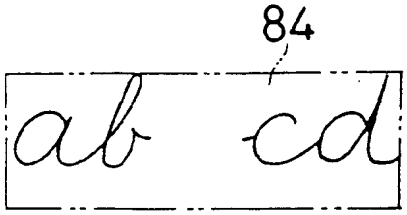


FIG. 29A

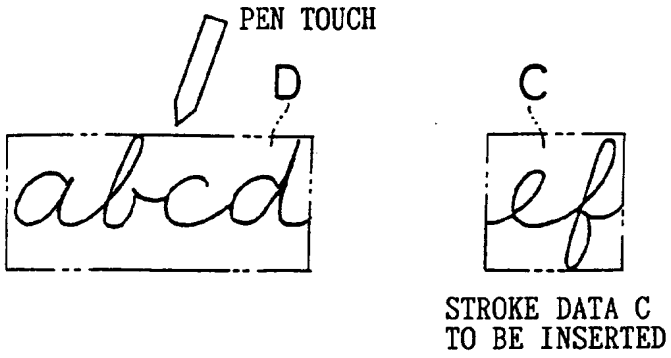


FIG. 29B

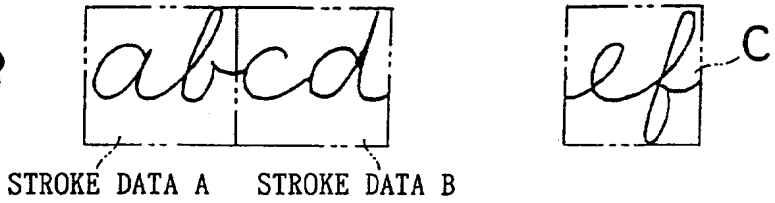


FIG. 29C

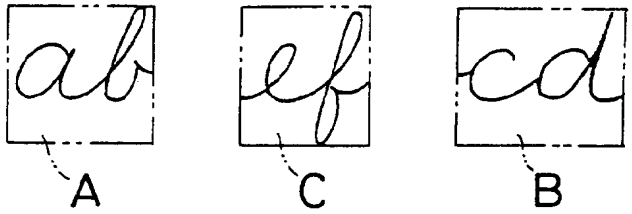


FIG. 29D

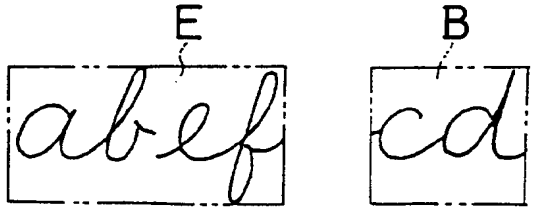
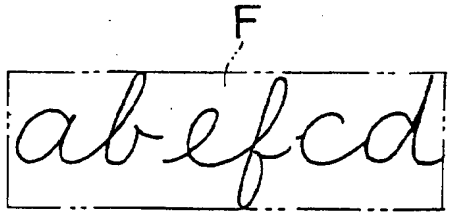


FIG. 29E



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/001446

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/0488 G06F17/24 G06K9/00
ADD.

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)
G06F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	MyScript: "MyScript -The Power of Handwriting", , 11 December 2014 (2014-12-11), pages 1-3, XP054976902, Retrieved from the Internet: URL:https://www.youtube.com/watch?v=yojFiBhPMUo [retrieved on 2016-11-10]	1-20, 22-26, 28-32
Y	the whole document	21,27,33
Y	US 7 751 623 B1 (SIMMONS ALEX [US] ET AL) 6 July 2010 (2010-07-06) abstract; figure 29	21,27,33
A	EP 0 720 084 A2 (SHARP KK [JP]) 3 July 1996 (1996-07-03) abstract; figures 13-15	1-33

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent 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
17 November 2016	29/11/2016

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, Fax: (+31-70) 340-3016	De Meyer, Arnaud

2

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2016/001446

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7751623 B1	06-07-2010	NONE	
EP 0720084 A2	03-07-1996	CN 1131773 A	25-09-1996
		DE 69525606 D1	04-04-2002
		DE 69525606 T2	24-10-2002
		EP 0720084 A2	03-07-1996
		JP 2939147 B2	25-08-1999
		JP H08185398 A	16-07-1996
		US 5850477 A	15-12-1998

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
PCT/EP2016/001446

TITLE: SYSTEM AND METHOD OF DIGITAL NOTE TAKING

APPLICANT: MYSCRIPT

IPC CLASSIFICATION: G06F3/0488, G06F17/24, G06K9/00

EXAMINER: De Meyer, Arnaud

CONSULTED DATABASES: NPL, WPI, INET

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: G06F3/04883, G06F17/242, G06K9/00402, G06K9/00442

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
Recognition of handwritten notes input on a touch screen.

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2016/001446	25.08.2016	25.08.2015

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/0488 G06F17/24 G06K9/00

Applicant
MYSCRIPT

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	De Meyer, Arnaud Telephone No. +31 70 340-0

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/EP2016/001446

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/EP2016/001446

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3-5, 8-10, 13-15, 18, 21, 24, 27, 30, 33
	No:	Claims	1, 2, 6, 7, 11, 12, 16, 17, 19, 20, 22, 23, 25, 26, 28, 29, 31, 32
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-33
Industrial applicability (IA)	Yes:	Claims	1-33
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (SEPARATE SHEET)

International application No.
PCT/EP2016/001446

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 MyScript: "MyScript -The Power of Handwriting", , 11 December 2014 (2014-12-11), pages 1-3, XP054976902, Retrieved from the Internet: URL:https://www.youtube.com/watch?v=yojFiBhPMUo [retrieved on 2016-11-10]

D2 US 7 751 623 B1 (SIMMONS ALEX [US] ET AL) 6 July 2010 (2010-07-06)

1 As far as it can be understood due to clarity issues (see Re Item VIII below), the subject-matter of **independent claims 1, 6, 11, 16, 22 and 28** is not new in the sense of **Article 33(2) PCT**, and the criteria of Article 33(1) PCT are therefore not met.

1.1 Claims 1, 6 and 11: Document D1 is a video that has been published by the applicant himself few months before the priority date of the present PCT application. Specifically, document D1 (by default, references in parentheses apply to this document) discloses a tablet computer running a program that recognizes handwriting note taking, and that

causes display of digital ink representing the user's handwriting, the digital ink being display in a block created in accordance with pre-existing handwriting and the type of information being displayed (e.g. 0:19-0:51).

As explained in §4 below, the exact meaning of the claims can not be grasped, even with the light of the description. It seems nevertheless that the disclosure of D1 falls under the scope of the claims.

Therefore, claims 1, 6 and 11 lack novelty.

1.2 Claims 16, 22 and 28: Document D1 further discloses a guide elements (0:40 the grid) and typeset block content (0:40 the equations). As explained in §5 below, the exact meaning of the claims can not be grasped, even with the light of the description. It seems nevertheless that the disclosure of D1 falls under the scope of the claims.

Therefore, claims 16, 22 and 28 lack novelty.

2 **Dependent claims 2-5, 7-10, 12-15, 17-21, 23-27, 29-33** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step.

2.1 Claims 2, 7 and 12: D1 discloses interactive digital ink blocks (e.g. 0:19-0:24).

2.2 Claims 3, 4, 8, 9, 13 and 14: Switching the graphical user interface of a tablet between a portrait mode and a landscape mode when rotating the device is notoriously known in the art.

2.3 Claims 5, 10 and 15: Automatically adapting the size of the graphical user interface to the size of the tablet computer is notoriously known in the art.

2.4 Claims 17, 23 and 29: D1 discloses parallel lines (e.g. 0:40 the horizontal lines).

2.5 Claims 18, 24 and 30: D1 does not disclose how the spacing between the lines is determined. The skilled person willing to implement D1 would therefore have to make a choice. The solution recited by the claims, namely defined a spacing based in the size of the text font used is seen as an aesthetic choice with no technical effect.

2.6 Claims 19, 20, 25, 26, 31 and 32: D1 discloses lists (0:25).

2.7 Claims 21, 27 and 33: D1 does not disclose processing lists of items and sub-items, i.e. a list comprising a hierarchy. The user willing to write sub-items would therefore be faced with the tedious task of positioning all the items manually. The technical problem is therefore formulated as how to simplify the positioning of items and sub-items in a handwritten list. When looking in the art for a solution to the technical problem, the skilled person would find fig.29 of D2 which disclose the solution recited by the claims.

Re Item VIII

Certain observations on the international application

3 Although claims 1 (system) and 16 (system) have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of **Article 6 PCT**.

The same objection also applies, mutatis mutandis, to claims 6 (method) and 22 (method), and claims 11 (medium) and 28 (medium), respectively.

4 The application does not meet the requirements of **Article 6 PCT**, because the claims are not clear.

4.1 Claims 1-33: The meaning of the terms of the claims should clear from the wording of the claims alone, independently of the description. That is not presently the case as it will be explained below.

When the claims are unclear, the description is consulted for clarifications, such that the search results in providing the most relevant prior arts. However, the different parts of the description elaborate on diverse aspects while using the same broad terminology, e.g. "block", to describe different features. Therefore, the meaning of the claims remains unclear even with the help of the description.

Specific examples of features that remain unclear even in the light of the description are provided in the following.

Claims 1, 6, 11, 16, 22 and 28: Even with the help of the description, the meaning of the terms "cause display of ... digital ink in a block layout in accordance with a layout of blocks of the handwriting input" can not be grasped. It is not understood what is a "block layout" (the layout of a block, a layout made of a block/blocks, a layout comprising blocks,..), what are the blocks of the handwriting input" (letters, words, the result of a segmentation process, do they simply correspond to the display area wherein the user wrote something...), what means "display of ... digital ink in a block layout" (display the ink at a specific location, display the ink anywhere while a block layout is being displayed...), is the user writing in a block or is the block created around the detected handwriting,...

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (SEPARATE SHEET)

International application No.

PCT/EP2016/001446

Claims 2, 7 and 12: Even with the help of the description, It is not understood what are the "blocks of digital ink" and what is the difference, if any, with the "blocks of the handwriting input".

Since it is not understood on which part of the description are based the claims, the examiner is not presently in a position to give indications on how to clarify to claims. The claims must nevertheless be clarified.

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XS CPRTENFRDE

Electronic Acknowledgement Receipt

EFS ID:	28353771
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Diana Hughes
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	14-FEB-2017
Filing Date:	22-DEC-2015
Time Stamp:	16:09:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	094060-0034IDS.pdf	1035363 dd7f57b332f6f821538b8494c6ff974dfa01e10a	no	4

Warnings:

Information:					
2	Foreign Reference	EP0720084.pdf	1697258 6705af3a14bd9587029de0db7117204ff5a4a731	no	38
Warnings:					
Information:					
3	Non Patent Literature	InternationalSearchReport.pdf	859279 31b9ab5a20b50e6a8c7279d1fd0d29af3b1eb6bf	no	11
Warnings:					
Information:					
4	Non Patent Literature	MyScript-ThePowerofHandwritingYouTube.pdf	1917955 257232810f1271b3d6a4da0beccf9685b370a7b4	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	5509855		

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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

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Patentanmeldung Nr.	**Patent application No.**	**Demande de brevet n°**

15290303.5 / EP15290303

The organization code and number of your priority application, to be used for filing abroad under the Paris Convention, is EP15290303.

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le President de l'Office européen des brevets
p.o.

V. Joseph

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Bezeichnung der Erfindung / Title of the invention / Titre de l'invention:
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System And Method For Beautifying Digital Ink

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SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

TECHNICAL FIELD

[0001] The present description relates generally to the field of handwriting recognition systems and methods using computing device interfaces. The present description relates more specifically to systems and methods for beautifying digital ink rendered from handwriting input to such computing device interfaces and providing editing of the digital ink on the computing device interfaces.

BACKGROUND

[0002] Computing devices continue to become more ubiquitous to daily life. They take the form of computer desktops, laptop computers, tablet computers, hybrid computers (2-in-1s), e-book readers, mobile phones, smartphones, wearable computers (including smartwatches, smart glasses/headsets), global positioning system (GPS) units, enterprise digital assistants (EDAs), personal digital assistants (PDAs), game consoles, and the like. Further, computing devices are being incorporated into vehicles and equipment, such as cars, trucks, farm equipment, manufacturing equipment, building environment control (e.g., lighting, HVAC), and home and commercial appliances.

[0003] Computing devices generally consist of at least one processing element, such as a central processing unit (CPU), some form of memory, and input and output devices. The variety of computing devices and their subsequent uses necessitate a variety of interfaces and input devices. One such input device is a touch sensitive surface such as a touch screen or touch pad wherein user input is received through contact between the user's finger or an instrument such as a pen or stylus and the touch sensitive surface. Another input device is an input surface that senses gestures made by a user above the input surface. A further input device is a position detection system which detects the relative position of either touch or non-touch interactions with a non-touch physical or virtual surface. Any of these methods of input can be used generally for drawing or inputting text. When user input is text the user's handwriting is interpreted using a handwriting recognition system or method.

[0004] One application of handwriting recognition in non-portable and portable computing devices, such as smartphones, phablets and tablets, is for the input of text into various

applications run by the computing devices in a manner similar to that traditionally done with keyboard, either physical or virtual. However, unlike keyboard input which is governed by strict layout rules, such as text entry on visible or invisible lines in accordance with the position of a displayed cursor, handwriting can be input virtually anywhere on the input surface of the device. While this substantially unconstrained input has some effect on the recognition accuracy of the handwriting, currently available advanced recognition algorithms are generally able to deal with such relatively 'free' positioning of textual characters.

[0005] Of more effect is a user's ability to interact with the input once it has been rendered as so-called 'digital ink' on the display. This is because, unlike typed or 'typeset ink' text which has characters relatively located in a uniform and known manner, the characters of the digital ink text are not uniform or in relatively known positions, generally due to the irregularity inherent in handwriting. Accordingly, conventional systems and methods typically only allow further interaction to be made on the typeset ink rendered from the recognized text, which is generally done at a different position of the display from the area where input is allowed.

[0006] It is desired by users however to be able to interact directly with the handwriting as well, such as to edit the input (e.g., add or delete characters or words), so that the creative flow of handwriting input is maintained. Some available applications provide alignment and scaling of the digital ink through normalization and the like, but these do not take into account certain geometrical features of the handwriting, and therefore the scaling and aligning is not properly performed to allow full interaction or faithful reproduction of the original digital ink, or do not use recognition to provide these operations, and as such do not provide interaction capabilities within the input signal such that editing operations can only be performed at the word level, and not at the character level, for example.

SUMMARY

[0007] The examples of the present invention that are described herein below provide systems and methods for beautifying and providing editing of digital ink on computing devices.

[0008] In one example, the present invention includes a system for beautifying digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The non-transitory computer readable medium may be configured to cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting

input, determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink, and cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

[0009] The structuring transformation may be determined from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the structuring transformation is determined from the minimum of the first and second ratio values.

[0010] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0011] In another example, the present invention includes a method for beautifying digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink, and displaying, on the display interface, second digital ink in accordance with the structuring transformation.

[0012] The method may determine the structuring transformation from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the method may determine the structuring transformation from the minimum of the first and second ratio values.

[0013] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0014] In another example, the present invention includes a non-transitory computer readable medium having a computer readable program code embodied therein, The computer readable program code may be adapted to be executed to implement a method for beautifying digital ink on a computing device. The computing device may include a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink, and displaying, on the display interface, second digital ink in accordance with the structuring transformation.

[0015] The method may determine the structuring transformation from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the method may determine the structuring transformation from the minimum of the first and second ratio values.

[0016] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0017] In another example, the present invention includes a system for providing editing of digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The non-transitory computer readable medium may be configured to cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input, determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges.

[0018] The elements of the digital ink may include text characters and the at least one non-transitory computer readable medium may be configured to display the input cursor at a

position between first and second characters in relation to the determined ranges of the first and second characters.

[0019] The determined ranges of the first and second characters may overlap, and the at least one non-transitory computer readable medium may be configured to compare geometrical features of the determined ranges of the first and second characters, and cause the display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

[0020] In another example, the present invention includes a method for providing editing of digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input, determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges

[0021] The elements of the digital ink may include text characters and the method may display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0022] The determined ranges of the first and second characters may overlap, and the method may compare geometrical features of the determined ranges of the first and second characters, and display the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

[0023] In another example, the present invention includes the present invention includes a non-transitory computer readable medium having a computer readable program code embodied therein, The computer readable program code may be adapted to be executed to implement a method for providing editing of digital ink on a computing device. The computing device may include a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps

of displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input, determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges

[0024] The elements of the digital ink may include text characters and the method may display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0025] The determined ranges of the first and second characters may overlap, and the method may compare geometrical features of the determined ranges of the first and second characters, and display the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The present system and method will be more fully understood from the following detailed description of the examples thereof, taken together with the drawings. In the drawings like reference numerals depict like elements. In the drawings:

[0027] FIG. 1 shows a block diagram of a computing device in accordance with an example of the present system and method;

[0028] FIG. 2 shows a block diagram of a system for handwriting recognition in accordance with an example of the present system and method;

[0029] FIG. 3 shows a block diagram illustrating detail of the handwriting recognition system of FIG. 2 in accordance with an example of the present system and method;

[0030] FIG. 4 shows a schematic view of an example visual rendering of an ink input area on a portion of an input surface of the computing device;

[0031] FIG. 5 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0032] FIG. 6 shows the example digital ink of FIG. 5 with geometrical information provided by the handwriting recognition system;

[0033] FIG. 7 shows the example input area of FIG. 4 with geometrical information provided by the handwriting recognition system;

[0034] FIG. 8 shows example beautified digital ink rendered on a line pattern;

[0035] FIG. 9 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0036] FIG. 10 shows the example digital ink of FIG. 9 with geometrical information provided by the handwriting recognition system;

[0037] FIG. 11 shows the example beautified digital ink of FIG. 8 with a cursor;

[0038] FIG. 12 shows the example digital ink of FIG. 5 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0039] FIG. 13 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0040] FIG. 14 shows the example digital ink of FIG. 13 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0041] FIG. 15 shows example beautified digital ink rendered on the line pattern;

[0042] FIG. 16 shows the example beautified digital ink of FIG. 15 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0043] FIG. 17A shows a first example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0044] FIG. 17B shows a second example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0045] FIG. 17C shows a third example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0046] FIG. 18A shows a fourth example cursor position for overlapping characters of the example beautified digital ink of FIG. 15; and

[0047] FIG. 18B shows a fifth example cursor position for overlapping characters of the example beautified digital ink of FIG. 15.

DETAILED DESCRIPTION

[0048] In the following detailed description, numerous specific details are set forth by way of examples in order to provide a thorough understanding of the relevant teachings. However, it should be apparent to those skilled in the art that the present teachings may be practiced without such details. In other instances, well known methods, procedures, components, and/or circuitry have been described at a relatively high-level, without detail, in order to avoid unnecessarily obscuring aspects of the present teachings.

[0049] Reference to and discussion of directional features such as up, down, above, below, lowest, highest, horizontal, vertical, etc., are made with respect to the Cartesian coordinate system as applied to the input surface on which the input to be recognized is made. Further, terms such as left and right are made in relation to the reader's frame of reference when viewing the drawings. Furthermore, the use of the term 'text' in the present description is understood as encompassing all alphanumeric characters, and strings thereof, in any written language and common place non-alphanumeric characters, e.g., symbols, used in written text. Further still, the examples shown in these drawings are in a left-to-right written language context, and therefore any reference to positions can be adapted for written languages having different directional formats.

[0050] The various technologies described herein generally relate to capture, processing and management of hand-drawn and handwritten content on portable and non-portable computing devices in a manner which retains the inputted style of the content while allowing conversion to a faithful typeset or beautified version of that content. The systems and methods described herein may utilize recognition of users' natural writing and drawing styles input to a computing device via an input surface, such as a touch sensitive screen, connected to, or of, the computing device or via an input device, such as a digital pen or mouse, connected to the computing device or via a physical or virtual surface monitored by a position detection system. Whilst the various examples are described with respect to recognition of handwriting input using so-called online recognition techniques, it is understood that application is possible to other forms of input for recognition, such as offline recognition in which images rather than digital ink are recognized. The terms hand-drawing and handwriting are used interchangeably herein to define the creation of digital content by users through use of their hands either directly onto a digital or digitally connected medium or via an input tool, such as a hand-held stylus. The term

"hand" is used herein to provide concise description of the input techniques, however the use of other parts of a users' body for similar input is included in this definition, such as foot, mouth and eye.

[0051] FIG. 1 shows a block diagram of an example computing device 100. The computing device may be a computer desktop, laptop computer, tablet computer, e-book reader, mobile phone, smartphone, wearable computer, digital watch, interactive whiteboard, global positioning system (GPS) unit, enterprise digital assistant (EDA), personal digital assistant (PDA), game console, or the like. The computing device 100 includes components of at least one processing element, some form of memory and input and/or output (I/O) devices. The components communicate with each other through inputs and outputs, such as connectors, lines, buses, cables, buffers, electromagnetic links, networks, modems, transducers, IR ports, antennas, or others known to those of ordinary skill in the art.

[0052] The computing device 100 has at least one display 102 for outputting data from the computing device such as images, text, and video. The display 102 may use LCD, plasma, LED, iOLED, CRT, or any other appropriate technology that is or is not touch sensitive as known to those of ordinary skill in the art. At least some of the display 102 is co-located with at least one input surface 104. The input surface 104 may employ technology such as resistive, surface acoustic wave, capacitive, infrared grid, infrared acrylic projection, optical imaging, dispersive signal technology, acoustic pulse recognition, or any other appropriate technology as known to those of ordinary skill in the art to receive user input. The input surface 104 may be bounded by a permanent or video-generated border that clearly identifies its boundaries.

[0053] In addition to the input surface 104, the computing device 100 may include one or more additional I/O devices (or peripherals) that are communicatively coupled via a local interface. The additional I/O devices may include input devices such as a keyboard, mouse, scanner, microphone, touchpads, bar code readers, laser readers, radio-frequency device readers, or any other appropriate technology known to those of ordinary skill in the art. Further, the I/O devices may include output devices such as a printer, bar code printers, or any other appropriate technology known to those of ordinary skill in the art. Furthermore, the I/O devices may include communications devices that communicate both inputs and outputs such as a modulator/demodulator (modem; for accessing another device, system, or network), a radio frequency (RF) or other transceiver, a telephonic interface, a bridge, a router, or any other

appropriate technology known to those of ordinary skill in the art. The local interface may have additional elements to enable communications, such as controllers, buffers (caches), drivers, repeaters, and receivers, which are omitted for simplicity but known to those of skill in the art. Further, the local interface may include address, control, and/or data connections to enable appropriate communications among the other computer components.

[0054] The computing device 100 also includes a processor 106, which is a hardware device for executing software, particularly software stored in the memory 108. The processor can be any custom made or commercially available general purpose processor, a central processing unit (CPU), a semiconductor based microprocessor (in the form of a microchip or chipset), a macroprocessor, microcontroller, digital signal processor (DSP), application specific integrated circuit (ASIC), field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, state machine, or any combination thereof designed for executing software instructions known to those of ordinary skill in the art. Examples of suitable commercially available microprocessors are as follows: a PA-RISC series microprocessor from Hewlett-Packard Company, an 80x86 or Pentium series microprocessor from Intel Corporation, a PowerPC microprocessor from IBM, a Sparc microprocessor from Sun Microsystems, Inc., a 68xxx series microprocessor from Motorola Corporation. DSP microprocessors, or ARM microprocessors.

[0055] The memory 108 can include any one or a combination of volatile memory elements (e.g., random access memory (RAM, such as DRAM, SRAM, or SDRAM)) and nonvolatile memory elements (e.g., ROM, EPROM, flash PROM, EEPROM, hard drive, magnetic or optical tape, memory registers, CD-ROM, WORM, DVD, redundant array of inexpensive disks (RAID), another direct access storage device (DASD)). Moreover, the memory 108 may incorporate electronic, magnetic, optical, and/or other types of storage media. The memory 108 can have a distributed architecture where various components are situated remote from one another but can also be accessed by the processor 106. Further, the memory 108 may be remote from the device, such as at a server or cloud-based system, which is remotely accessible by the computing device 100. The memory 108 is coupled to the processor 106, so the processor 106 can read information from and write information to the memory 108. In the alternative, the memory 108 may be integral to the processor 106. In another example, the processor 106 and the memory 108 may both reside in a single ASIC or other integrated circuit.

[0056] The software in the memory 108 includes an operating system 110 and an application 112. The software optionally further includes a handwriting recognition (HWR) system 114 which may each include one or more separate computer programs. Each of these has an ordered listing of executable instructions for implementing logical functions. The operating system 110 controls the execution of the application 112 (and the HWR system 114). The operating system 110 may be any proprietary operating system or a commercially available operating system, such as WEBOS, WINDOWS®, MAC and IPHONE OS®, LINUX, and ANDROID. It is understood that other operating systems may also be utilized.

[0057] The application 112 includes one or more processing elements related to detection, management and treatment of user input (discussed in detail later). The software may also include one or more other applications related to handwriting recognition, different functions, or both. Some examples of other applications include a text editor, telephone dialer, contacts directory, instant messaging facility, computer-aided design (CAD) program, email program, word processing program, web browser, and camera. The application 112, and the other applications, include program(s) provided with the computing device 100 upon manufacture and may further include programs uploaded or downloaded into the computing device 100 after manufacture.

[0058] The HWR system 114, with support and compliance capabilities, may be a source program, executable program (object code), script, application, or any other entity having a set of instructions to be performed. When a source program, the program needs to be translated via a compiler, assembler, interpreter, or the like, which may or may not be included within the memory, so as to operate properly in connection with the operating system. Furthermore, the handwriting recognition system with support and compliance capabilities can be written as (a) an object oriented programming language, which has classes of data and methods; (b) a procedure programming language, which has routines, subroutines, and/or functions, for example but not limited to C, C++, Pascal, Basic, Fortran, Cobol, Perl, Java, Objective C, Swift, and Ada; or (c) functional programing languages for example but no limited to Hope, Rex, Common Lisp, Scheme, Clojure, Racket, Erlang, OCaml, Haskell, Prolog, and F#. Alternatively, the HWR system 114 may be a method or system for communication with a handwriting recognition system remote from the device, such as server or cloud-based system, but is remotely accessible by the computing device 100 through communications links using the afore-mentioned

communications I/O devices of the computing device 100. Further, the application 112 and the HWR system 114 may operate together or be combined as a single application.

[0059] Strokes entered on or via the input surface 104 are processed by the processor 106 as digital ink. A user may enter a stroke with a finger or some instrument such as a pen or stylus suitable for use with the input surface. The user may also enter a stroke by making a gesture above the input surface 104 if technology that senses motions in the vicinity of the input surface 104 is being used, or with a peripheral device of the computing device 100, such as a mouse or joystick. A stroke is characterized by at least the stroke initiation location, the stroke termination location, and the path connecting the stroke initiation and termination locations. Because different users may naturally write the same object, e.g., a letter, a shape, a symbol, with slight variations, the HWR system accommodates a variety of ways in which each object may be entered whilst being recognized as the correct or intended object.

[0060] FIG. 2 is a schematic pictorial of an example of the HWR system 114, in either its local (i.e., loaded on the device 100) or remote (i.e., remotely accessible by the device 100) forms. The HWR system 114 includes stages such as preprocessing 116, recognition 118 and output 120. The preprocessing stage 116 processes the digital ink to achieve greater accuracy and reducing processing time during the recognition stage 118. This preprocessing may include normalizing of the path connecting the stroke initiation and termination locations by applying size normalization and/or methods such as B-spline approximation to smooth the input. The preprocessed strokes are then passed to the recognition stage 118 which processes the strokes to recognize the objects formed thereby. The recognized objects are then output 120 to the display 102 generally as a typesetted version of the handwritten elements/characters.

[0061] The recognition stage 118 may include different processing elements or experts. FIG. 3 is a schematic pictorial of the example of FIG. 2 showing schematic detail of the recognition stage 118. Three experts, a segmentation expert 122, a recognition expert 124, and a language expert 126, are illustrated which collaborate through dynamic programming to generate the output 120.

[0062] The segmentation expert 122 defines the different ways to segment the input strokes into individual element hypotheses, e.g., alphanumeric characters and mathematical operators, text characters, individual shapes, or sub expression, in order to form expressions, e.g., words, mathematical equations, or groups of shapes. For example, the segmentation expert 122

may form the element hypotheses by grouping consecutive strokes of the original input to obtain a segmentation graph where each node corresponds to at least one element hypothesis and where adjacency constraints between elements are handled by the node connections. Alternatively, the segmentation expert 122 may employ separate experts for different input types, such as text, drawings, equations, and music notation.

[0063] The recognition expert 124 provides classification of the features extracted by a classifier 128 and outputs a list of element candidates with probabilities or recognition scores for each node of the segmentation graph. Many types of classifiers exist that could be used to address this recognition task, e.g., Support Vector Machines, Hidden Markov Models, or Neural Networks such as Multilayer Perceptrons, Deep, Convolutional or Recurrent Neural Networks. The choice depends on the complexity, accuracy, and speed desired for the task.

[0064] The language expert 126 generates linguistic meaning for the different paths in the segmentation graph using language models (e.g., grammar or semantics). The expert 126 checks the candidates suggested by the other experts according to linguistic information 130. The linguistic information 130 can include a lexicon, regular expressions, etc. The language expert 126 aims at finding the best recognition path. In one example, the language expert 126 does this by exploring a language model such as final state automaton (determinist FSA) representing the content of linguistic information 130. In addition to the lexicon constraint, the language expert 126 may use statistical information modeling for how frequent a given sequence of elements appears in the specified language or is used by a specific user to evaluate the linguistic likelihood of the interpretation of a given path of the segmentation graph.

[0065] The present system and method make use of the HWR system 114 in order to recognize handwritten input to the device 100. As discussed earlier, unlike keyboard input which is governed by strict layout rules, such as text entry on visible or invisible lines in accordance with the position of a displayed cursor, the present system and method allows handwriting to be input virtually anywhere on the input surface 104 of the computing device 104, and this input is rendered as digital ink in the input position. The HWR system 114 is able to recognize this relatively 'freely' positioned handwriting. The present system and method further allows users to continue to interact with the digital ink itself and provide meaningful guidance and results of that interaction through beautifying the digital ink. Beautification is achieved by properly scaling and aligning the digital ink in accordance with an alignment structure of the input surface 104 by

taking into account certain geometrical features of the handwriting (described in detail later). Interaction is assisted by the performance of segmentation of strokes in the recognition process and using information on this segmentation to allow management of an input or editing cursor that acts as a pointer for character level interactions and editing operations. These and other aspects of the present system and method are now described.

[0066] FIG. 4 shows a schematic view of an example visual rendering of an ink input or capture area 400 on a portion of the input surface 104 of an example computing device 100. The input area 400 is provided as a constraint-free canvas that allows users to create object blocks (blocks of text, drawings, etc.) anywhere without worrying about sizing or alignment. However, as can be seen an alignment structure in the form of a line pattern background 410 can be provided for guidance of user input and the alignment of digital and typeset ink objects. In any case, as users may input handwriting that is not closely aligned to the line pattern, or may desire to ignore the line pattern and write in a unconstrained manner, such as diagonally or haphazardly, the recognition of the handwriting input is performed by the HWR system 114 without regard to the line pattern. An example alignment pattern is described in United States Patent Application No. 14/886,195 titled "System and Method of Digital Note Taking" filed in the name of the present Applicant and Assignee, the entire content of which is incorporated by reference herein.

[0067] For example, from this incorporated by reference patent application, the line pattern 410 has horizontal lines separated by a multiple of the vertical rhythm height unit being the density independent pixel (dp). Regardless of the particular device 100, the vertical distance between the horizontal lines 410 is defined by a line pattern unit (LPU) and the vertical rhythm height unit provides a graduated measure of the LPU on a particular device. For example, the LPU may be set at about one centimeter for any device being a certain multiple of the vertical rhythm height unit or users may be allowed to customize the line pattern unit to a different multiple of the vertical rhythm height unit according to their writing style. Alternatively, the vertical rhythm may be based on typeset text size (e.g., the minimum text size) and the LPU is provided as a multiple of this typeset text size. All lines 410 are displayed with the same light and subtle color, e.g., grey, that is visible but faded with respect to the rendering of the content itself. In this way the line pattern is noticeable but unobtrusive so as to guide the handwriting input without distracting from the content entry.

[0068] In order to assist user input, the application 112 renders the digital ink according to the user input in the position at which the input is made. For example, FIG. 5 shows the example input area 400 having handwritten input rendered as (first) digital ink 500. The digital ink 500 includes text characters or symbols, "H" 501, "o" 502, "w" 503, "a" 504, "r" 505, "e" 506, "y" 507, "o" 508, "u" 509 and "?" 510, forming the question phrase "How are you?". As can be seen, the input represented by the digital ink text 500 has been input by a user so as not be in accord with the line pattern 410. That is, the characters 501 to 510 of the digital ink text 500 have not been written directly on any one of the lines 410. This input can be rendered on the line pattern however by applying a structuring transformation on the strokes of the input to beautify the digital ink through proper scaling and alignment. In order to do this appropriately information regarding the relative geometry of the digital ink text 500 is determined, such as the descending part of the handwriting, e.g., the distance between base- and mid-lines of each handwritten character, as described in detail below.

[0069] The (first) geometrical information is provided by the HWR system 114. That is, in the recognition process, the recognition engine 118 determines information on the lower and upper extrema of each character of the input to the application 112 as recognized by the HWR system 114. The lower extremum is the lowest point at which the stroke (or strokes) of the character pass. The upper extremum is the highest point at which the stroke (or strokes) of the character pass. The recognition process also determines from these extremum writing lines at the levels of character, word (e.g., a series of characters), sentence or phrase (e.g., a series of characters and/or words), and text line (e.g., a series of characters, words and/or sentences). The writing lines include top-, bottom-, base-, mid-lines.

[0070] The top-line is defined as the horizontal line passing through a point related to the upper extremum across the horizontal extent of the character, word, sentence or text line. The bottom-line is defined as the horizontal line passing through a point related to the lower extremum across the horizontal extent of the character, word, sentence or text line. The base-line is defined as the horizontal line passing through a point related to the bottom-line across the horizontal extent of the character, word, sentence or text line, and the mid-line is defined as the horizontal line passing through a point related to the top- and base-lines across the horizontal extent of the character, word, sentence or text line. The determination of the points through

which these lines pass is particular to the recognition process and language model(s) used by the HWR system 114.

[0071] For example, for languages having all characters and words made from those characters in a sentence or phrase written with a similar vertical extent, such as pictographic languages, for characters within a word, sentence or text line, the character having the highest upper extrema may be used as the point for either (or both) the top- or mid-line, the character having the lowest lower extrema may be used as the point for the either (or both) bottom- and base-line, for example.

[0072] On the other hand, for languages having characters or letters written in a sentence or phrase with different sizes such as Latin-based languages, e.g., upper and lower casing, letters with ascenders and/or descenders (e.g., "h", "g"), diacritics (e.g., "i", "j") and punctuation symbols (e.g., "?"), for characters within a word, sentence or text line, the character having the highest upper extrema may be used as the point for the top-line, the character having the lowest lower extrema may be used as the point for the bottom-line, the character having the lowest lower extrema of characters which do not have a descender may be used as the point for the base-line, and the lower case character having the highest upper extrema of lower case characters which do not have an ascender may be used as the point for the mid-line, for example.

[0073] Alternatively, instead of setting the writing lines on absolute values, average or mean values can be taken, such as the average or mean of the lower and upper extrema across the text line, sentence or words, or the strokes of the characters themselves, so that local variations and anomalies, such as unduly offset characters, are not given undesired weight.

[0074] FIG. 6 shows the example input of FIG. 5 with the above-described geometrical information of the base- and mid-(or top-)lines provided by the HWR system 114 illustrated. That is, the characters 501-503 are recognized as belonging to one word 600, e.g., "How", with base-line B0 and mid-line M0 determined for the word 600, the characters 504-506 are recognized as belonging to one word 602, e.g., "are", with base-line B2 and mid-line M2 determined for the word 602, the characters 507-509 are recognized as belonging to one word 604, e.g., "you", with base-line B4 and mid-line M4 determined for the word 604, and the character 510 is recognized as being a single symbol 606, with base-line B6 determined for the symbol 606. The present system and method uses the geometrical information to provide a

structuring transformation through proper scaling and alignment of the strokes of the input as follows.

[0075] The structuring transformation uses a ratio which is the minimum between a number of different ratio values related to comparisons of (second) geometrical information of the line pattern 410 and the (first) geometrical information of the input at character, word, sentence or text line level. The level at which first, second and third ratios (described below) are all determined may be, for example, pre-determined or settable via the UI of the application 112. In the examples discussed herein, the word level is depicted, but it is understood that similar description is applicable to the other levels.

[0076] The geometrical information of the line pattern 410 is determined by the application as includes top-, base- and mid-lines, as shown in FIG. 7. For example, the base-line BL of each line 410 of the line pattern is defined as that line 410, the top-line TL of each line 410 is defined as being at an (first) offset vertical distance from the base-line BL of that line 410 (e.g., between about 60% and 80% of the LPU), and the mid-line ML of each line 410 is defined as being at an (second) offset vertical distance from the base-line BL (and/or top-line TL) of that line 410 (e.g., between about 30% and 70% of the distance between the base-line BL and top-line TL). In this way, sufficient space for ascender and descenders, upper casing, and grammatical symbols is provided once the digital ink has been scaled onto the line pattern 410.

[0077] A first ratio value is the ratio of the (first) distance (i.e., height) of the line pattern, i.e., one LPU, and the (first) distance (i.e., height) of each word of the input. The height of a word is defined as being vertical extent between the bottom-line and top-line of that word. A similar definition is applicable to the character level, as these are like words having a single character, such as the symbol 604. For sentences and text lines the height may be determined from the absolute values for the extrema, i.e., the lowest lower extremum and the highest upper extremum, and/or from the base- and top-lines, which may or may not be based on average, mean or adjusted (e.g., upper case or ascender/descender characters discarded) values.

[0078] Thus, in the example of FIG. 6, the height of the word 600 is from the highest point of the word, being the highest point of the character 501, to the lowest point of the word, being the lowest point of the character 503, the height of the word 602 is from the highest point of the word (e.g., the highest point of the character 504) to the lowest point of the word, (e.g., the lowest point of the character 508), the height of the word 604 is from the highest point of the

word (e.g., the highest point of the character 507) to the lowest point of the word (e.g., the lowest point of the character 507), and the height of the symbol 606 is from the highest point of the character 510 to the lowest point of the character 510, for example. The first ratio of each word therefore provides a comparison of the total height of that word, as set by the characters of the word (i.e., including casing, ascenders, descenders and grammatical symbols), and the LPU.

[0079] A second ratio value is the ratio of the (second) distance (e.g., top height) from the base-line BL to the top-line TL of the line pattern 410 and the (second) distance (e.g., top height) from the base-line to the top-line of each word of the input. Thus, in the example of FIG. 6, the top height of the word 600 is from the top-line of the word (e.g., passing through the highest point of the character 501) to the base-line B0, the top height of the word 602 is from the top-line of the word (e.g., passing through the highest point of the character 504) to the base-line B2, the top height of the word 604 is from the top-line of the word (e.g., passing through the highest point of the character 507) to the base-line B4, and the top height of the symbol 606 is from the top-line of the symbol 606 (e.g., passing through the highest point of the character 510) to the base-line B6. The second ratio of each word therefore provides a comparison of the top-line to base-line height of that word and the top-line height of the lines 410.

[0080] The third ratio is the ratio of the (third) distance (e.g., mid height) from the base-line BL to the mid-line ML of the line pattern 410 and the (third) distance (e.g., mid height) from the base-line to the mid-line of each word of the input. Thus, in the example of FIG. 6, the mid height of the word 600 is from the mid-line M0 to the base-line B0, the mid height of the word 602 is from the mid-line M2 to the base-line B2, the mid height of the word 604 is from the mid-line M4 to the base-line B4, and the mid height of the symbol 606 is from the mid-line of the symbol 606 (e.g., the same as the top-line) to the base-line B6. The third ratio of each word therefore provides a comparison of the mid-line to base-line height of that word and the mid-line height of the lines 410.

[0081] Two or more of these ratios are compared in order to determine the minimum value. For example, the first and second ratios may be compared, or the first and third, or the second and third, or all three ratios. Further, other ratios may be determined and used in the comparison. The comparison allows a minimum character, word, sentence or text line size to be used for the structuring transformation. In the structuring transformation, the rendered strokes of the scaled digital ink are the smallest compared to the original input. However, if the minimum

value of each compared ratio is greater than 1, then the returned minimum value is capped at 1, such that no scaling is performed. This especially applies to some punctuation marks which do not require scaling, such as periods.

[0082] Once the comparison is made, the elements of the (non-scaled or original) digital ink (e.g., the characters, words, etc. depending on the level used for the comparison) are scaled by the minimum value and are rendered on one of the lines 410 of the line pattern so that the base-line of the element is at the base-line of that line 410 (i.e., on the line 410). FIG. 8 shows an example in which the minimum ratio values for each of the words 600 to 606 of the digital ink500 are determined from a comparison of the first, second and third ratios described above in order to perform the structuring transformation of the digital ink 500 to structured (second) digital ink 800. The structured digital ink text 800 includes a word 801 being the scaled version of the word 600, a word 802 being the scaled version of the word 602, a word 804 being the scaled version of the word 604, and a word 806 being the scaled version of the word 606. The structured digital ink text 800 is rendered on the uppermost (first) line of the line pattern 410 so that the base-line of each scaled word 801 to 806 is positioned in the first line 410.

[0083] The HWR system 114 may have some issues with determining the base-lines of elements of the input since there may be many ambiguities leading to improbable base-line recognition. Accordingly, the application 112 may be configured to handle the translation of the scaled strokes depending on the elements/characters that are recognized by the HWR system 114. For example, the HWR system 114 may not be able to set a base-line for a single horizontal line recognized as a hyphen or minus sign, accordingly the application 112 may display the scaled strokes with an offset from the line 410, such as to be centered vertically in the line pattern of the rendering area.

[0084] The positioning of each element on the multiple lines of the line pattern 410 is made based on certain pre-defined or settable criteria, such as, for left-to-right written languages, aligned to the first available left-most section of a first available line from the top of the rendering area of the device 100 which can accommodate the scaled element. For example, in the example of FIG. 8, the rendering area is overlapped or coextensive with the input area 400 such that the scaled digital ink text 800 is left-aligned on the first line 410, since there is no other content (e.g., digital or typeset ink) displayed on any of the lines 410. Such positioning may therefore include reflowing of the input over multiple ones of the lines 410, for example, if the

next available position is one a line which is below the line previously used for the structured digital ink. In this way, paragraphs of text can be formed from a series of inputs of single lines of text (input as described below) and editing operations can be performed on the structured digital ink including those that trigger reflowing events (as described later).

[0085] With respect to the input and rendering areas or zones of the application 112, it is noted that these areas may be coextensive, as in the example of FIG. 8, such that once input has been received and displayed/rendered as the original digital ink (e.g., the digital ink 500) after a set amount of time, as measured by a clock of the computing device 100 in conjunction with the memory 108 for example, the input area is cleared of the original digital ink and the structured digital ink (e.g., the digital ink 800) stroke is displayed/rendered on the rendering area. Alternatively, the input and rendering areas may be separated into different zones of the interface 104 or on separate displays or display devices, such that display of the original digital ink may persist and be scrolled, for example, to allow further input, or be omitted after a certain time period or receipt of new input. For example, superimposed input in which characters or words or parts of words are input over the top of one another with fading or other omission of previously entered input may be possible in either case of separated or overlapped display, such as described in United States Patent Publication No. 2015/0286886 filed in the name of the present Applicant and Assignee and United States Patent Application No. 14/796,092 titled "System and Method for Superimposed Handwriting Recognition Technology" filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein.

[0086] Further, in the structuring transformation, the spaces between characters and words in the input are transformed to a fixed spacing, such as shown in FIG. 8. The fixed spacing may be set based on the LPU (e.g., about 5% to about 15% of the LPU) or the mid-line height of the line pattern (e.g., about 40% to about 60% of the mid height), or on other criteria. The fixed spacing is provided so that generally normalized and beautified digital ink output is provided aligned to the line pattern, particularly with respect to the above-mentioned new input which may be rendered as scaled digital ink on the same line as previously scaled input. Alternatively, the spacing between the characters/words of the input may be scaled in relation to the scaling of the associated characters/words.

[0087] The above-discussed example includes input which is generally horizontally provided, in the left-to-right written context. However, as is understood as the geometry of

elements of the input text, such as words, are considered for the structuring transformation, other manners of input are also handled by the present system and method. For example, FIG. 9 shows the example input area 400 having handwritten input rendered as digital ink text 900. The digital ink text 900 includes the 'words' 600, 602, 604 and 606, as in the above-described example, however these words are vertically input so that the word 600 is above the other words, the word 602 is above the words 604 and 606, and the words 604 and 606 are on the same text line. As such the digital ink 900 is on multiple text lines which are not aligned with any of the lines 410. As with the afore-described examples, the base-line B0 and mid-line M0 are determined for the word 600, the base-line B2 and mid-line M2 are determined for the word 602, the base-line B4 and mid-line M4 are determined for the word 604, and the base-line B6 is determined for the symbol 606, as shown in FIG. 10. Thus, as the geometrical information is the same, the structuring transformation is the same as described earlier, such that the non-structured digital ink 900 is transformed into the scaled and aligned digital ink 800 shown in FIG. 8. As can be understood, similar transformation can be applied to other alignments and manners of inputting the handwriting.

[0088] The beautification of the non-beautified or 'raw' digital ink according to the handwritten input to the device 100 into the beautified digital ink provides a way of displaying user handwritten input in a normalized and standard fashion thereby aiding legibility, usability and interactability with the content. It is considered that guidance for users for such interactions with the beautified digital ink using mechanisms similar to those expected in document processing applications is beneficial, as this enhances the user experience with the application 112. One such mechanism is the use of an input or editing cursor that acts as a pointer for character level editing operations, such as carriage return, space insertion, character deletion or insertion. For example, FIG. 11 shows a cursor 1100 provided after the beautified digital ink 800.

[0089] It is understood that beyond guiding handwritten interaction with the beautified content, the cursor also provides positioning of other forms of input, such as typing via keyboard or text input by voice recognition. As can be seen, the cursor 1100 is displayed with sizing and alignment similar to the structured digital ink. The cursor may be displayed by the application 112, and editing functions performed, in response to user interaction with the digital ink within the rendering or editing area. This interaction may be through known gestures on touch and

hover devices (such as tap, double tap, press, long press, swipe, pinch), specific digital ink editing gestures (such as those described in European Patent Application No. 15 290 296.1 titled "System and Method for Note Taking with Gestures" filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein), or hardware tools (such as keyboard, mouse). Alternatively, or additionally, the cursor may be displayed by the application 112 in a (set) default position, such as at the end of the (most recent) beautified digital ink (e.g., as shown in FIG. 11), for example, once the digital ink has been beautified. The cursor remains displayed, for example, until new handwriting input is detected by the application 112.

[0090] As mentioned earlier, the present system and method provides the cursor management through segmentation in the recognition process. This aspect of the present system and method is now described. As discussed above, segmentation is performed by the HWR system 114 during the recognition process. This segmentation information is retrieved by the application 112 to determine the ranges of each recognized element within the handwritten input, such as for example, characters of handwritten text, shapes of handwritten drawings, etc. For example, FIG. 12 shows the determined ranges, illustrated as character bounding boxes 511 to 520 for an example segmentation of the characters 501 to 510 of the input, respectively. The present system and method uses these ranges to display the cursor at the bounding box of each character. For example, in FIG. 11 the cursor 1100 is displayed at the right edge of the bounding box 520 of the character 510.

[0091] However, unlike typeset or fontified ink, digital ink, even the beautified digital ink, is not regularly provided on a character-by-character basis. This is because, handwriting is a form of personal font of the writing user, and while basic standards are followed in handwritten languages, many variations will exist. As such, many of the characters will overlap horizontally, or vertically, or both, due to capitalization, ascenders, descenders, slanted writing, or just untidy handwriting. While character overlap is handled by the HWR system 114 to properly recognize the characters, the character positions themselves are not adjusted through the segmentation or the beautification described above. Such adjustment could be made, but it is difficult to provide general rules because as stated above, the manner of handwriting is very personal. Accordingly, character overlap causes overlap of the bounding boxes. For example, as can be seen in FIG. 12 the bounding boxes 515 and 516 overlap dues to overlap of the characters 505 and 506. As such,

rendering a cursor on an overlapped bounding box may cause confusion for users. Examples of how the present system and method handle this situation is described below in relation to FIGS. 13 to 18.

[0092] FIG. 13 shows the example input area 400 having handwritten input rendered as digital ink text 1300. The digital ink text 1300 includes the characters or symbols, "T" 1302, "r" 1304, "e" 1306, and "e" 1308 forming the capitalized word "Tree". As before, the input represented by the digital ink text 1300 has been input by a user so as not be in accord with the line pattern 410. FIG. 14 shows the digital ink text 1300 with the determined ranges of each character as segmented by the HWR system 114 illustrated as bounding boxes 1402 to 1408 corresponding to the characters 1302 to 1308, respectively.

[0093] FIG. 15 shows the digital ink 1300 of FIG. 13 after the structuring transformation to produce scaled digital ink 1500 which is properly aligned with the line pattern 410 by the earlier described criteria. It is understood that since the beautified digital ink of the present example is a scaled and aligned version of the 'raw' digital ink without adjustment within words, such as inter-character spacing and character sizing, the structuring transformation is equally applicable to the ranges of the characters as segmented. Thus, as shown in FIG. 16, the bounding boxes 1402 to 1408 of the digital ink 1300 are scaled to bounding boxes 1602 to 1608, respectively, for the structured digital ink 1500. These scaled bounding boxes are therefore used by the application 112 to set the cursor position through consideration geometrical features of the bounding boxes in one or more of the following ways.

[0094] In the case that the ranges of two consecutive characters do not overlap, several strategies can be applied by the present system and method in order to place the cursor:

- The cursor is positioned between those two characters at the center between the range borders. For example, FIG. 17A shows a centered (first) cursor 1700 positioned in the center between the bounding boxes 1604 and 1606 of the non-overlapping respective (first) characters 1304 and (second) characters 1306.
- The cursor is positioned between those two characters at the right range border of the left-side character. For example, FIG. 17B shows a left-aligned (second) cursor 1702 positioned on the right edge of the bounding box 1604 of the character 1304 between the non-overlapping characters 1304 and 1306.

- The cursor is position between those two characters at the left range border of the right-side character. For example, FIG. 17C shows a right-aligned (third) cursor 1704 positioned on the left edge of the bounding box 1606 of the character 1306 between the non-overlapping characters 1304 and 1306.

[0095] Whereas, in the case that the ranges of two consecutive characters do overlap, several strategies can be applied by the present system and method in order to place the cursor:

- The cursor is positioned between those two characters at the center of the area of overlap defined by the ranges of the overlapped characters. For example, FIG. 18A shows a centered (fourth) cursor 1800 positioned in the center of the overlapping area of the (first) characters 1302 and (second) characters 1304. As can be seen however, this setting may cause confusion for users as to which character the cursor 1800 is related.
- The cursor is positioned between those two characters in consideration of the other geometrical features of the ranges of the overlapped characters, such as the height, the width, or the area of the bounding boxes to be at the range border of the character with either the smallest or the highest value of these geometrical features which is in the overlapping area. For example, FIG. 18B shows a left-aligned (fifth) cursor 1802 positioned on the left edge of the bounding box 1606 of the character 1306 between the overlapping characters 1302 and 1304, where the character having the bounding box of smallest height is used as the cursor positioning criteria.

[0096] As with any document editing application, the cursor position can be set and reset by user interaction within the editing area, such as with a tap or a click, provided by the application 112, as discussed earlier. However, in the afore-described example of the present system and method in which the input or capture area and the rendering or editing area are overlapped, the receipt of a gesture may cause ambiguity between setting of the cursor position and the input of new content. The present system and method accounts for such ambiguity to identify a 'set cursor position' action by evaluating certain criteria with respect to received user interaction. For example, when:

- the input is constituted by a unique stroke, until the end of the writing session; and
- the new input is a single-point gesture, such as a tap or other unique sampling point, defining a user interaction point; and

- content, such as a character or word, is present in the rendering area at the user interaction point, then:

the user interaction is considered as a request to set the cursor position.

[0097] The present system and method properly beautifies 'freely' (unstructured) input digital ink through scaling or minimizing and aligning the digital ink on alignment elements of an editing area by taking into account the descending part of the handwriting, e.g., the distance between the base-line and the mid-line of the handwriting as determined by the recognition process for recognizing the handwriting input. Further, the present system and method considers character segmentation determined by the recognition process for recognizing the handwriting input to allow management of an editing cursor position for the beautified digital ink so that editing operations can be performed on a character basis, and not only on a word, sentence, line or block basis, for example.

[0098] While the foregoing has described what is considered to be the best mode and/or other examples, it is understood that various modifications may be made therein and that the subject matter disclosed herein may be implemented in various forms and examples, and that they may be applied in numerous other applications, combinations, and environments, only some of which have been described herein. Those of ordinary skill in that art will recognize that the disclosed aspects may be altered or amended without departing from the true spirit and scope of the subject matter. Therefore, the subject matter is not limited to the specific details, exhibits, and illustrated examples in this description. It is intended to protect any and all modifications and variations that fall within the true scope of the advantageous concepts disclosed herein.

SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

TECHNICAL FIELD

[0001] The present description relates generally to the field of handwriting recognition systems and methods using computing device interfaces. The present description relates more specifically to systems and methods for beautifying digital ink rendered from handwriting input to such computing device interfaces and providing editing of the digital ink on the computing device interfaces.

BACKGROUND

[0002] Computing devices continue to become more ubiquitous to daily life. They take the form of computer desktops, laptop computers, tablet computers, hybrid computers (2-in-1s), e-book readers, mobile phones, smartphones, wearable computers (including smartwatches, smart glasses/headsets), global positioning system (GPS) units, enterprise digital assistants (EDAs), personal digital assistants (PDAs), game consoles, and the like. Further, computing devices are being incorporated into vehicles and equipment, such as cars, trucks, farm equipment, manufacturing equipment, building environment control (e.g., lighting, HVAC), and home and commercial appliances.

[0003] Computing devices generally consist of at least one processing element, such as a central processing unit (CPU), some form of memory, and input and output devices. The variety of computing devices and their subsequent uses necessitate a variety of interfaces and input devices. One such input device is a touch sensitive surface such as a touch screen or touch pad wherein user input is received through contact between the user's finger or an instrument such as a pen or stylus and the touch sensitive surface. Another input device is an input surface that senses gestures made by a user above the input surface. A further input device is a position detection system which detects the relative position of either touch or non-touch interactions with a non-touch physical or virtual surface. Any of these methods of input can be used generally for drawing or inputting text. When user input is text the user's handwriting is interpreted using a handwriting recognition system or method.

[0004] One application of handwriting recognition in non-portable and portable computing devices, such as smartphones, phablets and tablets, is for the input of text into various

applications run by the computing devices in a manner similar to that traditionally done with keyboard, either physical or virtual. However, unlike keyboard input which is governed by strict layout rules, such as text entry on visible or invisible lines in accordance with the position of a displayed cursor, handwriting can be input virtually anywhere on the input surface of the device. While this substantially unconstrained input has some effect on the recognition accuracy of the handwriting, currently available advanced recognition algorithms are generally able to deal with such relatively 'free' positioning of textual characters.

[0005] Of more effect is a user's ability to interact with the input once it has been rendered as so-called 'digital ink' on the display. This is because, unlike typed or 'typeset ink' text which has characters relatively located in a uniform and known manner, the characters of the digital ink text are not uniform or in relatively known positions, generally due to the irregularity inherent in handwriting. Accordingly, conventional systems and methods typically only allow further interaction to be made on the typeset ink rendered from the recognized text, which is generally done at a different position of the display from the area where input is allowed.

[0006] It is desired by users however to be able to interact directly with the handwriting as well, such as to edit the input (e.g., add or delete characters or words), so that the creative flow of handwriting input is maintained. Some available applications provide alignment and scaling of the digital ink through normalization and the like, but these do not take into account certain geometrical features of the handwriting, and therefore the scaling and aligning is not properly performed to allow full interaction or faithful reproduction of the original digital ink, or do not use recognition to provide these operations, and as such do not provide interaction capabilities within the input signal such that editing operations can only be performed at the word level, and not at the character level, for example.

SUMMARY

[0007] The examples of the present invention that are described herein below provide systems and methods for beautifying and providing editing of digital ink on computing devices.

[0008] In one example, the present invention includes a system for beautifying digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The non-transitory computer readable medium may be configured to cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting

input, determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink, and cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

[0009] The structuring transformation may be determined from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the structuring transformation is determined from the minimum of the first and second ratio values.

[0010] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0011] In another example, the present invention includes a method for beautifying digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink, and displaying, on the display interface, second digital ink in accordance with the structuring transformation.

[0012] The method may determine the structuring transformation from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the method may determine the structuring transformation from the minimum of the first and second ratio values.

[0013] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0014] In another example, the present invention includes a non-transitory computer readable medium having a computer readable program code embodied therein, The computer readable program code may be adapted to be executed to implement a method for beautifying digital ink on a computing device. The computing device may include a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink, and displaying, on the display interface, second digital ink in accordance with the structuring transformation.

[0015] The method may determine the structuring transformation from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the method may determine the structuring transformation from the minimum of the first and second ratio values.

[0016] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0017] In another example, the present invention includes a system for providing editing of digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The non-transitory computer readable medium may be configured to cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input, determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges.

[0018] The elements of the digital ink may include text characters and the at least one non-transitory computer readable medium may be configured to display the input cursor at a

position between first and second characters in relation to the determined ranges of the first and second characters.

[0019] The determined ranges of the first and second characters may overlap, and the at least one non-transitory computer readable medium may be configured to compare geometrical features of the determined ranges of the first and second characters, and cause the display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

[0020] In another example, the present invention includes a method for providing editing of digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input, determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges

[0021] The elements of the digital ink may include text characters and the method may display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0022] The determined ranges of the first and second characters may overlap, and the method may compare geometrical features of the determined ranges of the first and second characters, and display the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

[0023] In another example, the present invention includes the present invention includes a non-transitory computer readable medium having a computer readable program code embodied therein, The computer readable program code may be adapted to be executed to implement a method for providing editing of digital ink on a computing device. The computing device may include a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps

of displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input, determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges

[0024] The elements of the digital ink may include text characters and the method may display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0025] The determined ranges of the first and second characters may overlap, and the method may compare geometrical features of the determined ranges of the first and second characters, and display the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The present system and method will be more fully understood from the following detailed description of the examples thereof, taken together with the drawings. In the drawings like reference numerals depict like elements. In the drawings:

[0027] FIG. 1 shows a block diagram of a computing device in accordance with an example of the present system and method;

[0028] FIG. 2 shows a block diagram of a system for handwriting recognition in accordance with an example of the present system and method;

[0029] FIG. 3 shows a block diagram illustrating detail of the handwriting recognition system of FIG. 2 in accordance with an example of the present system and method;

[0030] FIG. 4 shows a schematic view of an example visual rendering of an ink input area on a portion of an input surface of the computing device;

[0031] FIG. 5 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0032] FIG. 6 shows the example digital ink of FIG. 5 with geometrical information provided by the handwriting recognition system;

[0033] FIG. 7 shows the example input area of FIG. 4 with geometrical information provided by the handwriting recognition system;

[0034] FIG. 8 shows example beautified digital ink rendered on a line pattern;

[0035] FIG. 9 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0036] FIG. 10 shows the example digital ink of FIG. 9 with geometrical information provided by the handwriting recognition system;

[0037] FIG. 11 shows the example beautified digital ink of FIG. 8 with a cursor;

[0038] FIG. 12 shows the example digital ink of FIG. 5 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0039] FIG. 13 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0040] FIG. 14 shows the example digital ink of FIG. 13 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0041] FIG. 15 shows example beautified digital ink rendered on the line pattern;

[0042] FIG. 16 shows the example beautified digital ink of FIG. 15 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0043] FIG. 17A shows a first example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0044] FIG. 17B shows a second example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0045] FIG. 17C shows a third example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0046] FIG. 18A shows a fourth example cursor position for overlapping characters of the example beautified digital ink of FIG. 15; and

[0047] FIG. 18B shows a fifth example cursor position for overlapping characters of the example beautified digital ink of FIG. 15.

DETAILED DESCRIPTION

[0048] In the following detailed description, numerous specific details are set forth by way of examples in order to provide a thorough understanding of the relevant teachings. However, it should be apparent to those skilled in the art that the present teachings may be practiced without such details. In other instances, well known methods, procedures, components, and/or circuitry have been described at a relatively high-level, without detail, in order to avoid unnecessarily obscuring aspects of the present teachings.

[0049] Reference to and discussion of directional features such as up, down, above, below, lowest, highest, horizontal, vertical, etc., are made with respect to the Cartesian coordinate system as applied to the input surface on which the input to be recognized is made. Further, terms such as left and right are made in relation to the reader's frame of reference when viewing the drawings. Furthermore, the use of the term 'text' in the present description is understood as encompassing all alphanumeric characters, and strings thereof, in any written language and common place non-alphanumeric characters, e.g., symbols, used in written text. Further still, the examples shown in these drawings are in a left-to-right written language context, and therefore any reference to positions can be adapted for written languages having different directional formats.

[0050] The various technologies described herein generally relate to capture, processing and management of hand-drawn and handwritten content on portable and non-portable computing devices in a manner which retains the inputted style of the content while allowing conversion to a faithful typeset or beautified version of that content. The systems and methods described herein may utilize recognition of users' natural writing and drawing styles input to a computing device via an input surface, such as a touch sensitive screen, connected to, or of, the computing device or via an input device, such as a digital pen or mouse, connected to the computing device or via a physical or virtual surface monitored by a position detection system. Whilst the various examples are described with respect to recognition of handwriting input using so-called online recognition techniques, it is understood that application is possible to other forms of input for recognition, such as offline recognition in which images rather than digital ink are recognized. The terms hand-drawing and handwriting are used interchangeably herein to define the creation of digital content by users through use of their hands either directly onto a digital or digitally connected medium or via an input tool, such as a hand-held stylus. The term

"hand" is used herein to provide concise description of the input techniques, however the use of other parts of a users' body for similar input is included in this definition, such as foot, mouth and eye.

[0051] FIG. 1 shows a block diagram of an example computing device 100. The computing device may be a computer desktop, laptop computer, tablet computer, e-book reader, mobile phone, smartphone, wearable computer, digital watch, interactive whiteboard, global positioning system (GPS) unit, enterprise digital assistant (EDA), personal digital assistant (PDA), game console, or the like. The computing device 100 includes components of at least one processing element, some form of memory and input and/or output (I/O) devices. The components communicate with each other through inputs and outputs, such as connectors, lines, buses, cables, buffers, electromagnetic links, networks, modems, transducers, IR ports, antennas, or others known to those of ordinary skill in the art.

[0052] The computing device 100 has at least one display 102 for outputting data from the computing device such as images, text, and video. The display 102 may use LCD, plasma, LED, iOLED, CRT, or any other appropriate technology that is or is not touch sensitive as known to those of ordinary skill in the art. At least some of the display 102 is co-located with at least one input surface 104. The input surface 104 may employ technology such as resistive, surface acoustic wave, capacitive, infrared grid, infrared acrylic projection, optical imaging, dispersive signal technology, acoustic pulse recognition, or any other appropriate technology as known to those of ordinary skill in the art to receive user input. The input surface 104 may be bounded by a permanent or video-generated border that clearly identifies its boundaries.

[0053] In addition to the input surface 104, the computing device 100 may include one or more additional I/O devices (or peripherals) that are communicatively coupled via a local interface. The additional I/O devices may include input devices such as a keyboard, mouse, scanner, microphone, touchpads, bar code readers, laser readers, radio-frequency device readers, or any other appropriate technology known to those of ordinary skill in the art. Further, the I/O devices may include output devices such as a printer, bar code printers, or any other appropriate technology known to those of ordinary skill in the art. Furthermore, the I/O devices may include communications devices that communicate both inputs and outputs such as a modulator/demodulator (modem; for accessing another device, system, or network), a radio frequency (RF) or other transceiver, a telephonic interface, a bridge, a router, or any other

appropriate technology known to those of ordinary skill in the art. The local interface may have additional elements to enable communications, such as controllers, buffers (caches), drivers, repeaters, and receivers, which are omitted for simplicity but known to those of skill in the art. Further, the local interface may include address, control, and/or data connections to enable appropriate communications among the other computer components.

[0054] The computing device 100 also includes a processor 106, which is a hardware device for executing software, particularly software stored in the memory 108. The processor can be any custom made or commercially available general purpose processor, a central processing unit (CPU), a semiconductor based microprocessor (in the form of a microchip or chipset), a macroprocessor, microcontroller, digital signal processor (DSP), application specific integrated circuit (ASIC), field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, state machine, or any combination thereof designed for executing software instructions known to those of ordinary skill in the art. Examples of suitable commercially available microprocessors are as follows: a PA-RISC series microprocessor from Hewlett-Packard Company, an 80x86 or Pentium series microprocessor from Intel Corporation, a PowerPC microprocessor from IBM, a Sparc microprocessor from Sun Microsystems, Inc., a 68xxx series microprocessor from Motorola Corporation, DSP microprocessors, or ARM microprocessors.

[0055] The memory 108 can include any one or a combination of volatile memory elements (e.g., random access memory (RAM, such as DRAM, SRAM, or SDRAM)) and nonvolatile memory elements (e.g., ROM, EPROM, flash PROM, EEPROM, hard drive, magnetic or optical tape, memory registers, CD-ROM, WORM, DVD, redundant array of inexpensive disks (RAID), another direct access storage device (DASD)). Moreover, the memory 108 may incorporate electronic, magnetic, optical, and/or other types of storage media. The memory 108 can have a distributed architecture where various components are situated remote from one another but can also be accessed by the processor 106. Further, the memory 108 may be remote from the device, such as at a server or cloud-based system, which is remotely accessible by the computing device 100. The memory 108 is coupled to the processor 106, so the processor 106 can read information from and write information to the memory 108. In the alternative, the memory 108 may be integral to the processor 106. In another example, the processor 106 and the memory 108 may both reside in a single ASIC or other integrated circuit.

[0056] The software in the memory 108 includes an operating system 110 and an application 112. The software optionally further includes a handwriting recognition (HWR) system 114 which may each include one or more separate computer programs. Each of these has an ordered listing of executable instructions for implementing logical functions. The operating system 110 controls the execution of the application 112 (and the HWR system 114). The operating system 110 may be any proprietary operating system or a commercially available operating system, such as WEBOS, WINDOWS®, MAC and IPHONE OS®, LINUX, and ANDROID. It is understood that other operating systems may also be utilized.

[0057] The application 112 includes one or more processing elements related to detection, management and treatment of user input (discussed in detail later). The software may also include one or more other applications related to handwriting recognition, different functions, or both. Some examples of other applications include a text editor, telephone dialer, contacts directory, instant messaging facility, computer-aided design (CAD) program, email program, word processing program, web browser, and camera. The application 112, and the other applications, include program(s) provided with the computing device 100 upon manufacture and may further include programs uploaded or downloaded into the computing device 100 after manufacture.

[0058] The HWR system 114, with support and compliance capabilities, may be a source program, executable program (object code), script, application, or any other entity having a set of instructions to be performed. When a source program, the program needs to be translated via a compiler, assembler, interpreter, or the like, which may or may not be included within the memory, so as to operate properly in connection with the operating system. Furthermore, the handwriting recognition system with support and compliance capabilities can be written as (a) an object oriented programming language, which has classes of data and methods; (b) a procedure programming language, which has routines, subroutines, and/or functions, for example but not limited to C, C++, Pascal, Basic, Fortran, Cobol, Perl, Java, Objective C, Swift, and Ada; or (c) functional programing languages for example but no limited to Hope, Rex, Common Lisp, Scheme, Clojure, Racket, Erlang, OCaml, Haskell, Prolog, and F#. Alternatively, the HWR system 114 may be a method or system for communication with a handwriting recognition system remote from the device, such as server or cloud-based system, but is remotely accessible by the computing device 100 through communications links using the afore-mentioned

communications I/O devices of the computing device 100. Further, the application 112 and the HWR system 114 may operate together or be combined as a single application.

[0059] Strokes entered on or via the input surface 104 are processed by the processor 106 as digital ink. A user may enter a stroke with a finger or some instrument such as a pen or stylus suitable for use with the input surface. The user may also enter a stroke by making a gesture above the input surface 104 if technology that senses motions in the vicinity of the input surface 104 is being used, or with a peripheral device of the computing device 100, such as a mouse or joystick. A stroke is characterized by at least the stroke initiation location, the stroke termination location, and the path connecting the stroke initiation and termination locations. Because different users may naturally write the same object, e.g., a letter, a shape, a symbol, with slight variations, the HWR system accommodates a variety of ways in which each object may be entered whilst being recognized as the correct or intended object.

[0060] FIG. 2 is a schematic pictorial of an example of the HWR system 114, in either its local (i.e., loaded on the device 100) or remote (i.e., remotely accessible by the device 100) forms. The HWR system 114 includes stages such as preprocessing 116, recognition 118 and output 120. The preprocessing stage 116 processes the digital ink to achieve greater accuracy and reducing processing time during the recognition stage 118. This preprocessing may include normalizing of the path connecting the stroke initiation and termination locations by applying size normalization and/or methods such as B-spline approximation to smooth the input. The preprocessed strokes are then passed to the recognition stage 118 which processes the strokes to recognize the objects formed thereby. The recognized objects are then output 120 to the display 102 generally as a typesetted version of the handwritten elements/characters.

[0061] The recognition stage 118 may include different processing elements or experts. FIG. 3 is a schematic pictorial of the example of FIG. 2 showing schematic detail of the recognition stage 118. Three experts, a segmentation expert 122, a recognition expert 124, and a language expert 126, are illustrated which collaborate through dynamic programming to generate the output 120.

[0062] The segmentation expert 122 defines the different ways to segment the input strokes into individual element hypotheses, e.g., alphanumeric characters and mathematical operators, text characters, individual shapes, or sub expression, in order to form expressions, e.g., words, mathematical equations, or groups of shapes. For example, the segmentation expert 122

may form the element hypotheses by grouping consecutive strokes of the original input to obtain a segmentation graph where each node corresponds to at least one element hypothesis and where adjacency constraints between elements are handled by the node connections. Alternatively, the segmentation expert 122 may employ separate experts for different input types, such as text, drawings, equations, and music notation.

[0063] The recognition expert 124 provides classification of the features extracted by a classifier 128 and outputs a list of element candidates with probabilities or recognition scores for each node of the segmentation graph. Many types of classifiers exist that could be used to address this recognition task, e.g., Support Vector Machines, Hidden Markov Models, or Neural Networks such as Multilayer Perceptrons, Deep, Convolutional or Recurrent Neural Networks. The choice depends on the complexity, accuracy, and speed desired for the task.

[0064] The language expert 126 generates linguistic meaning for the different paths in the segmentation graph using language models (e.g., grammar or semantics). The expert 126 checks the candidates suggested by the other experts according to linguistic information 130. The linguistic information 130 can include a lexicon, regular expressions, etc. The language expert 126 aims at finding the best recognition path. In one example, the language expert 126 does this by exploring a language model such as final state automaton (determinist FSA) representing the content of linguistic information 130. In addition to the lexicon constraint, the language expert 126 may use statistical information modeling for how frequent a given sequence of elements appears in the specified language or is used by a specific user to evaluate the linguistic likelihood of the interpretation of a given path of the segmentation graph.

[0065] The present system and method make use of the HWR system 114 in order to recognize handwritten input to the device 100. As discussed earlier, unlike keyboard input which is governed by strict layout rules, such as text entry on visible or invisible lines in accordance with the position of a displayed cursor, the present system and method allows handwriting to be input virtually anywhere on the input surface 104 of the computing device 104, and this input is rendered as digital ink in the input position. The HWR system 114 is able to recognize this relatively 'freely' positioned handwriting. The present system and method further allows users to continue to interact with the digital ink itself and provide meaningful guidance and results of that interaction through beautifying the digital ink. Beautification is achieved by properly scaling and aligning the digital ink in accordance with an alignment structure of the input surface 104 by

taking into account certain geometrical features of the handwriting (described in detail later). Interaction is assisted by the performance of segmentation of strokes in the recognition process and using information on this segmentation to allow management of an input or editing cursor that acts as a pointer for character level interactions and editing operations. These and other aspects of the present system and method are now described.

[0066] FIG. 4 shows a schematic view of an example visual rendering of an ink input or capture area 400 on a portion of the input surface 104 of an example computing device 100. The input area 400 is provided as a constraint-free canvas that allows users to create object blocks (blocks of text, drawings, etc.) anywhere without worrying about sizing or alignment. However, as can be seen an alignment structure in the form of a line pattern background 410 can be provided for guidance of user input and the alignment of digital and typeset ink objects. In any case, as users may input handwriting that is not closely aligned to the line pattern, or may desire to ignore the line pattern and write in a unconstrained manner, such as diagonally or haphazardly, the recognition of the handwriting input is performed by the HWR system 114 without regard to the line pattern. An example alignment pattern is described in United States Patent Application No. 14/886,195 titled "System and Method of Digital Note Taking" filed in the name of the present Applicant and Assignee, the entire content of which is incorporated by reference herein.

[0067] For example, from this incorporated by reference patent application, the line pattern 410 has horizontal lines separated by a multiple of the vertical rhythm height unit being the density independent pixel (dp). Regardless of the particular device 100, the vertical distance between the horizontal lines 410 is defined by a line pattern unit (LPU) and the vertical rhythm height unit provides a graduated measure of the LPU on a particular device. For example, the LPU may be set at about one centimeter for any device being a certain multiple of the vertical rhythm height unit or users may be allowed to customize the line pattern unit to a different multiple of the vertical rhythm height unit according to their writing style. Alternatively, the vertical rhythm may be based on typeset text size (e.g., the minimum text size) and the LPU is provided as a multiple of this typeset text size. All lines 410 are displayed with the same light and subtle color, e.g., grey, that is visible but faded with respect to the rendering of the content itself. In this way the line pattern is noticeable but unobtrusive so as to guide the handwriting input without distracting from the content entry.

[0068] In order to assist user input, the application 112 renders the digital ink according to the user input in the position at which the input is made. For example, FIG. 5 shows the example input area 400 having handwritten input rendered as (first) digital ink 500. The digital ink 500 includes text characters or symbols, "H" 501, "o" 502, "w" 503, "a" 504, "r" 505, "e" 506, "y" 507, "o" 508, "u" 509 and "?" 510, forming the question phrase "How are you?". As can be seen, the input represented by the digital ink text 500 has been input by a user so as not be in accord with the line pattern 410. That is, the characters 501 to 510 of the digital ink text 500 have not been written directly on any one of the lines 410. This input can be rendered on the line pattern however by applying a structuring transformation on the strokes of the input to beautify the digital ink through proper scaling and alignment. In order to do this appropriately information regarding the relative geometry of the digital ink text 500 is determined, such as the descending part of the handwriting, e.g., the distance between base- and mid-lines of each handwritten character, as described in detail below.

[0069] The (first) geometrical information is provided by the HWR system 114. That is, in the recognition process, the recognition engine 118 determines information on the lower and upper extrema of each character of the input to the application 112 as recognized by the HWR system 114. The lower extremum is the lowest point at which the stroke (or strokes) of the character pass. The upper extremum is the highest point at which the stroke (or strokes) of the character pass. The recognition process also determines from these extremum writing lines at the levels of character, word (e.g., a series of characters), sentence or phrase (e.g., a series of characters and/or words), and text line (e.g., a series of characters, words and/or sentences). The writing lines include top-, bottom-, base-, mid-lines.

[0070] The top-line is defined as the horizontal line passing through a point related to the upper extremum across the horizontal extent of the character, word, sentence or text line. The bottom-line is defined as the horizontal line passing through a point related to the lower extremum across the horizontal extent of the character, word, sentence or text line. The base-line is defined as the horizontal line passing through a point related to the bottom-line across the horizontal extent of the character, word, sentence or text line, and the mid-line is defined as the horizontal line passing through a point related to the top- and base-lines across the horizontal extent of the character, word, sentence or text line. The determination of the points through

which these lines pass is particular to the recognition process and language model(s) used by the HWR system 114.

[0071] For example, for languages having all characters and words made from those characters in a sentence or phrase written with a similar vertical extent, such as pictographic languages, for characters within a word, sentence or text line, the character having the highest upper extrema may be used as the point for either (or both) the top- or mid-line, the character having the lowest lower extrema may be used as the point for the either (or both) bottom- and base-line, for example.

[0072] On the other hand, for languages having characters or letters written in a sentence or phrase with different sizes such as Latin-based languages, e.g., upper and lower casing, letters with ascenders and/or descenders (e.g., "h", "g"), diacritics (e.g., "i", "j") and punctuation symbols (e.g., "?"), for characters within a word, sentence or text line, the character having the highest upper extrema may be used as the point for the top-line, the character having the lowest lower extrema may be used as the point for the bottom-line, the character having the lowest lower extrema of characters which do not have a descender may be used as the point for the base-line, and the lower case character having the highest upper extrema of lower case characters which do not have an ascender may be used as the point for the mid-line, for example.

[0073] Alternatively, instead of setting the writing lines on absolute values, average or mean values can be taken, such as the average or mean of the lower and upper extrema across the text line, sentence or words, or the strokes of the characters themselves, so that local variations and anomalies, such as unduly offset characters, are not given undesired weight.

[0074] FIG. 6 shows the example input of FIG. 5 with the above-described geometrical information of the base- and mid-(or top-)lines provided by the HWR system 114 illustrated. That is, the characters 501-503 are recognized as belonging to one word 600, e.g., "How", with base-line B0 and mid-line M0 determined for the word 600, the characters 504-506 are recognized as belonging to one word 602, e.g., "are", with base-line B2 and mid-line M2 determined for the word 602, the characters 507-509 are recognized as belonging to one word 604, e.g., "you", with base-line B4 and mid-line M4 determined for the word 604, and the character 510 is recognized as being a single symbol 606, with base-line B6 determined for the symbol 606. The present system and method uses the geometrical information to provide a

structuring transformation through proper scaling and alignment of the strokes of the input as follows.

[0075] The structuring transformation uses a ratio which is the minimum between a number of different ratio values related to comparisons of (second) geometrical information of the line pattern 410 and the (first) geometrical information of the input at character, word, sentence or text line level. The level at which first, second and third ratios (described below) are all determined may be, for example, pre-determined or settable via the UI of the application 112. In the examples discussed herein, the word level is depicted, but it is understood that similar description is applicable to the other levels.

[0076] The geometrical information of the line pattern 410 is determined by the application as includes top-, base- and mid-lines, as shown in FIG. 7. For example, the base-line BL of each line 410 of the line pattern is defined as that line 410, the top-line TL of each line 410 is defined as being at an (first) offset vertical distance from the base-line BL of that line 410 (e.g., between about 60% and 80% of the LPU), and the mid-line ML of each line 410 is defined as being at an (second) offset vertical distance from the base-line BL (and/or top-line TL) of that line 410 (e.g., between about 30% and 70% of the distance between the base-line BL and top-line TL). In this way, sufficient space for ascender and descenders, upper casing, and grammatical symbols is provided once the digital ink has been scaled onto the line pattern 410.

[0077] A first ratio value is the ratio of the (first) distance (i.e., height) of the line pattern, i.e., one LPU, and the (first) distance (i.e., height) of each word of the input. The height of a word is defined as being vertical extent between the bottom-line and top-line of that word. A similar definition is applicable to the character level, as these are like words having a single character, such as the symbol 604. For sentences and text lines the height may be determined from the absolute values for the extrema, i.e., the lowest lower extremum and the highest upper extremum, and/or from the base- and top-lines, which may or may not be based on average, mean or adjusted (e.g., upper case or ascender/descender characters discarded) values.

[0078] Thus, in the example of FIG. 6, the height of the word 600 is from the highest point of the word, being the highest point of the character 501, to the lowest point of the word, being the lowest point of the character 503, the height of the word 602 is from the highest point of the word (e.g., the highest point of the character 504) to the lowest point of the word, (e.g., the lowest point of the character 508), the height of the word 604 is from the highest point of the

word (e.g., the highest point of the character 507) to the lowest point of the word (e.g., the lowest point of the character 507), and the height of the symbol 606 is from the highest point of the character 510 to the lowest point of the character 510, for example. The first ratio of each word therefore provides a comparison of the total height of that word, as set by the characters of the word (i.e., including casing, ascenders, descenders and grammatical symbols), and the LPU.

[0079] A second ratio value is the ratio of the (second) distance (e.g., top height) from the base-line BL to the top-line TL of the line pattern 410 and the (second) distance (e.g., top height) from the base-line to the top-line of each word of the input. Thus, in the example of FIG. 6, the top height of the word 600 is from the top-line of the word (e.g., passing through the highest point of the character 501) to the base-line B0, the top height of the word 602 is from the top-line of the word (e.g., passing through the highest point of the character 504) to the base-line B2, the top height of the word 604 is from the top-line of the word (e.g., passing through the highest point of the character 507) to the base-line B4, and the top height of the symbol 606 is from the top-line of the symbol 606 (e.g., passing through the highest point of the character 510) to the base-line B6. The second ratio of each word therefore provides a comparison of the top-line to base-line height of that word and the top-line height of the lines 410.

[0080] The third ratio is the ratio of the (third) distance (e.g., mid height) from the base-line BL to the mid-line ML of the line pattern 410 and the (third) distance (e.g., mid height) from the base-line to the mid-line of each word of the input. Thus, in the example of FIG. 6, the mid height of the word 600 is from the mid-line M0 to the base-line B0, the mid height of the word 602 is from the mid-line M2 to the base-line B2, the mid height of the word 604 is from the mid-line M4 to the base-line B4, and the mid height of the symbol 606 is from the mid-line of the symbol 606 (e.g., the same as the top-line) to the base-line B6. The third ratio of each word therefore provides a comparison of the mid-line to base-line height of that word and the mid-line height of the lines 410.

[0081] Two or more of these ratios are compared in order to determine the minimum value. For example, the first and second ratios may be compared, or the first and third, or the second and third, or all three ratios. Further, other ratios may be determined and used in the comparison. The comparison allows a minimum character, word, sentence or text line size to be used for the structuring transformation. In the structuring transformation, the rendered strokes of the scaled digital ink are the smallest compared to the original input. However, if the minimum

value of each compared ratio is greater than 1, then the returned minimum value is capped at 1, such that no scaling is performed. This especially applies to some punctuation marks which do not require scaling, such as periods.

[0082] Once the comparison is made, the elements of the (non-scaled or original) digital ink (e.g., the characters, words, etc. depending on the level used for the comparison) are scaled by the minimum value and are rendered on one of the lines 410 of the line pattern so that the base-line of the element is at the base-line of that line 410 (i.e., on the line 410). FIG. 8 shows an example in which the minimum ratio values for each of the words 600 to 606 of the digital ink500 are determined from a comparison of the first, second and third ratios described above in order to perform the structuring transformation of the digital ink 500 to structured (second) digital ink 800. The structured digital ink text 800 includes a word 801 being the scaled version of the word 600, a word 802 being the scaled version of the word 602, a word 804 being the scaled version of the word 604, and a word 806 being the scaled version of the word 606. The structured digital ink text 800 is rendered on the uppermost (first) line of the line pattern 410 so that the base-line of each scaled word 801 to 806 is positioned in the first line 410.

[0083] The HWR system 114 may have some issues with determining the base-lines of elements of the input since there may be many ambiguities leading to improbable base-line recognition. Accordingly, the application 112 may be configured to handle the translation of the scaled strokes depending on the elements/characters that are recognized by the HWR system 114. For example, the HWR system 114 may not be able to set a base-line for a single horizontal line recognized as a hyphen or minus sign, accordingly the application 112 may display the scaled strokes with an offset from the line 410, such as to be centered vertically in the line pattern of the rendering area.

[0084] The positioning of each element on the multiple lines of the line pattern 410 is made based on certain pre-defined or settable criteria, such as, for left-to-right written languages, aligned to the first available left-most section of a first available line from the top of the rendering area of the device 100 which can accommodate the scaled element. For example, in the example of FIG. 8, the rendering area is overlapped or coextensive with the input area 400 such that the scaled digital ink text 800 is left-aligned on the first line 410, since there is no other content (e.g., digital or typeset ink) displayed on any of the lines 410. Such positioning may therefore include reflowing of the input over multiple ones of the lines 410, for example, if the

next available position is one a line which is below the line previously used for the structured digital ink. In this way, paragraphs of text can be formed from a series of inputs of single lines of text (input as described below) and editing operations can be performed on the structured digital ink including those that trigger reflowing events (as described later).

[0085] With respect to the input and rendering areas or zones of the application 112, it is noted that these areas may be coextensive, as in the example of FIG. 8, such that once input has been received and displayed/rendered as the original digital ink (e.g., the digital ink 500) after a set amount of time, as measured by a clock of the computing device 100 in conjunction with the memory 108 for example, the input area is cleared of the original digital ink and the structured digital ink (e.g., the digital ink 800) stroke is displayed/rendered on the rendering area. Alternatively, the input and rendering areas may be separated into different zones of the interface 104 or on separate displays or display devices, such that display of the original digital ink may persist and be scrolled, for example, to allow further input, or be omitted after a certain time period or receipt of new input. For example, superimposed input in which characters or words or parts of words are input over the top of one another with fading or other omission of previously entered input may be possible in either case of separated or overlapped display, such as described in United States Patent Publication No. 2015/0286886 filed in the name of the present Applicant and Assignee and United States Patent Application No. 14/796,092 titled "System and Method for Superimposed Handwriting Recognition Technology" filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein.

[0086] Further, in the structuring transformation, the spaces between characters and words in the input are transformed to a fixed spacing, such as shown in FIG. 8. The fixed spacing may be set based on the LPU (e.g., about 5% to about 15% of the LPU) or the mid-line height of the line pattern (e.g., about 40% to about 60% of the mid height), or on other criteria. The fixed spacing is provided so that generally normalized and beautified digital ink output is provided aligned to the line pattern, particularly with respect to the above-mentioned new input which may be rendered as scaled digital ink on the same line as previously scaled input. Alternatively, the spacing between the characters/words of the input may be scaled in relation to the scaling of the associated characters/words.

[0087] The above-discussed example includes input which is generally horizontally provided, in the left-to-right written context. However, as is understood as the geometry of

elements of the input text, such as words, are considered for the structuring transformation, other manners of input are also handled by the present system and method. For example, FIG. 9 shows the example input area 400 having handwritten input rendered as digital ink text 900. The digital ink text 900 includes the 'words' 600, 602, 604 and 606, as in the above-described example, however these words are vertically input so that the word 600 is above the other words, the word 602 is above the words 604 and 606, and the words 604 and 606 are on the same text line. As such the digital ink 900 is on multiple text lines which are not aligned with any of the lines 410. As with the afore-described examples, the base-line B0 and mid-line M0 are determined for the word 600, the base-line B2 and mid-line M2 are determined for the word 602, the base-line B4 and mid-line M4 are determined for the word 604, and the base-line B6 is determined for the symbol 606, as shown in FIG. 10. Thus, as the geometrical information is the same, the structuring transformation is the same as described earlier, such that the non-structured digital ink 900 is transformed into the scaled and aligned digital ink 800 shown in FIG. 8. As can be understood, similar transformation can be applied to other alignments and manners of inputting the handwriting.

[0088] The beautification of the non-beautified or 'raw' digital ink according to the handwritten input to the device 100 into the beautified digital ink provides a way of displaying user handwritten input in a normalized and standard fashion thereby aiding legibility, usability and interactability with the content. It is considered that guidance for users for such interactions with the beautified digital ink using mechanisms similar to those expected in document processing applications is beneficial, as this enhances the user experience with the application 112. One such mechanism is the use of an input or editing cursor that acts as a pointer for character level editing operations, such as carriage return, space insertion, character deletion or insertion. For example, FIG. 11 shows a cursor 1100 provided after the beautified digital ink 800.

[0089] It is understood that beyond guiding handwritten interaction with the beautified content, the cursor also provides positioning of other forms of input, such as typing via keyboard or text input by voice recognition. As can be seen, the cursor 1100 is displayed with sizing and alignment similar to the structured digital ink. The cursor may be displayed by the application 112, and editing functions performed, in response to user interaction with the digital ink within the rendering or editing area. This interaction may be through known gestures on touch and

hover devices (such as tap, double tap, press, long press, swipe, pinch), specific digital ink editing gestures (such as those described in European Patent Application No. 15 290 296.1 titled "System and Method for Note Taking with Gestures" filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein), or hardware tools (such as keyboard, mouse). Alternatively, or additionally, the cursor may be displayed by the application 112 in a (set) default position, such as at the end of the (most recent) beautified digital ink (e.g., as shown in FIG. 11), for example, once the digital ink has been beautified. The cursor remains displayed, for example, until new handwriting input is detected by the application 112.

[0090] As mentioned earlier, the present system and method provides the cursor management through segmentation in the recognition process. This aspect of the present system and method is now described. As discussed above, segmentation is performed by the HWR system 114 during the recognition process. This segmentation information is retrieved by the application 112 to determine the ranges of each recognized element within the handwritten input, such as for example, characters of handwritten text, shapes of handwritten drawings, etc. For example, FIG. 12 shows the determined ranges, illustrated as character bounding boxes 511 to 520 for an example segmentation of the characters 501 to 510 of the input, respectively. The present system and method uses these ranges to display the cursor at the bounding box of each character. For example, in FIG. 11 the cursor 1100 is displayed at the right edge of the bounding box 520 of the character 510.

[0091] However, unlike typeset or fontified ink, digital ink, even the beautified digital ink, is not regularly provided on a character-by-character basis. This is because, handwriting is a form of personal font of the writing user, and while basic standards are followed in handwritten languages, many variations will exist. As such, many of the characters will overlap horizontally, or vertically, or both, due to capitalization, ascenders, descenders, slanted writing, or just untidy handwriting. While character overlap is handled by the HWR system 114 to properly recognize the characters, the character positions themselves are not adjusted through the segmentation or the beautification described above. Such adjustment could be made, but it is difficult to provide general rules because as stated above, the manner of handwriting is very personal. Accordingly, character overlap causes overlap of the bounding boxes. For example, as can be seen in FIG. 12 the bounding boxes 515 and 516 overlap dues to overlap of the characters 505 and 506. As such,

rendering a cursor on an overlapped bounding box may cause confusion for users. Examples of how the present system and method handle this situation is described below in relation to FIGS. 13 to 18.

[0092] FIG. 13 shows the example input area 400 having handwritten input rendered as digital ink text 1300. The digital ink text 1300 includes the characters or symbols, "T" 1302, "r" 1304, "e" 1306, and "e" 1308 forming the capitalized word "Tree". As before, the input represented by the digital ink text 1300 has been input by a user so as not be in accord with the line pattern 410. FIG. 14 shows the digital ink text 1300 with the determined ranges of each character as segmented by the HWR system 114 illustrated as bounding boxes 1402 to 1408 corresponding to the characters 1302 to 1308, respectively.

[0093] FIG. 15 shows the digital ink 1300 of FIG. 13 after the structuring transformation to produce scaled digital ink 1500 which is properly aligned with the line pattern 410 by the earlier described criteria. It is understood that since the beautified digital ink of the present example is a scaled and aligned version of the 'raw' digital ink without adjustment within words, such as inter-character spacing and character sizing, the structuring transformation is equally applicable to the ranges of the characters as segmented. Thus, as shown in FIG. 16, the bounding boxes 1402 to 1408 of the digital ink 1300 are scaled to bounding boxes 1602 to 1608, respectively, for the structured digital ink 1500. These scaled bounding boxes are therefore used by the application 112 to set the cursor position through consideration geometrical features of the bounding boxes in one or more of the following ways.

[0094] In the case that the ranges of two consecutive characters do not overlap, several strategies can be applied by the present system and method in order to place the cursor:

- The cursor is positioned between those two characters at the center between the range borders. For example, FIG. 17A shows a centered (first) cursor 1700 positioned in the center between the bounding boxes 1604 and 1606 of the non-overlapping respective (first) characters 1304 and (second) characters 1306.
- The cursor is positioned between those two characters at the right range border of the left-side character. For example, FIG. 17B shows a left-aligned (second) cursor 1702 positioned on the right edge of the bounding box 1604 of the character 1304 between the non-overlapping characters 1304 and 1306.

- The cursor is position between those two characters at the left range border of the right-side character. For example, FIG. 17C shows a right-aligned (third) cursor 1704 positioned on the left edge of the bounding box 1606 of the character 1306 between the non-overlapping characters 1304 and 1306.

[0095] Whereas, in the case that the ranges of two consecutive characters do overlap, several strategies can be applied by the present system and method in order to place the cursor:

- The cursor is positioned between those two characters at the center of the area of overlap defined by the ranges of the overlapped characters. For example, FIG. 18A shows a centered (fourth) cursor 1800 positioned in the center of the overlapping area of the (first) characters 1302 and (second) characters 1304. As can be seen however, this setting may cause confusion for users as to which character the cursor 1800 is related.
- The cursor is positioned between those two characters in consideration of the other geometrical features of the ranges of the overlapped characters, such as the height, the width, or the area of the bounding boxes to be at the range border of the character with either the smallest or the highest value of these geometrical features which is in the overlapping area. For example, FIG. 18B shows a left-aligned (fifth) cursor 1802 positioned on the left edge of the bounding box 1606 of the character 1306 between the overlapping characters 1302 and 1304, where the character having the bounding box of smallest height is used as the cursor positioning criteria.

[0096] As with any document editing application, the cursor position can be set and reset by user interaction within the editing area, such as with a tap or a click, provided by the application 112, as discussed earlier. However, in the afore-described example of the present system and method in which the input or capture area and the rendering or editing area are overlapped, the receipt of a gesture may cause ambiguity between setting of the cursor position and the input of new content. The present system and method accounts for such ambiguity to identify a 'set cursor position' action by evaluating certain criteria with respect to received user interaction. For example, when:

- the input is constituted by a unique stroke, until the end of the writing session; and
- the new input is a single-point gesture, such as a tap or other unique sampling point, defining a user interaction point; and

- content, such as a character or word, is present in the rendering area at the user interaction point, then:

the user interaction is considered as a request to set the cursor position.

[0097] The present system and method properly beautifies 'freely' (unstructured) input digital ink through scaling or minimizing and aligning the digital ink on alignment elements of an editing area by taking into account the descending part of the handwriting, e.g., the distance between the base-line and the mid-line of the handwriting as determined by the recognition process for recognizing the handwriting input. Further, the present system and method considers character segmentation determined by the recognition process for recognizing the handwriting input to allow management of an editing cursor position for the beautified digital ink so that editing operations can be performed on a character basis, and not only on a word, sentence, line or block basis, for example.

[0098] While the foregoing has described what is considered to be the best mode and/or other examples, it is understood that various modifications may be made therein and that the subject matter disclosed herein may be implemented in various forms and examples, and that they may be applied in numerous other applications, combinations, and environments, only some of which have been described herein. Those of ordinary skill in that art will recognize that the disclosed aspects may be altered or amended without departing from the true spirit and scope of the subject matter. Therefore, the subject matter is not limited to the specific details, exhibits, and illustrated examples in this description. It is intended to protect any and all modifications and variations that fall within the true scope of the advantageous concepts disclosed herein.

CLAIMS

We claim:

1. A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. A system according to any one of the preceding claims, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. A system according to any one of the preceding claims, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. A system according to any one of the preceding claims, wherein the alignment structure is a line pattern.

7. A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. A method according to any one of claims 7 to 9, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. A method according to any one of claims 7 to 10, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. A method according to any one of claims 7 to 11, wherein the alignment structure is a line pattern.

13. A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. A non-transitory computer readable medium according to any one of claims 13 to 15, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. A non-transitory computer readable medium according to any one of claims 13 to 16, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. A non-transitory computer readable medium according to any one of claims 13 to 17, wherein the alignment structure is a line pattern.

19. A system for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges.

20. A system according to claim 19, wherein the elements of the digital ink include text characters, the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

21. A system according to claim 20, wherein the determined ranges of the first and second characters overlap, the at least one non-transitory computer readable medium configured to:

compare geometrical features of the determined ranges of the first and second characters; and

cause said display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

22. A system according to claim 21, wherein the geometrical features include height and width of the determined ranges.

23. A method for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

24. A method according to claim 23, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

25. A method according to claim 24, wherein the determined ranges of the first and second characters overlap, the method comprising comparing geometrical features of the determined ranges of the first and second characters, the input cursor being displayed on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

26. A method according to claim 25, wherein the geometrical features include height and width of the determined ranges.

27. A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for providing editing of digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

28. A non-transitory computer readable medium according to claim 27, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

29. A non-transitory computer readable medium according to claim 28, wherein the determined ranges of the first and second characters overlap, the method comprising comparing geometrical features of the determined ranges of the first and second characters, the input cursor being displayed on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

30. A non-transitory computer readable medium according to claim 29, wherein the geometrical features include height and width of the determined ranges.

CLAIMS

We claim:

1. A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. A system according to any one of the preceding claims, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. A system according to any one of the preceding claims, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. A system according to any one of the preceding claims, wherein the alignment structure is a line pattern.

7. A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. A method according to any one of claims 7 to 9, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. A method according to any one of claims 7 to 10, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. A method according to any one of claims 7 to 11, wherein the alignment structure is a line pattern.

13. A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. A non-transitory computer readable medium according to any one of claims 13 to 15, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. A non-transitory computer readable medium according to any one of claims 13 to 16, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. A non-transitory computer readable medium according to any one of claims 13 to 17, wherein the alignment structure is a line pattern.

19. A system for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges.

20. A system according to claim 19, wherein the elements of the digital ink include text characters, the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

21. A system according to claim 20, wherein the determined ranges of the first and second characters overlap, the at least one non-transitory computer readable medium configured to:

compare geometrical features of the determined ranges of the first and second characters; and

cause said display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

22. A system according to claim 21, wherein the geometrical features include height and width of the determined ranges.

23. A method for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

24. A method according to claim 23, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

25. A method according to claim 24, wherein the determined ranges of the first and second characters overlap, the method comprising comparing geometrical features of the determined ranges of the first and second characters, the input cursor being displayed on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

26. A method according to claim 25, wherein the geometrical features include height and width of the determined ranges.

27. A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for providing editing of digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

28. A non-transitory computer readable medium according to claim 27, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

29. A non-transitory computer readable medium according to claim 28, wherein the determined ranges of the first and second characters overlap, the method comprising comparing geometrical features of the determined ranges of the first and second characters, the input cursor being displayed on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

30. A non-transitory computer readable medium according to claim 29, wherein the geometrical features include height and width of the determined ranges.

ABSTRACT

A system, method and computer program product for use in beautifying digital ink of handwriting input to a computing device are provided. The computing device is connected to an input device in the form of an input surface. A user is able to provide input by applying pressure to or gesturing above the input surface using either his or her finger or an instrument such as a stylus or pen. The present system and method monitors the input strokes. The computing device further has a processor and at least one application for recognizing the handwriting input under control of the processor. The at least one system application is configured to cause display of the digital ink, determine from geometrical information of the handwriting input determined through the recognition of the handwriting input and geometrical information of an alignment structure of the display interface, a structuring transformation of the digital ink, and cause display of transformed digital ink in accordance with the structuring transformation.

ABSTRACT

A system, method and computer program product for use in beautifying digital ink of handwriting input to a computing device are provided. The computing device is connected to an input device in the form of an input surface. A user is able to provide input by applying pressure to or gesturing above the input surface using either his or her finger or an instrument such as a stylus or pen. The present system and method monitors the input strokes. The computing device further has a processor and at least one application for recognizing the handwriting input under control of the processor. The at least one system application is configured to cause display of the digital ink, determine from geometrical information of the handwriting input determined through the recognition of the handwriting input and geometrical information of an alignment structure of the display interface, a structuring transformation of the digital ink, and cause display of transformed digital ink in accordance with the structuring transformation.

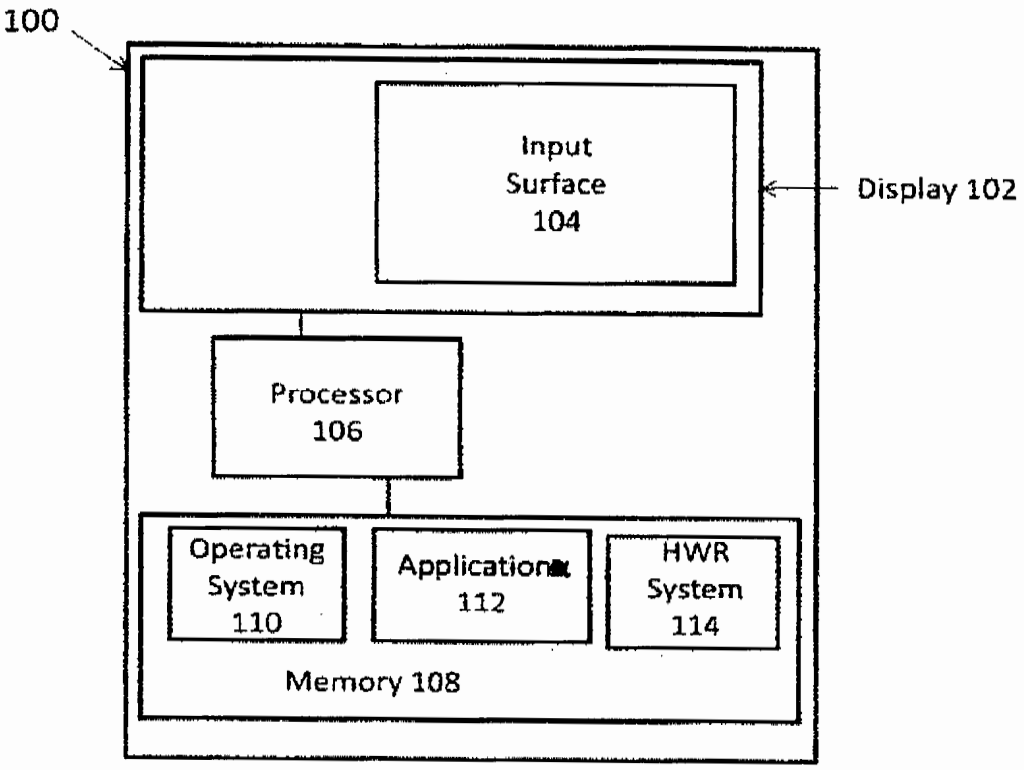

100
Input Surface 104
Display 102
Processor 106
Operating System 110
Applications 112
HWR System 114
Memory 108

FIG. 1

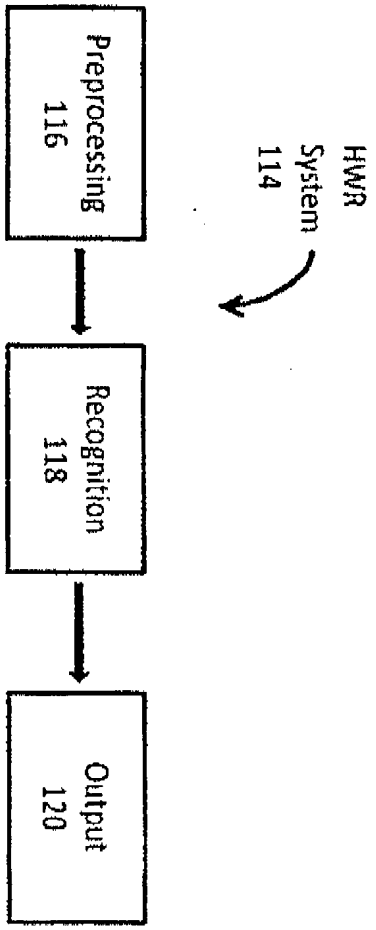

Preprocessing
116
HWR
System
114
Recognition
118
Output
120

FIG. 2

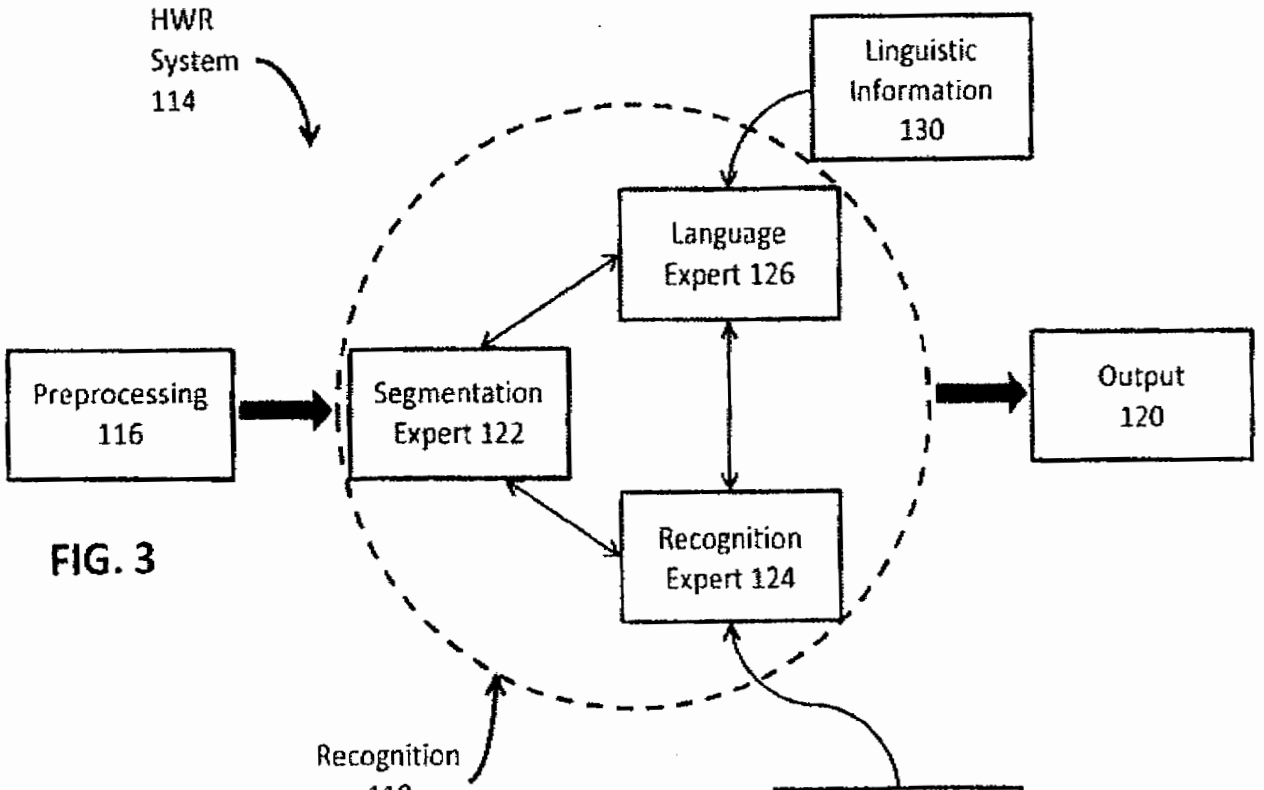


FIG. 3

10 08/12/2015 16:48:39.#13541 P.048/057

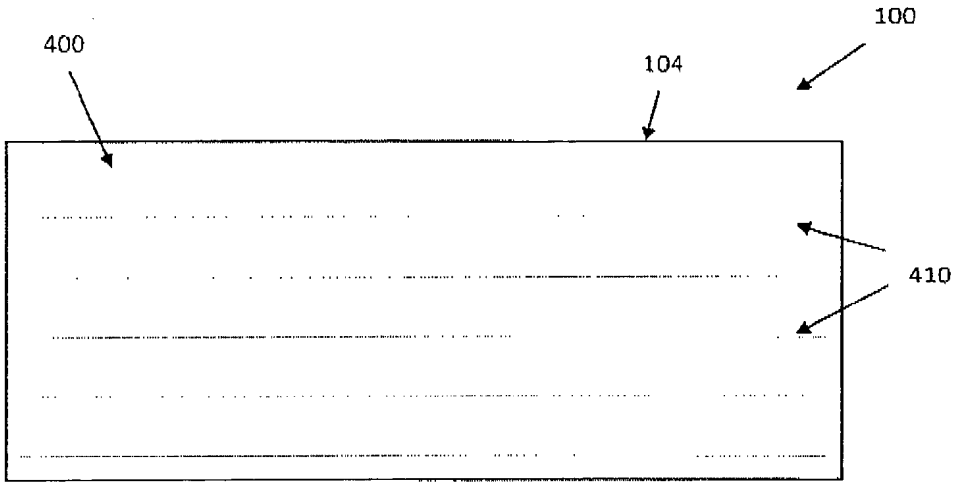

400
104
100
410

FIG. 4

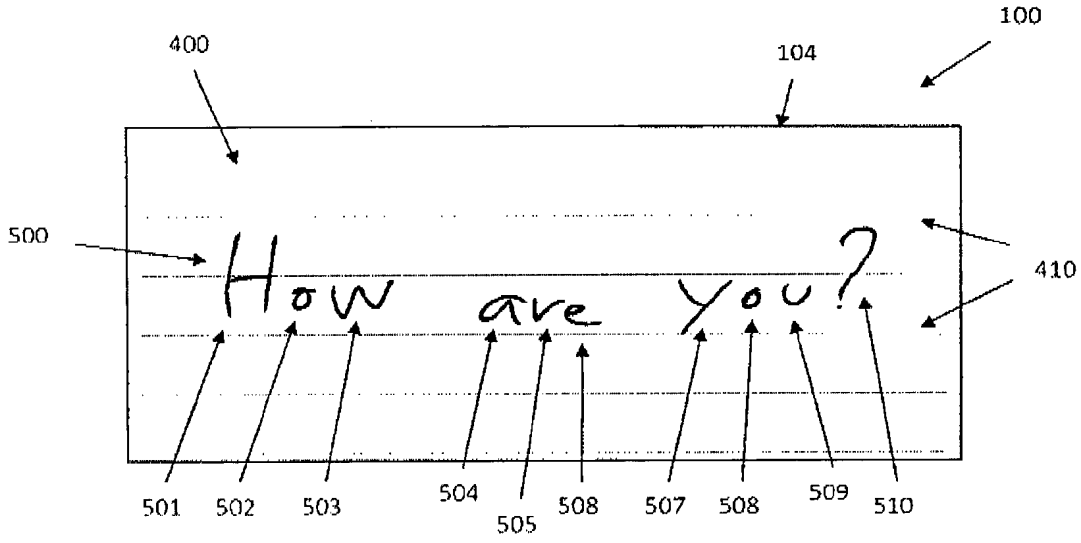

400
104
100
500
How are you?
410
501
502
503
504
505
508
507
508
509
510

FIG. 5

FROM:Müller - Bore +49894905710 08/12/2015 16:49:04 #13541 P.050/057

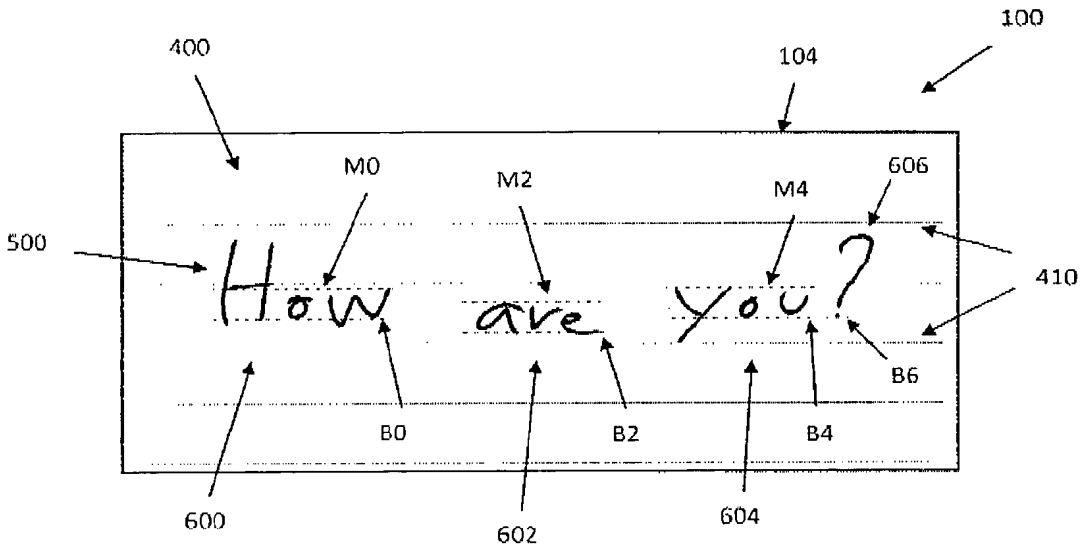


FIG. 6

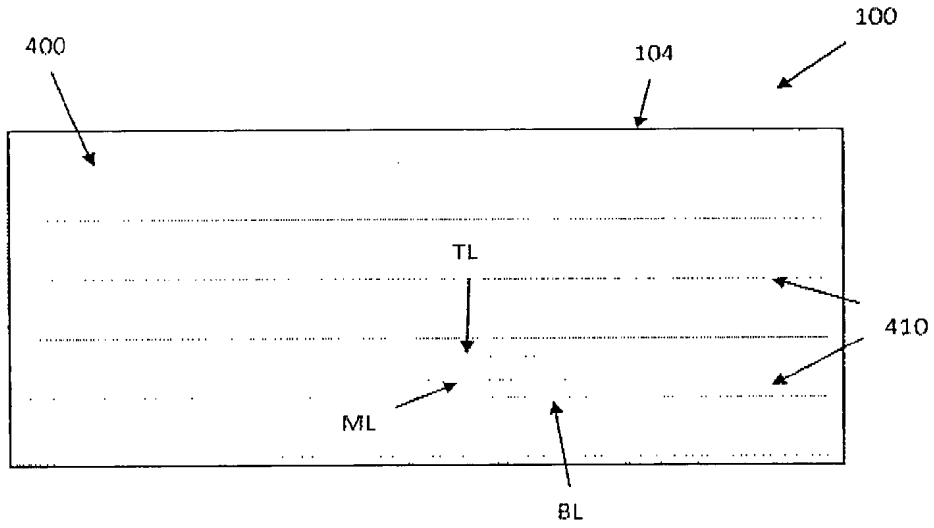


FIG. 7

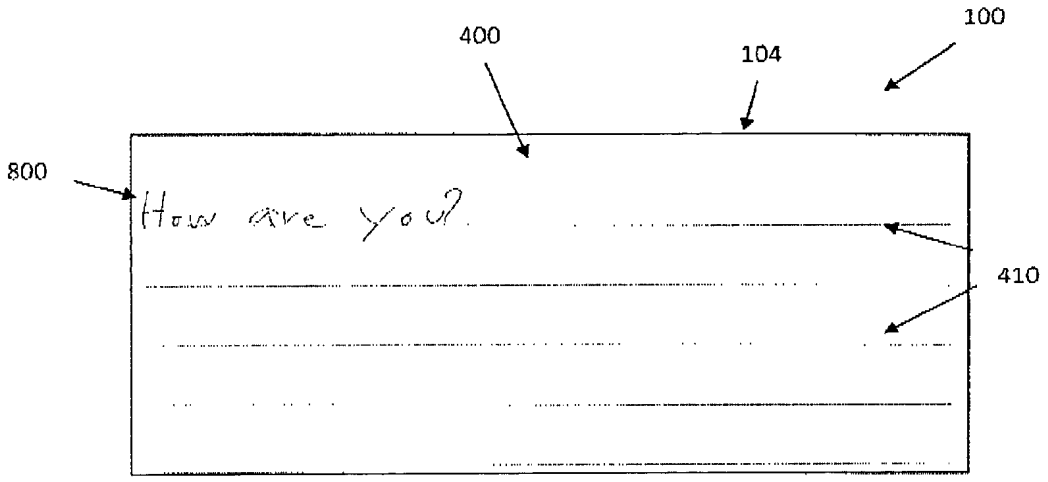

400
104
100
800
How are you?
410

FIG. 8

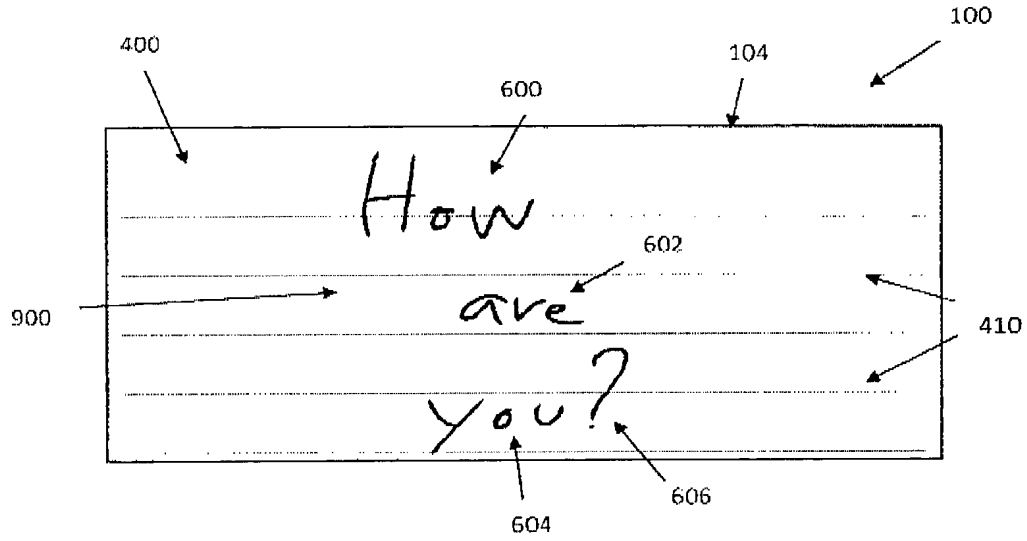

400
600
104
100
How
602
900
are
410
you?
604
606

FIG. 9

FROM:Müller - Bore +49894905710 08/12/2015 16:49:29 #13541 P.052/057

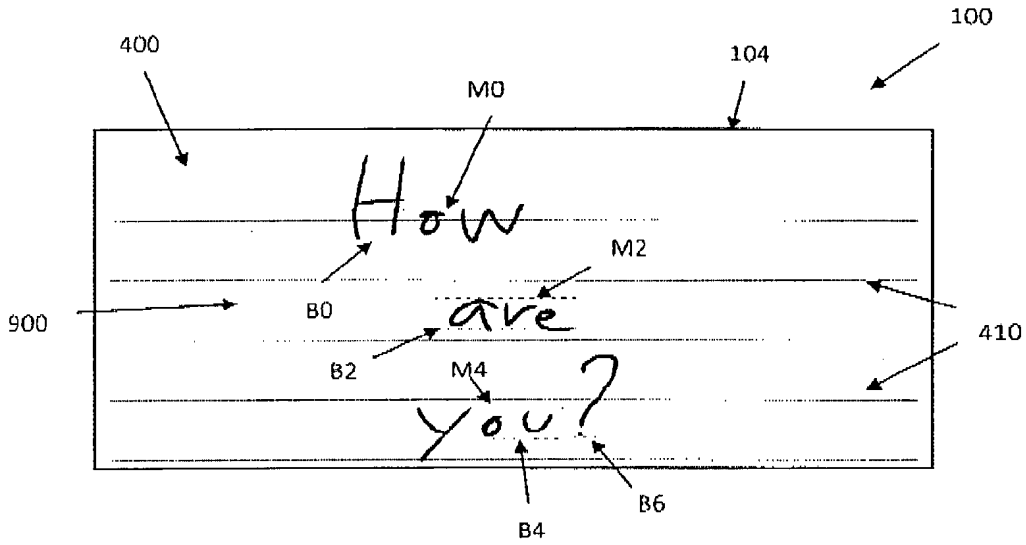


FIG. 10

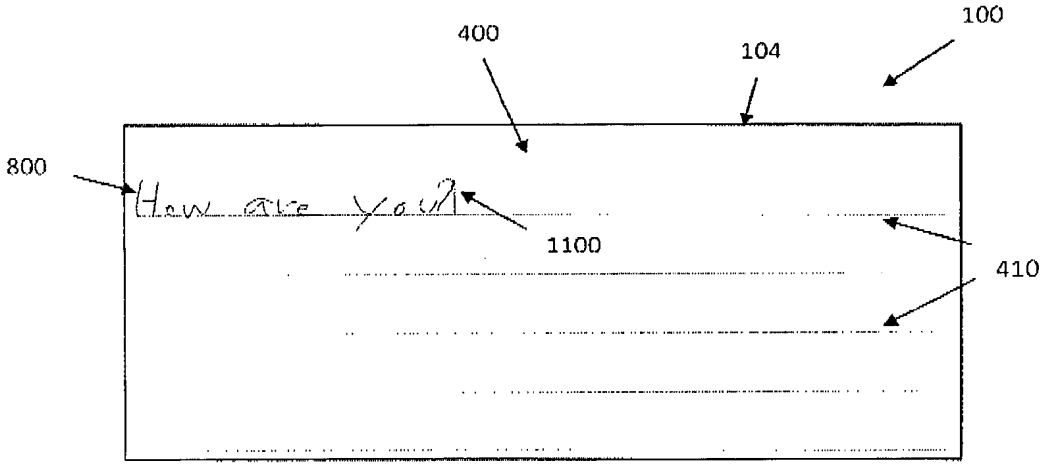


FIG. 11

FROM:Müller - Bore +49894905710 08/12/2015 16:49:41 #13541 P.053/057

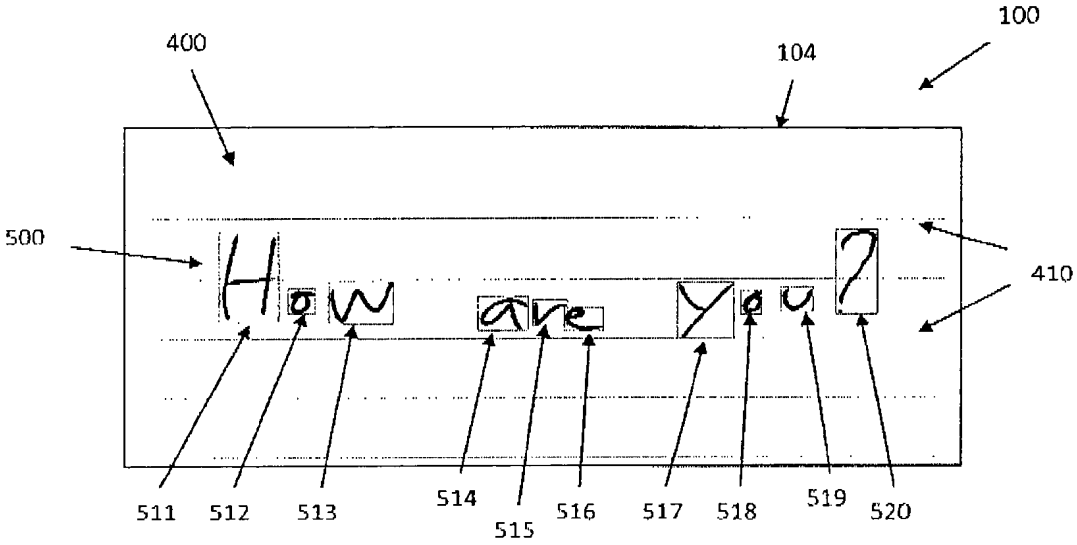


FIG. 12

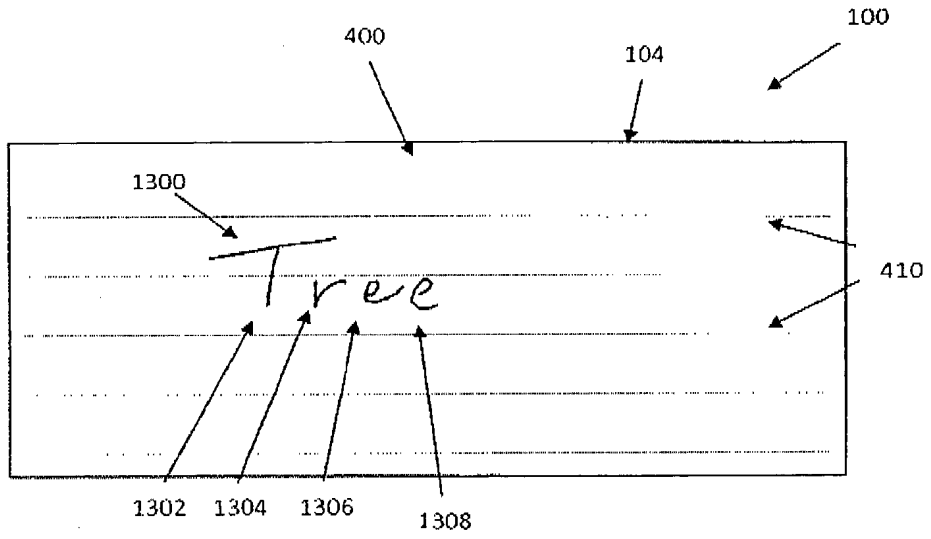


FIG. 13

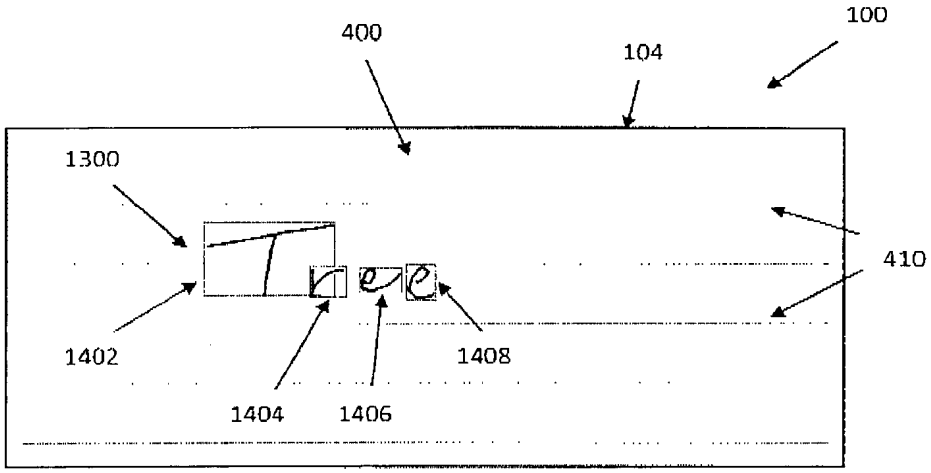

400
104
100
1300
410
1402
1404
1406
1408

FIG. 14

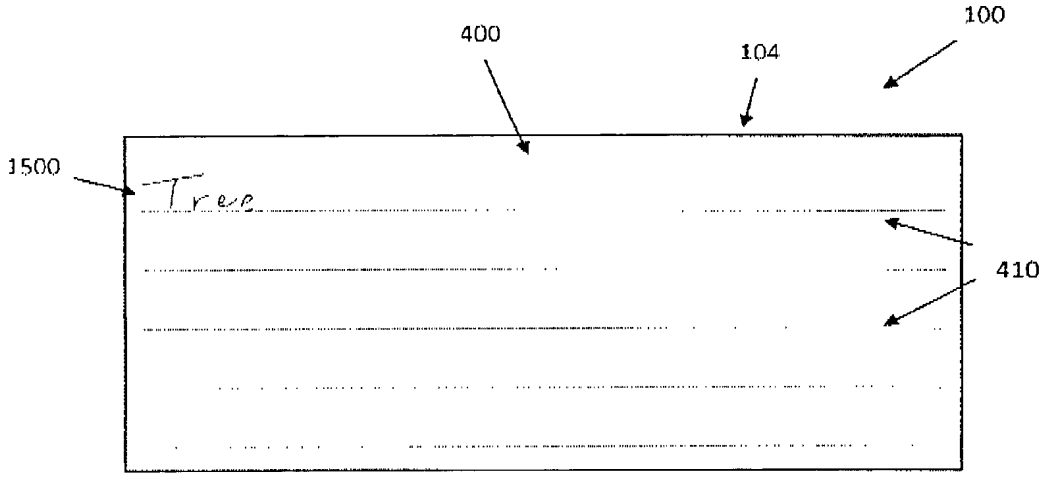

400
104
100
1500
Tree
410

FIG. 15

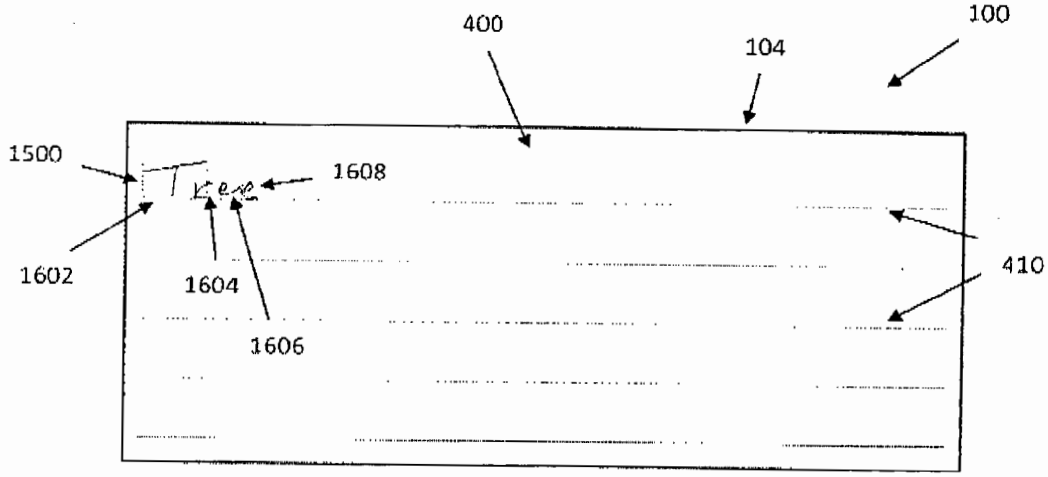


FIG. 16

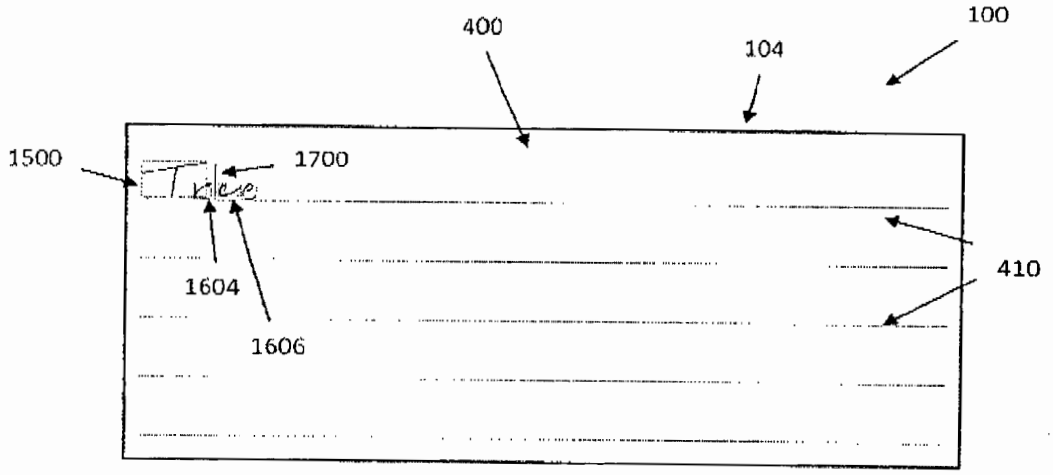


FIG. 17A

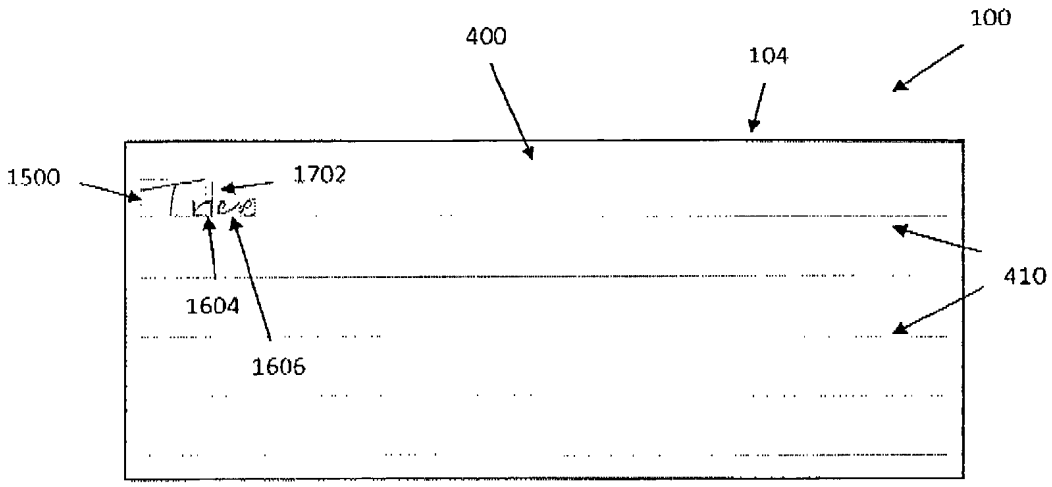


FIG. 17B

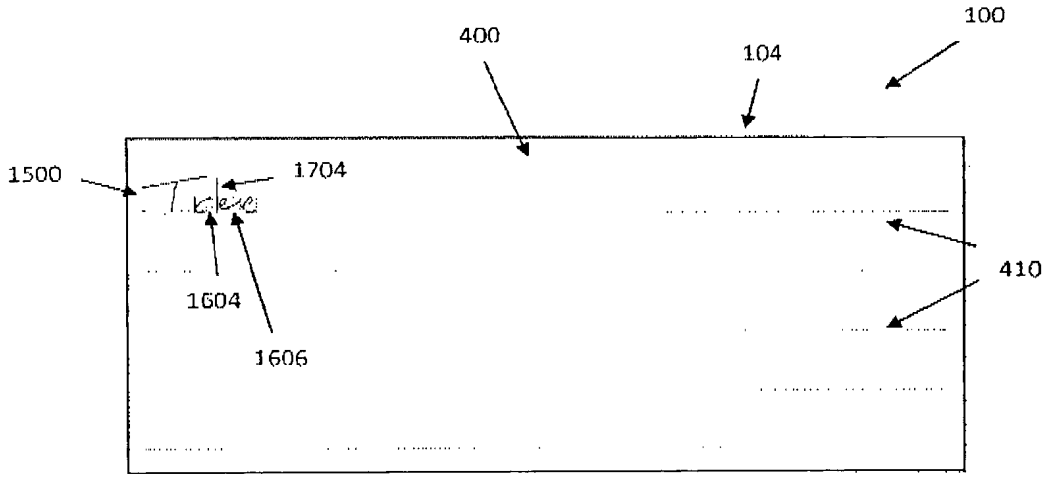


FIG. 17C

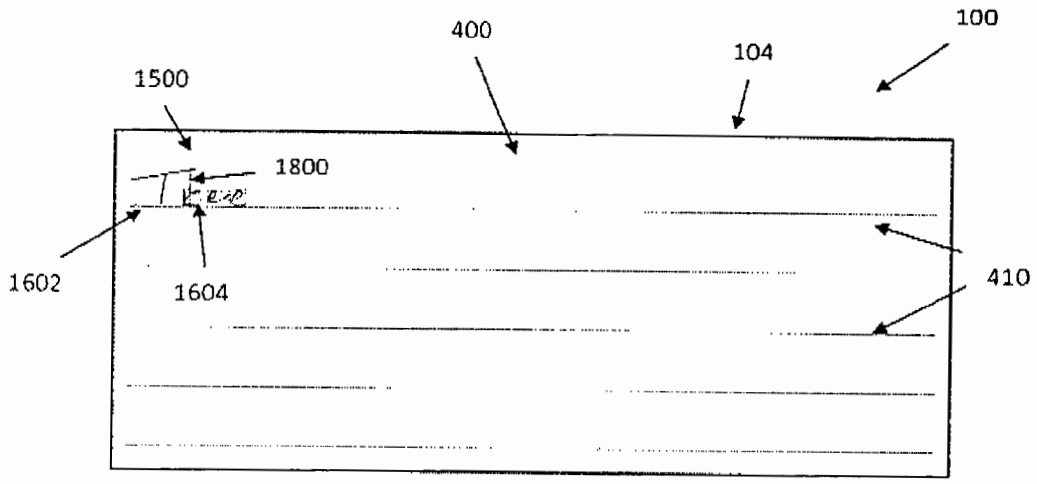


FIG. 18A

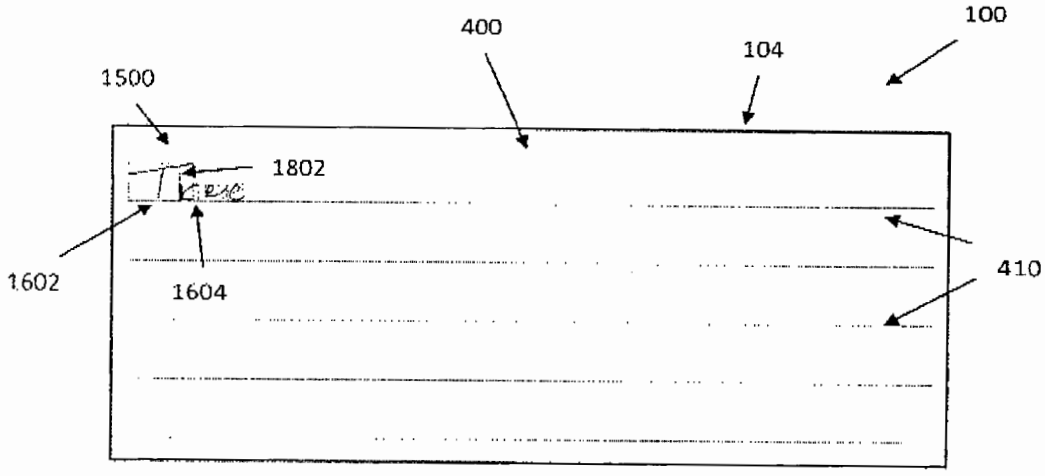


FIG. 18B

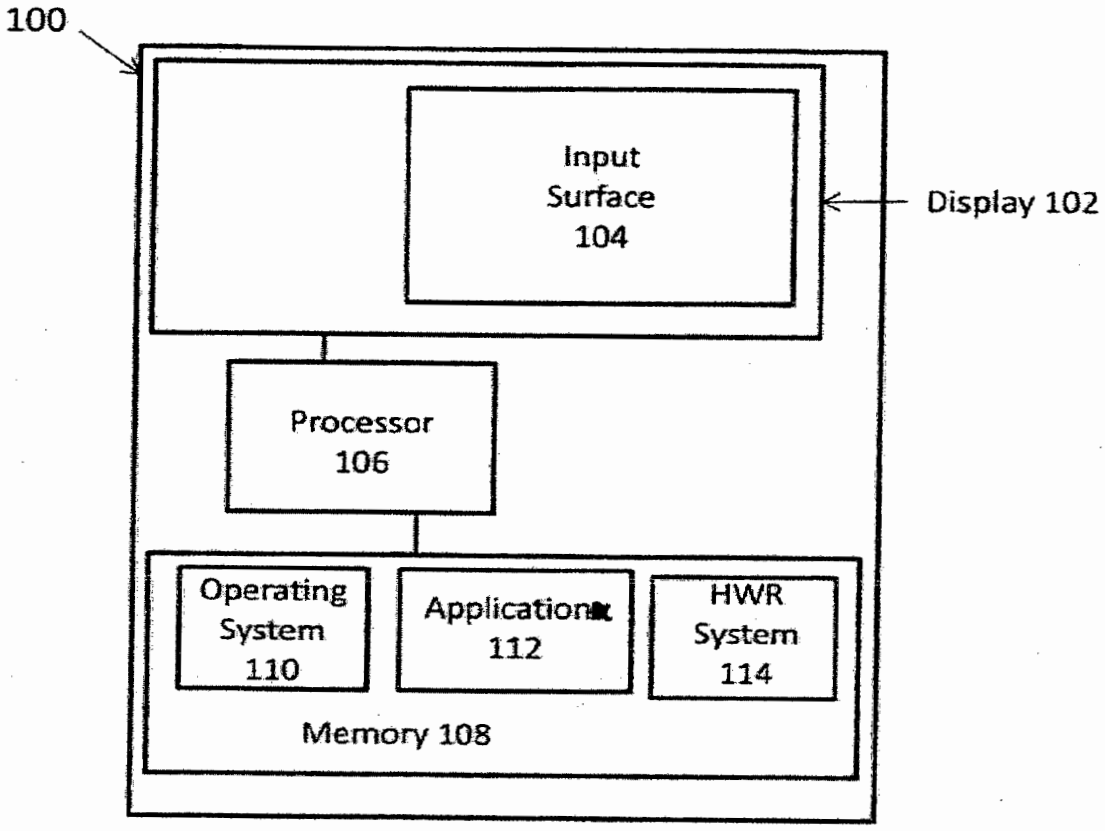

100
Input
Surface
104
Display 102
Processor
106
Operating
System
110
Applications
112
HWR
System
114
Memory 108

FIG. 1

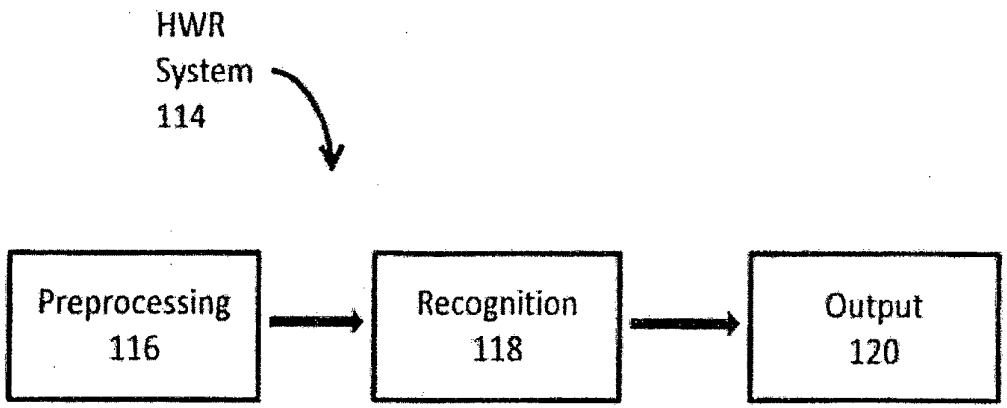

HWR
System
114
Preprocessing
116
Recognition
118
Output
120

FIG. 2

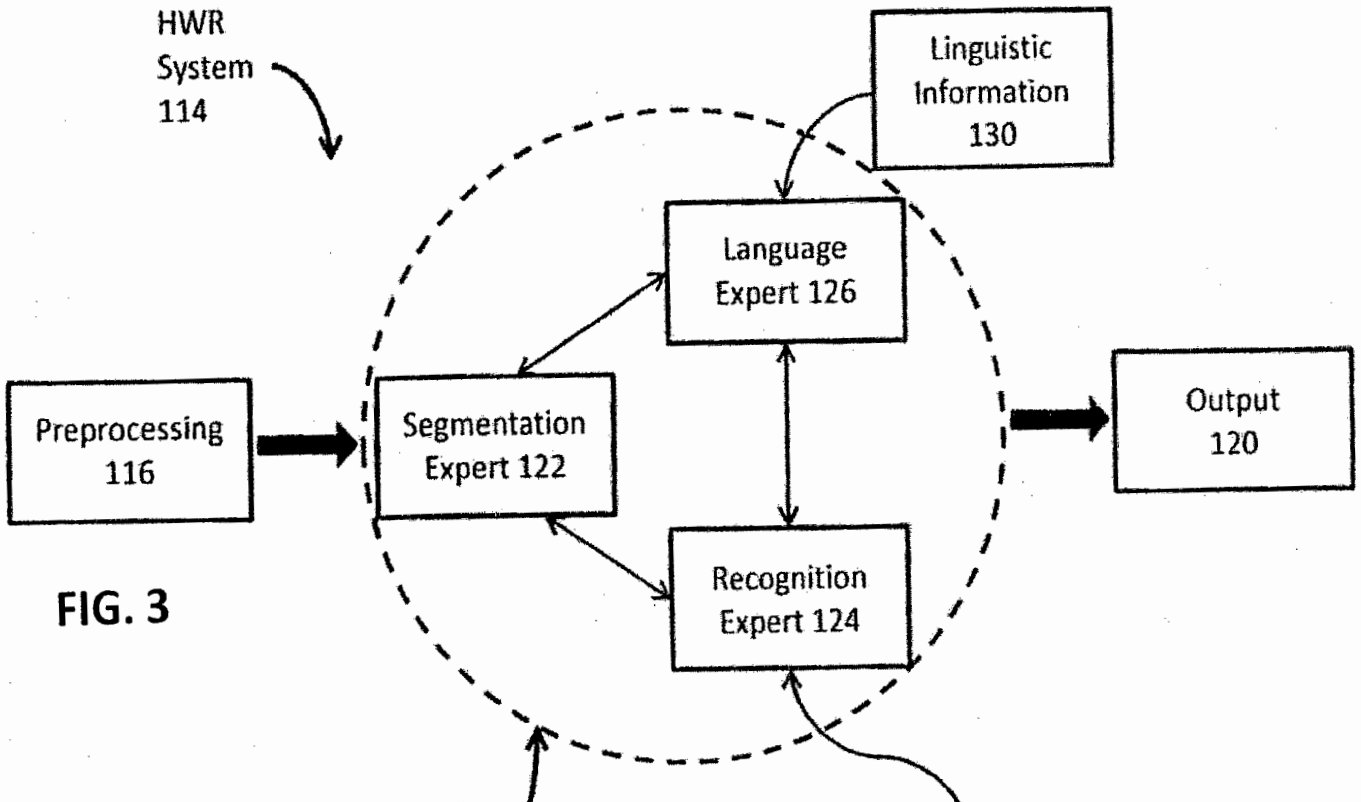

HWR
System
114
Linguistic
Information
130
Language
Expert 126
Preprocessing
116
Segmentation
Expert 122
Output
120
Recognition
Expert 124

FIG. 3

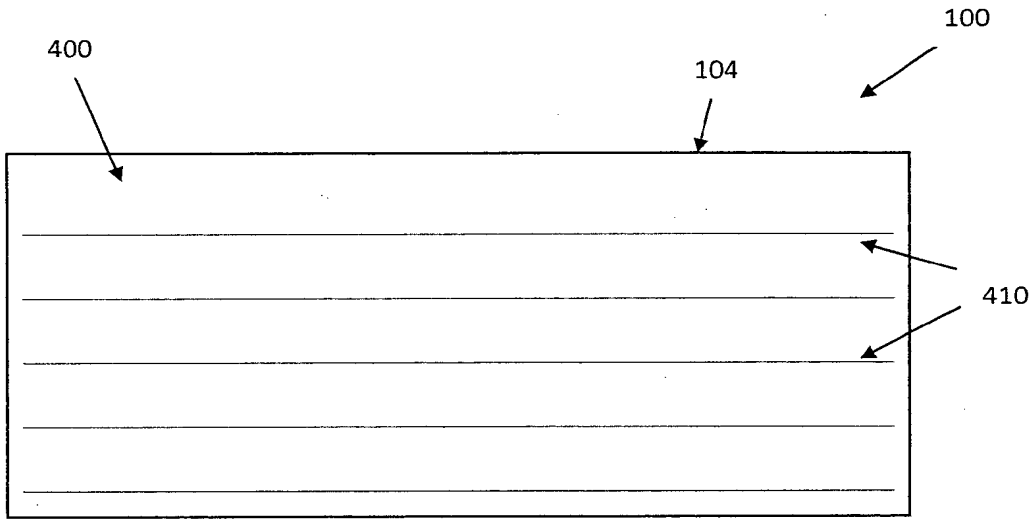

400
104
100
410

FIG. 4

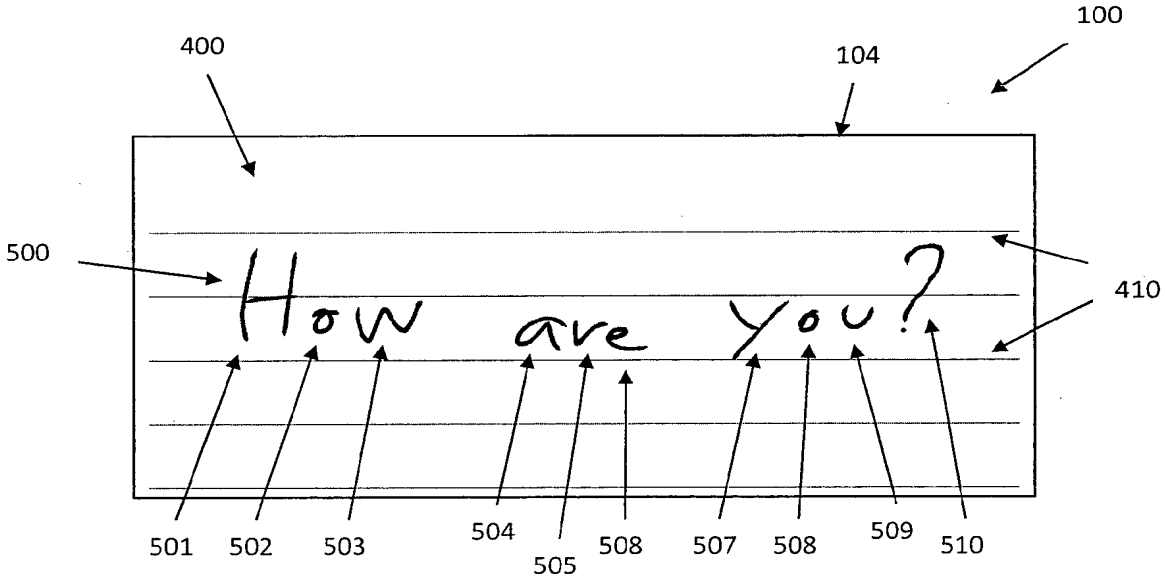

400
104
100
500
How are you?
410
501
502
503
504
505
508
507
508
509
510

FIG. 5

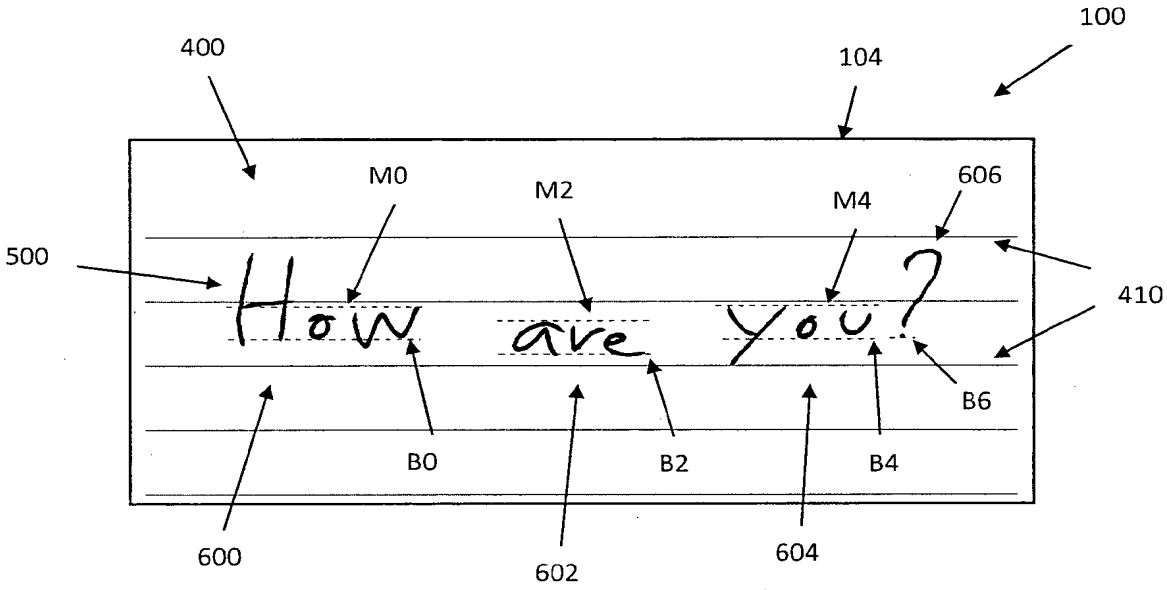

100
400
104
M0
M2
606
M4
500
How are you?
410
B6
B0
B2
B4
600
602
604

FIG. 6

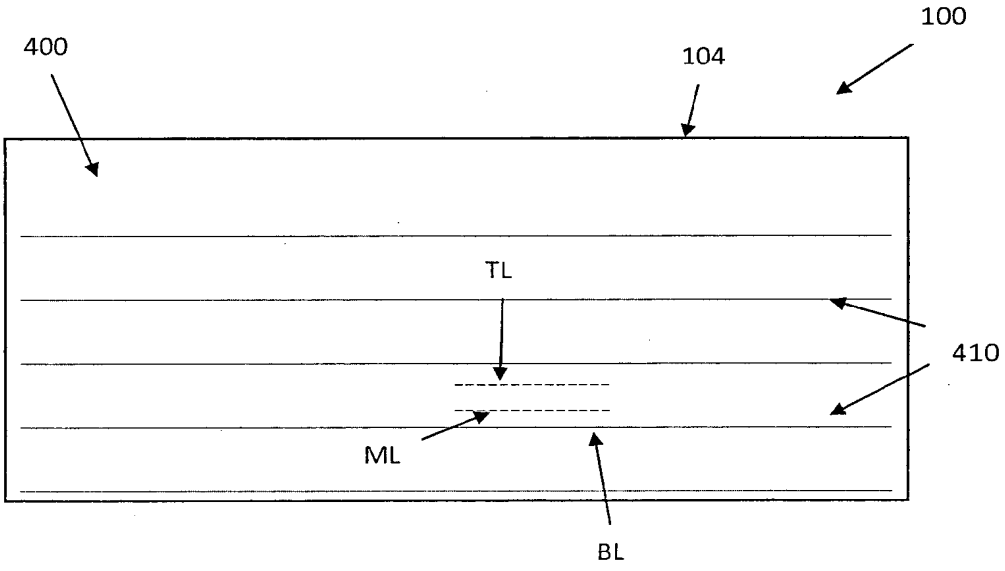

100
400
104
TL
410
ML
BL

FIG. 7

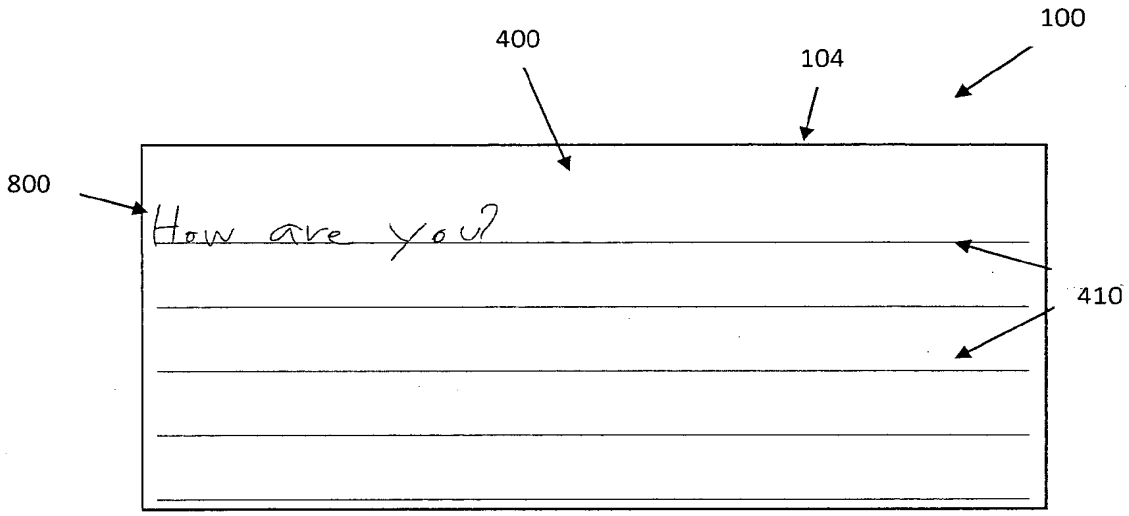

100
400
104
800
How are you?
410

FIG. 8

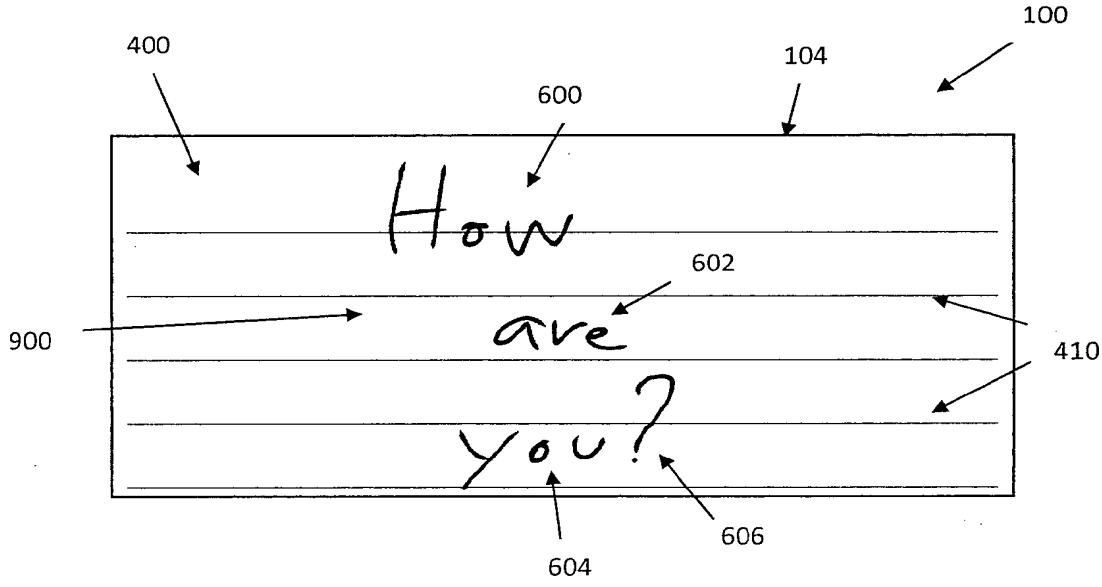

100
400
104
600
How
602
900
are
410
you?
606
604

FIG. 9

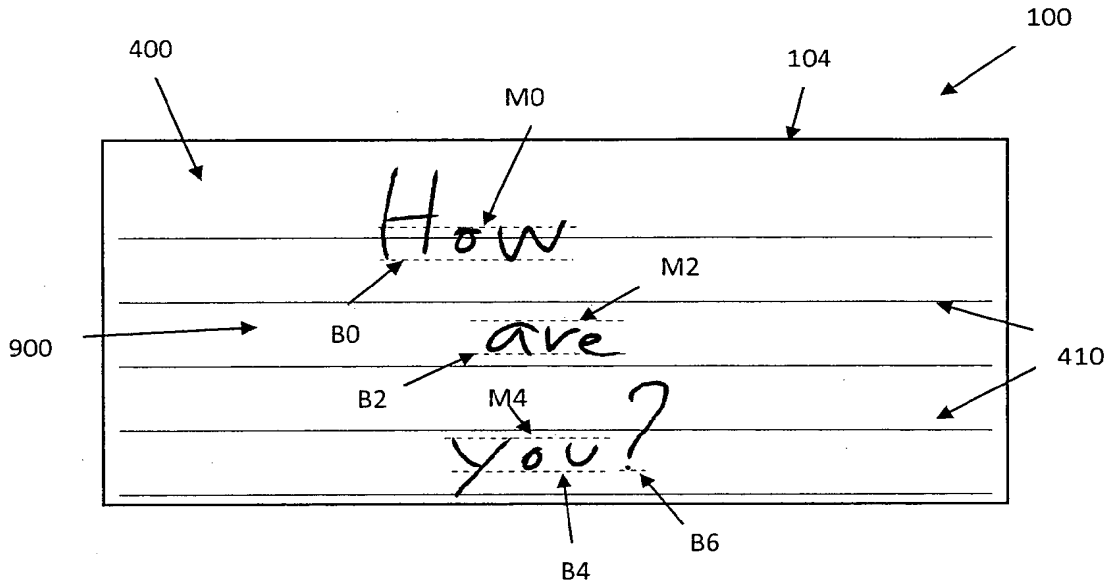

100
400
104
M0
How
M2
B0
are
900
410
B2
M4
you?
B6
B4

FIG. 10

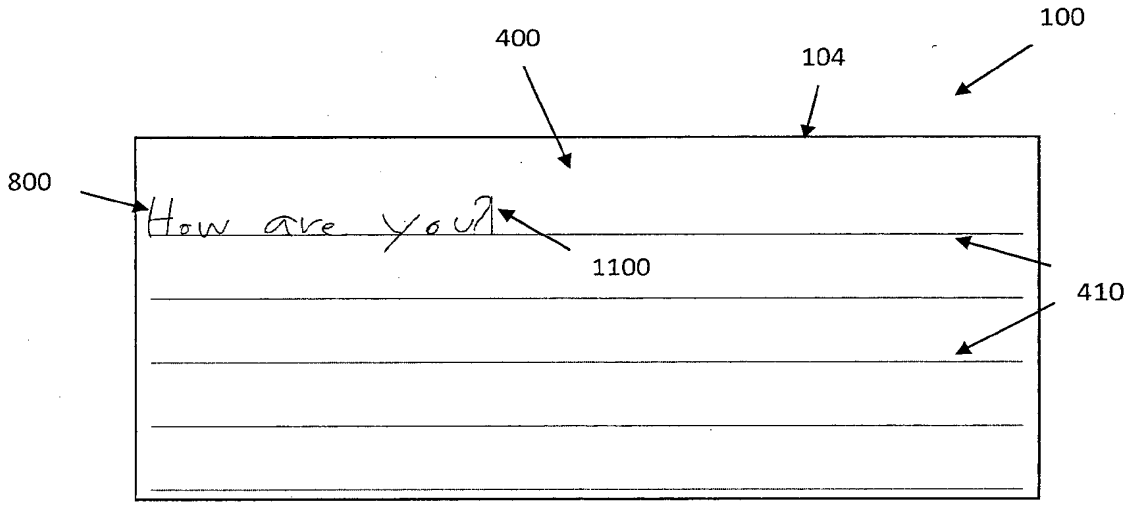

100
400
104
800
How are you?
1100
410

FIG. 11

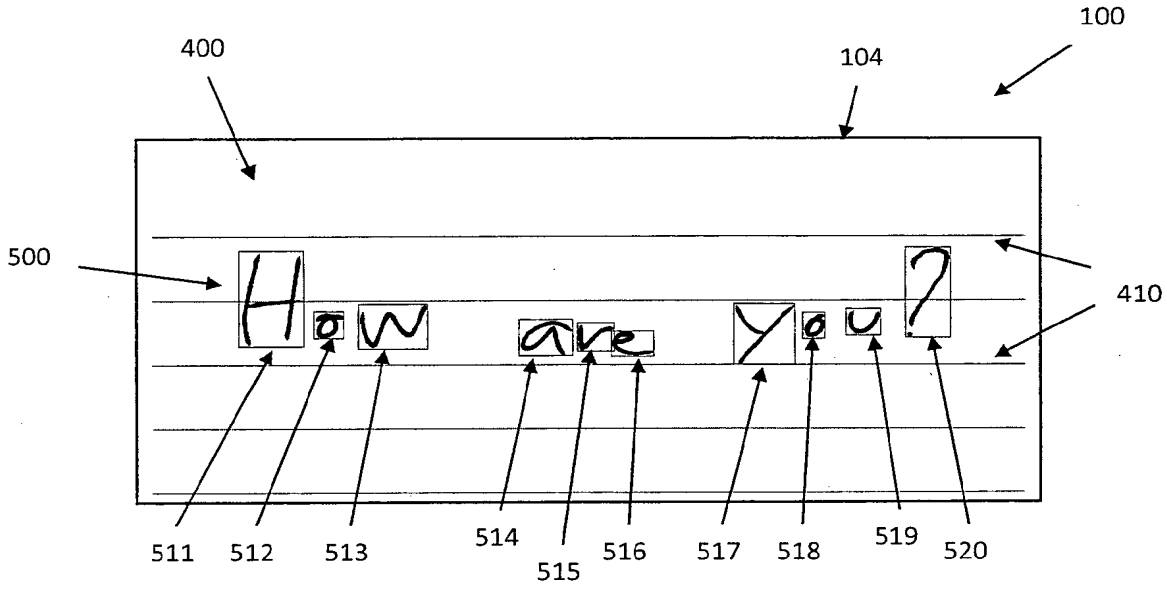

100
400
104
500
How are you ?
410
511
512
513
514
515
516
517
518
519
520

FIG. 12

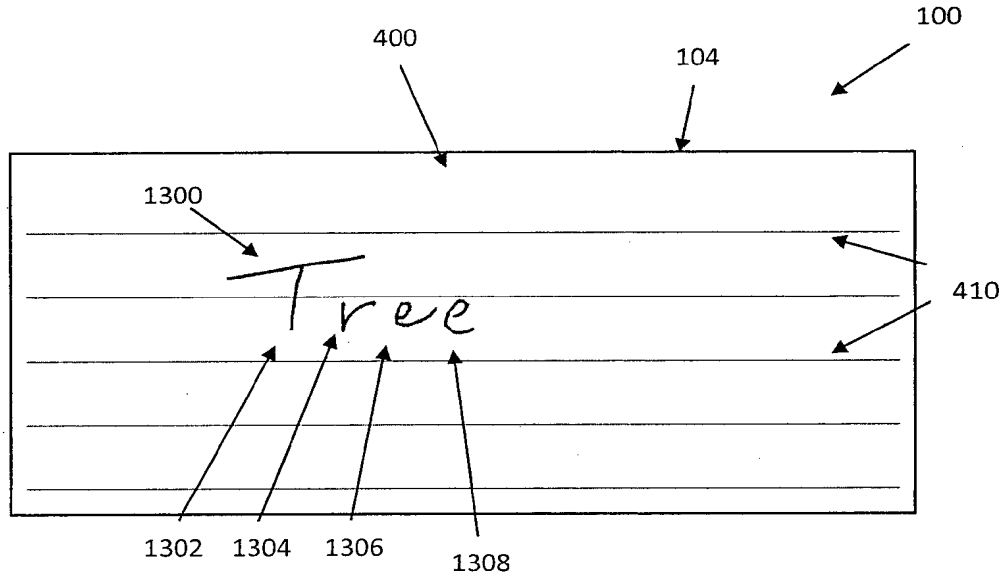

100
400
104
1300
Tree
410
1302
1304
1306
1308

FIG. 13

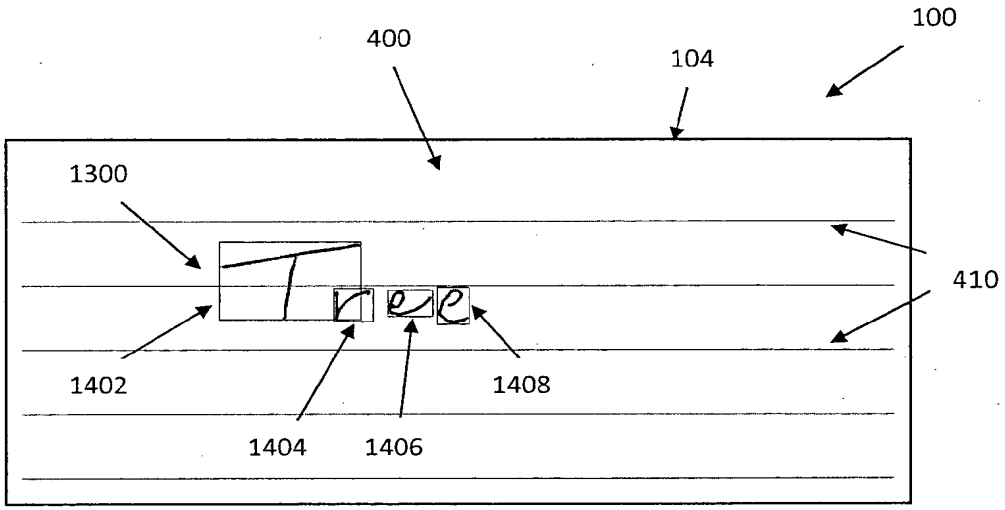

100
400
104
1300
410
1402
1404
1406
1408

FIG. 14

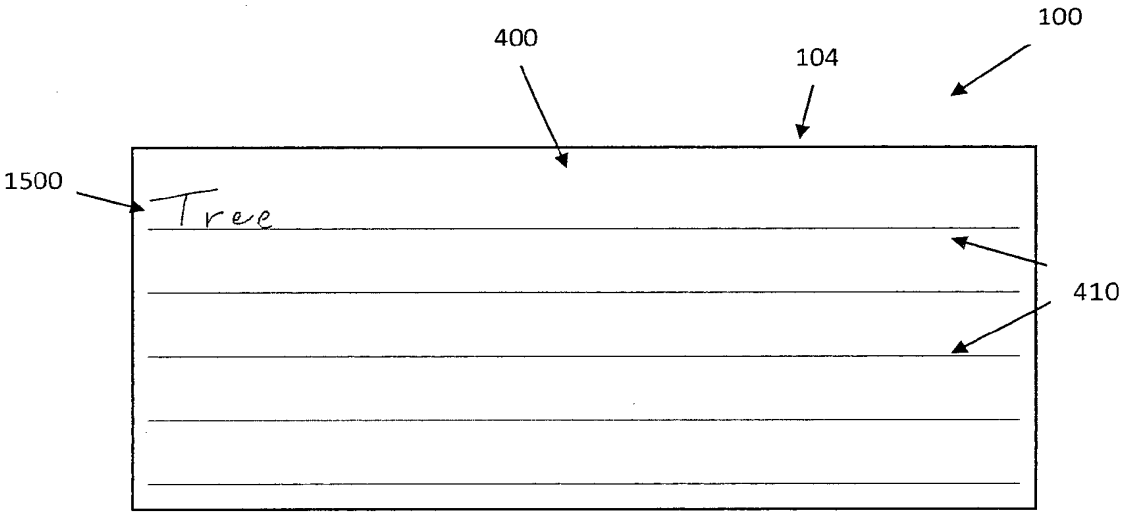

100
400
104
1500
Tree
410

FIG. 15

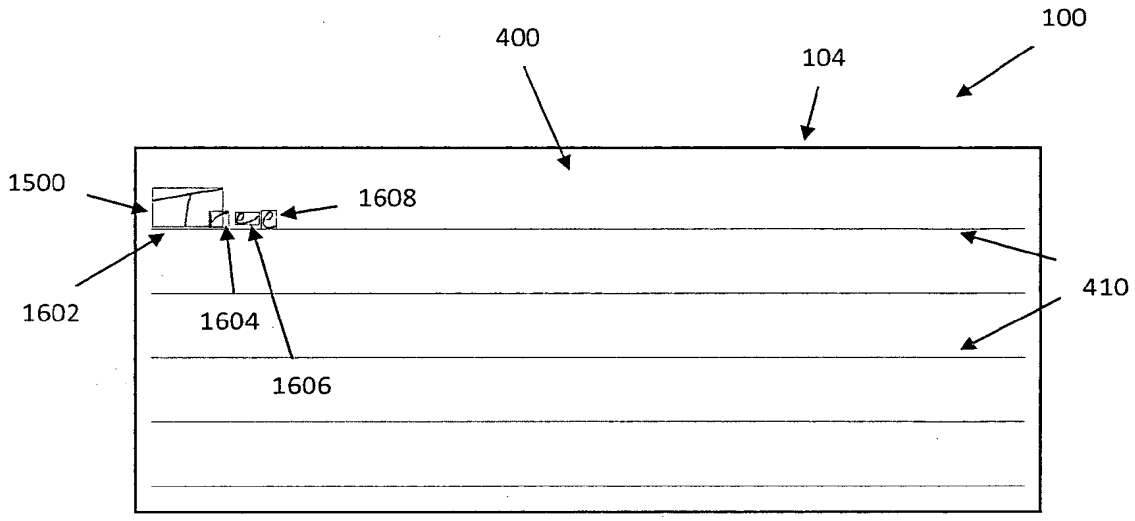


FIG. 16

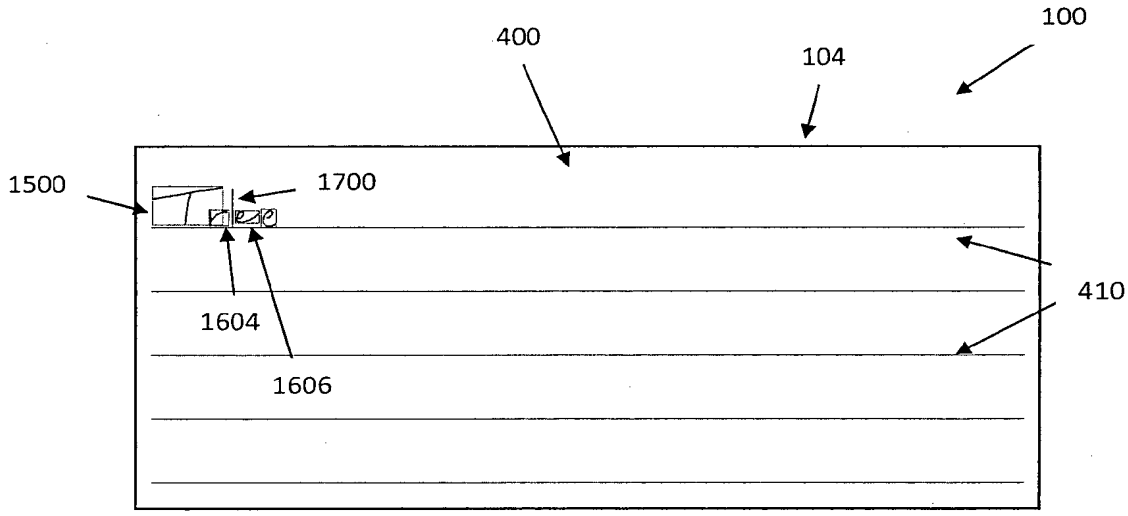


FIG. 17A

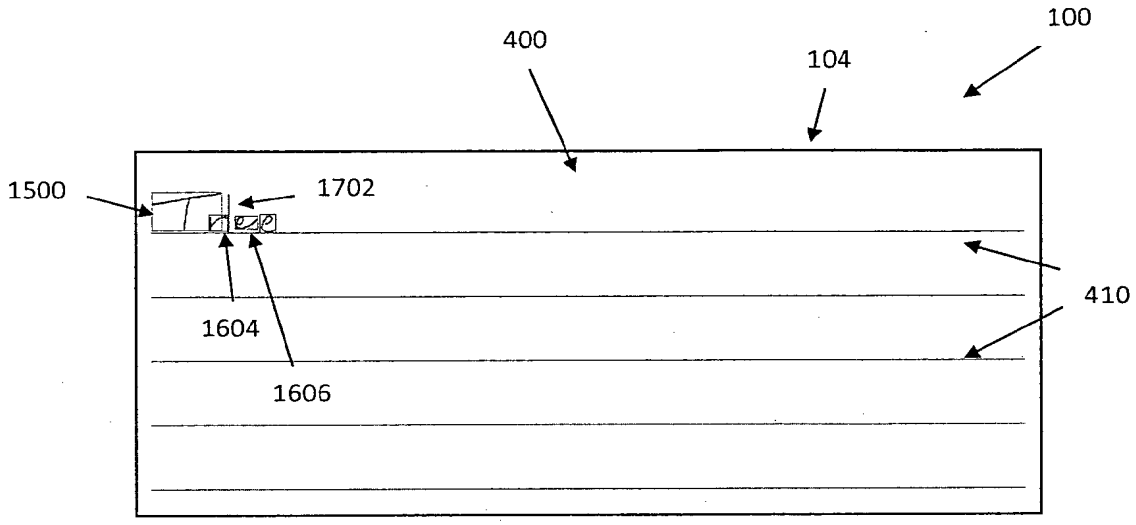


FIG. 17B

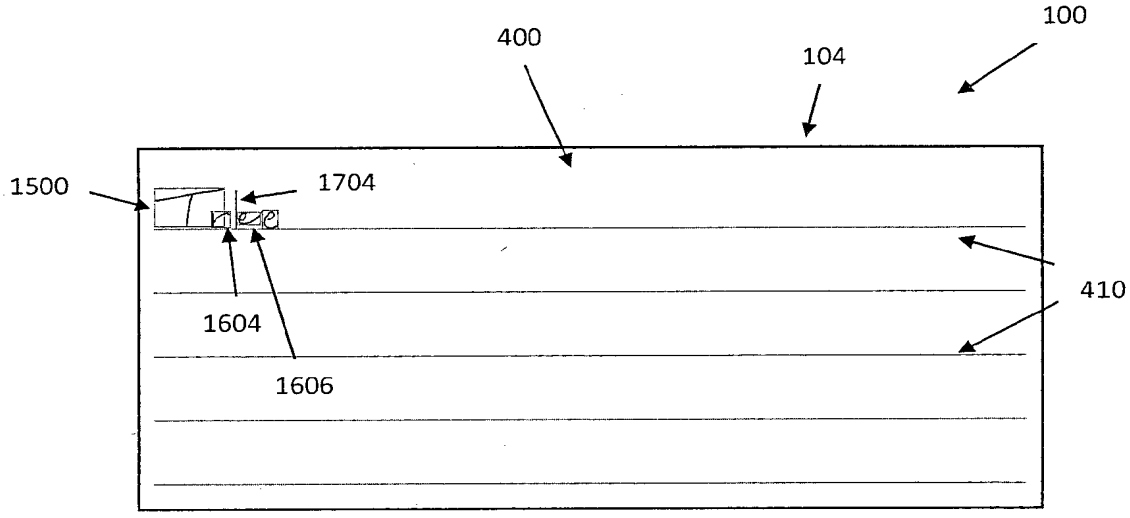


FIG. 17C

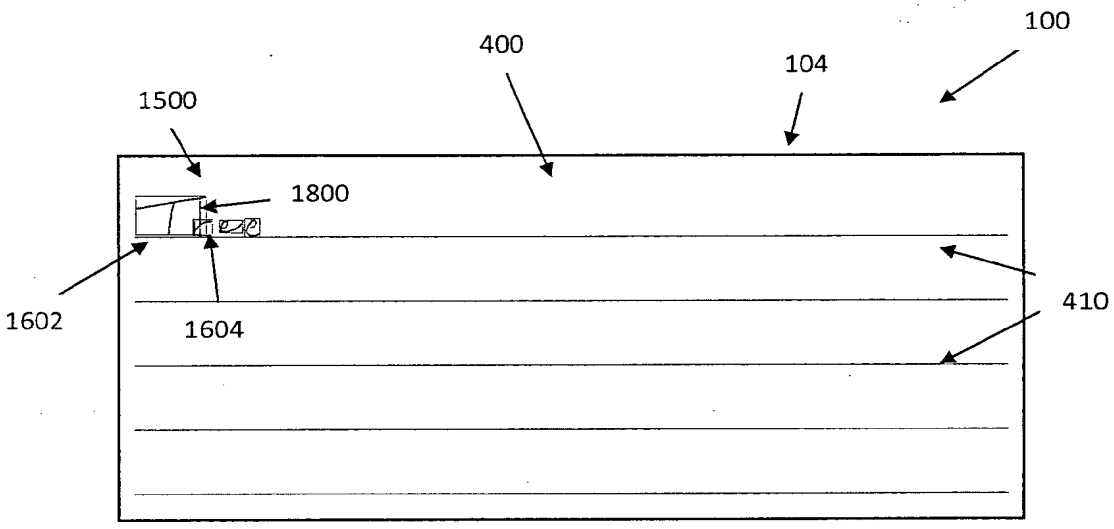


FIG. 18A

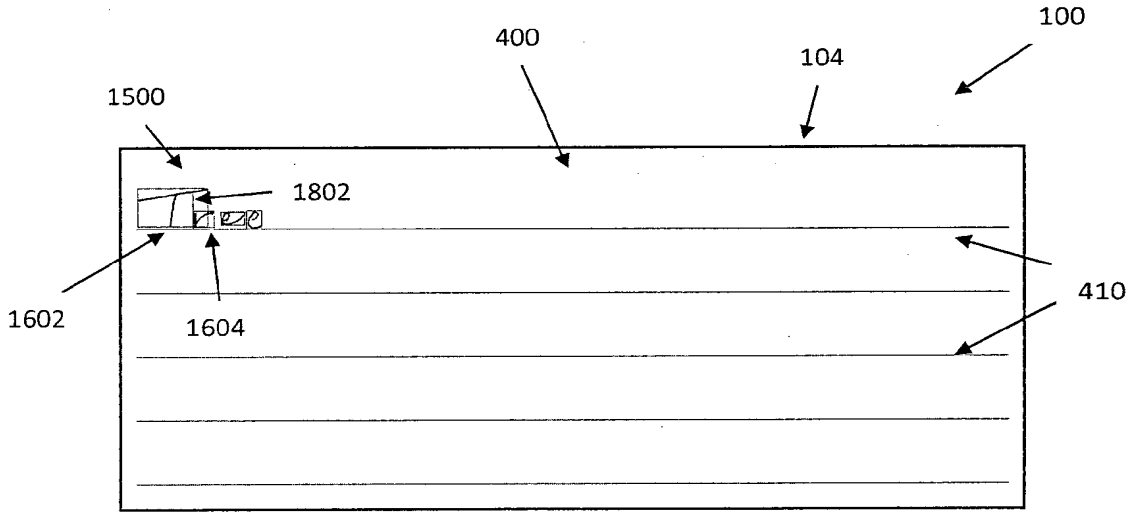


FIG. 18B

Attorney Docket No.: 094060-0034 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Edgard Baudry et al.	:	Customer Number: 1923
Application No.: 14/978,081	:	Confirmation Number: 6051
Filed: December 22, 2015	:	Group Art Unit: 2668
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	Examiner: To be assigned

PRELIMINARY AMENDMENT

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

Sir:

Prior to examination of the above-referenced application, please amend the application as follows:

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

Amendments to the Specification

Please amend following paragraphs [0086] and [0090] as follows.

[0086] With respect to the input and rendering areas or zones of the application 112, it is noted that these areas may be coextensive, as in the example of FIG. 8, such that once input has been received and displayed/rendered as the original digital ink (e.g., the digital ink 500) after a set amount of time, as measured by a clock of the computing device 100 in conjunction with the memory 108 for example, the input area is cleared of the original digital ink and the structured digital ink (e.g., the digital ink 800) is displayed/rendered on the rendering area. Alternatively, the input and rendering areas may be separated into different zones of the interface 104 or on separate displays or display devices, such that display of the original digital ink may persist and be scrolled, for example, to allow further input, or be omitted after a certain time period or receipt of new input. For example, superimposed input in which characters or words or parts of words are input over the top of one another with fading or other omission of previously entered input may be possible in either case of separated or overlapped display, such as described in United States Patent Publication No. 2015/0286886 filed in the name of the present Applicant and Assignee and United States Patent ~~Application~~ Publication No. ~~14/796,092 titled "System and Method for Superimposed Handwriting Recognition Technology"~~ 2015/0356360 filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein.

[0090] It is understood that beyond guiding handwritten interaction with the beautified content, the cursor also provides positioning of other forms of input, such as typing via keyboard or text input by voice recognition. As can be seen, the cursor 1100 is displayed with sizing and alignment similar to the structured digital ink. The cursor may be displayed by the application 112, and editing functions performed, in response to user interaction with the digital ink within the rendering or editing area. This interaction may be through known gestures on touch and hover devices (such as tap, double tap, press, long press, swipe, pinch), specific digital ink editing gestures (such as those described in European Patent Application No. 15 290 296.1 and US Patent Application No. 14/989,217 both titled "System and Method for Note Taking with Gestures" and both filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein), or hardware tools (such as keyboard, mouse). Alternatively, or additionally, the cursor may be displayed by the application 112 in a (set) default position, such as at the end of the (most recent) beautified digital ink (e.g., as shown in FIG. 11), for example, once the digital ink has been beautified. The cursor remains displayed, for example, until new handwriting input is detected by the application 112.

REMARKS

Paragraphs [0086] and [0090] have been amended. No new matter has been added to the application.

The entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience. Applicants' undersigned attorney may be contacted at the address and telephone number set forth below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 13-0206 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDermott Will & Emery LLP

/Zachary Getzelman/

Zachary Getzelman
Registration No. 71,292

227 West Monroe Street
Chicago, IL 60606-5096
Phone: 312- 372-2000
Facsimile: 312- 984-7700
Date: May 12, 2016

Please recognize our Customer No. 1923 as our correspondence address.

DM_US 72876565-1.094060.0034

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard Baudry, Conf. No. 6051
Art Unit	2668
Examiner Name	To be assigned
Attorney Docket Number	094060-0034

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6408092		2002-06-18	Sites	
	2	7284200		2007-10-16	Bernstein et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard Baudry, Conf. No. 6051
Art Unit	2668
Examiner Name	To be assigned
Attorney Docket Number	094060-0034

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

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14978081
Filing Date	2015-12-22
First Named Inventor	Edgard Baudry, Conf. No. 6051
Art Unit	2668
Examiner Name	To be assigned
Attorney Docket Number	094060-0034

CERTIFICATION STATEMENT

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

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

OR

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

See attached certification statement.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Zachary Getzelman/	Date (YYYY-MM-DD)	2016-05-12
Name/Print	Zachary Getzelman	Registration Number	71292

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

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

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

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

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

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

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

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

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

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

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

Electronic Acknowledgement Receipt

EFS ID:	25763088
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Zachary L Getzelman/Masako Kozawa
Filer Authorized By:	Zachary L Getzelman
Attorney Docket Number:	094060-0034
Receipt Date:	12-MAY-2016
Filing Date:	22-DEC-2015
Time Stamp:	16:00:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		094060-0034PrelimAmendAsFiled.pdf	80432 8475a60c084f50af3eb5eb2bde26ccb3193c2953	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	094060-0034IDSAsFiled.pdf	612208 74cefce50c447edaf0cf34db81537e2d13ab12a0	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	692640		

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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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/978,081	Filing Date 12/22/2015	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT **12/22/2015**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT **05/12/2016**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

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

LIE
PAULA BRITTON

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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

POA ACCEPTANCE LETTER

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000080593219

Date Mailed: 02/16/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/04/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mteklemichael/

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/978,081	12/22/2015	2668	800	094060-0034	18	3

CONFIRMATION NO. 6051

REPLACEMENT FILING RECEIPT

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000080593227

Date Mailed: 02/16/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Edgard Baudry, Nantes Cedex, FRANCE;
Bertrand Gourraud, Nantes Cedex, FRANCE;

Applicant(s)

MyScript, Nantes Cedex 3, FRANCE;

Power of Attorney: The patent practitioners associated with Customer Number 1923

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 15290303.5 12/08/2015

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

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Retrieve Electronic Priority Application(s) (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 01/08/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/978,081**

Projected Publication Date: 06/08/2017

Non-Publication Request: No

Early Publication Request: No
** **SMALL ENTITY** **
Title

SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

Preliminary Class

382

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

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PTO/AIA/82 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office: U.S DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

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

I hereby appoint:

■ Practitioners associated with Customer Number: 1923

OR

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

Name	Registration Number	Name	Registration Number

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

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

■ The address associated with Customer Number: 1923

OR

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

Assignee Name and Address: Myscript
3 rue de la Rainière, Parc Club du Perray, 44339 Nantes cedex 3, France

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

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

Signature	[signature]	Date	Dec 17, 2014
Name	Paddy Padmanabhan	Telephone	33228019050
Title	CEO		

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

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

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: MYSCRIPT

Application No./Patent No.: 14/978,081 Filed/Issue Date: December 22, 2015

Titled: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

MYSCRIPT, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 037462, Frame 0767, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Amol A. Parikh/	February 4, 2016
Signature	Date
Amol A. Parikh	60671
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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:	24821021
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Masako Kozawa
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	04-FEB-2016
Filing Date:	22-DEC-2015
Time Stamp:	13:24:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	094060-0034CorrectedADS3As Filed.pdf	102836 2ed8a23d3885cb605b86610d95a54d217b97b002	no	8

Warnings:	
Information:	

2	Power of Attorney	094060-0034POA3AsFiled.pdf	124437 6b1f7621b88493a2ef733213aa532e55536d633e	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73	094060-0034StatementAsFiled.pdf	79753 e1385de8692ed902209976ef1448f7054e850d5d	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	307026		

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.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Edgard		Baudry	

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

City	Nantes Cedex 3	Country of Residence	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	State/Province	
Postal Code	44339	Country	FR

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bertrand		Gourraud	

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

City	Nantes Cedex 3	Country of Residence	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	State/Province	
Postal Code	44339	Country	FR

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

Correspondence Information:

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	1923		
Email Address	ipdocketmwe@mwe.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK		
Attorney Docket Number	094060-0034	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	Suggested Figure for Publication (if any)	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	1923		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

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

Foreign Priority Information:

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

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
15290303.5	EP	2015-12-08	

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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

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

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

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Applicant Information:

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

Applicant 1

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

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
◉ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	MyScript		
Mailing Address Information For Applicant:			
Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	**State/Province**	
Country	FR	Postal Code	44339
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Assignee 1

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

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

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

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

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

Signature:

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

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Amol A. Parikh/			Date (YYYY-MM-DD)	2016-02-04
First Name	Amol	Last Name	Parikh	Registration Number	60671

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

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

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

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 CooperationTreaty.

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

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

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

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

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number
14/978,081

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	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	18 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

IMPROPER CPOA LETTER

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000080132142

Date Mailed: 01/28/2016

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 01/19/2016. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney has not been accepted because the party who is giving power has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A party who is not the applicant must become the applicant in accordance with 37 CFR 1.46(c) and appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. For a reissue application, reexamination proceeding, or supplemental examination proceeding, a patent owner who was not the applicant under 37 CFR 1.46 must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).

/atesfai/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/978,081	12/22/2015	2668	800	094060-0034	18	3

CONFIRMATION NO. 6051

UPDATED FILING RECEIPT

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000080132025

Date Mailed: 01/28/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Edgard Baudry, Nantes Cedex, FRANCE;
Bertrand Gourraud, Nantes Cedex, FRANCE;

Applicant(s)

Edgard Baudry, Nantes Cedex, FRANCE;
Bertrand Gourraud, Nantes Cedex, FRANCE;

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 15290303.5 12/08/2015

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 01/08/2016
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/978,081**
Projected Publication Date: 06/08/2017
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****
Title

SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

Preliminary Class

382

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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

NOT GRANTED

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

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

IMPROPER CFR REQUEST

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000080132200

Date Mailed: 01/28/2016

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

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

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

- The ADS submitted on 01/19/2016 attempts to change the applicant but cannot be entered. Any request to change the applicant once the applicant has been specified must include (1) an application data sheet specifying the new applicant in the Applicant Information section, and (2) a statement under 37 CFR 3.73(c) (USPTO Form PTO/AIA/96 or an equivalent) to show chain of title to the new applicant. The application data sheet must contain markings to show the information that is being changed, with underlining for additions and strike-through or brackets for deletions. See 37 CFR 1.76(c)(2).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/atesfai/

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number
14/978,081

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	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	18 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

FORMALITIES LETTER

OC00000079963784

Date Mailed: 01/19/2016

NOTICE OF INCOMPLETE REPLY (NONPROVISIONAL)

Filing Date Granted

The U.S. Patent and Trademark Office has received your reply on 01/12/2016 to the Notice to File Missing Parts (Notice) mailed 01/12/2016 and it has been entered into the nonprovisional application. The reply, however, does not include the following items required in the Notice. A complete reply must be timely filed to prevent ABANDONMENT of the above-identified application. Replies should be mailed to: Mail Stop Missing Parts, Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450.

Applicant is given **TWO MONTHS** from the date of the Notice to File Missing Parts (Notice) mailed 01/12/2016 within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- A mailing address for each inventor has not been submitted. A new application data sheet (ADS) in compliance with 37 CFR 1.76 or inventor's oath or declaration in compliance with 37 CFR 1.63 identifying the mailing address and residence (if the inventor lives at a location which is different from where the inventor customarily receives mail) is required.
  Edgard Baudry

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ebekele/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

IMPROPER CFR REQUEST

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000079963650

Date Mailed: 01/19/2016

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

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

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

- The ADS submitted on 01/12/2016 was not properly marked up to show the desired changes. For information being changed relative to the information already of record, additions must be shown with underlining, and deletions must be shown with strike-through or brackets. See 37 CFR 1.76(c)(2)

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ebekele/

UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015	Edgard Baudry	094060-0034

CONFIRMATION NO. 6051

IMPROPER CPOA LETTER

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000079963597

Date Mailed: 01/19/2016

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 01/12/2016. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney has not been accepted because the party who is giving power has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A party who is not the applicant must become the applicant in accordance with 37 CFR 1.46(c) and appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. For a reissue application, reexamination proceeding, or supplemental examination proceeding, a patent owner who was not the applicant under 37 CFR 1.46 must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).

/ebekele/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Docket No.: 094060-0034 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Customer Number: 1923
Edgard BAUDRY et al.	:	Confirmation Number: 6051
Application No.: 14/978,081	:	Group Art Unit: 2668
Filed: December 22, 2015	:	Examiner: To be assigned
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE OF INCOMPLETE REPLY

Sir:

In response to the Notice to File Missing Parts dated January 12, 2016 and the Notice of Incomplete Reply dated January 19, 2016, submitted herewith is Corrected Application Data Sheet.

Application No.: 14/978,081

REMARKS

Applicants believe no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 130206 from which the undersigned is authorized to draw.

Respectfully submitted,
McDermott Will & Emery LLP

/ Amol A. Parikh /

Amol A. Parikh
Registration No. 60,671

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Please recognize our Customer No. 1923 as our correspondence address.

Date: January 19, 2016

DM_US 69637217-1.094060.0034

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Edgard		Baudry	

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

City	Nantes Cedex 3	Country of Residence	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	State/Province	
Postal Code	44339	Country	FR

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bertrand		Gourraud	

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

City	Nantes Cedex 3	Country of Residence	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	State/Province	
Postal Code	44339	Country	FR

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

Correspondence Information:

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

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

Customer Number	1923		
Email Address	ipdocketmwe@mwe.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK		
Attorney Docket Number	094060-0034	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	**Suggested Figure for Publication (if any)**	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	1923		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

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

Foreign Priority Information:

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

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
15290303.5	EP	2015-12-08	

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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

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

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

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Applicant Information:

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

Applicant 1

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

Clear

○ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
◉ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	MyScript		
Mailing Address Information For Applicant:			
Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	**State/Province**	
Country	FR	Postal Code	44339
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Assignee 1

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

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

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

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

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

Signature:

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

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Amol A. Parikh/			Date (YYYY-MM-DD)	2016-01-19
First Name	Amol	Last Name	Parikh	Registration Number	60671

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

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

PTO/AIA/82 (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/978,081
Filing Date	December 22, 2015
First Named Inventor	Edgard BAUDRY
Title	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
Art Unit	2668
Examiner Name	To be assigned
Attorney Docket Number	094060-0034

SIGNATURE of Applicant or Patent Practitioner

Signature	/Amol A. Parikh/	Date (Optional)	January 19, 2016
Name	Amol A. Parikh	Registration Number	60671
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 1923

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☐ The address associated with the above-mentioned Customer Number

OR

☑ The address associated with Customer Number: 1923

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

MyScript

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Vivek Padmanabhan/	Date (Optional)	
Name	Vivek Padmanabhan		
Title	Chief Executive Officer		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt

EFS ID:	24663058
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Masako Kozawa
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	19-JAN-2016
Filing Date:	22-DEC-2015
Time Stamp:	17:30:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	094060-0034ResponseToNIRAsFiled.pdf	74326 509bdc9f69f6998bd1a691d651d3a2a3d657d4b7	no	2

Warnings:	
Information:	

2	Application Data Sheet	094060-0034CorrectedADS2.pdf	103087 ddd75e7e75faf1ceb924ab3c8302aea7e2de4eac	no	8
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Power of Attorney	094060-0034POA2AsFiled.pdf	1345351 5717f160e24b49ed940802d4b5d45972dabd58c6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1522764		

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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/978,081	12/22/2015	2668	800	094060-0034	18	3

CONFIRMATION NO. 6051

FILING RECEIPT

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000079811137

Date Mailed: 01/12/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

None

Applicant(s)

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 01/08/2016
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/978,081**
Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

Preliminary Class

382

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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

NOT GRANTED

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

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number
14/978,081

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	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	18 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

APPLICATION AS AMENDED - PART II

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015		094060-0034

CONFIRMATION NO. 6051

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000079811144

Date Mailed: 01/12/2016

Improper Submission of Authorization to Permit Access to Search Results under 37 CFR 1.14(h)(2)

The Authorization to Permit Access to the Search Results from the instant application under 37 CFR 1.14(h)(2) (authorization to permit access to search results) submitted on 12/22/2015 in the above-identified application is not accepted because:

- It was not properly signed. If applicant still wishes to provide authorization to permit access to the search results under 37 CFR 1.14(h)(2), applicant must submit a properly signed authorization (e.g., PTO/SB/69).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nhassani/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015		094060-0034

CONFIRMATION NO. 6051

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

OC000000079811141

Date Mailed: 01/12/2016

Improper Submission of Authorization to Permit Access to Application by Participating Offices under 37 CFR 1.14(h)(1) (Priority Document Exchange)

The Authorization to Permit Access to Application-As-Filed by Participating Offices under 37 CFR 1.14(h)(1) (authorization to permit access to application via priority document exchange) submitted on 12/22/2015 in the above-identified application is not accepted because:

- It was not properly signed. If applicant still wishes to provide authorization to permit access under 37 CFR 1.14(h)(1), applicant must submit a properly signed authorization (e.g., PTO/SB/39).

Any authorization should be submitted prior to filing a subsequent foreign application with a participating intellectual property office in which priority is claimed to the above-identified U.S. application to ensure that it is likely that the participating foreign intellectual property office will be successful in its attempt to retrieve a copy of the U.S. priority application from the Office.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nhassani/

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/978,081	12/22/2015		094060-0034

CONFIRMATION NO. 6051

1923
MCDERMOTT, WILL & EMERY LLP
The McDermott Building
500 North Capitol Street, N.W.
Washington, DC 20001

FORMALITIES LETTER

OC000000079811138

Date Mailed: 01/12/2016

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The inventor's oath or declaration or an application data sheet (ADS) naming each inventor has not been submitted. An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor, or a properly executed ADS in compliance with 37 CFR 1.76 identifying each inventor by his or her legal name, mailing address, and residence (if an inventor lives at a location which is different from where the inventor customarily receives mail) is required. If an ADS as set forth above is provided, the filing of the inventor's oath or declaration may be postponed until the application is otherwise in condition for allowance. See 37 CFR 1.53(f).

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- The ADS received on 12/22/2015 was not properly signed. Therefore, the Office will treat it only as a transmittal letter. See 37 CFR 1.76(e). Inventorship has not been set by this document and any foreign priority or domestic benefit claims contained therein are ineffective. See 37 CFR 1.55 or 37 CFR 1.78.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nhassani/

PTO/AIA/82 (04-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/978,081
Filing Date	December 22, 2015
First Named Inventor	Edgard BAUDRY
Title	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
Art Unit	2668
Examiner Name	To be assigned
Attorney Docket Number	094060-0034

SIGNATURE of Applicant or Patent Practitioner

Signature	/Amol A. Parikh/	Date (Optional)	January 12, 2016
Name	Amol A. Parikh	Registration Number	60671
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 1923

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☐ The address associated with the above-mentioned Customer Number

OR

☑ The address associated with Customer Number: 1923

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

MyScript

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Vivek Padmanabhan/	Date (Optional)	
Name	Vivek Padmanabhan		
Title	Chief Executive Officer		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt

EFS ID:	24595904
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	
Customer Number:	1923
Filer:	Amol A. Parikh/Masako Kozawa
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	12-JAN-2016
Filing Date:	22-DEC-2015
Time Stamp:	12:13:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	094060-0034ResponseToNFMPAsFiled.pdf	74325 9b7a3630ce1a4e68d23a655c9bcd4b3923a405a7	no	2

Warnings:	
Information:	

2	Application Data Sheet	094060-0034CorrectedADSAsFiled.pdf	102970 e233af07e29885e9b3fc9b7595d610d2244823cc	no	8
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Oath or Declaration filed	094060-0034DeclarationsAsFiled.pdf	457467 07c1ebb31c685044a02d6b24fb27d581066e0fa2	no	2
Warnings:					
Information:					
4	Power of Attorney	094060-0034POAAsFiled.pdf	1345349 a209453a56843c1f2fb99714dda469189da60814	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1980111		

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.

Docket No.: 094060-0034 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Customer Number: 1923
Edgard BAUDRY et al.	:	Confirmation Number: 6051
Application No.: 14/978,081	:	Group Art Unit: 2668
Filed: December 22, 2015	:	Examiner: To be assigned
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE MISSING PARTS

Sir:

In response to the Notice to File Missing Parts dated January 12, 2016, submitted herewith are Corrected Application Data Sheet and Declarations executed by the inventors.

Application No.: 14/978,081

REMARKS

Applicants believe no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 130206 from which the undersigned is authorized to draw.

Respectfully submitted,
McDermott Will & Emery LLP

/ Amol A. Parikh /

Amol A. Parikh
Registration No. 60,671

227 West Monroe Street
Chicago, IL 60606-5096
Phone: 312- 372-2000
Facsimile: 312- 984-7700
Date: January 12, 2016

Please recognize our Customer No. 1923 as our correspondence address.

DM_US 69473670-1.094060.0034

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Edgard		Baudry	

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

City	Nantes Cedex 3	Country of Residence	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	State/Province	
Postal Code	44339	Country	FR

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bertrand		Gourraud	

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

City	Nantes Cedex 3	Country of Residence	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	State/Province	
Postal Code	44339	Country	FR

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

Correspondence Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

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

Customer Number	1923		
Email Address	ipdocketmwe@mwe.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK		
Attorney Docket Number	094060-0034	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	**Suggested Figure for Publication (if any)**	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	1923		

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

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

Foreign Priority Information:

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

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
15290303.5	EP	2015-12-08	

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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

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

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

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Applicant Information:

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

Applicant 1

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

Clear

○ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
◉ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	MyScript		
Mailing Address Information For Applicant:			
Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	**State/Province**	
Country	FR	Postal Code	44339
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Assignee 1

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

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

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

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

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

Signature:

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This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Amol A. Parikh/			Date (YYYY-MM-DD)	2015-01-12
First Name	Amol	Last Name	Parikh	Registration Number	60671

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	14/978,081
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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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:

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

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

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

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

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

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

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

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

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

Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [ ] The attached application, or
- [X] United States application or PCT international application number 14/978,081 filed on December 22, 2015.

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

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

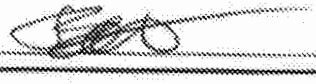
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Edgard Baudry Date (Optional): _____

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

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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.

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

Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

As the below named inventor, I hereby declare that:

This declaration is directed to:

- ☐ The attached application, or
- ☒ United States application or PCT international application number 14/978,081 filed on December 22, 2015.

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

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

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

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Bertrand Gourraud Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.

Attorney Docket No.: 094060-0034 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Customer Number: 1923
Edgard Baudry	:	Confirmation Number: Not Yet Assigned
Application No.: Not Yet Assigned	:	Group Art Unit: Not Yet Assigned
Filed: December 22, 2015	:	Examiner: Not Yet Assigned
For: SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	:	

PRELIMINARY AMENDMENT

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

Prior to examination of the above-referenced application, please amend the application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in this application.

1. (Original) A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. (Original) A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. (Original) A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. (Original) A system according to claim 1, wherein the alignment structure is a line pattern.

7. (Original) A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. (Original) A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. (Original) A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. (Original) A method according to claim 7, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. (Original) A method according to claim 7, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. (Original) A method according to claim 7, wherein the alignment structure is a line pattern.

13. (Original) A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. (Original) A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. (Original) A non-transitory computer readable medium according to claim 13, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. (Original) A non-transitory computer readable medium according to claim 13, wherein the alignment structure is a line pattern.

19-30. (Cancelled)

REMARKS

Applicant has cancelled Claims 19-30 herein.

Entry of the foregoing amendments prior to examination is respectfully requested.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP

/Amol A. Parikh/
Amol A. Parikh, Reg. No. 60,671

227 W. Monroe Street
Chicago, IL 60606
Phone: 312.372.2000
Facsimile: 202.756.8087
Date: December 22, 2015

Please recognize our Customer No. 1923 as our correspondence address.

DM_US 68719906-1.094060.0033

SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to European Application No. 15 290 303.5 filed on December 8, 2015, the entire contents of which is incorporated herein.

TECHNICAL FIELD

[0002] The present description relates generally to the field of handwriting recognition systems and methods using computing device interfaces. The present description relates more specifically to systems and methods for beautifying digital ink rendered from handwriting input to such computing device interfaces and providing editing of the digital ink on the computing device interfaces.

BACKGROUND

[0003] Computing devices continue to become more ubiquitous to daily life. They take the form of computer desktops, laptop computers, tablet computers, hybrid computers (2-in-1s), e-book readers, mobile phones, smartphones, wearable computers (including smartwatches, smart glasses/headsets), global positioning system (GPS) units, enterprise digital assistants (EDAs), personal digital assistants (PDAs), game consoles, and the like. Further, computing devices are being incorporated into vehicles and equipment, such as cars, trucks, farm equipment, manufacturing equipment, building environment control (e.g., lighting, HVAC), and home and commercial appliances.

[0004] Computing devices generally consist of at least one processing element, such as a central processing unit (CPU), some form of memory, and input and output devices. The variety of computing devices and their subsequent uses necessitate a variety of interfaces and input devices. One such input device is a touch sensitive surface such as a touch screen or touch pad wherein user input is received through contact between the user's finger or an instrument such as a pen or stylus and the touch sensitive surface. Another input device is an input surface that senses gestures made by a user above the input surface. A further input device is a position detection system which detects the relative position of either touch or non-touch interactions with a non-touch physical or virtual surface. Any of these methods of input can be used generally

for drawing or inputting text. When user input is text the user's handwriting is interpreted using a handwriting recognition system or method.

[0005] One application of handwriting recognition in non-portable and portable computing devices, such as smartphones, phablets and tablets, is for the input of text into various applications run by the computing devices in a manner similar to that traditionally done with keyboard, either physical or virtual. However, unlike keyboard input which is governed by strict layout rules, such as text entry on visible or invisible lines in accordance with the position of a displayed cursor, handwriting can be input virtually anywhere on the input surface of the device. While this substantially unconstrained input has some effect on the recognition accuracy of the handwriting, currently available advanced recognition algorithms are generally able to deal with such relatively 'free' positioning of textual characters.

[0006] Of more effect is a user's ability to interact with the input once it has been rendered as so-called 'digital ink' on the display. This is because, unlike typed or 'typeset ink' text which has characters relatively located in a uniform and known manner, the characters of the digital ink text are not uniform or in relatively known positions, generally due to the irregularity inherent in handwriting. Accordingly, conventional systems and methods typically only allow further interaction to be made on the typeset ink rendered from the recognized text, which is generally done at a different position of the display from the area where input is allowed.

[0007] It is desired by users however to be able to interact directly with the handwriting as well, such as to edit the input (e.g., add or delete characters or words), so that the creative flow of handwriting input is maintained. Some available applications provide alignment and scaling of the digital ink through normalization and the like. However, these do not take into account certain geometrical features of the handwriting and therefore the scaling and aligning is not properly performed to allow full interaction or faithful reproduction of the original digital ink. Further, they do not use recognition to provide these operations, and as such do not provide interaction capabilities within the input signal. Accordingly, editing operations can only be performed at the word level, and not at the character level, for example.

SUMMARY

[0008] The examples of the present invention that are described herein below provide systems and methods for beautifying and providing editing of digital ink on computing devices.

[0009] In one example, the present invention includes a system for beautifying digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The non-transitory computer readable medium may be configured to cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink, and cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

[0010] The structuring transformation may be determined from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the structuring transformation is determined from the minimum of the first and second ratio values.

[0011] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0012] In another example, the present invention includes a method for beautifying digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink, and displaying, on the display interface, second digital ink in accordance with the structuring transformation.

[0013] The method may determine the structuring transformation from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the method may determine the structuring transformation from the minimum of the first and second ratio values.

[0014] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0015] In another example, the present invention includes a non-transitory computer readable medium having a computer readable program code embodied therein. The computer readable program code may be adapted to be executed to implement a method for beautifying digital ink on a computing device. The computing device may include a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input, determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink, and displaying, on the display interface, second digital ink in accordance with the structuring transformation.

[0016] The method may determine the structuring transformation from at least two comparisons of the first and second geometrical information. The at least two comparisons may provide first and second ratio values of the first and second geometrical information and the method may determine the structuring transformation from the minimum of the first and second ratio values.

[0017] The structuring transformation may scale the first digital ink to produce the second digital ink. The structuring transformation may align the first digital ink with the alignment structure to produce the second digital ink. The alignment structure may be a line pattern.

[0018] In another example, the present invention includes a system for providing editing of digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The non-transitory computer readable medium may be configured to cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input, determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital

ink, and cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges.

[0019] The elements of the digital ink may include text characters and the at least one non-transitory computer readable medium may be configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0020] The determined ranges of the first and second characters may overlap, and the at least one non-transitory computer readable medium may be configured to compare geometrical features of the determined ranges of the first and second characters, and cause the display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

[0021] In another example, the present invention includes a method for providing editing of digital ink on computing devices. Each computing device may include a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input, determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

[0022] The elements of the digital ink may include text characters and the method may display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0023] The determined ranges of the first and second characters may overlap, and the method may compare geometrical features of the determined ranges of the first and second characters, and display the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

[0024] In another example, the present invention includes a non-transitory computer readable medium having a computer readable program code embodied therein. The computer

readable program code may be adapted to be executed to implement a method for providing editing of digital ink on a computing device. The computing device may include a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor. The method may include the steps of displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input, determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink, and displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

[0025] The elements of the digital ink may include text characters and the method may display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

[0026] The determined ranges of the first and second characters may overlap, and the method may compare geometrical features of the determined ranges of the first and second characters, and display the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison. The geometrical features may include height and width of the determined ranges.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The present system and method will be more fully understood from the following detailed description of the examples thereof, taken together with the drawings. In the drawings like reference numerals depict like elements. In the drawings:

[0028] FIG. 1 shows a block diagram of a computing device in accordance with an example of the present system and method;

[0029] FIG. 2 shows a block diagram of a system for handwriting recognition in accordance with an example of the present system and method;

[0030] FIG. 3 shows a block diagram illustrating detail of the handwriting recognition system of FIG. 2 in accordance with an example of the present system and method;

[0031] FIG. 4 shows a schematic view of an example visual rendering of an ink input area on a portion of an input surface of the computing device;

[0032] FIG. 5 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0033] FIG. 6 shows the example digital ink of FIG. 5 with geometrical information provided by the handwriting recognition system;

[0034] FIG. 7 shows the example input area of FIG. 4 with geometrical information provided by the handwriting recognition system;

[0035] FIG. 8 shows example beautified digital ink rendered on a line pattern;

[0036] FIG. 9 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0037] FIG. 10 shows the example digital ink of FIG. 9 with geometrical information provided by the handwriting recognition system;

[0038] FIG. 11 shows the example beautified digital ink of FIG. 8 with a cursor;

[0039] FIG. 12 shows the example digital ink of FIG. 5 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0040] FIG. 13 shows the example input area of FIG. 4 having example handwritten input rendered as digital ink;

[0041] FIG. 14 shows the example digital ink of FIG. 13 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0042] FIG. 15 shows example beautified digital ink rendered on the line pattern;

[0043] FIG. 16 shows the example beautified digital ink of FIG. 15 with character bounding boxes determined from character segmentation of the example handwritten input provided by the handwriting recognition system;

[0044] FIG. 17A shows a first example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0045] FIG. 17B shows a second example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0046] FIG. 17C shows a third example cursor position for non-overlapping characters of the example beautified digital ink of FIG. 15;

[0047] FIG. 18A shows a fourth example cursor position for overlapping characters of the example beautified digital ink of FIG. 15; and

[0048] FIG. 18B shows a fifth example cursor position for overlapping characters of the example beautified digital ink of FIG. 15.

DETAILED DESCRIPTION

[0049] In the following detailed description, numerous specific details are set forth by way of examples in order to provide a thorough understanding of the relevant teachings. However, it should be apparent to those skilled in the art that the present teachings may be practiced without such details. In other instances, well known methods, procedures, components, and/or circuitry have been described at a relatively high-level, without detail, in order to avoid unnecessarily obscuring aspects of the present teachings.

[0050] Reference to and discussion of directional features such as up, down, above, below, lowest, highest, horizontal, vertical, etc., are made with respect to the Cartesian coordinate system as applied to the input surface on which the input to be recognized is made. Further, terms such as left and right are made in relation to the reader's frame of reference when viewing the drawings. Furthermore, the use of the term 'text' in the present description is understood as encompassing all alphanumeric characters, and strings thereof, in any written language and common place non-alphanumeric characters, e.g., symbols, used in written text. Further still, the examples shown in these drawings are in a left-to-right written language context, and therefore any reference to positions can be adapted for written languages having different directional formats.

[0051] The various technologies described herein generally relate to capture, processing and management of hand-drawn and handwritten content on portable and non-portable computing devices in a manner which retains the inputted style of the content while allowing conversion to a faithful typeset or beautified version of that content. The systems and methods described herein may utilize recognition of users' natural writing and drawing styles input to a computing device via an input surface, such as a touch sensitive screen, connected to, or of, the computing device or via an input device, such as a digital pen or mouse, connected to the computing device or via a physical or virtual surface monitored by a position detection system. Whilst the various examples are described with respect to recognition of handwriting input using so-called online recognition techniques, it is understood that application is possible to other forms of input for recognition, such as offline recognition in which images rather than digital ink are recognized. The terms hand-drawing and handwriting are used interchangeably herein to

define the creation of digital content by users through use of their hands either directly onto a digital or digitally connected medium or via an input tool, such as a hand-held stylus. The term "hand" is used herein to provide concise description of the input techniques, however the use of other parts of a users' body for similar input is included in this definition, such as foot, mouth and eye.

[0052] FIG. 1 shows a block diagram of an example computing device 100. The computing device may be a computer desktop, laptop computer, tablet computer, e-book reader, mobile phone, smartphone, wearable computer, digital watch, interactive whiteboard, global positioning system (GPS) unit, enterprise digital assistant (EDA), personal digital assistant (PDA), game console, or the like. The computing device 100 includes components of at least one processing element, some form of memory and input and/or output (I/O) devices. The components communicate with each other through inputs and outputs, such as connectors, lines, buses, cables, buffers, electromagnetic links, networks, modems, transducers, IR ports, antennas, or others known to those of ordinary skill in the art.

[0053] The computing device 100 has at least one display 102 for outputting data from the computing device such as images, text, and video. The display 102 may use LCD, plasma, LED, iOLED, CRT, or any other appropriate technology that is or is not touch sensitive as known to those of ordinary skill in the art. At least some of the display 102 may be co-located with at least one input surface 104. The input surface 104 may employ technology such as resistive, surface acoustic wave, capacitive, infrared grid, infrared acrylic projection, optical imaging, dispersive signal technology, acoustic pulse recognition, or any other appropriate technology as known to those of ordinary skill in the art to receive user input. The input surface 104 may be bounded by a permanent or video-generated border that clearly identifies its boundaries.

[0054] In addition to the input surface 104, the computing device 100 may include one or more additional I/O devices (or peripherals) that are communicatively coupled via a local interface. The additional I/O devices may include input devices such as a keyboard, mouse, scanner, microphone, touchpads, bar code readers, laser readers, radio-frequency device readers, or any other appropriate technology known to those of ordinary skill in the art. Further, the I/O devices may include output devices such as a printer, bar code printers, or any other appropriate technology known to those of ordinary skill in the art. Furthermore, the I/O devices may include

communications devices that communicate both inputs and outputs such as a modulator/demodulator (modem; for accessing another device, system, or network), a radio frequency (RF) or other transceiver, a telephonic interface, a bridge, a router, or any other appropriate technology known to those of ordinary skill in the art. The local interface may have additional elements to enable communications, such as controllers, buffers (caches), drivers, repeaters, and receivers, which are omitted for simplicity but known to those of skill in the art. Further, the local interface may include address, control, and/or data connections to enable appropriate communications among the other computer components.

[0055] The computing device 100 also includes a processor 106, which is a hardware device for executing software, particularly software stored in the memory 108. The processor can be any custom made or commercially available general purpose processor, a central processing unit (CPU), a semiconductor based microprocessor (in the form of a microchip or chipset), a macroprocessor, microcontroller, digital signal processor (DSP), application specific integrated circuit (ASIC), field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, state machine, or any combination thereof designed for executing software instructions known to those of ordinary skill in the art. Examples of suitable commercially available microprocessors are as follows: a PA-RISC series microprocessor from Hewlett-Packard Company, an 80x86 or Pentium series microprocessor from Intel Corporation, a PowerPC microprocessor from IBM, a Sparc microprocessor from Sun Microsystems, Inc., a 68xxx series microprocessor from Motorola Corporation, DSP microprocessors, or ARM microprocessors.

[0056] The memory 108 can include any one or a combination of volatile memory elements (e.g., random access memory (RAM, such as DRAM, SRAM, or SDRAM)) and nonvolatile memory elements (e.g., ROM, EPROM, flash PROM, EEPROM, hard drive, magnetic or optical tape, memory registers, CD-ROM, WORM, DVD, redundant array of inexpensive disks (RAID), another direct access storage device (DASD)). Moreover, the memory 108 may incorporate electronic, magnetic, optical, and/or other types of storage media. The memory 108 can have a distributed architecture where various components are situated remote from one another but can also be accessed by the processor 106. Further, the memory 108 may be remote from the device, such as at a server or cloud-based system, which is remotely accessible by the computing device 100. The memory 108 is coupled to the processor 106, so the

processor 106 can read information from and write information to the memory 108. In the alternative, the memory 108 may be integral to the processor 106. In another example, the processor 106 and the memory 108 may both reside in a single ASIC or other integrated circuit.

[0057] The software in the memory 108 includes an operating system 110 and an application 112. The software optionally further includes a handwriting recognition (HWR) system 114 which may each include one or more separate computer programs. Each of these has an ordered listing of executable instructions for implementing logical functions. The operating system 110 controls the execution of the application 112 (and the HWR system 114). The operating system 110 may be any proprietary operating system or a commercially available operating system, such as WEBOS, WINDOWS®, MAC and IPHONE OS®, LINUX, and ANDROID. It is understood that other operating systems may also be utilized.

[0058] The application 112 includes one or more processing elements related to detection, management and treatment of user input (discussed in detail later). The software may also include one or more other applications related to handwriting recognition, different functions, or both. Some examples of other applications include a text editor, telephone dialer, contacts directory, instant messaging facility, computer-aided design (CAD) program, email program, word processing program, web browser, and camera. The application 112, and the other applications, include program(s) provided with the computing device 100 upon manufacture and may further include programs uploaded or downloaded into the computing device 100 after manufacture.

[0059] The HWR system 114, with support and compliance capabilities, may be a source program, executable program (object code), script, application, or any other entity having a set of instructions to be performed. When a source program, the program needs to be translated via a compiler, assembler, interpreter, or the like, which may or may not be included within the memory, so as to operate properly in connection with the operating system. Furthermore, the handwriting recognition system with support and compliance capabilities can be written as (a) an object oriented programming language, which has classes of data and methods; (b) a procedure programming language, which has routines, subroutines, and/or functions, for example but not limited to C, C++, Pascal, Basic, Fortran, Cobol, Perl, Java, Objective C, Swift, and Ada; or (c) functional programing languages for example but no limited to Hope, Rex, Common Lisp, Scheme, Clojure, Racket, Erlang, OCaml, Haskell, Prolog, and F#. Alternatively, the HWR

system 114 may be a method or system for communication with a handwriting recognition system remote from the device, such as server or cloud-based system, but is remotely accessible by the computing device 100 through communications links using the afore-mentioned communications I/O devices of the computing device 100. Further, the application 112 and the HWR system 114 may operate together or be combined as a single application.

[0060] Strokes entered on or via the input surface 104 are processed by the processor 106 as digital ink. A user may enter a stroke with a finger or some instrument such as a pen or stylus suitable for use with the input surface. The user may also enter a stroke by making a gesture above the input surface 104 if technology that senses motions in the vicinity of the input surface 104 is being used, or with a peripheral device of the computing device 100, such as a mouse or joystick. A stroke is characterized by at least the stroke initiation location, the stroke termination location, and the path connecting the stroke initiation and termination locations. Because different users may naturally write the same object, e.g., a letter, a shape, a symbol, with slight variations, the HWR system accommodates a variety of ways in which each object may be entered whilst being recognized as the correct or intended object.

[0061] FIG. 2 is a schematic pictorial of an example of the HWR system 114, in either its local (i.e., loaded on the device 100) or remote (i.e., remotely accessible by the device 100) forms. The HWR system 114 includes stages such as preprocessing 116, recognition 118 and output 120. The preprocessing stage 116 processes the digital ink to achieve greater accuracy and reducing processing time during the recognition stage 118. This preprocessing may include normalizing of the path connecting the stroke initiation and termination locations by applying size normalization and/or methods such as B-spline approximation to smooth the input. The preprocessed strokes are then passed to the recognition stage 118 which processes the strokes to recognize the objects formed thereby. The recognized objects are then output 120 to the display 102 generally as a typesetted version of the handwritten elements/characters.

[0062] The recognition stage 118 may include different processing elements or experts. FIG. 3 is a schematic pictorial of the example of FIG. 2 showing schematic detail of the recognition stage 118. Three experts, a segmentation expert 122, a recognition expert 124, and a language expert 126, are illustrated which collaborate through dynamic programming to generate the output 120.

[0063] The segmentation expert 122 defines the different ways to segment the input strokes into individual element hypotheses, e.g., alphanumeric characters and mathematical operators, text characters, individual shapes, or sub expression, in order to form expressions, e.g., words, mathematical equations, or groups of shapes. For example, the segmentation expert 122 may form the element hypotheses by grouping consecutive strokes of the original input to obtain a segmentation graph where each node corresponds to at least one element hypothesis and where adjacency constraints between elements are handled by the node connections. Alternatively, the segmentation expert 122 may employ separate experts for different input types, such as text, drawings, equations, and music notation.

[0064] The recognition expert 124 provides classification of the features extracted by a classifier 128 and outputs a list of element candidates with probabilities or recognition scores for each node of the segmentation graph. Many types of classifiers exist that could be used to address this recognition task, e.g., Support Vector Machines, Hidden Markov Models, or Neural Networks such as Multilayer Perceptrons, Deep, Convolutional or Recurrent Neural Networks. The choice depends on the complexity, accuracy, and speed desired for the task.

[0065] The language expert 126 generates linguistic meaning for the different paths in the segmentation graph using language models (e.g., grammar or semantics). The expert 126 checks the candidates suggested by the other experts according to linguistic information 130. The linguistic information 130 can include a lexicon, regular expressions, etc. The language expert 126 aims at finding the best recognition path. In one example, the language expert 126 does this by exploring a language model such as finite state automaton (FSA) representing the content of linguistic information 130. In addition to the lexicon constraint, the language expert 126 may use statistical information modeling for how frequent a given sequence of elements appears in the specified language or is used by a specific user to evaluate the linguistic likelihood of the interpretation of a given path of the segmentation graph.

[0066] The present system and method make use of the HWR system 114 in order to recognize handwritten input to the device 100. As discussed earlier, unlike keyboard input which is governed by strict layout rules, such as text entry on visible or invisible lines in accordance with the position of a displayed cursor, the present system and method allows handwriting to be input virtually anywhere on the input surface 104 of the computing device 100, and this input is rendered as digital ink in the input position, or in an offset position if the handwriting input is

offset from the rendering position. The HWR system 114 is able to recognize this relatively 'freely' positioned handwriting. The present system and method further allows users to continue to interact with the digital ink itself and provide meaningful guidance and results of that interaction through beautifying the digital ink. Beautification is achieved by properly scaling and aligning the digital ink in accordance with an alignment structure of the input surface 104 by taking into account certain geometrical features of the handwriting (described in detail later). Interaction is assisted by the performance of segmentation of strokes in the recognition process and using information on this segmentation to allow management of an input or editing cursor that acts as a pointer for character level interactions and editing operations. These and other aspects of the present system and method are now described.

[0067] FIG. 4 shows a schematic view of an example visual rendering of an ink input or capture area 400 on a portion of the input surface 104 of an example computing device 100. The input area 400 is provided as a constraint-free canvas that allows users to create object blocks (blocks of text, drawings, etc.) anywhere without worrying about sizing or alignment. However, as can be seen an alignment structure in the form of a line pattern background 410 can be provided for guidance of user input and the alignment of digital and typeset ink objects. In any case, as users may input handwriting that is not closely aligned to the line pattern, or may desire to ignore the line pattern and write in a unconstrained manner, such as diagonally or haphazardly, the recognition of the handwriting input is performed by the HWR system 114 without regard to the line pattern. An example alignment pattern is described in United States Patent Application No. 14/886,195 titled "System and Method of Digital Note Taking" filed in the name of the present Applicant and Assignee, the entire content of which is incorporated by reference herein.

[0068] For example, from this incorporated by reference patent application, the line pattern 410 has horizontal lines separated by a multiple of the vertical rhythm height unit being the density independent pixel (dp). Regardless of the particular device 100, the vertical distance between the horizontal lines 410 is defined by a line pattern unit (LPU) and the vertical rhythm height unit provides a graduated measure of the LPU on a particular device. For example, the LPU may be set at about one centimeter for any device being a certain multiple of the vertical rhythm height unit or users may be allowed to customize the line pattern unit to a different multiple of the vertical rhythm height unit according to their writing style. Alternatively, the

vertical rhythm may be based on typeset text size (e.g., the minimum text size) and the LPU is provided as a multiple of this typeset text size. All lines 410 are displayed with the same light and subtle color, e.g., grey, that is visible but faded with respect to the rendering of the content itself. In this way the line pattern is noticeable but unobtrusive so as to guide the handwriting input without distracting from the content entry.

[0069] In order to assist user input, the application 112 can render the digital ink according to the user input in the position at which the input is made. For example, FIG. 5 shows the example input area 400 having handwritten input rendered as (first) digital ink 500. The digital ink 500 includes text characters or symbols, “H” 501, “o” 502, “w” 503, “a” 504, “r” 505, “e” 506, “y” 507, “o” 508, “u” 509 and “?” 510, forming the question phrase “How are you?”. As can be seen, the input represented by the digital ink text 500 has been input by a user so as not to be in accord with the line pattern 410. That is, the characters 501 to 510 of the digital ink text 500 have not been written directly on any one of the lines 410. This input can be rendered on the line pattern however by applying a structuring transformation on the strokes of the input to beautify the digital ink through proper scaling and alignment. In order to do this appropriately information regarding the relative geometry of the digital ink text 500 is determined, such as the descending part of the handwriting, e.g., the distance between base- and mid-lines of each handwritten character, as described in detail below.

[0070] The (first) geometrical information is provided by the HWR system 114. That is, in the recognition process, the recognition engine 118 determines information on the lower and upper extrema of each character of the input to the application 112 as recognized by the HWR system 114. The lower extremum is the lowest point at which the stroke (or strokes) of the character pass. The upper extremum is the highest point at which the stroke (or strokes) of the character pass. The recognition process also determines from these extremum writing lines at the levels of character, word (e.g., a series of characters), sentence or phrase (e.g., a series of characters and/or words), and text line (e.g., a series of characters, words and/or sentences). The writing lines include top-, bottom-, base- and mid-lines.

[0071] The top-line is defined as the horizontal line passing through a point related to the upper extremum across the horizontal extent of the character, word, sentence or text line. The bottom-line is defined as the horizontal line passing through a point related to the lower extremum across the horizontal extent of the character, word, sentence or text line. The base-line

is defined as the horizontal line passing through a point related to the bottom-line across the horizontal extent of the character, word, sentence or text line, and the mid-line is defined as the horizontal line passing through a point related to the top- and base-lines across the horizontal extent of the character, word, sentence or text line. The determination of the points through which these lines pass is particular to the recognition process and language model(s) used by the HWR system 114.

[0072] For example, for languages having all characters and words made from those characters in a sentence or phrase written with a similar vertical extent, such as pictographic languages, for characters within a word, sentence or text line, the character having the highest upper extrema may be used as the point for either (or both) the top- or mid-line, and the character having the lowest lower extrema may be used as the point for the either (or both) bottom- and base-line, for example.

[0073] On the other hand, for languages having characters or letters written in a sentence or phrase with different sizes, such as Latin-based languages, e.g., upper and lower casing, letters with ascenders and/or descenders (e.g., “h”, “g”), diacritics (e.g., “i”, “j”) and punctuation symbols (e.g., “?”), for characters within a word, sentence or text line, the character having the highest upper extrema may be used as the point for the top-line, the character having the lowest lower extrema may be used as the point for the bottom-line, the character having the lowest lower extrema of characters which do not have a descender may be used as the point for the base-line, and the lower case character having the highest upper extrema of lower case characters which do not have an ascender may be used as the point for the mid-line, for example.

[0074] Alternatively, instead of setting the writing lines on absolute values, average or mean values can be taken, such as the average or mean of the lower and upper extrema across the text line, sentence or words, or the strokes of the characters themselves, so that local variations and anomalies, such as unduly offset characters, are not given undesired weight.

[0075] FIG. 6 shows the example input of FIG. 5 with the above-described geometrical information of the base- and mid-(or top-)lines provided by the HWR system 114 illustrated. That is, the characters 501-503 are recognized as belonging to one word 600, e.g., “How”, with base-line B0 and mid-line M0 determined for the word 600, the characters 504-506 are recognized as belonging to one word 602, e.g., “are”, with base-line B2 and mid-line M2 determined for the word 602, the characters 507-509 are recognized as belonging to one word

604, e.g., "you", with base-line B4 and mid-line M4 determined for the word 604, and the character 510 is recognized as being a single symbol 606, with base-line B6 determined for the symbol 606. The present system and method uses the geometrical information to provide a structuring transformation through proper scaling and alignment of the strokes of the input as follows.

[0076] The structuring transformation uses a ratio which is the minimum between a number of different ratio values related to comparisons of (second) geometrical information of the line pattern 410 and the (first) geometrical information of the input at character, word, sentence or text line level. The level at which first, second and third ratios (described below) are all determined may be, for example, pre-determined or settable via the UI of the application 112. In the examples discussed herein, the word level is depicted, but it is understood that similar description is applicable to the other levels.

[0077] The geometrical information of the line pattern 410 is determined by the application and includes top-, base- and mid-lines, as shown in FIG. 7. For example, the base-line BL of each line 410 of the line pattern is defined as that line 410, the top-line TL of each line 410 is defined as being at an (first) offset vertical distance from the base-line BL of that line 410 (e.g., between about 60% and about 80% of the LPU), and the mid-line ML of each line 410 is defined as being at an (second) offset vertical distance from the base-line BL (and/or top-line TL) of that line 410 (e.g., between about 30% and about 70% of the distance between the base-line BL and top-line TL). In this way, sufficient space for ascenders and descenders, upper casing, and grammatical symbols is provided once the digital ink has been scaled onto the line pattern 410.

[0078] A first ratio value is the ratio of the (first) distance (i.e., height) of the line pattern, i.e., one LPU, and the (first) distance (i.e., height) of each word of the input. The height of a word is defined as the vertical extent between the bottom-line and top-line of that word. A similar definition is applicable to the character level, as these are like words having a single character, such as the symbol 606. For sentences and text lines the height may be determined from the absolute values for the extrema, i.e., the lowest lower extremum and the highest upper extremum, and/or from the base- and top-lines, which may or may not be based on average, mean or adjusted (e.g., upper case or ascender/descender characters discarded) values.

[0079] Thus, in the example of FIG. 6, the height of the word 600 is from the highest point of the word, being the highest point of the character 501, to the lowest point of the word, being the lowest point of the character 503, the height of the word 602 is from the highest point of the word (e.g., the highest point of the character 504) to the lowest point of the word, (e.g., the lowest point of the character 508), the height of the word 604 is from the highest point of the word (e.g., the highest point of the character 507) to the lowest point of the word (e.g., the lowest point of the character 507), and the height of the symbol 606 is from the highest point of the character 510 to the lowest point of the character 510, for example. The first ratio of each word therefore provides a comparison of the total height of that word, as set by the characters of the word (i.e., including casing, ascenders, descenders and grammatical symbols), and the LPU.

[0080] A second ratio value is the ratio of the (second) distance (e.g., top height) from the base-line BL to the top-line TL of the line pattern 410 and the (second) distance (e.g., top height) from the base-line to the top-line of each word of the input. Thus, in the example of FIG. 6, the top height of the word 600 is from the top-line of the word (e.g., passing through the highest point of the character 501) to the base-line B0, the top height of the word 602 is from the top-line of the word (e.g., passing through the highest point of the character 504) to the base-line B2, the top height of the word 604 is from the top-line of the word (e.g., passing through the highest point of the character 507) to the base-line B4, and the top height of the symbol 606 is from the top-line of the symbol 606 (e.g., passing through the highest point of the character 510) to the base-line B6. The second ratio of each word therefore provides a comparison of the top-line to base-line height of that word and the top-line height of the lines 410.

[0081] The third ratio is the ratio of the (third) distance (e.g., mid height) from the base-line BL to the mid-line ML of the line pattern 410 and the (third) distance (e.g., mid height) from the base-line to the mid-line of each word of the input. Thus, in the example of FIG. 6, the mid height of the word 600 is from the mid-line M0 to the base-line B0, the mid height of the word 602 is from the mid-line M2 to the base-line B2, the mid height of the word 604 is from the mid-line M4 to the base-line B4, and the mid height of the symbol 606 is from the mid-line of the symbol 606 (e.g., the same as the top-line) to the base-line B6. The third ratio of each word therefore provides a comparison of the mid-line to base-line height of that word and the mid-line height of the lines 410.

[0082] Two or more of these ratios are compared in order to determine the minimum value. For example, the first and second ratios may be compared, or the first and third, or the second and third, or all three ratios. Further, other ratios may be determined and used in the comparison. The comparison allows a minimum character, word, sentence or text line size to be used for the structuring transformation. In the structuring transformation, the rendered strokes of the scaled digital ink are the smallest compared to the original input. However, if the minimum value of each compared ratio is greater than 1, then the returned minimum value is capped at 1, such that no scaling is performed. This especially applies to some punctuation marks which do not require scaling, such as periods.

[0083] Once the comparison is made, the elements of the (non-scaled or original) digital ink (e.g., the characters, words, etc. depending on the level used for the comparison) are scaled by the minimum value and are rendered on one of the lines 410 of the line pattern so that the base-line of the scaled element is at the base-line of that line 410 (i.e., on the line 410). FIG. 8 shows an example in which the minimum ratio values for each of the words 600 to 606 of the digital ink 500 are determined from a comparison of the first, second and third ratios described above in order to perform the structuring transformation of the digital ink 500 to structured (second) digital ink 800. The structured digital ink text 800 includes a word 801 being the scaled version of the word 600, a word 802 being the scaled version of the word 602, a word 804 being the scaled version of the word 604, and a word 806 being the scaled version of the word 606. The structured digital ink text 800 is rendered on the uppermost (first) line of the line pattern 410 so that the base-line of each scaled word 801 to 806 is positioned in the first line 410.

[0084] The HWR system 114 may have some issues with determining the base-lines of elements of the input since there may be many ambiguities leading to improbable base-line recognition. Accordingly, the application 112 may be configured to handle the translation of the scaled strokes depending on the elements/characters that are recognized by the HWR system 114. For example, the HWR system 114 may not be able to set a base-line for a single horizontal line recognized as a hyphen or minus sign, accordingly the application 112 may display the scaled strokes with an offset from the line 410, such as to be centered vertically in the line pattern of the rendering area.

[0085] The positioning of each element on the multiple lines of the line pattern 410 is made based on certain pre-defined or settable criteria, such as, for left-to-right written languages,

aligned to the first available left-most section of a first available line from the top of the rendering area of the device 100 which can accommodate the scaled element. For example, in the example of FIG. 8, the rendering area is overlapped or coextensive with the input area 400 such that the scaled digital ink text 800 is left-aligned on the first line 410, since there is no other content (e.g., digital or typeset ink) displayed on any of the lines 410. Another example of criteria for positioning of the transformed ink can be the usage of a cursor as an insertion point of the new input, e.g., allowing users to complete previous inputs (described in detail later). Such positioning may therefore include reflowing of the input over multiple ones of the lines 410, for example, if the next available position is on a line which is below the line previously used for the structured digital ink. In this way, paragraphs of text can be formed from a series of inputs of single lines of text (input as described below) and editing operations can be performed on the structured digital ink including those that trigger reflowing events (as described later).

[0086] With respect to the input and rendering areas or zones of the application 112, it is noted that these areas may be coextensive, as in the example of FIG. 8, such that once input has been received and displayed/rendered as the original digital ink (e.g., the digital ink 500) after a set amount of time, as measured by a clock of the computing device 100 in conjunction with the memory 108 for example, the input area is cleared of the original digital ink and the structured digital ink (e.g., the digital ink 800) is displayed/rendered on the rendering area. Alternatively, the input and rendering areas may be separated into different zones of the interface 104 or on separate displays or display devices, such that display of the original digital ink may persist and be scrolled, for example, to allow further input, or be omitted after a certain time period or receipt of new input. For example, superimposed input in which characters or words or parts of words are input over the top of one another with fading or other omission of previously entered input may be possible in either case of separated or overlapped display, such as described in United States Patent Publication No. 2015/0286886 filed in the name of the present Applicant and Assignee and United States Patent Application No. 14/796,092 titled "System and Method for Superimposed Handwriting Recognition Technology" filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein.

[0087] Further, in the structuring transformation, the spaces between characters and between words in the input are transformed to a fixed spacing, such as shown in FIG. 8. The fixed spacing may be set based on the LPU (e.g., about 5% to about 15% of the LPU) or the mid-

line height of the line pattern (e.g., about 40% to about 60% of the mid height), or on other criteria. The fixed spacing is provided so that generally normalized and beautified digital ink output is provided aligned to the line pattern, particularly with respect to the above-mentioned new input which may be rendered as scaled digital ink on the same line as previously scaled input. Alternatively, the spacing between the characters/words of the input may be scaled in relation to the scaling of the associated characters/words.

[0088] The above-discussed example includes input which is generally horizontally provided in the left-to-right (or right-to-left) written context. However, as is understood as the geometry of elements of the input text, such as words, are considered for the structuring transformation, other manners of input are also handled by the present system and method. For example, FIG. 9 shows the example input area 400 having handwritten input rendered as digital ink text 900. The digital ink text 900 includes the 'words' 600, 602, 604 and 606, as in the above-described example, however these words are vertically input so that the word 600 is above the other words, the word 602 is above the words 604 and 606, and the words 604 and 606 are on the same text line. As such the digital ink 900 is on multiple text lines which are not aligned with any of the lines 410. As with the afore-described examples, the base-line B0 and mid-line M0 are determined for the word 600, the base-line B2 and mid-line M2 are determined for the word 602, the base-line B4 and mid-line M4 are determined for the word 604, and the base-line B6 is determined for the symbol 606, as shown in FIG. 10. Thus, as the geometrical information is the same, the structuring transformation is the same as described earlier, such that the non-structured digital ink 900 is transformed into the scaled and aligned digital ink 800 shown in FIG. 8. As can be understood, similar transformation can be applied to other alignments and manners of inputting the handwriting.

[0089] The beautification of the non-beautified or 'raw' digital ink according to the handwritten input to the device 100 into the beautified digital ink provides a way of displaying user handwritten input in a normalized and standard fashion thereby aiding legibility, usability and interactability with the content. It is considered that guidance for users for such interactions with the beautified digital ink using mechanisms similar to those expected in document processing applications is beneficial, as this enhances the user experience with the application 112. One such mechanism is the use of an input or editing cursor that acts as a pointer for character level editing operations, such as carriage return, space insertion, character deletion or

insertion. For example, FIG. 11 shows a cursor 1100 provided after the beautified digital ink 800.

[0090] It is understood that beyond guiding handwritten interaction with the beautified content, the cursor also provides positioning of other forms of input, such as typing via keyboard or text input by voice recognition. As can be seen, the cursor 1100 is displayed with sizing and alignment similar to the structured digital ink. The cursor may be displayed by the application 112, and editing functions performed, in response to user interaction with the digital ink within the rendering or editing area. This interaction may be through known gestures on touch and hover devices (such as tap, double tap, press, long press, swipe, pinch), specific digital ink editing gestures (such as those described in European Patent Application No. 15 290 296.1 titled "System and Method for Note Taking with Gestures" filed in the name of the present Applicant and Assignee, the entire contents of which are incorporated by reference herein), or hardware tools (such as keyboard, mouse). Alternatively, or additionally, the cursor may be displayed by the application 112 in a (set) default position, such as at the end of the (most recent) beautified digital ink (e.g., as shown in FIG. 11), for example, once the digital ink has been beautified. The cursor remains displayed, for example, until new handwriting input is detected by the application 112.

[0091] As mentioned earlier, the present system and method provides the cursor management through segmentation in the recognition process. This aspect of the present system and method is now described. As discussed above, segmentation is performed by the HWR system 114 during the recognition process. This segmentation information is retrieved by the application 112 to determine the ranges of each recognized element within the handwritten input, such as for example, characters of handwritten text, shapes of handwritten drawings, etc. For example, FIG. 12 shows the determined ranges, illustrated as character bounding boxes 511 to 520 for an example segmentation of the characters 501 to 510 of the input, respectively. The present system and method uses these ranges to display the cursor at the bounding box of each character. For example, in FIG. 11 the cursor 1100 is displayed at the right edge of the bounding box 520 of the character 510.

[0092] However, unlike typeset or fontified ink, digital ink, even the beautified digital ink, is not regularly provided on a character-by-character basis. This is because, handwriting is a form of personal font of the writing user, and while basic standards are followed in handwritten

languages, many variations will exist. As such, many of the characters will overlap horizontally, or vertically, or both, due to capitalization, ascenders, descenders, slanted writing, or just untidy handwriting. While character overlap is handled by the HWR system 114 to properly recognize the characters, the character positions themselves are not adjusted through the segmentation or the beautification described above. Such adjustment could be made, but it is difficult to provide general rules because as stated above, the manner of handwriting is very personal. Accordingly, character overlap causes overlap of the bounding boxes. For example, as can be seen in FIG. 12 the bounding boxes 515 and 516 overlap dues to overlap of the characters 505 and 506. As such, rendering a cursor on an overlapped bounding box may cause confusion for users. Examples of how the present system and method handle this situation is described below in relation to FIGS. 13 to 18.

[0093] FIG. 13 shows the example input area 400 having handwritten input rendered as digital ink text 1300. The digital ink text 1300 includes the characters or symbols, “T” 1302, “r” 1304, “e” 1306, and “e” 1308 forming the capitalized word “Tree”. As before, the input represented by the digital ink text 1300 has been input by a user so as not to be in accord with the line pattern 410. FIG. 14 shows the digital ink text 1300 with the determined ranges of each character as segmented by the HWR system 114 illustrated as bounding boxes 1402 to 1408 corresponding to the characters 1302 to 1308, respectively.

[0094] FIG. 15 shows the digital ink 1300 of FIG. 13 after the structuring transformation to produce scaled digital ink 1500 which is properly aligned with the line pattern 410 by the earlier described criteria. It is understood that since the beautified digital ink of the present example is a scaled and aligned version of the ‘raw’ digital ink without adjustment within words, such as inter-character spacing and character sizing, the structuring transformation is equally applicable to the ranges of the characters as segmented. Thus, as shown in FIG. 16, the bounding boxes 1402 to 1408 of the digital ink 1300 are scaled to bounding boxes 1602 to 1608, respectively, for the structured digital ink 1500. These scaled bounding boxes are therefore used by the application 112 to set the cursor position through consideration of geometrical features of the bounding boxes in one or more of the following ways.

[0095] In the case that the ranges of two consecutive characters do not overlap, several strategies can be applied by the present system and method in order to place the cursor:

- The cursor is positioned between those two characters at the center between the range borders. For example, FIG. 17A shows a centered (first) cursor 1700 positioned in the center between the bounding boxes 1604 and 1606 of the non-overlapping respective (first) character 1304 and (second) character 1306.
- The cursor is positioned between those two characters at the right range border of the left-side character. For example, FIG. 17B shows a left-aligned (second) cursor 1702 positioned on the right edge of the bounding box 1604 of the character 1304 between the non-overlapping characters 1304 and 1306.
- The cursor is position between those two characters at the left range border of the right-side character. For example, FIG. 17C shows a right-aligned (third) cursor 1704 positioned on the left edge of the bounding box 1606 of the character 1306 between the non-overlapping characters 1304 and 1306.

[0096] Whereas, in the case that the ranges of two consecutive characters do overlap, several strategies can be applied by the present system and method in order to place the cursor:

- The cursor is positioned between those two characters at the center of the area of overlap defined by the ranges of the overlapped characters. For example, FIG. 18A shows a centered (fourth) cursor 1800 positioned in the center of the overlapping area of the (first) character 1302 and (second) character 1304. As can be seen however, this setting may cause confusion for users as to which character the cursor 1800 is related.
- The cursor is positioned between those two characters in consideration of the other geometrical features of the ranges of the overlapped characters, such as the height, the width, or the area of the bounding boxes to be at the range border of the character with either the smallest or the highest value of these geometrical features which is in the overlapping area. For example, FIG. 18B shows a left-aligned (fifth) cursor 1802 positioned on the left edge of the bounding box 1604 of the character 1304 between the overlapping characters 1302 and 1304, where the character having the bounding box of smallest height is used as the cursor positioning criteria.

[0097] As with any document editing application, the cursor position can be set and reset by user interaction within the editing area, such as with a tap or a click, provided by the application 112, as discussed earlier. However, in the afore-described example of the present system and method in which the input or capture area and the rendering or editing area are

overlapped, the receipt of a gesture may cause ambiguity between setting of the cursor position and the input of new content. The present system and method accounts for such ambiguity to identify a 'set cursor position' action by evaluating certain criteria with respect to received user interaction. For example, when:

- the input is constituted by a unique stroke, until the end of the writing session; and
- the new input is a single-point gesture, such as a tap or other unique sampling point, defining a user interaction point; and
- content, such as a character or word, is present in the rendering area at the user interaction point, then:

the user interaction is considered as a request to set the cursor position.

[0098] The present system and method properly beautifies 'freely' (unstructured) input digital ink through scaling or minimizing and aligning the digital ink on alignment elements of an editing area by taking into account the relative geometrical information of the handwriting, such as the descending part of the handwriting, e.g., the distance between the base-line and the mid-line of the handwriting as determined by the recognition process for recognizing the handwriting input. Further, the present system and method considers character segmentation determined by the recognition process for recognizing the handwriting input to allow management of an editing cursor position for the beautified digital ink so that editing operations can be performed on a character basis, and not only on a word, sentence, line or block basis, for example.

[0099] While the foregoing has described what is considered to be the best mode and/or other examples, it is understood that various modifications may be made therein and that the subject matter disclosed herein may be implemented in various forms and examples, and that they may be applied in numerous other applications, combinations, and environments, only some of which have been described herein. Those of ordinary skill in that art will recognize that the disclosed aspects may be altered or amended without departing from the true spirit and scope of the subject matter. Therefore, the subject matter is not limited to the specific details, exhibits, and illustrated examples in this description. It is intended to protect any and all modifications and variations that fall within the true scope of the advantageous concepts disclosed herein.

CLAIMS

We claim:

1. A system for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determine, from first geometrical information of the handwriting input determined through the recognition of the handwriting input and second geometrical information of an alignment structure of the display interface, a structuring transformation of the first digital ink; and

cause display of, on the display interface, second digital ink in accordance with the structuring transformation.

2. A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation from at least two comparisons of the first and second geometrical information.

3. A system according to claim 2, the at least two comparisons provide first and second ratio values of the first and second geometrical information, the at least one non-transitory computer readable medium configured to determine the structuring transformation from the minimum of the first and second ratio values.

4. A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to scale the first digital ink to produce the second digital ink.

5. A system according to claim 1, the at least one non-transitory computer readable medium configured to determine the structuring transformation to align the first digital ink with the alignment structure to produce the second digital ink.

6. A system according to claim 1, wherein the alignment structure is a line pattern.

7. A method for beautifying digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

8. A method according to claim 7, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

9. A method according to claim 8, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

10. A method according to claim 7, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

11. A method according to claim 7, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

12. A method according to claim 7, wherein the alignment structure is a line pattern.

13. A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for beautifying digital ink on a computing device, the computing device comprising a

processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, first digital ink in accordance with the handwriting input;

determining, from geometrical information of the handwriting input determined through the recognition of the handwriting input, a structuring transformation of the first digital ink; and

displaying, on the display interface, second digital ink in accordance with the structuring transformation.

14. A non-transitory computer readable medium according to claim 13, wherein the structuring transformation is determined from at least two comparisons of the first and second geometrical information.

15. A non-transitory computer readable medium according to claim 14, wherein the at least two comparisons provide first and second ratio values of the first and second geometrical information, the structuring transformation is determined from the minimum of the first and second ratio values.

16. A non-transitory computer readable medium according to claim 13, wherein the structuring transformation scales the first digital ink to produce the second digital ink.

17. A non-transitory computer readable medium according to claim 13, wherein the structuring transformation aligns the first digital ink with the alignment structure to produce the second digital ink.

18. A non-transitory computer readable medium according to claim 13, wherein the alignment structure is a line pattern.

19. A system for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for

recognizing handwriting input under control of the processor, the at least one non-transitory computer readable medium configured to:

cause display of, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determine, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

cause display of, on the display interface, an input cursor in relation to the determined digital ink element ranges.

20. A system according to claim 19, wherein the elements of the digital ink include text characters, the at least one non-transitory computer readable medium configured to display the input cursor at a position between first and second characters in relation to the determined ranges of the first and second characters.

21. A system according to claim 20, wherein the determined ranges of the first and second characters overlap, the at least one non-transitory computer readable medium configured to:

compare geometrical features of the determined ranges of the first and second characters; and

cause said display of the input cursor on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

22. A system according to claim 21, wherein the geometrical features include height and width of the determined ranges.

23. A method for providing editing of digital ink on computing devices, each computing device comprising a processor and at least one non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

24. A method according to claim 23, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

25. A method according to claim 24, wherein the determined ranges of the first and second characters overlap, the method comprising comparing geometrical features of the determined ranges of the first and second characters, the input cursor being displayed on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

26. A method according to claim 25, wherein the geometrical features include height and width of the determined ranges.

27. A non-transitory computer readable medium having a computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a method for providing editing of digital ink on a computing device, the computing device comprising a processor and at least one system non-transitory computer readable medium for recognizing handwriting input under control of the processor, the method comprising:

displaying, on a display interface of a computing device, digital ink in accordance with the handwriting input;

determining, from segmentation information of the handwriting input determined through the recognition of the handwriting input, ranges of elements of the digital ink; and

displaying, on the display interface, an editing cursor in relation to the determined digital ink element ranges.

28. A non-transitory computer readable medium according to claim 27, wherein the elements of the digital ink include text characters, the input cursor being displayed at a position between first and second characters in relation to the determined ranges of the first and second characters.

29. A non-transitory computer readable medium according to claim 28, wherein the determined ranges of the first and second characters overlap, the method comprising comparing geometrical features of the determined ranges of the first and second characters, the input cursor being displayed on a border of the determined range of the first character or the determined range of the second character within the region of overlap in accordance with the comparison.

30. A non-transitory computer readable medium according to claim 29, wherein the geometrical features include height and width of the determined ranges.

ABSTRACT

A system, method and computer program product for use in beautifying digital ink of handwriting input to a computing device are provided. The computing device is connected to an input device in the form of an input surface. A user is able to provide input by applying pressure to or gesturing above the input surface using either his or her finger or an instrument such as a stylus or pen. The present system and method monitors the input strokes. The computing device further has a processor and at least one application for recognizing the handwriting input under control of the processor. The at least one system application is configured to cause display of the digital ink, determine from geometrical information of the handwriting input determined through the recognition of the handwriting input and geometrical information of an alignment structure of the display interface, a structuring transformation of the digital ink, and cause display of transformed digital ink in accordance with the structuring transformation.

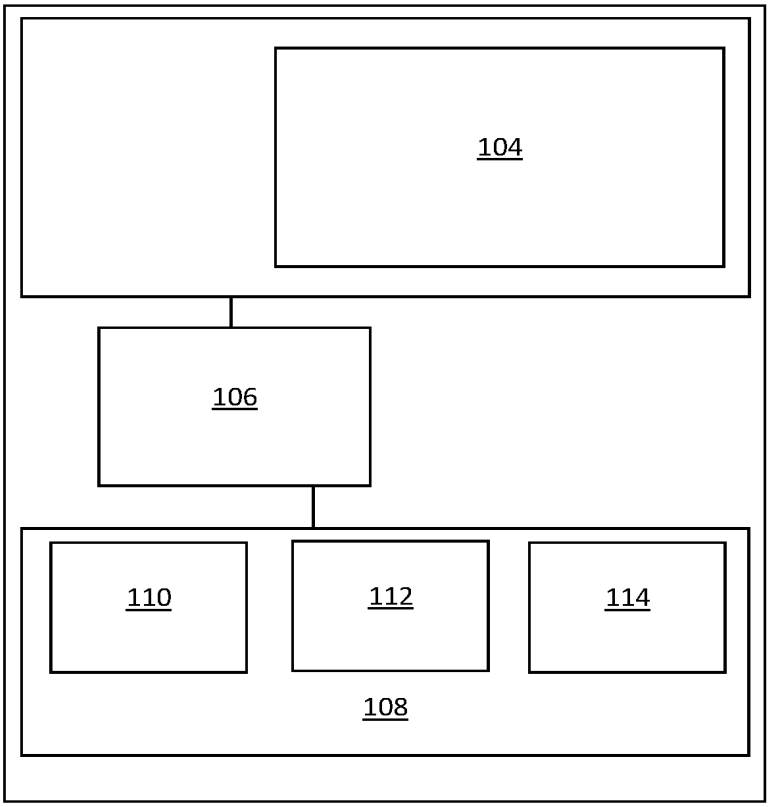


FIG. 1

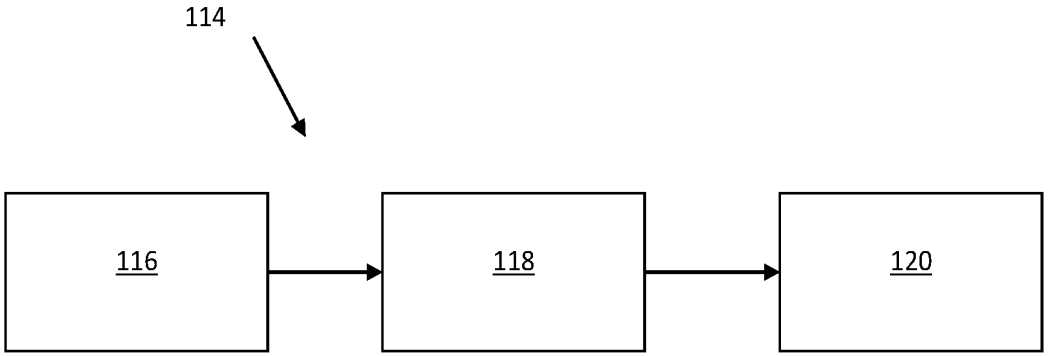


FIG. 2

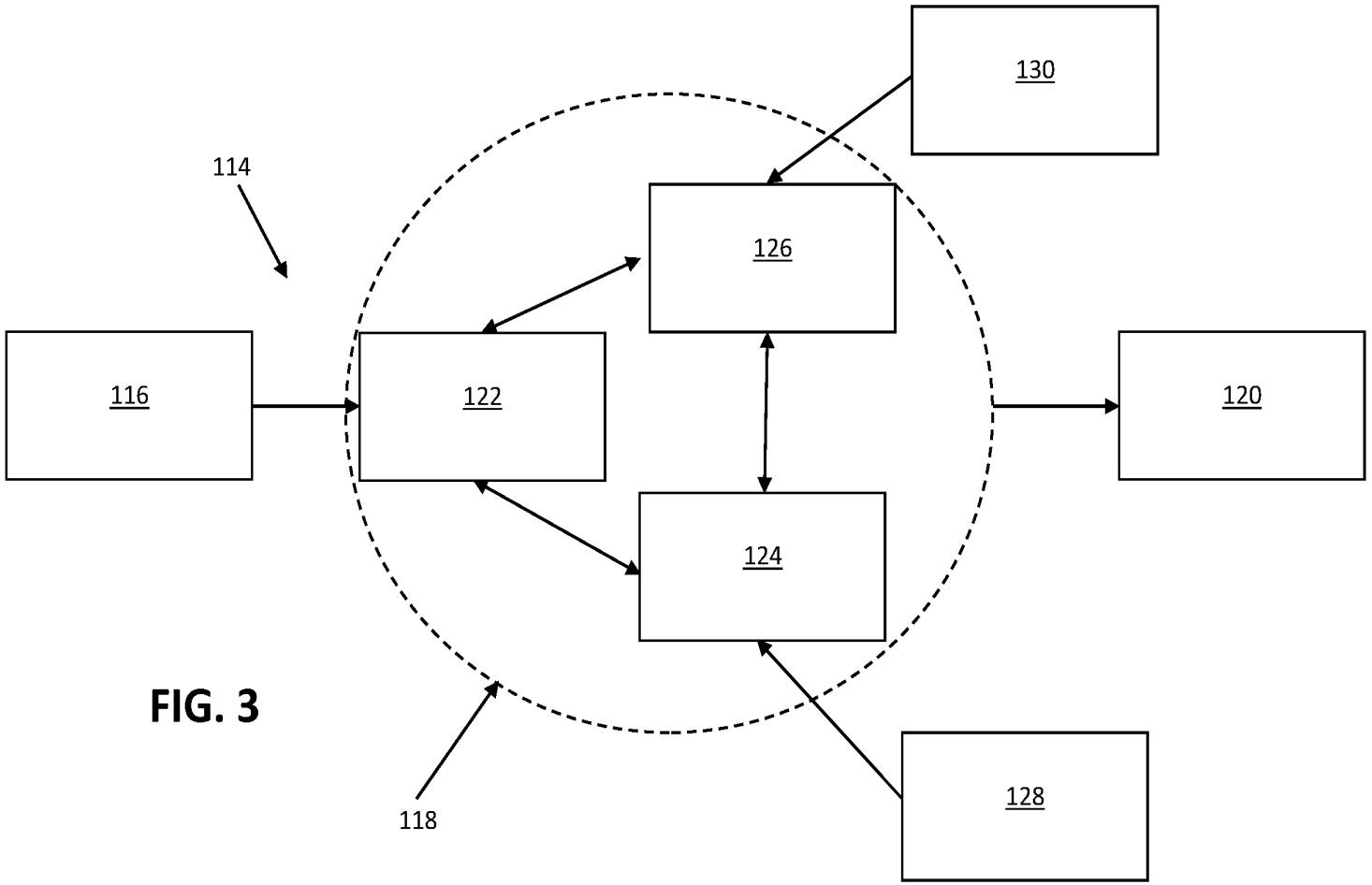


FIG. 3

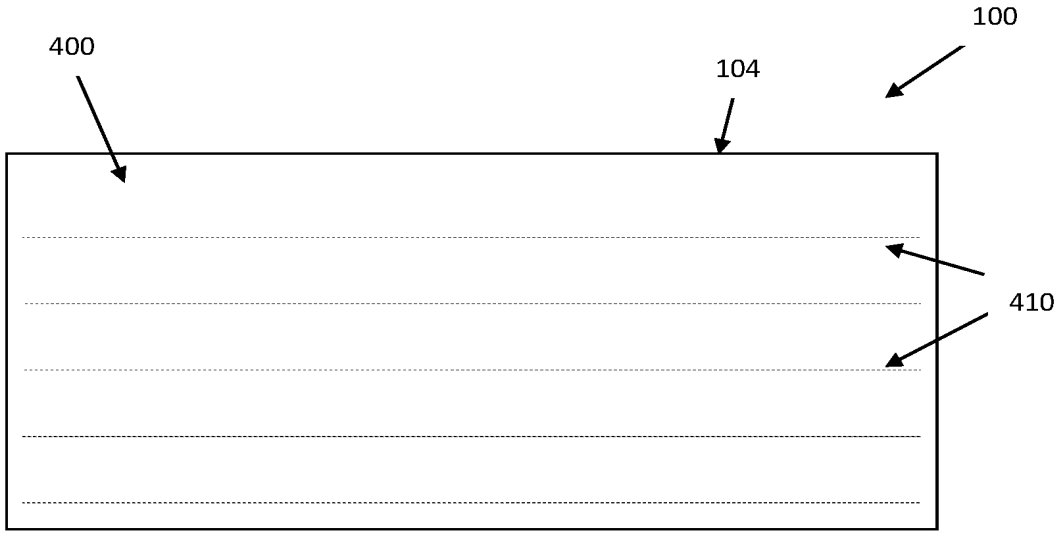

100
400
104
410

FIG. 4

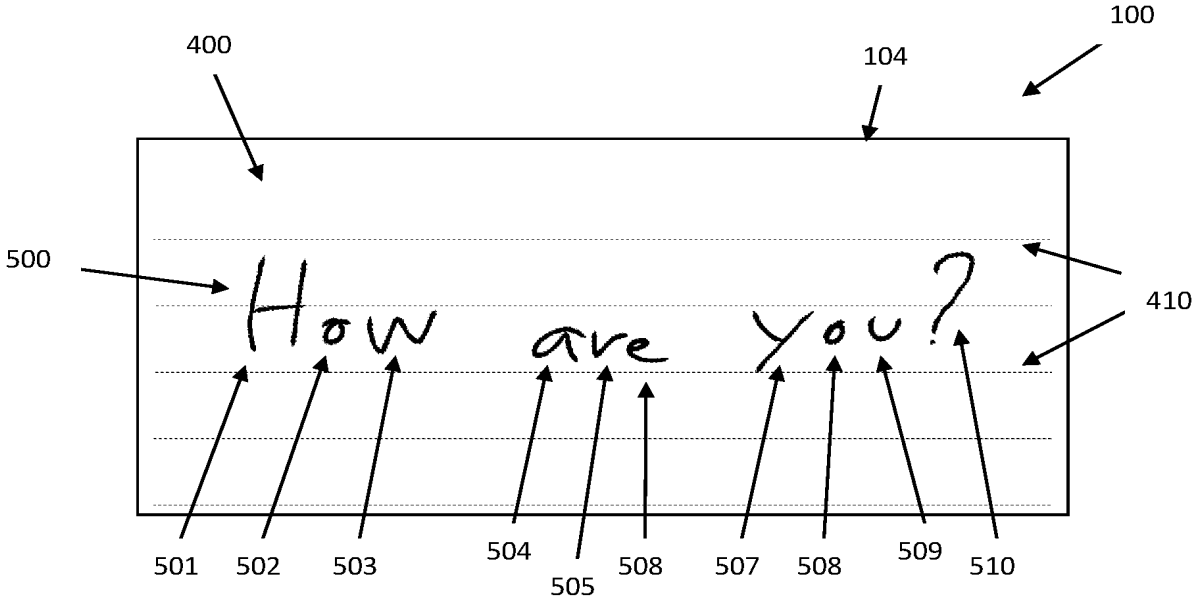

100
400
104
500
How are you?
410
501
502
503
504
505
508
507
508
509
510

FIG. 5

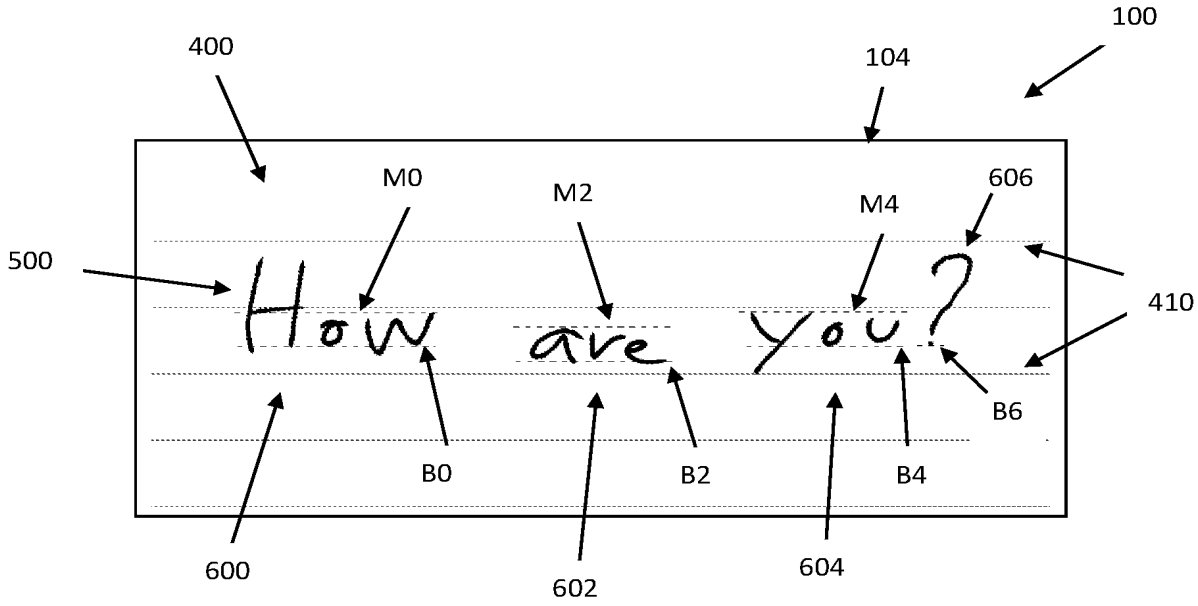

100
400
104
M0
M2
606
M4
500
How are you?
410
B6
B0
B2
B4
600
602
604

FIG. 6

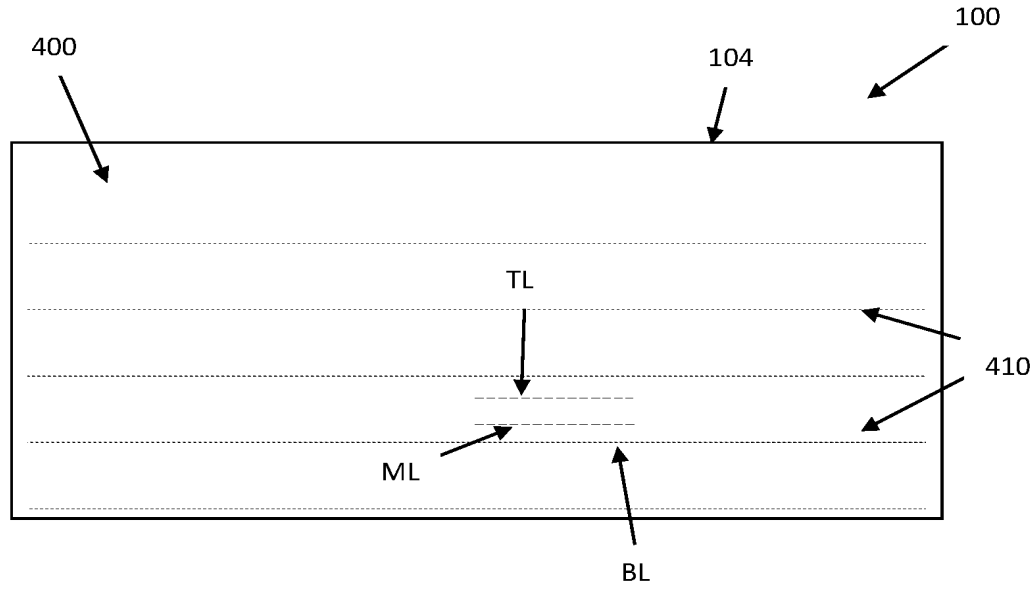

100
400
104
TL
410
ML
BL

FIG. 7

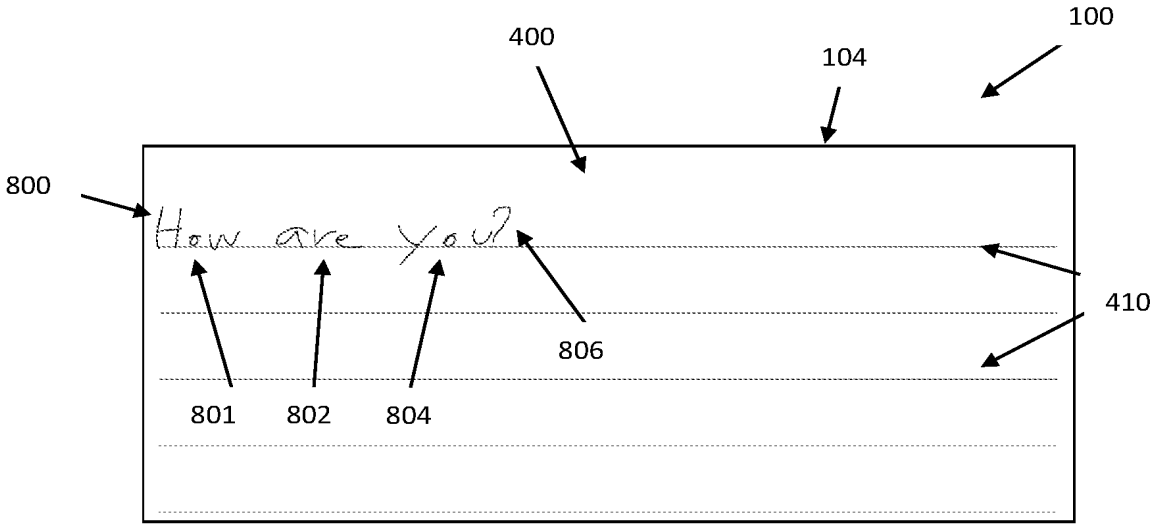

100
400
104
800
How are you?
410
806
801
802
804

FIG. 8

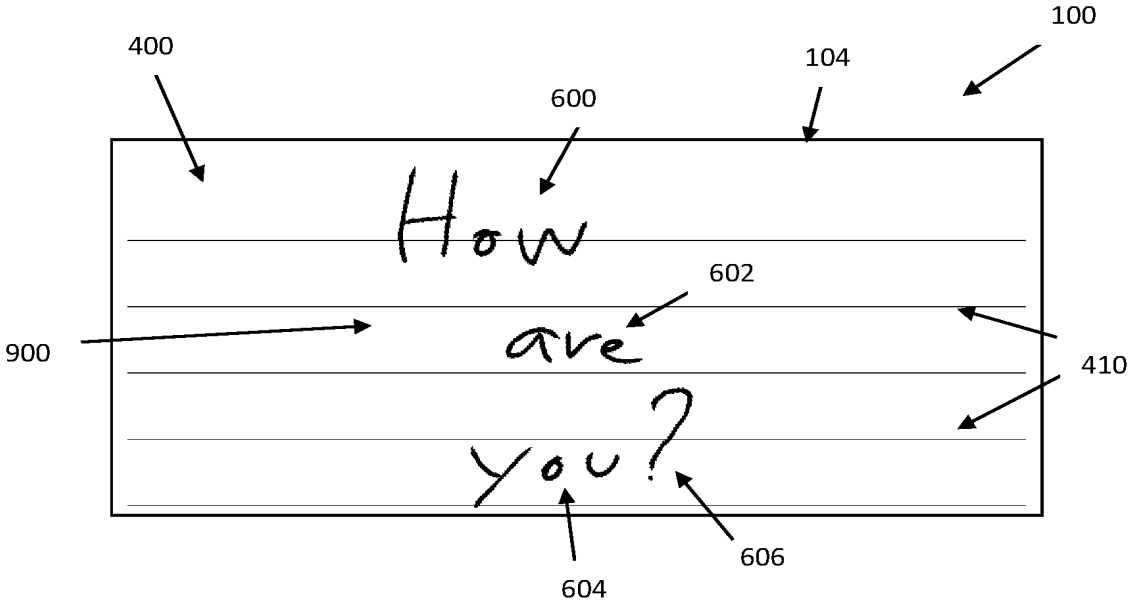

100
400
104
600
How
602
900
are
410
you?
606
604

FIG. 9

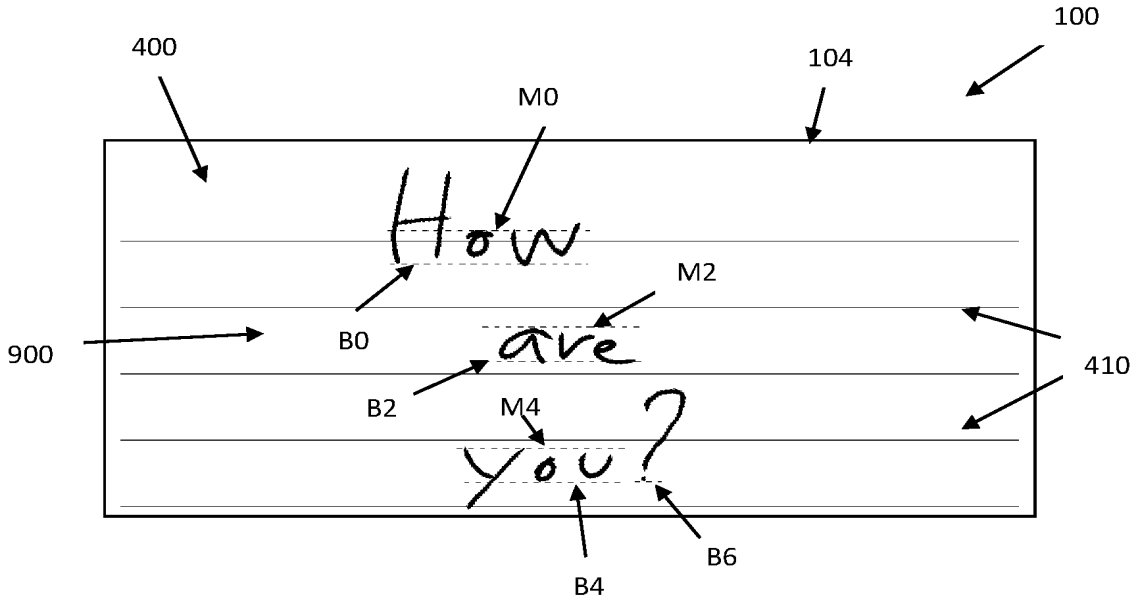

100
400
104
M0
How
M2
B0
are
900
410
B2
M4
you?
B6
B4

FIG. 10

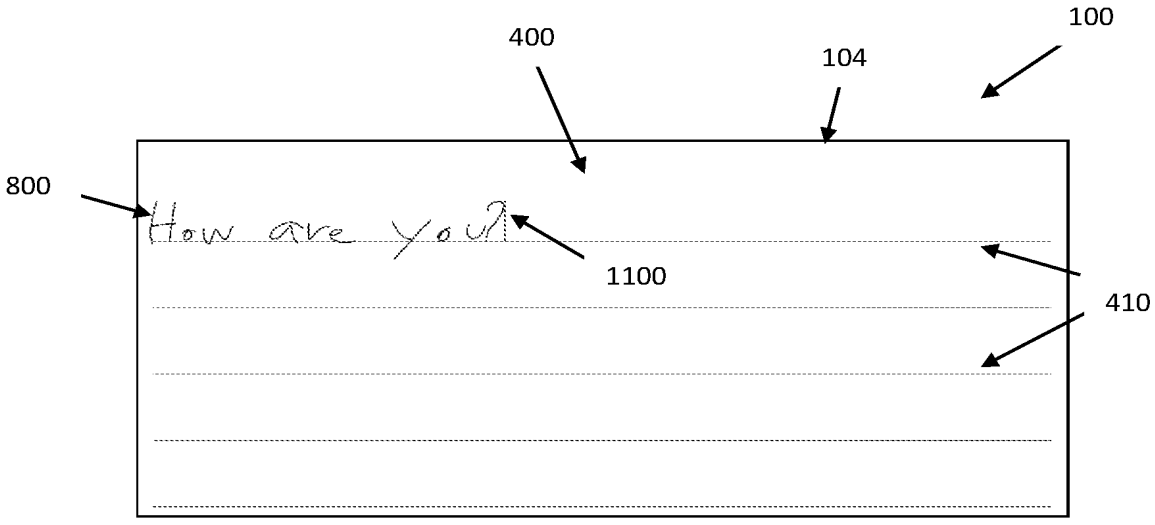

100
400
104
800
How are you?
1100
410

FIG. 11

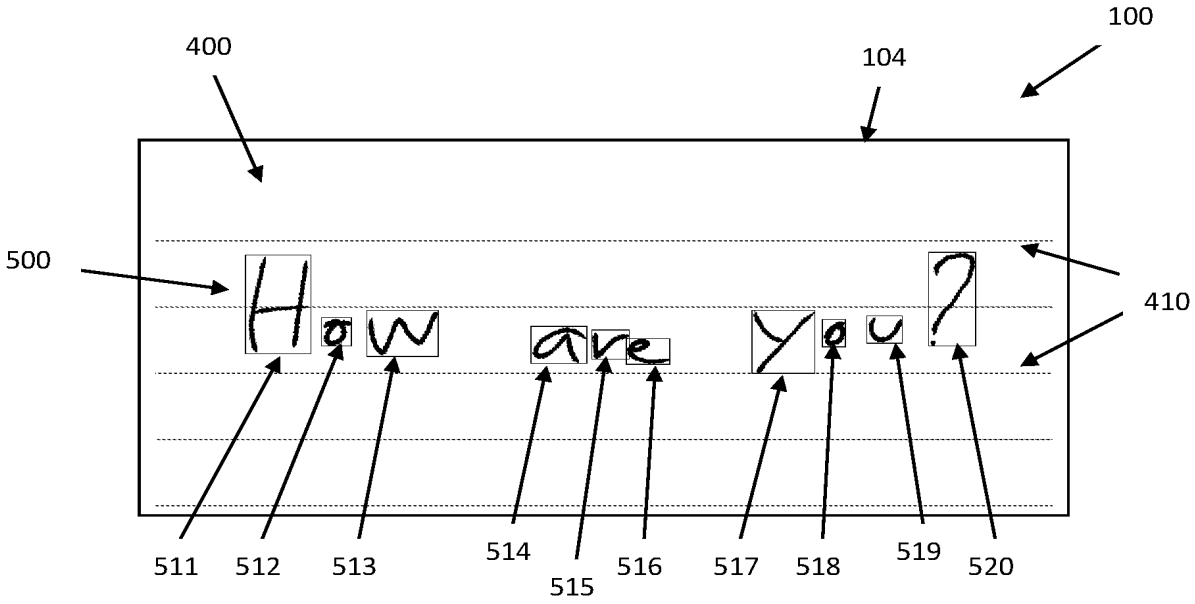

100
400
104
500
How are you ?
410
511
512
513
514
515
516
517
518
519
520

FIG. 12

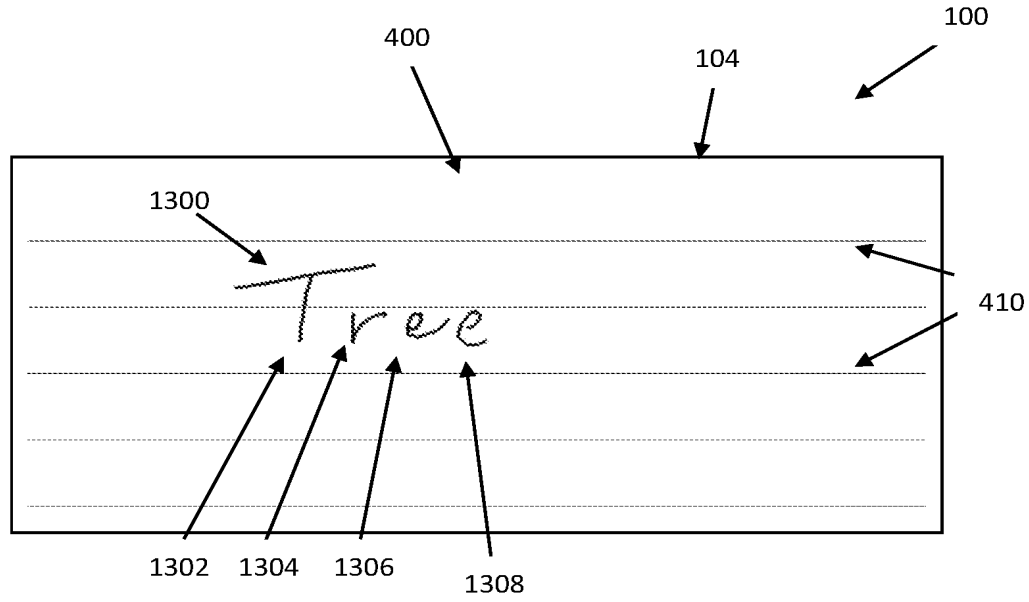

100
400
104
1300
Tree
410
1302
1304
1306
1308

FIG. 13

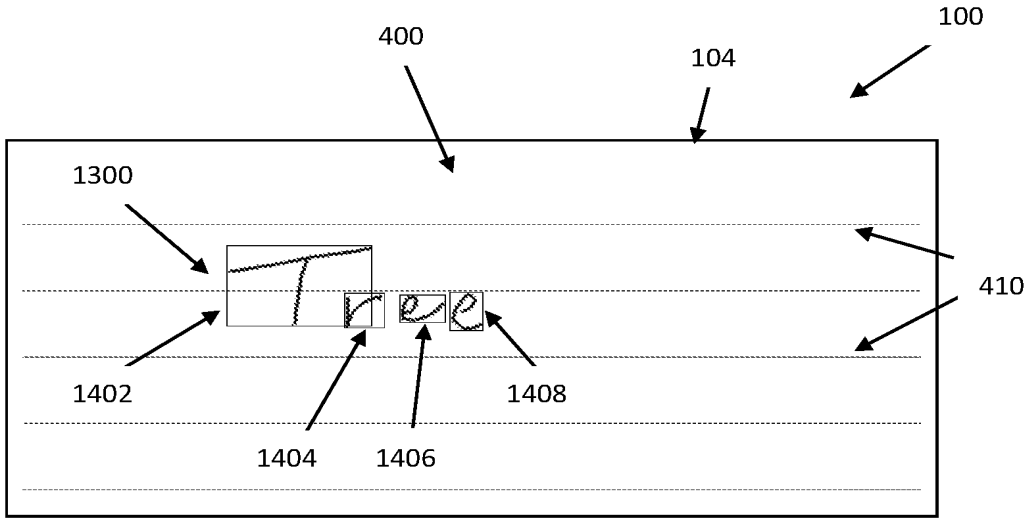

400
104
100
1300
410
1402
1404
1406
1408

FIG. 14

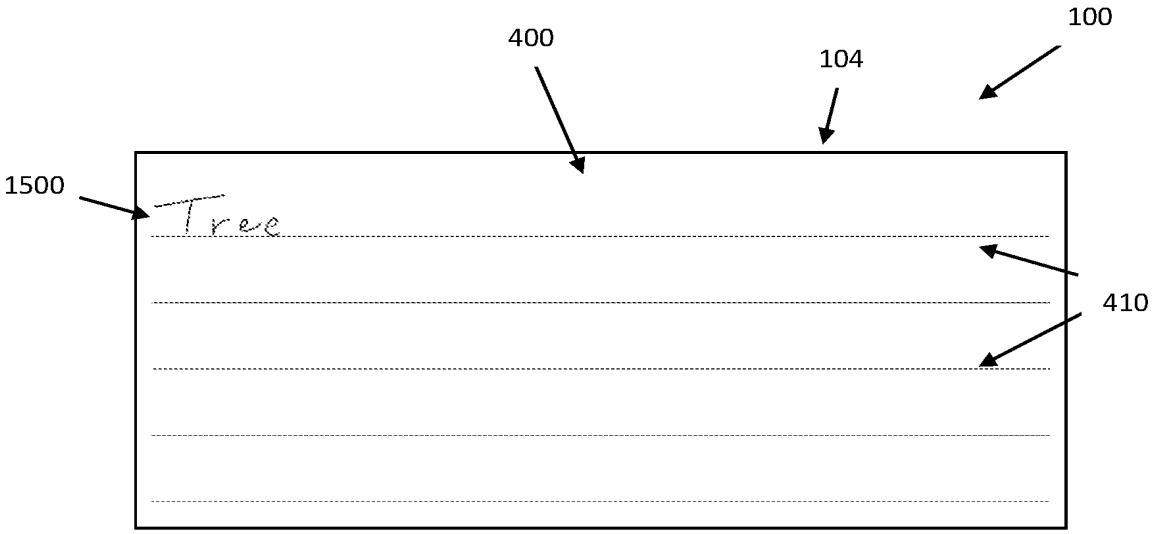

400
104
100
1500
Tree
410

FIG. 15

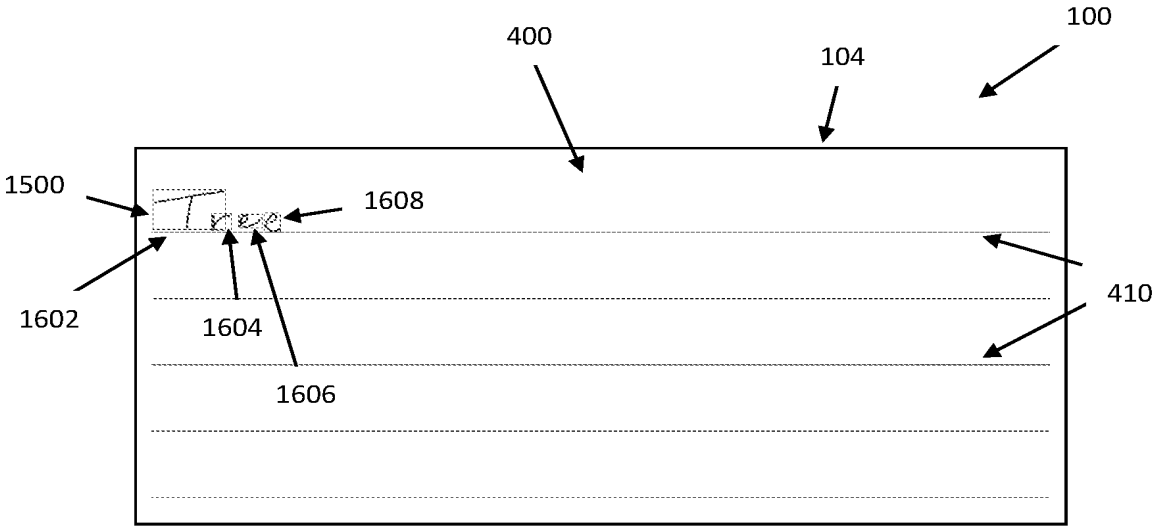


FIG. 16

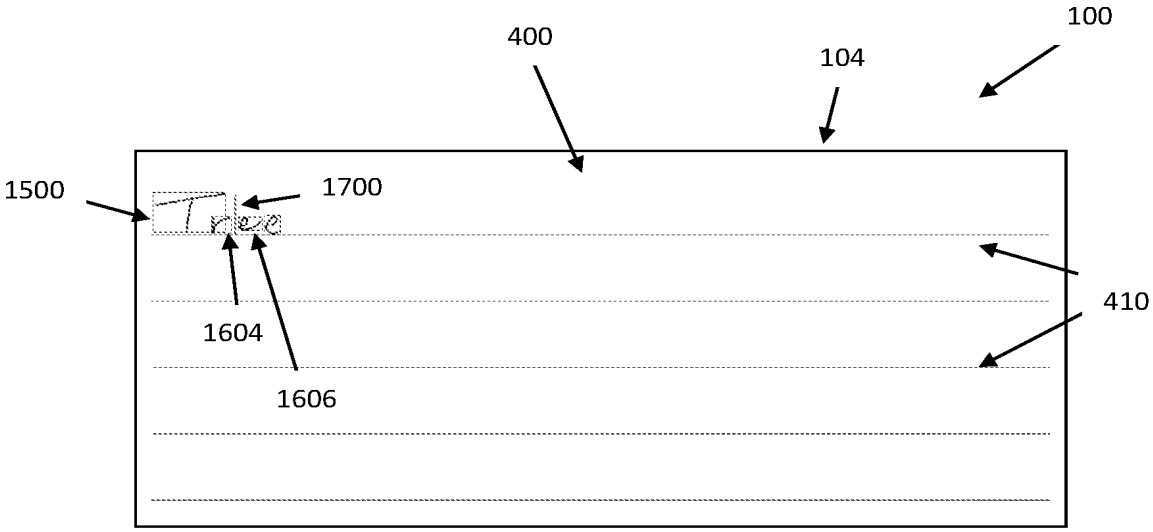


FIG. 17A

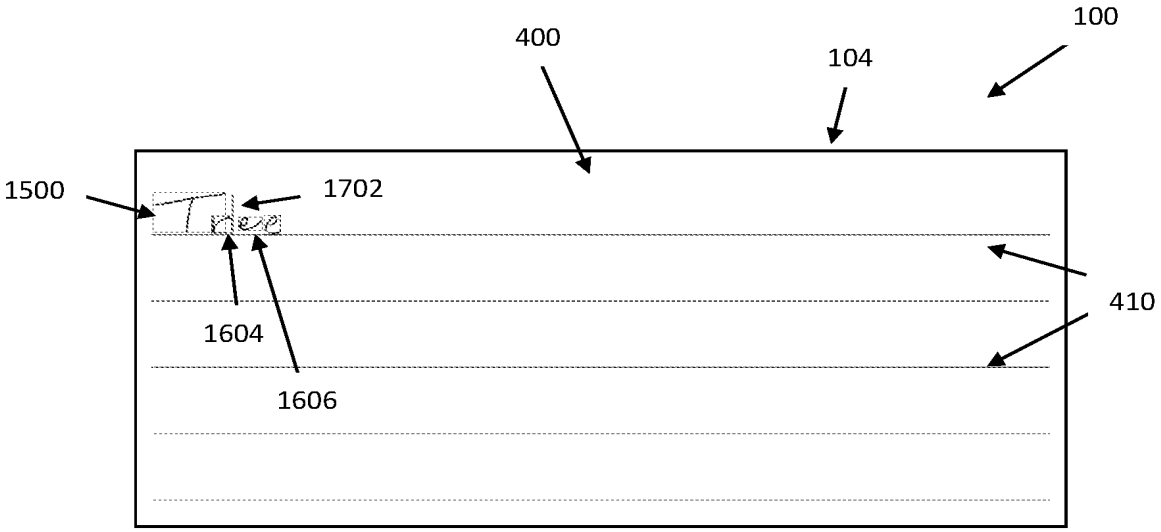


FIG. 17B

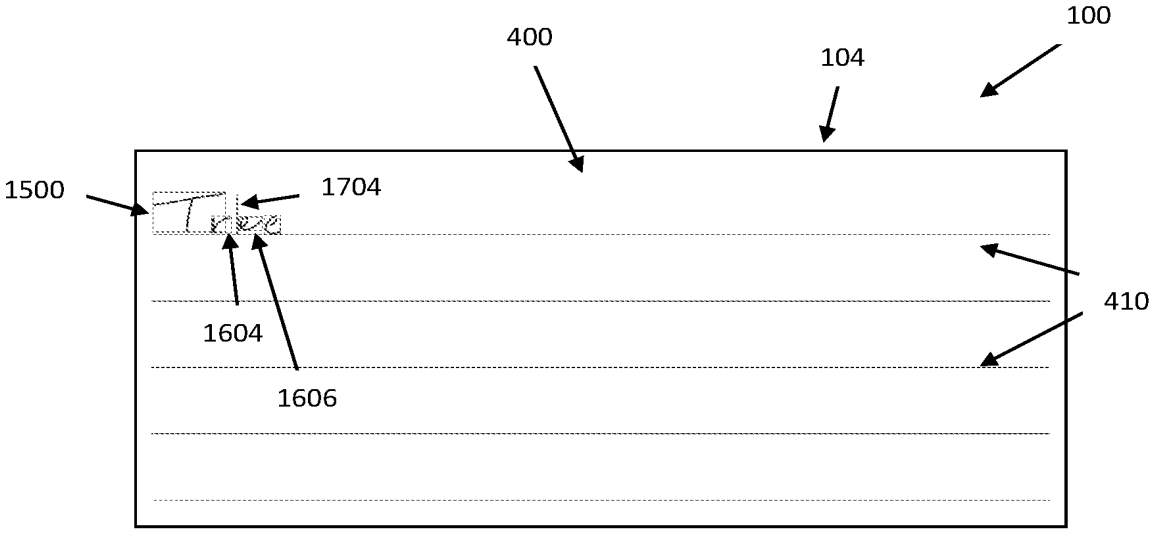


FIG. 17C

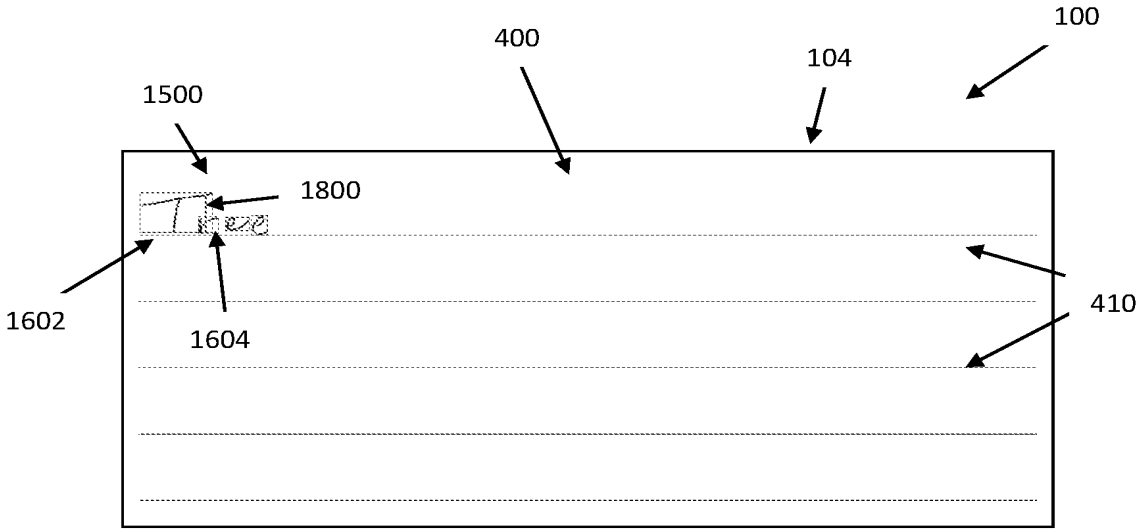


FIG. 18A

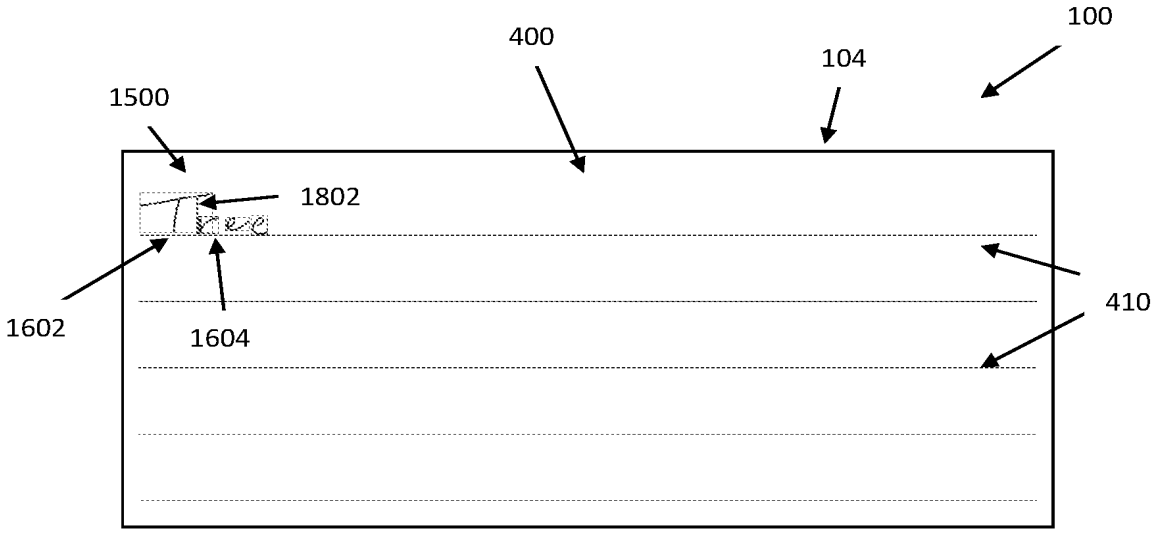


FIG. 18B

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Filer:	Amol A. Parikh/Sarah Goodnight
Attorney Docket Number:	094060-0034

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	70	70
Utility Search Fee	2111	1	300	300
Utility Examination Fee	2311	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Late Filing Fee for Oath or Declaration	2051	1	70	70
Petition:				

Description	Fee Code	Quantity	Amount	Sub Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		800

Electronic Acknowledgement Receipt

EFS ID:	24441265
Application Number:	14978081
International Application Number:	
Confirmation Number:	6051
Title of Invention:	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK
First Named Inventor/Applicant Name:	Edgard Baudry
Customer Number:	1923
Filer:	Amol A. Parikh/Sarah Goodnight
Filer Authorized By:	Amol A. Parikh
Attorney Docket Number:	094060-0034
Receipt Date:	22-DEC-2015
Filing Date:	
Time Stamp:	13:19:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$800
RAM confirmation Number	13345
Deposit Account	130206
Authorized User	MCDERMOTT WILL & EMERY LLP

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1823083 6b06674d2413d52ee516fc2c499be4786f1b103d	no	8
Warnings:					
Information:					
2	Preliminary Amendment	PreliminaryAmendment.pdf	73464 5e68144686e01135a02742b1136abc8f01dc4931	no	6
Warnings:					
Information:					
3		Application.pdf	176868 4e06634476537ed60508ca476c36818947440c75	yes	32

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	25
Claims	26	31
Abstract	32	32

Warnings:					
Information:					
4	Drawings-only black and white line drawings	Drawings.pdf	471996 b9768bc82cbbf5c6f27db0b842e9d3dea20e9164	no	12
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	36884 1381382d916c7889f4d3b6fec4768e66ea9e4f65	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2582295		

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.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

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

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Edgard		Baudry	

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

City	Nantes Cedex 3	Country of Residence i	FR

Mailing Address of Inventor:

Address 1	3 rue de la Rainiere, Parc Club du Perray
Address 2	

City	Nantes Cedex 3	State/Province	
Postal Code	44339	**Country** i	FR

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

Correspondence Information:

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

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

Customer Number	1923		
Email Address	ipdocketmwe@mwe.com	Add Email	Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK		
Attorney Docket Number	094060-0034	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	12	**Suggested Figure for Publication (if any)**	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	1923		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

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

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Foreign Priority Information:

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

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
15290303.5	EP	2015-12-08	

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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

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

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

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Applicant Information:

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

Applicant 1 — Remove

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

Clear

Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
● Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	MyScript		
Mailing Address Information For Applicant:			
Address 1	3 rue de la Rainiere, Parc Club du Perray		
Address 2			
City	Nantes Cedex 3	**State/Province**	
Country	FR	Postal Code	44339
Phone Number		Fax Number	
Email Address			

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

Assignee Information including Non-Applicant Assignee Information:

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

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

Assignee 1

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

Remove

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

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

Mailing Address Information For Assignee including Non-Applicant Assignee:

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

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

Signature:

Remove

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

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Amol A. Parikh/			Date (YYYY-MM-DD)	2015-12-22
First Name	Amol	Last Name	Parikh	Registration Number	

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

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	094060-0034
	Application Number	
Title of Invention	SYSTEM AND METHOD FOR BEAUTIFYING DIGITAL INK	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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