UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 10,108,277 B2
APPLICATION NO. : 15/047013
DATED : October 23, 2018
INVENTOR(S) : Yasuo Oda et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 30, Lines 49-67 Claim 1:

"1. A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator; a signal production circuit configured to generate first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines; wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable."

Should read:

--1. A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;

a signal production circuit configured to generate first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.--

Signed and Sealed this
Eleventh Day of June, 2019

Andrei Iancu
Director of the United States Patent and Trademark Office

Column 31, Lines 25-30 Claim 9:
"9. The pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals."
Should read:
--9. The pen-shaped position indicator according to claim 1, further comprising:
a coil configured to receive an excitation signal; and
a power generation circuit configured to generate a drive voltage based on the excitation signal;
wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.--

Columns 32-33, Line 64-17 Claim 14:
"14. A method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator; forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and trans- mitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguish- able from the first signal; and detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships."
Should read:
--14. A method of detecting angle information of a pen-shaped position indicator, the method comprising:
forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;
forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and
detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.--

Column 32, Lines 54-58 Claim 23:
"23. The method according to claim 22, comprising: forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit."
Should read:

--23. The method according to claim 22, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit.--

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 05/15/2019

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104

EXAMINER	
LU, WILLIAM	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
05/15/2019	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):

USPTOeAction@SeedIP.com
pairlinkdktg@seedip.com

Response to the Request for Certificate of Correction	Patent No. 10108277	Applicant(s) Oda et al.
	Issue Date 10/23/2018	Docket No. 940131.442C4

This is in response to the request for a Certificate of Correction filed 22 January 2019

☑ **Request Approval- In- Part** - Consideration has been given to your request for the issuance of a Certificate of Correction under the provisions of 37 CFR 1.322 and/or 37 CFR 1.323. The Request is improper and approved in part for the reason(s) below:

☐ **Supersede/Vacate** - The Certificate of Correction issued in error, in that error(s) was made in identifying the patent number and/or keying text/corrections. See Other Comments below:

1. ☐ Assignees' names and addresses (assignment data) printed in a patent, are based solely on information supplied in the appropriate space for identifying the assignment data on the Issue Fee Transmittal Form (PTOL-85b). Any request for a patent to be corrected to state the name of the assignee, must state that the assignment was submitted for recordation as set forth in in 37 CFR 3.11 before issuance of the patent. Petition under 3.81 is to be filed for consideration of correction to assignee. The petition fee set forth in 37 CFR 1.17(i)(1) (currently $140, $70, $35 for large, small and micro entities, respectively.

2. ☐ The alleged error in _____, is in fact an Amendment and/or Change made by the examiner and considered to be in accordance with the permissible amendments enumerated in the Manual of Patent Examining Procedure (MPEP) Section 1302.04. Applicant did not file objection or amendment under 37 CFR 1.312 prior to payment of the issue fee.

3. ☐ A petition under CFR 1.182 is required to correct the alleged errors in spelling or order of inventor's names, since inventor's names are printed solely in accordance with the type-written names, and in the order of the type-written names on the Application Data Sheet (ADS). The required fee currently under rule 1.17(f) (small entity $200, large entity $400, micro entity fee $100).

4. ☐ With respect to the alleged error in changing the inventor name on the patent due to clerical error in ADS/OATH of related patents. The inventors name is printed in accordance with the OATH/ADS submitted at the time of filing the application. However, your attention is directed to C.F.R. 1.324, wherein a request is being made to change, add or delete inventor(s), after issuance of the patent.

5. ☐ With respect to the alleged error in _____, comparison of the printed patent with the corresponding location in the application file reveals that there is no discrepancy.

6. ☐ With respect to 37 CFR 1.72, the title should be brief but technically accurate and descriptive and should contain fewer than 500 characters. Inasmuch as the words new, improved, improvement of, and improvement in are not considered as part of the title of an invention, these words should not be included at the beginning of the title of the invention and will be deleted when the Office enters the title into the Offices computer records, and when any patent issues.

7. ☐ The fee for correction under 37 CFR 1.323 is set forth in 37 CFR 1.20(a). ☐Partial fee ☐No fee was received with your request. Full fee payment is required before further action is taken on this request.

8. ☐ With respect to the request for corrected Letters Patent (Grant), corrections to the original Letters Patent are made under the provisions of Rule 1.322(b), not Rule1.323, unless a petition is granted.

9. ☑ Other Comments: See Continuation Sheet

Further correspondence concerning this matter should be filed and directed to the Certificates of Correction Branch.

Legal Instrument Examiner: DENISE HOPKINS Phone: (703)756-5364

Certificates of Correction Branch email:CustomerServiceCoC@uspto.gov CoC Central Phone Number: (703)756-1814

If applicable, information regarding a petition under 37 CFR 1.183 should be directed to the attention of the Commissioner for Patents using the FAX number (571) 273-8300

Continuation of Other Comments: Column 30, Lines 4--67: "different" should read, --differential--- needs clarification on location in the patent

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 02/08/2019

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104

EXAMINER	
LU, WILLIAM	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
02/08/2019	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):

USPTOeAction@SeedIP.com
pairlinkdktg@seedip.com

UNITED STATES PATENT AND TRADEMARK OFFICE

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

Patent No.: 10108277
Issue Date: 23 October 2018
Appl. No.: 15/047,013
Filed: 18 February 2016

PART (A) RESPONSE FOR CERTIFICATES OF CORRECTION

This is a decision on the Certificate of Correction request filed 22 January 2019.

The request for issuance of Certificate of Correction for the above-identified correction(s) under the provisions of 37 CFR 1.322 and/or 1.323 is hereby:

(Check one)
☑ Approved ☐ Approved in Part ☐ Denied

Comments: ____

PART (B) PETITION UNDER 37 CFR 1.324 OR 37 CFR 1.48

☐ This is a decision on the petition filed ____ to correct inventorship under 37 CFR 1.324.

☐ This is a decision on the request under 37 CFR 1.48, petition filed ____. In view of the fact that the patent has already issued, the request under 37 CFR 1.48 has been treated as a petition to correct inventorship under 37 CFR 1.324.

The petition is hereby: ☐ Granted ☐ Dismissed

Comment: ____

The patented filed is being forwarded to Certificate of Corrections Branch for issuance of a certificate naming only the actual inventor or inventors.

/KENT W CHANG/
Supervisory Patent Examiner, Art Unit 2624
Technology Center 2600
Phone: (571)272-7667

Certificates of Correction Branch email: CustomerServiceCoC@uspto.gov CoC Central Phone Number: (703) 756-1814

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No.	:	10,108,277 B2
Issue Date	:	October 23, 2018
Inventor(s)	:	Yasuo Oda et al.
Docket No.	:	940131.442C4
Date	:	January 22, 2019

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

REQUEST FOR CERTIFICATE OF CORRECTION

Commissioner for Patents:

A certificate of correction is respectfully requested in the above-identified patent. The following errors have been made:

In the claims, column 30, issued claim 1, lines 49-67,

"1. A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator; a signal production circuit configured to generate first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines; wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable."

Is incorrect. According to the Amendment After Final, filed on June 15, 2018, the lines should correctly read as follows:

--1. A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 9

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;

a signal production circuit configured to generate first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.--

In the claims, column 31, issued claim 9, lines 25-30,

"9. The pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals."

Is incorrect. According to the Amendment After Final, filed on June 15, 2018, the lines should correctly read as follows:

--9. The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.--

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 10

In the claims, columns 32-33, issued claim 14, lines 64-17,

"14. A method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator; forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and trans- mitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguish- able from the first signal; and detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships."

Is incorrect. According to the Amendment After Final, filed on June 15, 2018, the lines should correctly read as follows:

--14. A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.--

Due to claim renumbering, issued claim 14 appeared as claim 28 during prosecution.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 11

In the claims, column 32, issued claim 23, lines 54-58,

"23. The method according to claim 22, comprising: forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit."

Is incorrect. According to the Amendment After Final, filed on June 15, 2018, the lines should correctly read as follows:

--23. The method according to claim 22, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit.--

Due to claim renumbering, issued claim 23 appeared as claim 37 during prosecution.

Attached is the certificate of correction, which indicates the corrections to be made, by reference to the column and line numbers in the printed patent. Because the errors were made by the Patent Office, no fee is necessary. However if the errors are determined to be ours, the Director is hereby authorized to charge payment of any fees associated with this communication to Deposit Account No. 19-1090.

Respectfully submitted,
SEED Intellectual Property Law Group LLP

/Shoko Leek/
Shoko I. Leek
Registration No.43,746

SIL:scm

Enclosure:
Certificate of Correction

SEED Intellectual Property Law Group LLP
701 Fifth Avenue, Suite 5400
Seattle, Washington 98104-7092
Phone: (206) 622-4900
Fax: (206) 682-6031

6587046_1

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.	: 10,108,277 B2
APPLICATION NO.	: 15/047,013
DATED	: October 23, 2018
INVENTOR(S)	: Yasuo Oda et al.

It is certified that errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 30, Lines 49-67:

"different" should read, --differential--.

"1. A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator; a signal production circuit configured to generate first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines; wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable."

Should read:

--1. A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;

a signal production circuit configured to generate first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.--

MAILING ADDRESS OF SENDER:
Shoko I. Leek
Seed Intellectual Property Law Group LLP
701 Fifth Avenue, Suite 5400
Seattle, Washington 98104

PATENT NO. 10,108,277 B2

No. of additional copies: 0

SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.	: 10,108,277 B2
APPLICATION NO.	: 15/047,013
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INVENTOR(S)	: Yasuo Oda et al.

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Column 31, Lines 25-30:

"9. The pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals."

Should read:

--9. The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.--

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DATED	: October 23, 2018
INVENTOR(S)	: Yasuo Oda et al.

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Columns 32-33, Line 64-17:

"14. A method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator; forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and trans- mitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguish- able from the first signal; and detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships."

Should read:

--14. A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.--

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Column 32, Lines 54-58:

"23. The method according to claim 22, comprising: forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit."

Shoud read:

--23. The method according to claim 22, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit.--.

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PATENT NO. 10,108,277 B2

No. of additional copies: 0

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Electronic Acknowledgement Receipt

EFS ID:	34915716
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Stephen Morehead
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	22-JAN-2019
Filing Date:	18-FEB-2016
Time Stamp:	17:43:23
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	Request for Certificate of Correction	Req_CoC_442C4.pdf	104700 96ae9d71453ef70af996665f295e371cee5f64fc	no	9

Warnings:

Information:	
Total Files Size (in bytes):	104700

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
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www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	10/23/2018	10108277	940131.442C4	1066

500 7590 10/03/2018

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
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SUITE 5400
SEATTLE, WA 98104

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

Yasuo Oda, Saitama, JAPAN;
Wacom Co., Ltd., Saitama, JAPAN;
Sadao Yamamoto, Saitama, JAPAN;
Yoshihisa Sugiyama, Saitama, JAPAN;

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Please enter A.na amendments
W.L.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
Art Unit	:	2624
Date of Notice of Allowance	:	June 12, 2018
Docket No.	:	940131.442C4
Date	:	June 15, 2018

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

AMENDMENT AFTER ALLOWANCE

(UNDER 37 CFR 1.312)

Commissioner for Patents:

In response to the Examiner's request in the Notice of Allowance dated June 12, 2018, please amend the application as follows:

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

Remarks begin on page 8 of this paper.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 21

Sheet 1 of 1

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTORS Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2183

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	NAME	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/W.L/	1	2002/0148655	A1	10/17/02	Cho et al.	
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/W.L/	3	2003/0151596	A1	08/14/03	Moyne et al.	
/W.L/	4	2004/0056849	A1	03/25/04	Lohbihler et al.	
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/W.L/	6	2004/0260507	A1	12/23/04	Chang et al.	
/W.L/	7	2005/0162398	A1	07/28/05	Eliasson et al.	
/W.L/	8	2006/0279549	A1	12/14/06	Zhang et al.	
/W.L/	9	2007/0205996	A1	11/06/07	Huang	
/W.L/	10	2008/0076351	A1	03/27/08	Washiro	
/W.L/	11	2008/0150918	A1	06/26/08	Hagen et al.	
/W.L/	12	2010/0085325	A1	04/08/10	King-Smith et al.	

FOREIGN PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	COUNTRY	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	TRANSLATION YES	TRANSLATION NO
/W.L/	1	200305826	A	11/01/03	TW (with English Abstract)	Corresponds to US 2005/162398A1		X

NON-PATENT LITERATURE DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

/W.L/	1		Taiwanese Office Action issued January 29, 2016, for TW Application No. 104126245, 9 pages.
/W.L/	2		Communication pursuant to Article 94(3) EPC dated November 25, 2015, for EP Application No. 11 150 998.0-1959, 7 pages.

EXAMINER /WILLIAM LU/	DATE CONSIDERED 08/28/2018

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

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.L/

Exhibit 1002 Page 22

Sheet 1 of 1

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTORS Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2183

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/W.L/	10	2008/0076351	A1	03/27/08	Washiro	
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/W.L/	12	2010/0085325	A1	04/08/10	King-Smith et al.	

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EXAMINER /WILLIAM LU/	DATE CONSIDERED 06/22/2018

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.L/ Exhibit 1002 Page 23

Sheet 1 of 1

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTORS Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2183

U.S. PATENT DOCUMENTS

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/W.L/	9	2007/0205996	A1	11/06/07	Huang /W.L/	
/W.L/	10	2008/0076351	A1	03/27/08	Washiro	
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/W.L/	12	2010/0085325	A1	04/08/10	King-Smith et al.	

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EXAMINER /WILLIAM LU/	DATE CONSIDERED 06/22/2018

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.

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Exhibit 1002 Page 24

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 06/21/2018

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WASHINGTON 98104
UNITED STATES OF AMERICA

EXAMINER	
LU, WILLIAM	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
06/21/2018	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):

USPTOeAction@SeedIP.com
pairlinkdktg@seedip.com

Notice of Allowability	Application No. 15/047,013	Applicant(s) Oda et al.	
	Examiner WILLIAM LU	Art Unit 2624	AIA Status No

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

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

1. ☑ This communication is responsive to the Notice of Allowance filed June 12th 2018.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☑ The allowed claim(s) is/are 1-9 and 24-39 . 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 _____.

/WILLIAM LU/
Examiner, Art Unit 2624

Sheet 1 of 1

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTORS Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2183

U.S. PATENT DOCUMENTS

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/W.L/	12	2010/0085325	A1	04/08/10	King-Smith et al.	

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EXAMINER /WILLIAM LU/	DATE CONSIDERED 04/28/2016

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.

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Exhibit 1002 Page 27

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
Art Unit	:	2624
Date of Notice of Allowance	:	June 12, 2018
Docket No.	:	940131.442C4
Date	:	June 15, 2018

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

AMENDMENT AFTER ALLOWANCE

(UNDER 37 CFR 1.312)

Commissioner for Patents:

In response to the Examiner's request in the Notice of Allowance dated June 12, 2018, please amend the application as follows:

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

Remarks begin on page 8 of this paper.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 28

Amendments to the Claims:

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

Listing of Claims:

1. (Previously Presented) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;

a signal production circuit configured to generate first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

2. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 29

3. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

4. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

5. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

6. (Previously Presented) The pen-shaped position indicator according to claim 3, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

7. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other.

8. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other.

9. (Previously Presented) The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 30

wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.

10-23. (Canceled)

24. (Currently Amended) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

[[a]] first and second electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and

a signal production circuit configured to generate [[a]] first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form [[a]] first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

25. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits a signal via a conductive line.

26. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

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27. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

28. (Previously Presented) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

29. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

30. (Previously Presented) The method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

31. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

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32. (Previously Presented) The method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

33. (Previously Presented) The method according to claim 30, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

34. (Previously Presented) The method according to claim 28, wherein the first and second signals are different in type from each other.

35. (Previously Presented) The method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other.

36. (Currently Amended) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming [[a]] first and second capacitive relationships between a sensor surface and [[a]] first and second electrodes, respectively, wherein the first and second electrodes are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator, and wherein the first and second electrodes are supplied with [[a]] first and second signals generated by a signal production circuit via ~~a conductive~~ first and second lines, respectively, wherein the first and second signals are distinguishable from each other; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

37. (Previously Presented) The method according to claim 36, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 33

38. (Previously Presented) The method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

39. (Previously Presented) The method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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REMARKS

In reviewing the allowed claims set forth in the examiner's amendment in the notice of allowance mailed June 12, 2018, applicant noted minor typographical errors in claims 24 and 36 and submits the present amendment to correct the errors. No new matter is added by way of this amendment and entry thereof is respectfully requested.

Respectfully submitted,

SEED Intellectual Property Law Group LLP

/Shoko Leek/
Shoko I. Leek
Registration No. 43,746

SIL:mck

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6246215_1

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 35

Electronic Patent Application Fee Transmittal

Application Number:	15047013
Filing Date:	18-Feb-2016
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Filer:	Shoko I. Leek/Maria Krebs
Attorney Docket Number:	940131.442C4

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	1000	1000

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
PRINTED COPY OF PATENT - NO COLOR	8001	1	3	3
		Total in USD ($)		**1003**

Electronic Acknowledgement Receipt

EFS ID:	32912494
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Maria Krebs
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	15-JUN-2018
Filing Date:	18-FEB-2016
Time Stamp:	15:20:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1003
RAM confirmation Number	061818INTEFSW15211900
Deposit Account	
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	940131_442C4_Issue_Fee.pdf	184012 3e15ebd0cdebf61a0c3328e47858996940fc8f7d	no	1
Warnings:					
Information:					
2		940131_442C4_312.pdf	83245 7e996ad1b86fd0fef7e59157fef48324b401e964	yes	8

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment after Notice of Allowance (Rule 312)	1	1
Claims	2	7
Applicant Arguments/Remarks Made in an Amendment	8	8

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	31860 5655df7f9f5e72e265742d070d21f4fe16c2a2a9	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	299117		

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.

PART B - FEE(S) TRANSMITTAL

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

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

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

500 7590 06/12/2018

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WASHINGTON 98104
UNITED STATES OF AMERICA

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

TITLE OF INVENTION: POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	09/12/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
LU, WILLIAM	2624	345-174000

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

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

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

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

1 Seed IP Law Group LLP
2
3

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

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

(A) NAME OF ASSIGNEE: Wacom Co., Ltd.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Saitama, JP

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

4a. The following fee(s) are submitted:

☒ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☒ Advance Order - # of Copies 1

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

☐ A check is enclosed.

☒ Payment by credit card. ~~Form PTO-2038 is attached.~~

☒ The director is hereby authorized to charge ~~the required fee(s),~~ any deficiency, or credits any overpayment, to Deposit Account Number 19-1090 ~~(enclose an extra copy of this form).~~

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ 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 /Shoko Leek/ Date June 15, 2018

Typed or printed name Shoko I. Leek Registration No. 43,746

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.

Exhibit 1002 Page 41

UNITED STATES PATENT AND TRADEMARK OFFICE

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

NOTICE OF ALLOWANCE AND FEE(S) DUE

500 7590 06/12/2018

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WASHINGTON 98104
UNITED STATES OF AMERICA

EXAMINER
LU, WILLIAM

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 06/12/2018

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

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nonprovisional	UNDISCOUNTED	$1000	$0.00	$0.00	$1000	09/12/2018

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 42

PART B - FEE(S) TRANSMITTAL

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

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

500 7590 06/12/2018

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
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SEATTLE, WASHINGTON 98104
UNITED STATES OF AMERICA

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

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EXAMINER	ART UNIT	CLASS-SUBCLASS
LU, WILLIAM	2624	345-174000

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

1 _____
2 _____
3 _____

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

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

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

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

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

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

❑ A check is enclosed.

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

❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

❑ Applicant certifying micro entity status. See 37 CFR 1.29

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.

Exhibit 1002 Page 43

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 06/12/2018

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WASHINGTON 98104
UNITED STATES OF AMERICA

EXAMINER	
LU, WILLIAM	
ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 06/12/2018

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.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 44

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

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

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

Privacy Act Statement

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

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

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

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 45

Notice of Allowability	Application No. 15/047,013	Applicant(s) Oda et al.	
	Examiner WILLIAM LU	Art Unit 2624	AIA Status No

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

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

1. ☑ This communication is responsive to 04 April 2018.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☑ The allowed claim(s) is/are 1-9 and 24-39 . 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 _____.

/WILLIAM LU/
Examiner, Art Unit 2624

DETAILED ACTION

1. Claims 1-9, 24-39 filed April 4th 2018 are pending in the current application.

Notice of Pre-AIA or AIA Status

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

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 4th 20178 has been entered.

EXAMINER'S AMENDMENT

4. Authorization for this examiner's amendment was given in an interview with Shoko Leek (Reg#43746) on May 30th 2018.

5. The application has been amended as follows:

1. (Previously Presented) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator; a signal production circuit configured to generate first and

second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines; wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

2. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

3. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

4. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the penshaped position indicator.

5. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

6. (Currently Amended) The pen-shaped position indicator according to ~~claim 1~~ claim 3, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

7. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other.

8. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other.

9. (Previously Presented) The pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.

10-23. (Canceled)

24. (Currently Amended) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a ~~plurality of~~ first and second electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and a signal production circuit configured to generate a ~~plurality of~~ first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the ~~plurality~~

~~of~~ first and second electrodes, respectively, wherein the ~~plurality of~~ first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines; wherein the ~~plurality of~~ first and second electrodes are configured to form a ~~plurality of~~ first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the penshaped position indicator is obtainable.

25. (Currently Amended) The pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits ~~one of the plurality of signals via one of the conductive lines~~ a signal via a conductive line.

26. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

27. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

28. (Previously Presented) A method of detecting angle information of a penshaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator; forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion

different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

29. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

30. (Previously Presented) The method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the penshaped position indicator.

31. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

32. (Previously Presented) The method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

33. (Currently Amended) The method according to ~~claim 28~~ claim 30, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

34. (Previously Presented) The method according to claim 28, wherein the first and second signals are different in type from each other.

35. (Previously Presented) The method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other.

36. (Currently Amended) A method of detecting angle information of a penshaped position indicator, the method comprising: forming a ~~plurality of~~ first and second capacitive relationships between a sensor surface and a ~~plurality of~~ first and second electrodes, ~~which~~ respectively, wherein the first and second electrodes are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator, and wherein the ~~plurality of~~ first and second electrodes are supplied with a ~~plurality of~~ first and second signals generated by a signal production circuit via a ~~plurality of~~ conductive first and second lines, respectively, wherein the ~~plurality of~~ first and second signals are distinguishable from each other; and detecting angular information of the pen-shaped position indicator based on the ~~plurality of~~ first and second capacitive relationships.

37. (Currently Amended) The method according to claim 36, comprising: forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which ~~one of the plurality of signals~~ a signal is supplied from the signal production circuit.

38. (Previously Presented) The method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

39. (Previously Presented) The method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

Reasons for Allowance

6. The following is an examiner's statement of reasons for allowance: The invention is most clearly presented in figures 12A and 12B where the pen where a first signal (C1) is driven to one electrode in the pen tip and a second signal (C2) is driven to a second electrode. Each of the electrodes driven with a distinguishable signal creates a capacitive relationship with the sensor surface. The claims have been amended to clarify that the plurality of capacitive relationships are between each electrode and the sensor surface rather than the multiple lines in a capacitive touch screen and the plurality of electrodes in the pen (as would be present in previously cited Katsurahira et al. (US2005/0128191)). While multiple electrostatic relationships between the pen and tablet are present in the prior art and the positioning of the electrodes are present in the adjacent art of signature verification pens, it would not have been obvious to combine all of the elements from these disparate arts in this fashion.

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

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM LU whose telephone number is (571)270-1809. The examiner can normally be reached on 10am-6:30pm.

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, Kent Chang can be reached on 27667. 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.

WILLIAM LU
Examiner
Art Unit 2624

/WILLIAM LU/
Examiner, Art Unit 2624

Applicant-Initiated Interview Summary	**Application No.** 15/047,013	**Applicant(s)** Oda et al.	
	Examiner WILLIAM LU	**Art Unit** 2624	**AIA Status** No

All participants (applicant, applicants representative, PTO personnel):

(1) WILLIAM LU. (3) _____.

(2) SHOKO LEEK (Reg#43746). (4) _____.

Date of Interview: 30 May 2018.

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

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

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

Claim(s) discussed: 1,24,28 and 36.

Identification of prior art discussed: _____.

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

Review of prior art applied. Examiner's interpretation of the claims was clarified.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

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

☐ Attachment

/WILLIAM LU/ Examiner, Art Unit 2624	

Summary of Record of Interview Requirements

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

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

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

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

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

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

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

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

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

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

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

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

Examiner to Check for Accuracy

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

Notice of References Cited	Application/Control No. 15/047,013	Applicant(s)/Patent Under Reexamination Oda et al.	
	Examiner WILLIAM LU	Art Unit 2624	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-5422959-A	06-1995	Lee; Michael E.	G06K9/00154	382/119
*	B	US-7719515-B2	05-2010	Fujiwara; Koji	G06F3/03545	345/156
*	C	US-5117071-A	05-1992	Greanias; Evon C.	G06F3/03545	345/174
	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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/047,013	Oda et al.
	Examiner	**Art Unit**
	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016	07/24/2017	12/08/2017	06/01/2018				
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2	2	✓	✓	✓	✓	=				
3	3	✓	✓	✓	✓	=				
4	4	✓	✓	✓	✓	=				
5	5	✓	✓	✓	✓	=				
6	6	✓	✓	✓	✓	=				
7	7	✓	✓	✓	✓	=				
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23	37		✓	✓	✓	=				
24	38		✓	✓	✓	=				
25	39		✓	✓	✓	=				

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/047,013	Oda et al.
	Examiner	Art Unit
	WILLIAM LU	2624

CPC - Searched*		
Symbol	Date	Examiner
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	4/29/2016	WL
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	11/28/2016	WL
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	7/24/2017	WL
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	06/01/2018	WL

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.

/WILLIAM LU/ Examiner, Art Unit 2624	

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 59

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/047,013	Oda et al.
	Examiner	Art Unit
	WILLIAM LU	2624

Search Notes		
Search Notes	**Date**	**Examiner**
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	4/29/2016	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	4/29/2016	WL
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	11/28/2016	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	11/28/2016	WL
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	7/24/2017	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	7/24/2017	WL
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	06/01/2018	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	06/01/2018	WL

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
	G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	06/01/2018	WL

/WILLIAM LU/ Examiner, Art Unit 2624	

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 60

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/047,013	Oda et al.
	Examiner	**Art Unit**
	WILLIAM LU	2624

CPC								
Symbol							**Type**	**Version**
G06F	/	3	/	03545			F	2013-01-01
G06F	/	3	/	046			I	2013-01-01
G06F	/	3	/	044			I	2013-01-01
G06F	/	3	/	0383			I	2013-01-01
G06F	/	3	/	0416			I	2013-01-01

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	25	
/WILLIAM LU/ Examiner, Art Unit 2624	01 June 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	12A

U.S. Patent and Trademark Office

Part of Paper No.: 20180601

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 61

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/047,013	Oda et al.
	Examiner	**Art Unit**
	WILLIAM LU	2624

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06F	/	3	/	0354

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	25	
/WILLIAM LU/ Examiner, Art Unit 2624	01 June 2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	12A

U.S. Patent and Trademark Office

Part of Paper No.: 20180601

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/047,013	Oda et al.
	Examiner	**Art Unit**
	WILLIAM LU	2624

☐ 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
1	1	10	24	19	33										
2	2	11	25	20	34										
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6	6	15	29	24	38										
7	7	16	30	25	39										
8	8	17	31												
9	9	18	32												

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 25	
/WILLIAM LU/ Examiner, Art Unit 2624 (Primary Examiner) 01 June 2018 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 12A

U.S. Patent and Trademark Office Part of Paper No.: 20180601

Bibliographic Data

Application No: 15/047,013

Foreign Priority claimed: (●) Yes ( ) No

35 USC 119 (a-d) conditions met: [✓] Yes [ ] No | [ ] Met After Allowance

Verified and Acknowledged: /WILLIAM LU/ | Examiner's Signature | Initials

Title: POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/18/2016	345	2624	940131.442C4
RULE			

APPLICANTS

Wacom Co., Ltd., Saitama, JAPAN

INVENTORS

Yasuo Oda Saitama, JAPAN

Sadao Yamamoto Saitama, JAPAN

Yoshihisa Sugiyama Saitama, JAPAN

CONTINUING DATA

This application is a CON of 14542438 11/14/2014 PAT 9529456

14542438 is a CON of 12877780 09/08/2010 PAT 8963889

FOREIGN APPLICATIONS

JAPAN 2010-024858 02/05/2010

IF REQUIRED, FOREIGN LICENSE GRANTED**

03/02/2016

STATE OR COUNTRY

JAPAN

ADDRESS

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701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104
UNITED STATES

FILING FEE RECEIVED

$6,400

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	135	("2009/0058830").URPN.	USPAT	OR	ON	2017/07/28 14:08
L2	158	glove and touch near2 event and g06f.cpcl.	USPAT	OR	ON	2017/07/28 14:34
L3	8	glove same touch near2 event and g06f.cpcl.	USPAT	OR	ON	2017/07/28 14:34
L4	55	glove same touch near2 event and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/07/28 14:34
S1	16	(("OGAWA") near3 ("Shinya")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 07:32
S2	121	(("TAKAHASHI") near3 ("Mamoru")).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 07:32
S3	137	S1 or S2	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:32
S4	2	S3 and second near2 touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:32
S5	22681	g06f.cpcl. and second near2 touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:33
S6	264	g06f.cpcl. and second near2 touch and lag	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:33
S7	2518	g06f.cpcl. and second near2 touch and (lag or delay)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:33
S8	337	g06f.cpcl. and second near2 touch and (lag or delay) and (hover$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:34
S9	7818	g06f.cpcl. and finger near5 (hover$4 or proximity)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:41
S10	4677	g06f.cpcl. and finger near2 (hover$4 or proximity)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:42
S11	1021	g06f.cpcl. and finger near2 (hover$4 or proximity) and	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2017/02/06 07:42

		(delay or lag)	JPO; DERWENT; IBM_TDB			
S12	407	g06f.cpcl. and finger near2 (hover$4 or proximity) and (delay or lag) and multi$touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:42
S13	18	g06f.cpcl. and finger near2 (hover$4 or proximity) same (delay or lag) and multi$touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:42
S14	704	g06f.cpcl. and finger near2 (hover$4 or proximity) same touch and (delay or lag)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:44
S15	15	g06f.cpcl. and finger near2 (hover$4 or proximity) same first near2 touch and (delay or lag)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:50
S16	3	"8884897"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:53
S17	7	proximity near2 threshold and second near2 touch near2 event	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:56
S18	63	distance near2 threshold and second near2 touch near2 event	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 07:57
S19	487	touch$4 same hover$4 same gesture and (lag or delay)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 08:03
S20	0	"15379340"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/02/06 08:11
S21	4055	g06f.cpcl. and glove and proximity	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/07/28 12:26
S22	771	g06f.cpcl. and glove and proximity and touch near2 input and threshold	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/07/28 12:26
S23	1	"15379340"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/07/28 12:38

7/ 28/ 2017 4:54:54 PM
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UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Automated Interview Request (AIR)

May 11 2018

This paper requesting to schedule and/or conduct an interview is appropriate because:

This submission is requested to be accepted as an authorization for this interview to communicate via the internet. Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned concerning scheduling of the interview via video conference, instant messaging, or electronic mail, and to conduct the interview in accordance with office practice including video conferencing.

Name(s):
Shoko Leek

S-signature:
/Shoko Leek/

Registration Number:
43746

U.S. Application Number:
15047013

Confirmation Number:
1066

E-mail Address:
ShokoL@SeedIP.com

Phone Number:
2066944874

Proposed Time of Interview:
6-18-2018 11:00 AM ET

Prefered Interview Type:
In-person

I am the applicant or applicant's representative for this application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/047,013	Filing Date 02/18/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT **04/04/2018**

	(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))	* 25	Minus	** 25	= 0	X $100 =	0
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $460 =	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
STEPHEN W. HOOVER

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.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. 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	15047013	Filing Date	2016-02-18	Docket Number (if applicable)	940131.442C4	Art Unit	2624
First Named Inventor	Yasuo Oda			Examiner Name	William Lu		

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 Petition for Extension of Time, Fee Deficiency Authorization

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 _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. 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.

Signature of Registered U.S. Patent Practitioner			
Signature	/Shoko Leek/	Date (YYYY-MM-DD)	2018-04-04
Name	Shoko I. Leek	Registration Number	43746

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.

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

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether 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 7/31/2016. 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 displays a valid OMB control number.

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

Docket Number (Optional): 940131.442C4

Application Number: 15/047,013

Filed: February 18, 2016

For: POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Art Unit: 2624

Examiner: William Lu

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	$ 200
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	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 _____.

☑ 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 43,746.

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

/Shoko Leek/ — Signature

April 4, 2018 — Date

Shoko I. Leek — Typed or printed name

206-622-4900 — 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.

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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	April 4, 2018

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

FEE DEFICIENCY AUTHORIZATION FORM

Commissioner for Patents:

Applicant(s) hereby authorize(s) the Director to charge any deficiencies or credit any overpayment in fees due by way of the enclosed papers only to Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group LLP

/Shoko Leek/
Shoko I. Leek
Registration No. 43,746

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

6122297_1

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 74

Electronic Patent Application Fee Transmittal

Application Number:	15047013
Filing Date:	18-Feb-2016
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Filer:	Shoko I. Leek/Kathleen Retan
Attorney Docket Number:	940131.442C4

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
		Total in USD ($)		**2100**

Electronic Acknowledgement Receipt

EFS ID:	32243152
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek
Filer Authorized By:	
Attorney Docket Number:	940131.442C4
Receipt Date:	04-APR-2018
Filing Date:	18-FEB-2016
Time Stamp:	18:03:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2100
RAM confirmation Number	040518INTEFSW18043900
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	Request for Continued Examination (RCE)	940131_442C4_RCE.pdf	697642 0546eb171113ffe97f56f91683ce78f6fd10871c	no	3
Warnings:					
Information:					
2	Extension of Time	940131_442C4_EOT.pdf	163322 ee05f8d3699b5958076a970f259cdc7106ba9d02	no	2
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	940131_442C4_FDA.pdf	46889 acbb9b1179371186e298cd28ad4d9af41ac30f5b	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32669 b23067c0cc759eda552fd269a4c04e352dc1f9cf	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	940522		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	January 5, 2018

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

RESPONSE UNDER 37 CFR 1.116

Commissioner for Patents:

In response to the Office Action dated December 12, 2017, please amend the application as follows:

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

Remarks begin on page 8 of this paper.

Amendments to the Claims:

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

Listing of Claims:

1. (Currently Amended) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;

a signal production circuit configured to generate first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

2. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

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3. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

4. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

5. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

6. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

7. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other.

8. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other.

9. (Previously Presented) The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

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wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.

10-23. (Canceled)

24. (Previously Presented) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and

a signal production circuit configured to generate a plurality of signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the plurality of electrodes, respectively, wherein the plurality of signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

25. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits one of the plurality of signals via one of the conductive lines.

26. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

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27. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

28. (Currently Amended) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

29. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

30. (Previously Presented) The method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

31. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

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32. (Previously Presented) The method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

33. (Previously Presented) The method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

34. (Previously Presented) The method according to claim 28, wherein the first and second signals are different in type from each other.

35. (Previously Presented) The method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other.

36. (Previously Presented) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator, wherein the plurality of electrodes are supplied with a plurality of signals generated by a signal production circuit via a plurality of conductive lines, respectively, wherein the plurality of signals are distinguishable from each other; and

detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships.

37. (Previously Presented) The method according to claim 36, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied.

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38. (Previously Presented) The method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

39. (Previously Presented) The method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

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REMARKS

The Examiner is thanked for the clearly stated action and for conducting a telephone interview on January 4, 2018. The present amendment is filed in view of the discussion during the interview. Claims 1–9 and 24–39 are pending, of which claims 1, 24, 28, and 36 are independent claims. Claims 1 and 28 are currently amended. No new matter has been added to the application.

Rejections under 35 U.S.C. § 103

Claims 1, 3-9, 24-28, and 30-39 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073) in view of Lee (US5,422,959)

Claims 2 and 29 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al., Chainer et al., Fukushima et al., and Lee (US5,422,959) as applied to claim 1, in further view of Lee (US2010/0067674).

In response, applicant has amended claims 1 and 28, as set forth above, to emphasize that a second electrode, to which a second signal distinguishable from a first signal supplied to a first electrode is supplied, is arranged at a position that is "off an axis of the pen-shaped position indicator" (*e.g.*, *surrounding* the axis of the position indicator). Fukushima (US2003/0142073), in ¶[0083], describes generating "signals having varying frequencies (… fu, fv, and fw)" and outputting a selected signal via a transmitting circuit to the "coils 103-105 of indicating device 101" as shown in Fig. 2. Fukushima, however, is silent as to positioning a second electrode, to which a second signal distinguishable from a first signal supplied to a first electrode is supplied, "off an axis of the pen-shaped position indicator" as now more particularly recited in claims 1 and 28. Similarly, Fukushima is silent as to arranging "a plurality of electrodes" so as "to surround an axis of the pen-shaped [position] indicator" as already recited in claims 24 and 36. The rest of the prior art is not reasonably modifiable or combinable with Fukushima to render claims 1 and 28 and 24 and 36 obvious. For example, Katsurahira (US2005/0128191) teaches electrode 72 that surrounds electrode 71 in Fig. 4. However, Katsurahira's electrodes 72 and 71 generate an electric field therebetween when power

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is supplied to the oscillator 70 connected between the electrodes 72 and 71 (para 73) and, as such, electrode 72 cannot be reasonably modified to, or substituted for, the "second electrode" to which a second signal distinguishable from a first signal supplied to a first electrode is supplied, as claimed.

Based on the foregoing, applicant respectfully submits that claims 1, 24, 28, and 36, as amended, now more particularly recite the subject matter that is clearly allowable over the cited and applied prior art references. Allowance of these claims as well as their respective dependent claims is respectfully requested.

Conclusion

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

SEED Intellectual Property Law Group LLP

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

PTO/SB/434 (05-13)

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

Practitioner Docket No.:	Application No.:	Filing Date:
940131.442C4	15/047,013	February 18, 2016
First Named Inventor:	**Title:**	
Yasuo Oda	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:
    - Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
    - The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
        - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
        - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
            - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
            - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/Shoko Leek/	January 5, 2018
Name (Print/Typed)	**Practitioner Registration No.**
Shoko I. Leek	43,746

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

☑ * Total of 1 forms are submitted.

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:	31417452
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Maria Krebs
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	05-JAN-2018
Filing Date:	18-FEB-2016
Time Stamp:	13:31:26
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		940131_442C4_Amendment.pdf	102309 32bf8648e9f257f5cb871531ebb85bc9b0872aeb	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	7
	Applicant Arguments/Remarks Made in an Amendment	8	9

Warnings:					
Information:					
2	After Final Consideration Program Request	940131_442C4_AFCP.pdf	226710 7dd51ddf1799f834efddd21a6745bd8022fcccaa	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	329019		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/047,013	Filing Date 02/18/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT **01/05/2018**

	(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))	* 25	Minus	** 25	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

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

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

LIE
ALLYSON PURNELL

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 12/12/2017

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
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EXAMINER
LU, WILLIAM

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
12/12/2017	PAPER

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.

Office Action Summary	Application No. 15/047,013	Applicant(s) ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	AIA (First Inventor to File) Status No

-- 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 *25 August 2017*.

☐ 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) *1-9 and 24-39* 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) *1-9 and 24-39* 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 *18 February 2016* 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: _____.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 95

DETAILED ACTION

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

2. Claims 1-23 were filed February 18th 2016

3. Claims 10-23 were cancelled in the amendment filed August 4th 2016

4. Claims 24-39 were added in the amendment field August 4th 2016

5. Claims 1-9, 24-39 are pending in the current action.

Response to Arguments

6. Applicant's arguments with respect to claims 1-9, 24-39 have been considered but are not persuasive.

7. With regards towards applicant's argument regarding Lee lack of teaching regarding the limitation "first and second signals that are distinguishable from each other," the Examiner must respectfully clarify the argument. The original intent of the inclusion of Chainer, Lee, and Fukushima was to show that it would have been obvious for one of ordinary skill in the art at the time of invention to duplicate the circuit of Katsurahira with small modifications to the sensor in the tip in order to read in different data. While Katsurahira shows only the use of one signal generator to produce a signal that is modified by pressure, the other references Chainer, Lee and Fukushima teaches the duplication of various portions of the circuits in order to measure different angles or directions. While the applicant's arguments regarding Chainer and Lee are persuasive, Fukushima still teaches the limitation "first and second signals that are distinguishable

from each other." See Fukushima paragraph 83 where Fukushima produces fu, fv, and fw which are supplied the sensors at the tip of the pen. Under this combination, the Examiner asserts it would have been obvious to modify Katsurahira's signal generator 70 to generate different frequencies for different sensors. The rejection below has been modified to reflect that. Therefore, the claims remain rejection under Katsurahira, Chainer, Lee and Fukushima.

Claim Rejections - 35 USC § 103

8. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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

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

10. Claims 1, 3-9, 24-28 and 30-39 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073) in view of Lee (US5,422,959)

Consider claim 1, a pen-shaped position indicator configured to capacitively couple with a sensor surface, **(See Katsurahira paragraph 40)** the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position; **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration

shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. However in the same field of endeavor Fukushima teaches the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Katsurahira teaches a signal generate generating a signal, however, Katsurahira does not explicitly teach a signal production circuit configured to generate first and second signals that are distinguishable from each other. However, in the same field of endeavor Fukushima teaches a signal production circuit configured to generate first and second signals that are distinguishable from each other. **(See Fukushima paragraph**

83 where Fukushima discusses a transmission control section which generates different frequencies fu, fv, and fw which are supplied to different sensors.) Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira by duplicating the signal generator to supply multiple electrodes with different signals for the advantage of/ benefit of gathering additional useful data by duplicating using existing circuitry that is tuned slightly differently to gather data in a different direction.

Chainer teaches a plurality of signals, however Chainer does not explicitly teach; conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 3, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the

pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 4, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 5, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 6, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pend-shaped position indicator according to claim 1, wherein

the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 7, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals of different frequencies to be detected by the coils to determine tilt angle.)**

Consider claim 8, where the pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other. **(See Fukushima figure 2 paragraph 29, 81-83, 101 where Fukushima discusses that the pen generates several signals of electromagnetic coupling to be sequentially driven at predetermined time intervals.)**

Consider claim 9, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; **(See Katsurahira figure 4 where Katsurahira discloses a coil 75)** and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is

supplied to the signal production circuit to generate the first and second signals.**(See Katsurahira paragraph 73 where Katsurahira discusses wherein detection of an electromagnetic wave results in the detection of an induced voltage which supplies power to the oscillator and drives the electrodes.)**

Consider claim 24, where Katsurahira teaches a pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious

for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. However in the same field of endeavor Fukushima teaches wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Katsurahira teaches a signal generate generating a signal, however, Katsurahira does not explicitly teach a signal production circuit configured to generate first and second signals that are distinguishable from each other;. However, in the same field of

endeavor Fukushima teaches a signal production circuit configured to generate first and second signals that are distinguishable from each other;. **(See Fukushima paragraph 83 where Fukushima discusses a transmission control section which generates different frequencies fu, fv, and fw which are supplied to different sensors.)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira by duplicating the signal generator to supply multiple electrodes with different signals for the advantage of/ benefit of gathering additional useful data by duplicating using existing circuitry that is tuned slightly differently to gather data in a different direction.

Chainer teaches a plurality of signals, however Chainer does not explicitly teach conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 25, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits one of the plurality of signals via the conductive lines. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)**

Consider claim 26, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 27, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 28, where Katsurahira teaches a method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal produced in the pen-shaped position indicator. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal;. However in the same field of endeavor of active stylus construction, Chainer teaches forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal; **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the

pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. However in the same field of endeavor Fukushima teaches detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Katsurahira teaches a signal generate generating a signal, however, Katsurahira does not explicitly teach wherein the second signal is distinguishable from the first. However, in the same field of endeavor Fukushima teaches wherein the second signal is distinguishable from the first. **(See Fukushima paragraph 83 where Fukushima discusses a transmission control section which generates different frequencies fu, fv, and fw which are supplied to different sensors.)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira by duplicating the signal generator to supply multiple electrodes with different signals for the advantage of/

benefit of gathering additional useful data by duplicating using existing circuitry that is tuned slightly differently to gather data in a different direction.

Chainer teaches a plurality of signals, however Chainer does not explicitly teach a first signal generated by a signal production circuit and transmitted via a first conductive line and a second signal generated by the signal production circuit and transmitted via a second conductive line. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus and they measure the direct and lateral forces independently.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 30 where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 31, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 32, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 33, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 34, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the first and second signals are different in type from each other. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals of different frequencies to be detected by the coils to determine tilt angle.)**

Consider claim 35, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other. **(See Fukushima figure 2 paragraph 29, 81-83, 101 where Fukushima discusses that the pen generates several signals of electromagnetic coupling to be sequentially driven at predetermined time intervals.)**

Consider claim 36 where Katsurahira teaches a method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator and, respectively; and. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly

teach are supplied with a plurality of signals that are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches are supplied with a plurality of signals that are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships. However in the same field of endeavor Fukushima teaches detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Katsurahira teaches a signal generate generating a signal, however, Katsurahira does not explicitly teach wherein the plurality of signals are distinguishable from each other. However, in the same field of endeavor Fukushima teaches wherein the plurality of signals are distinguishable from each other. **(See Fukushima paragraph 83 where Fukushima discusses a transmission control section which generates different frequencies fu, fv, and fw which are supplied to different sensors.)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira by duplicating the signal generator to supply multiple electrodes with different signals for the advantage of/ benefit of gathering additional useful data by duplicating using existing circuitry that is tuned slightly differently to gather data in a different direction.

Chainer teaches a plurality of signals, however Chainer does not explicitly teach generated by the signal production circuit and transmitted via a plurality of conductive lines, respectively. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 37, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 36, comprising: forming a capacitive

relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied. **(See Katsurahira paragraph 40 where the pen is both receiving from and transmitting to the tablet via the resonant circuit.)**

Consider claim 38, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 39, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

11. Claims 2 and 29 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073) Lee (US5,422,959) as

applied to claim 1, in further view of Lee (US2010/0067674) (hereinafter referred to as Lee2)

Consider claim 2, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, however they do not explicitly teach wherein, the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**.** However in the same field of endeavor Lee2 teaches the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**. (See Lee2 figure 5 where one generator 1220 is stacked on top of another 1230 along the axis of the pen)** Therefore, it would have been obvious to one of ordinary skill in the art that the stacking of electrodes along an axis is an obvious matter of positioning.

Consider claim 29, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, however they do not explicitly teach wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator. However in the same field of endeavor Lee2 teaches the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**. (See Lee2 figure 5 where one generator 1220 is stacked on top of another 1230 along the axis of the pen)** Therefore, it would have been obvious to one

of ordinary skill in the art that the stacking of electrodes along an axis is an obvious matter of positioning.

Conclusion

12. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM LU whose telephone number is (571)270-1809. The examiner can normally be reached on Monday - Friday 10am to 6pm.

14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kent Chang can be reached on (571)272-7667. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15. 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.

/WILLIAM LU/

Examiner, Art Unit 2624

/KENT CHANG/
Supervisory Patent Examiner, Art Unit 2624

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016	07/24/2017	12/08/2017					
	1	✓	✓	✓	✓					
	2	✓	✓	✓	✓					
	3	✓	✓	✓	✓					
	4	✓	✓	✓	✓					
	5	✓	✓	✓	✓					
	6	✓	✓	✓	✓					
	7	✓	✓	✓	✓					
	8	✓	✓	✓	✓					
	9	✓	✓	✓	✓					
	10	✓	-	-	-					
	11	✓	-	-	-					
	12	✓	-	-	-					
	13	✓	-	-	-					
	14	✓	-	-	-					
	15	✓	-	-	-					
	16	✓	-	-	-					
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	23	✓	-	-	-					
	24		✓	✓	✓					
	25		✓	✓	✓					
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	27		✓	✓	✓					
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	29		✓	✓	✓					
	30		✓	✓	✓					
	31		✓	✓	✓					
	32		✓	✓	✓					
	33		✓	✓	✓					
	34		✓	✓	✓					
	35		✓	✓	✓					
	36		✓	✓	✓					

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	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016	07/24/2017	12/08/2017					
	37		✓	✓	✓					
	38		✓	✓	✓					
	39		✓	✓	✓					

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	August 25, 2017

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

AMENDMENT

Commissioner for Patents:

In response to the Office Action dated July 26, 2017, please amend the application as follows:

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

Remarks begin on page 8 of this paper.

Electronic Acknowledgement Receipt

EFS ID:	30183976
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Maria Krebs
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	25-AUG-2017
Filing Date:	18-FEB-2016
Time Stamp:	12:32:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		940131_442C4_Amendment.pdf	99021 0604d869b79e7a14be92e4e5c9d6f7ca41f05d83	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	8	9
	Claims	2	7
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	99021	

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.

REMARKS

The examiner is thanked for the clearly stated action and for conducting a telephone interview on August 24, 2017. The present amendment is filed in response to the office action mailed July 26, 2017, and in view of the interview in which it was agreed that independent claims 1, 24 and 28 are allowable and so is claim 36 subject to amendments to improve clarity. Upon entry of the present amendment, claims 1–9 and 24–39 will be pending.

Rejections under 35 U.S.C. § 103

In the office action, claims 1, 3-9, 24-28, and 30-39 were rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073) in view of Lee (US5,422,959) ("Lee"). Claims 2 and 29 were rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira, Chainer, Fukushima and Lee as applied to claim 1, in further view of Lee (US2010/0067674) ("Lee2").

In particular, the office has relied upon Lee as allegedly teaching "first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes" as recited in independent claims 1, 24, 28 and 36 (office action, page 5, emphasis original).

Contrary to the office's finding, Chainer does not teach two distinguishable signals transmitted to two electrodes and neither does the newly-cited Lee reference.

Chainer's "acceleration signals" Ax and Ay are induced in the electrodes 36/40 and 34/38, respectively, due to a mechanical stress applied to the electrodes. As such, Ax and Ay cannot correspond to the claimed "first and second signals that are distinguishable from each other … and transmitted to the first and second electrodes via the conductive lines."

Lee discloses a tethered stylus, which calculates a relative angle of a stylus as "the simple ratio of direct pressure to lateral pressure on the stylus." *Lee*, Col. 5, lines 29-31. Lee, in reference to its Fig. 3, discusses transmission wires 74 which "supply electricity to" the direct pressure transducer 66 and the lateral pressure transducer 58. *Lee*, Col. 10, line 63-Col. 12, line 2. Lee further describes that "electrical signals proportional to pressure" from the direct

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pressure transducer 66 and the lateral pressure transducer 58 are relayed back "through transmission wires 74, through stylus transmission tether wires 76, to signal processing means." *Lee*, Col., 12, lines 11-21. Thus, Lee's transmission wires 74 are used to supply electricity to the pressure transducers 66 and 58, and to relay electrical signals, which are proportional to the pressures applied to the pressure transducer 66 and 58, from the pressure transducers 66 and 58 to the signal processing means. As such, neither the "electricity" nor the "electrical signals proportional to pressure" correspond to the claimed "first and second signals that are distinguishable from each other … and transmitted to the first and second electrodes via the conductive lines."

Accordingly, independent claims 1, 24, 28 and 36 are submitted as clearly allowable over the prior art. In this connection, claim 36 has been amended, as set forth above, to more particularly recite the subject matter that applicant considers as their invention and for improved clarity. No new matter has been added by way of the amendment.

Conclusion

The present application including claims 1-9 and 24-39, as amended, is now believed to be in condition for allowance. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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Amendments to the Claims:

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

Listing of Claims:

1. (Previously Presented) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position;

a signal production circuit configured to generate first and second signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

2. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

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3. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

4. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

5. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

6. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

7. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other.

8. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other.

9. (Previously Presented) The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

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wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.

10-23. (Canceled)

24. (Previously Presented) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and

a signal production circuit configured to generate a plurality of signals that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the plurality of electrodes, respectively, wherein the plurality of signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;

wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

25. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits one of the plurality of signals via one of the conductive lines.

26. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

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27. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

28. (Previously Presented) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

29. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

30. (Previously Presented) The method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

31. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

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32. (Previously Presented) The method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

33. (Previously Presented) The method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

34. (Previously Presented) The method according to claim 28, wherein the first and second signals are different in type from each other.

35. (Previously Presented) The method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other.

36. (Currently Amended) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator ~~and~~, wherein the plurality of electrodes are supplied with a plurality of signals generated by a signal production circuit ~~and transmitted~~ via a plurality of conductive lines, respectively, wherein the plurality of signals are distinguishable from each other~~, respectively~~; and

detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships.

37. (Previously Presented) The method according to claim 36, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied.

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38. (Previously Presented) The method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

39. (Previously Presented) The method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

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PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/047,013	Filing Date 02/18/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT **08/25/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

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

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

LIE
MYRTLE LEIGH

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

UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Automated Interview Request (AIR)

Aug 3 2017

This paper requesting to schedule and/or conduct an interview is appropriate because:

This submission is requested to be accepted as an authorization for this interview to communicate via the internet. Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned concerning scheduling of the interview via video conference, instant messaging, or electronic mail, and to conduct the interview in accordance with office practice including video conferencing.

Name(s):
Shoko Leek

S-signature:
/Shoko Leek/

Registration Number:
43746

U.S. Application Number:
15047013

Confirmation Number:
1066

E-mail Address:
ShokoL@SeedIP.com

Phone Number:
2066944874

Proposed Time of Interview:
8-11-2017 3:00 PM ET

Prefered Interview Type:
Telephonic

I am the applicant or applicant's representative for this application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 07/26/2017

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EXAMINER
LU, WILLIAM

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
07/26/2017	PAPER

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.

Office Action Summary	Application No. 15/047,013	Applicant(s) ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	AIA (First Inventor to File) Status No

-- 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 *03 March 2017*.

☐ 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) *1-9 and 24-39* 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) *1-9 and 24-39* 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 *18 February 2016* 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: _____.

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DETAILED ACTION

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

2. Claims 1-23 were filed February 18th 2016

3. Claims 10-23 were cancelled in the amendment filed August 4th 2016

4. Claims 24-39 were added in the amendment field August 4th 2016

5. Claims 1-9, 24-39 are pending in the current action.

Continued Examination Under 37 CFR 1.114

6. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 3rd 2017 has been entered.

Response to Arguments

7. Applicant's arguments with respect to claims 1-9, 24-39 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

8. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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

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

10. Claims 1, 3-9, 24-28 and 30-39 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073) in view of Lee (US5,422,959)

Consider claim 1, a pen-shaped position indicator configured to capacitively couple with a sensor surface, **(See Katsurahira paragraph 40)** the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position; **(See**

Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped

position indicator is obtainable. However in the same field of endeavor Fukushima teaches the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Chainer teaches a plurality of signals, however Chainer does not explicitly teach a signal production circuit configured to generate first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage

of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 3, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 4, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 5, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the

sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 6, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pend-shaped position indicator according to claim 1, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 7, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals of different frequencies to be detected by the coils to determine tilt angle.)**

Consider claim 8, where the pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other. **(See Fukushima figure 2 paragraph 29, 81-83, 101 where Fukushima discusses that the pen generates several signals of electromagnetic coupling to be sequentially driven at predetermined time intervals.)**

Consider claim 9, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; **(See Katsurahira figure 4 where Katsurahira discloses a coil 75)** and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.**(See Katsurahira paragraph 73 where Katsurahira discusses wherein detection of an electromagnetic wave results in the detection of an induced voltage which supplies power to the oscillator and drives the electrodes.)**

Consider claim 24, where Katsurahira teaches a pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer

teaches a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. However in the same field of endeavor Fukushima teaches wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the

time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Chainer teaches a plurality of signals, however Chainer does not explicitly teach a signal production circuit configured to generate first and second signals that are distinguishable from each other; and conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 25, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits one of the plurality of signals via the conductive lines. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply**

electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)

Consider claim 26, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 27, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 28, where Katsurahira teaches a method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal produced in the pen-shaped position indicator. **(See Katsurahira**

figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal;. However in the same field of endeavor of active stylus construction, Chainer teaches forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal; **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly

teach detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. However in the same field of endeavor Fukushima teaches detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Chainer teaches a plurality of signals, however Chainer does not explicitly teach a first signal generated by a signal production circuit and transmitted via a first conductive line and a second signal generated by the signal production circuit and transmitted via a second conductive line wherein the second signal is distinguishable from the first. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus and they measure the direct and lateral forces independently.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 30 where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 31, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 32, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 33, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 34, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the first and second signals are different in type from each other. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals of different frequencies to be detected by the coils to determine tilt angle.)**

Consider claim 35, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other. **(See Fukushima figure 2 paragraph 29, 81-83, 101 where Fukushima discusses that the pen generates several signals of electromagnetic coupling to be sequentially driven at predetermined time intervals.)**

Consider claim 36 where Katsurahira teaches a method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a

plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator and, respectively; and. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach are supplied with a plurality of signals that are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches are supplied with a plurality of signals that are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships. However in the same field of endeavor Fukushima teaches detecting angular information of the pen-shaped position indicator based on the

plurality of capacitive relationships **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Chainer teaches a plurality of signals, however Chainer does not explicitly teach generated by the signal production circuit and transmitted via a plurality of conductive lines, respectively, wherein the plurality of signals are distinguishable from each other. However in the same field of endeavor Lee teaches the limitation. **(See Lee col 10 line 63-col 12 line 2 where Lee discusses transmission wires 74 which supply electricity to the direct transducer 66 and the lateral transducer 58 and transmit electric signals out of the stylus.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer in view of Fukushima for the advantage of/ benefit of utilizing a well-known medium (wires) for the transmission of electric signals.

Consider claim 37, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 36, comprising: forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied. **(See Katsurahira paragraph**

40 where the pen is both receiving from and transmitting to the tablet via the resonant circuit.)

Consider claim 38, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 39, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

11. Claims 2 and 29 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073) Lee (US5,422,959) as applied to claim 1, in further view of Lee (US2010/0067674) (hereinafter referred to as Lee2)

Consider claim 2, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the pen-shaped position indicator according to claim 1, however they do not explicitly teach wherein, the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**.** However in the same field of endeavor Lee2 teaches the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**. (See Lee2 figure 5 where one generator 1220 is stacked on top of another 1230 along the axis of the pen)** Therefore, it would have been obvious to one of ordinary skill in the art that the stacking of electrodes along an axis is an obvious matter of positioning.

Consider claim 29, where Katsurahira in view of Chainer in view of Fukushima in view of Lee teaches the method according to claim 28, however they do not explicitly teach wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator. However in the same field of endeavor Lee2 teaches the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**. (See Lee2 figure 5 where one generator 1220 is stacked on top of another 1230 along the axis of the pen)** Therefore, it would have been obvious to one of ordinary skill in the art that the stacking of electrodes along an axis is an obvious matter of positioning.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM LU whose telephone number is (571)270-1809. The examiner can normally be reached on Monday - Friday 10am to 6pm.

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kent Chang can be reached on (571)272-7667. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

14. 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.

/WILLIAM LU/

Examiner, Art Unit 2624

Notice of References Cited	Application/Control No. 15/047,013	Applicant(s)/Patent Under Reexamination ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5,422,959 A	06-1995	Lee; Michael E.	G06K9/00154	382/119
	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

*		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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016	07/24/2017						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
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	32		✓	✓						
	33		✓	✓						
	34		✓	✓						
	35		✓	✓						
	36		✓	✓						

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	15047013	ODA ET AL.
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	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016	07/24/2017						
	37		✓	✓						
	38		✓	✓						
	39		✓	✓						

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	596	pen and rho and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S2	2101	pen and theta and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S3	565	pen and theta and phi and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S4	147	(sensor near10 pen) and theta and phi and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:47
S5	2081926	(sensor near10 pen) and theta and phi and signal g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S6	141	(sensor near10 pen) and theta and phi and signal and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S7	21	(sensor near10 pen) and theta and phi and second near2 signal and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S8	72	((Yasuo) near2 (Oda)).INV.	US-PGPUB;	OR	ON	2015/10/28

			USPAT			16:05
S9	54	((Sadao) near2 (Yamamoto)).INV.	US-PGPUB; USPAT	OR	ON	2015/10/28 16:05
S10	44	((Yoshihisa) near2 (Sugiyama)).INV.	US-PGPUB; USPAT	OR	ON	2015/10/28 16:05
S11	111	S8 or S9 or S10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S12	105	S8 or S9 or S10 and pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S13	69	(S8 or S9 or S10) and pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S14	8786	(pen or stylus) near10 electrode	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S15	284	(pen or stylus) near10 electrode and theta	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S16	46	(pen or stylus) near10 electrode and theta and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S17	48	G06f.cpcl. and (pen or stylus) near10 second near2 electrode near10 capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:59
S18	738	G06f.cpcl. and (pen or stylus) near10 second near2 signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2015/11/02 12:00

			IBM_TDB			
S19	275	G06f.cpcl. and (pen or stylus) near10 second near2 signal and angle	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:17
S20	104	G06f.cpcl. and (pen or stylus) near10 second near2 signal and angle and capacitive	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:18
S21	6	("20050184768" | "20100264958" | "6140846").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:21
S22	25	(pen or stylus) near10 second near2 electrode and second near2 signal and angle and capacitive	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:22
S23	38	("20050128191" | "20080149402" | "20050171714" | "20090078746" | "20030214490" | "20080238885" | "20100252335" | "7735024" | "20040201580" | "20090139780" | "5672852" | "5600105" | "6535206" | "20090278794" | "20090065268" | "5138118" | "5484251" | "20040160429" | "20040201580" | "20070227785" | "20090078746" | "20070146351" | "20080042998" | "20100026639" | "20100155153" | "20090184940" | "5128624" | "7570252" | "7474300" | "20010012002" | "20030095109" | "20080257613" | "20090078476" | "20090128249" | "20100051356" | "8604365" | "20060007164" | "6930672" | "20080156546" | "8546706").PN.	US-PGPUB; USPAT	OR	ON	2015/11/02 12:32
S24	2877	G06f.cpcl. and stylus and second near2 electrode	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S25	809	G06f.cpcl. and stylus and second near2 electrode and second near2 signal	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S26	260	G06f.cpcl. and stylus and second near2 electrode and second near2 signal and angle	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S27	43	stylus near5 angle and second near2 electrode and second near2 signal and angle	US-PGPUB; USPAT	OR	ON	2015/11/02 12:58
S28	43	stylus near5 angle and second near2	US-PGPUB;	OR	ON	2015/11/02

		electrode and second near2 signal	USPAT			12:58
S29	46	stylus near5 tilt near2 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:04
S30	47	stylus near10 tilt near2 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:05
S31	379	stylus near10 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:08
S32	2	stylus near10 angle and capacitive and segment near2 electrode	US-PGPUB; USPAT	OR	ON	2015/11/02 13:08
S33	41	("20040125430" | "20050231656" | "20050285985" | "20060007224" | "20060197753" | "20060250381" | "20080030461" | "20080111780" | "20080129909" | "20080158172" | "20100059296" | "4320292" | "4405921" | "4740782" | "4838655" | "5151688" | "5445871" | "5502514" | "5568292" | "5677744" | "5852487" | "5926238" | "5930591" | "5990980" | "5995172" | "6236063" | "6242729" | "6803906" | "6972753" | "7053967" | "7205988" | "7536557" | "7629945" | "6232607" | "20050040393" | "20050091297" | "20090225210" | "5182661" | "7612767" | "4439855" | "20040140962").PN.	US-PGPUB; USPAT	OR	ON	2015/11/02 13:10
S34	253	("20080049153" | "20080049154" | "20080055295" | "20080055496" | "20080055497" | "20080055498" | "20080055499" | "20080055507" | "20080062156" | "20080062157" | "20080062343" | "20080066972" | "20080084374" | "20080111780" | "20080129909" | "20080129913" | "20080129914" | "20080158172" | "20080165311" | "20080284925" | "20080297487" | "20090128529" | "20090135492" | "20090167728" | "20100001978" | "20100006350" | "20100013793" | "20100013794" | "20100013796" | "20100020044" | "20100045904" | "20100059296" | "20100118237" | "20100302419" | "20100315394" | "3970846" | "4220815" | "4320292" | "4334219" | "4345248" | "4405921" | "4476463" | "4481510" | "4484179" | "4490607" | "4496981" | "4542375" | "4577057" | "4602321" | "4603356" | "4642459" | "4644338" | "4655552" | "4662718" | "4671671" | "4677428" | "4679909" | "4684939" | "4698460" | "4705942" | "4720869" | "4736203" | "4740782" | "4759610" | "4767192" | "4772101" | "4782327" | "4782328" | "4785564" | "4794634" | "4814760" | "4823178" | "4838655" | "4846559" | "4877697" | "4893120" | "4904056" | "4917474" | "5003356" | "5037119" | "5039206" | "5051570" | "5083175" | "5105186" | "5140153" | "5151688" | "5153420" | "5172104" | "5204661" | "5236850" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:11

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S35	134	("20010000676" | "20010046013" | "20010052597" | "20010055008" | "20020027164" | "20020030581" | "20020030768" | "20020052192" | "20020067845" | "20020071074" | "20020074549" | "20020126240" | "20020149571" | "20030103030" | "20030137494" | "20030151569" | "20030156087" | "20030156230" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:11

		"20030174256" | "20030174870" | "20030179323" | "20030183019" | "20030205662" | "20030218116" | "20030231277" | "20030234759" | "20040046900" | "20040113877" | "20040125430" | "20040252867" | "20050007125" | "20050110777" | "20050134749" | "20050146517" | "20050179706" | "20050200603" | "20050231656" | "20050285985" | "20060007224" | "20060010658" | "20060026521" | "20060034492" | "20060125971" | "20060170658" | "20060176288" | "20060187367" | "20060197753" | "20060202975" | "20060249763" | "20060250381" | "20060279690" | "20070030258" | "20070109239" | "20070109286" | "20070216905" | "20070279346" | "20080029691" | "20080030461" | "20080048995" | "20080049153" | "20080049154" | "20080055295" | "20080055496" | "20080055497" | "20080055498" | "20080055499" | "20080055507" | "20080062156" | "20080062157" | "20080062343" | "20080066972" | "20080084374" | "20080111780" | "20080129909" | "20080129913" | "20080129914" | "20080158172" | "20080165311" | "20080284925" | "20080297487" | "20090128529" | "20090135492" | "20090167728" | "20100001978" | "20100006350" | "20100013793" | "20100013794" | "20100013796" | "20100020044" | "20100045904" | "20100059296" | "20100118237" | "20100302419" | "20100315394" | "3970846" | "4220815" | "4320292" | "4334219" | "4345248" | "4405921" | "4476463" | "4481510" | "4484179" | "4490607" | "4496981" | "4542375" | "4577057" | "4602321" | "4603356" | "4642459" | "4644338" | "4655552" | "4662718" | "4671671" | "4677428" | "4679909" | "4684939" | "4698460" | "4705942" | "4720869" | "4736203" | "4740782" | "4759610" | "4767192" | "4772101" | "4782327" | "4782328" | "4785564" | "4794634" | "4814760" | "4823178" | "4838655" | "4846559" | "4877697").PN.				
S36	312	S34 or S35	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S37	312	S36	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S38	10	S37 and stylus near10 angle	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S39	21	("20030197691" | "20090065269" | "20100066693" | "20100073323" | "20110001708" | "20110175834" | "20120050207" | "20120062497" | "20120146958" | "20120154340" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:14

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S40	147	radial near2 electrodes and stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:21
S41	889	segment$4 near2 electrodes and stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:22
S42	37	segment$4 near2 electrodes near10 stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:23
S43	5	"12877780"	US-PGPUB; USPAT	OR	ON	2015/11/02 15:04
S44	1	"14542438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 15:11
S45	14	"12877780"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 15:17
S46	1566	G06F.cpcl. and (electrostatic or capacitive) near10 pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 13:20
S47	150	G06F.cpcl. and (electrostatic or capacitive) near10 pen near2 tip	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 13:20
S48	17	("2005/0128191").URPN.	USPAT	OR	OFF	2016/04/27 13:26
S49	25435	G06F.cpcl. and electrodes near "10" (pen or sylus) near5 (tip or distal)	US-PGPUB; USPAT; USOCR;	OR	OFF	2016/04/27 15:17

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S50	76	G06F.cpcl. and electrodes near10 (pen or sylus) near5 (tip or distal)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:17
S51	1	"14452438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:19
S52	1	"14542438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:19
S53	1117	G06F.cpcl. and electrodes and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S54	171371	G06F.cpcl. and electrodes and phi and pen or stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S55	378	G06F.cpcl. and electrodes and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S56	303	G06F.cpcl. and electrode and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:55
S57	23	G06F.cpcl. and electrode same phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:56
S58	146	G06F.cpcl. and electrode and theta and	US-PGPUB;	OR	OFF	2016/04/27

		phi and (pen or stylus)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:56
S59	590	electrode and theta and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 16:01
S60	75	electrode same (pen or stylus) and phi and theta	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 16:01
S61	4	("8154525" | "8253702" | "20030142073" | "20090065269").PN.	US-PGPUB; USPAT	OR	OFF	2016/04/28 14:40
S62	0	("032504" | "072805").PN.	US-PGPUB; USPAT	OR	OFF	2016/04/28 14:40
S63	0	"15047013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/30 16:14
S64	4	"13117954"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/30 17:28
S65	1	"15047013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/07/14 14:03
S66	314	stylus same second near2 electrode and angl$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:32
S67	418	stylus same second near2 signal and angl$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:32
S68	829	(pen or stylus) same second near2	US-PGPUB;	OR	ON	2016/11/28

		signal and angl$4	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			00:35
S69	3	(pen or stylus) same second near2 signal and angl$4 and capacit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:39
S70	486	(pen or stylus) same second near2 signal and angl$4 and capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:39
S71	475	(pen or stylus) same second near2 electrode and angl$4 and capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:42
S72	1313	(pen or stylus) and second near2 electrode and angl$4 and capacit$4 and ultrasonic	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:45
S73	1351	(pen or stylus) and second near2 signal and angl$4 and capacit$4 and ultrasonic	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:48
S74	238	(pen or stylus) same second near2 signal and angl$4 and capacit$4 and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:56
S75	44	("4513437").URPN.	USPAT	OR	ON	2016/11/28 01:06
S76	10	("4513437").URPN. and capacitive	USPAT	OR	ON	2016/11/28 01:09
S77	69	(pen or stylus) same second near2 signal and tilt and capacit$4 and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 06:20

C:\ Users\ wlu\ Documents\ EAST\ Workspaces\ 15047013.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	4/29/2016	WL
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	11/28/2016	WL
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	7/24/2017	WL

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
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	4/29/2016	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	4/29/2016	WL
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	11/28/2016	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	11/28/2016	WL
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	7/24/2017	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	7/24/2017	WL

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

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	15/047,013	Filing Date	2016-02-18	Docket Number (if applicable)	940131.442C4	Art Unit	2624
First Named Inventor	Yasuo Oda			Examiner Name	William Lu		

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 Petition for Extension of Time, Fee Deficiency Authorization Form

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 _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. 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.

Signature of Registered U.S. Patent Practitioner			
Signature	/Shoko Leek/	Date (YYYY-MM-DD)	2017-03-30
Name	Shoko I. Leek	Registration Number	43746

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.

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

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether 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 7/31/2016. 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 displays a valid OMB control number.

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

Docket Number (Optional): 940131.442C4

Application Number: 15/047,013

Filed: February 18, 2016

For: POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Art Unit: 2624

Examiner: William Lu

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	$ 200
☐	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
☐	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
☐	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 _____.

☑ 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 43,746.

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

/Shoko Leek/ — Signature

March 30, 2017 — Date

Shoko I. Leek — Typed or printed name

206-622-4900 — 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.

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.

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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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	March 30, 2017

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

FEE DEFICIENCY AUTHORIZATION FORM

Commissioner for Patents:

Applicant(s) hereby authorize(s) the Director to charge any deficiencies or credit any overpayment in fees due by way of the enclosed papers only to Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group LLP

/Shoko Leek/
Shoko I. Leek
Registration No. 43,746

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

5498213_1

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 175

Electronic Patent Application Fee Transmittal

Application Number:	15047013
Filing Date:	18-Feb-2016
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Filer:	Shoko I. Leek/Maria Krebs
Attorney Docket Number:	940131.442C4

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
RCE- 1st Request	1801	1	1200	1200
		Total in USD ($)		**1400**

Electronic Acknowledgement Receipt

EFS ID:	28785135
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Maria Krebs
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	30-MAR-2017
Filing Date:	18-FEB-2016
Time Stamp:	16:00:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1400
RAM confirmation Number	033117INTEFSW16012500
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	Request for Continued Examination (RCE)	940131_442C4_RCE.pdf	697646 7efbb8bbc0c76c11c0d41165e806f01a72ae4ecb	no	3
Warnings:					
Information:					
2	Extension of Time	940131_442C4_EOT.pdf	163324 b88dde81a5cc885fe83a8a54ec325645c82fcd2b	no	2
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	940131_442C4_FDA.pdf	47269 83b29d0511ca85bc28aa52d3d166cb1e9bc5d7b0	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32533 70cb2376b7bdcbccde4012600702f0946d4b817b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	940772		

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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 03/24/2017

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104

EXAMINER	
LU, WILLIAM	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
03/24/2017	PAPER

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.

ADVISORY ACTION

Response to Arguments

1. Applicant's amendments to the claims filed February 9th 2017 overcomes the current prior art combination. However, the amendments changes the scope of the claims and requires further search and consideration. Thus, the amendments will not be entered at this moment.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM LU whose telephone number is (571)270-1809. The examiner can normally be reached on Monday - Friday 10am to 6pm.

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, Kent Chang can be reached on (571)272-7667. 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.

/WILLIAM LU/
Examiner, Art Unit 2624

/KENT CHANG/

Supervisory Patent Examiner, Art Unit 2624

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 15/047,013	**Applicant(s)** ODA ET AL.	
	Examiner WILLIAM LU	**Art Unit** 2624	**AIA (First Inventor to File) Status** No

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

THE REPLY FILED 09 February 2017 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☒ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance;

(2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:

a) ☒ The period for reply expires *3* months from the mailing date of the final rejection.

b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

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

NOTICE OF APPEAL

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

AMENDMENTS

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

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. ☐ Applicant's reply has overcome the following rejection(s): _____.

6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. ☒ For purposes of appeal, the proposed amendment(s): (a) ☒ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

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

9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because:

_____.

13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____

14. ☐ Other: _____.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: .
Claim(s) objected to: .
Claim(s) rejected: .
Claim(s) withdrawn from consideration: .

/KENT CHANG/ Supervisory Patent Examiner, Art Unit 2624	

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 184

Do NOT enter A.F. amendments
WL

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	February 9, 2017

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

AMENDMENT

Commissioner for Patents:

In response to the Office Action dated November 30, 2016, please amend the application as follows:

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

Remarks begin on page 8 of this paper.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 185

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.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 03/01/2017

SEED INTELLECTUAL PROPERTY LAW GROUP LLP
701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104

EXAMINER
LU, WILLIAM

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
03/01/2017	PAPER

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.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)		
	15/047,013	ODA ET AL.		
	Examiner	Art Unit	AIA (First Inventor to File) Status	Page
	WILLIAM LU	2624	No	1 of 1

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

1. WILLIAM LU (Examiner); Telephonic
2. Shoko Leek (Attorney of Record); Telephonic

Date of Interview: 08 February 2017

Claim(s) discussed: 1

Identification of prior art discussed: Chainer et al. (US4,513,437)

Amendment Proposed: Applicant added limitations to differentiate the signal generation circuit from the piezo electric transducer recited in Chainer

Brief Description of main topic of discussion: Discussion of the claim amendments and how they differ from the prior art combination.

Issues Discussed:

Proposed Amendments:
Agreement was reached regarding the current prior art combination. No agreement was reached regarding allowability.

Item(s) under 35 U.S.C. 103:

/WILLIAM LU/ Examiner, Art Unit 2624	/KENT CHANG/ Supervisory Patent Examiner, Art Unit 2624

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable time limit of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

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

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicant's responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04

Please further see:

MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

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Remarks begin on page 8 of this paper.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 188

Electronic Acknowledgement Receipt

EFS ID:	28310402
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Maria Krebs
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	09-FEB-2017
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1		940131_442C4_Amendment.pdf	144382 23576cd5a321ebdb3bcd7d4247ff7879b7a92cb4	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	8	9
	Claims	2	7
	Response After Final Action	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	144382	

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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

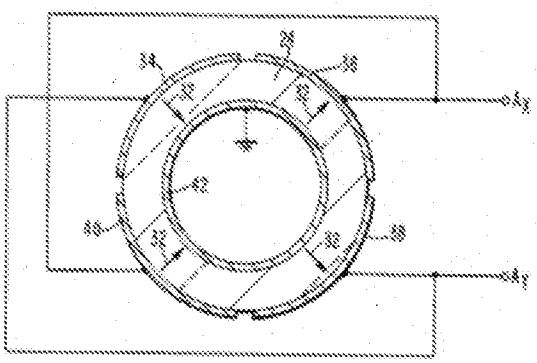
The examiner is thanked for the clearly stated action and for conducting a telephone interview on February 3, 2017, and on February 8, 2017. The present amendment is prepared and filed in view of the discussion during the interview.

Claims 1-9 and 24-39 are pending, of which claims 1, 24, 28 and 36 are independent. In the office action, claims 1, 3-9, 24-28, and 30-39 were rejected under 35 U.S.C. 103 as obvious over Katsurahira (US 2005/0128191) in view of Chainer (US 4,513,437) in further view of and Fukushima (US 2003/0142073). Dependent claims 2 and 29 were rejected as obvious over Katsurahira and Fukushima, in further view of Lee (US 2010/0067674).

In the Office Action, Chainer was relied upon for teaching "a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other" in figure 3 and col 4 line 59 – col 5 line 36. (Office Action, page 3.) Chainer, in figure 3 reproduced below, discloses a cantilevered beam type accelerometer, which includes "four circumferentially disposed electrodes" 34, 36, 38, 40, that are "appropriately interconnected to produce two orthogonal acceleration component signals Ax and Ay." *Chainer*, Abstract. Chainer describes:

> Four circumferentially spaced electrodes in combination with an interior ground plane or electrode 42 provide the means by which the appropriate acceleration signals Ax and Ay are detected when a force is applied transverse to the axis of said tube due to motion of the pen. As will be appreciated, acceleration forces cause the tube to be deflected or to bend very slightly due to the mass of the tube. The electrodes 36 and 40 are coupled together and produce the signals Ax as indicated, and similarly, electrodes 34 and 38 are connected together to produce the signals Ay. (*Chainer*, Col. 5, lines 9-19.)

FIG. 3



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In Chainer's accelerometer, mechanical stress applied to the tube produces the signals Ax and Ay, which can be detected from electrodes 36/40 and 34/38. Chainer does not teach or suggest "a signal production circuit configured to generate first and second signals that are distinguishable from each other" and "conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines" as now explicitly recited in claim 1, and similarly in claims 24, 28 and 36. Support for the amendments is found, for example, in FIG. 2 of the application.

Fukushima and Lee fail to cure the deficiencies of Chainer. Thus, claims 1, 24, 28 and 36, as amended, are now believed to be clearly allowable over the cited and applied prior art of record.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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Amendments to the Claims:

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

Listing of Claims:

1. (Currently Amended) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode arranged at a first position of the pen-tip portion;

a second electrode arranged at a second position of the pen-tip portion different from the first position; [[and]]

a signal production circuit configured to ~~supply~~ generate first and second signals [[to]] that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the first and second electrodes, respectively, wherein the first and second signals generated by the signal production circuit, in operation, are ~~distinguishable from each other~~ transmitted to the first and second electrodes via the conductive lines;

wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

2. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

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3. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

4. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

5. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

6. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

7. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other.

8. (Previously Presented) The pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other.

9. (Currently Amended) [[the]]The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

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wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.

10-23. (Canceled)

24. (Currently Amended) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and

a signal production circuit configured to ~~supply~~ generate a plurality of signals [[to]] that are distinguishable from each other; and

conductive lines extending between the signal production circuit and the plurality of electrodes, respectively, wherein the plurality of signals generated by the signal production circuit, in operation, are ~~distinguishable from each other~~ transmitted to the first and second electrodes via the conductive lines;

wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

25. (Currently Amended) The pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit ~~provides~~ transmits one of the plurality of signals via one of the conductive lines.

26. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

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27. (Previously Presented) The pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

28. (Currently Amended) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal ~~produced~~ generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal ~~produced~~ generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator ~~and~~, wherein the second signal is distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

29. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

30. (Previously Presented) The method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

31. (Previously Presented) The method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

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32. (Previously Presented) The method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

33. (Previously Presented) The method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

34. (Previously Presented) The method according to claim 28, wherein the first and second signals are different in type from each other.

35. (Previously Presented) The method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other.

36. (Currently Amended) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator and are supplied with a plurality of signals ~~that~~ generated by a signal production circuit and transmitted via a plurality of conductive lines, respectively, wherein the plurality of signals are distinguishable from each other, respectively; and

detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships.

37. (Previously Presented) The method according to claim 36, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied.

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38. (Previously Presented) The method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

39. (Previously Presented) The method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/047,013	Filing Date 02/18/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT	02/09/2017	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

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

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

LIE
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.**
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

500 7590 11/30/2016

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EXAMINER
LU, WILLIAM

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
11/30/2016	PAPER

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.

Office Action Summary	Application No. 15/047,013	Applicant(s) ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	AIA (First Inventor to File) Status No

-- 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 *04 August 2016*.

☐ 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) *1-9 and 24-39* 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) *1-9 and 24-39* 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 *18 February 2016* 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: _____.

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DETAILED ACTION

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

2. Claims 1-23 were filed February 18th 2016

3. Claims 10-23 were cancelled in the amendment filed August 4th 2016

4. Claims 24-39 were added in the amendment field August 4th 2016

5. Claims 1-9, 24-39 are pending in the current action.

Claim Rejections - 35 USC § 112

6. The amendments filed August 4th 2016 resolve the prior 112 issue.

Claim Rejections - 35 USC § 103

7. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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

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

9. Claims 1, 3-9, 24-28 and 30-39 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al. (US4,513,437) in view of Fukushima et al. (US2003/0142073)

Consider claim 1, a pen-shaped position indicator configured to capacitively couple with a sensor surface, **(See Katsurahira paragraph 40)** the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a first electrode arranged at a first position of the pen-tip portion; a second electrode arranged at a second position of the pen-tip portion different from the first position; **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. However in the same field of endeavor Fukushima teaches the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Consider claim 3, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 1, wherein the second

electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 4, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 1, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 5, where Katsurahira in view of Chainer in view of Fukushima teaches the pen shaped position indicator according to claim 1, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 6, where Katsurahira in view of Chainer in view of Fukushima teaches the pend-shaped position indicator according to claim 1, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 7, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 1, wherein the first and second signals are different in type from each other. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals of different frequencies to be detected by the coils to determine tilt angle.)**

Consider claim 8, where the pen-shaped position indicator according to claim 1, wherein the first and second signals are of the same type but have a time difference from each other. **(See Fukushima figure 2 paragraph 29, 81-83, 101 where Fukushima discusses that the pen generates several signals of electromagnetic coupling to be sequentially driven at predetermined time intervals.)**

Consider claim 9, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; **(See Katsurahira figure 4 where**

Katsurahira discloses a coil 75) and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.**(See Katsurahira paragraph 73 where Katsurahira discusses wherein detection of an electromagnetic wave results in the detection of an induced voltage which supplies power to the oscillator and drives the electrodes.)**

Consider claim 24, where Katsurahira teaches a pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising: a pen-shaped body having a pen-tip portion; a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other. However in the same field of endeavor of active stylus construction, Chainer teaches a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer**

42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.) Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. However in the same field of endeavor Fukushima teaches wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Consider claim 25, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit provides one of the plurality of signals. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have two capacitive transducers with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 26, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 27, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 28, where Katsurahira teaches a method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal produced in the pen-shaped position indicator. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly teach forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal; However in the same field of endeavor of active stylus construction, Chainer teaches forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal; **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the

pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. However in the same field of endeavor Fukushima teaches detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Consider claim 30 where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 31, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator. **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)**

Consider claim 32, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 33, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 34, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, wherein the first and second signals are different in type from each other. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals of different frequencies to be detected by the coils to determine tilt angle.)**

Consider claim 35, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other. **(See Fukushima figure 2 paragraph 29, 81-83, 101 where Fukushima discusses that the pen generates several signals of electromagnetic coupling to be sequentially driven at predetermined time intervals.)**

Consider claim 36 where Katsurahira teaches a method of detecting angle information of a pen-shaped position indicator, the method comprising: forming a plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator and, respectively; and. **(See Katsurahira figure 4 and paragraphs 69-80 where Katsurahira shows a pen with electrodes 71 and 72 located at a pen tip)**

Katsurahira teaches a pen with two electrodes and a signal generator to supply a signal **(See Katsurahira paragraphs 77-78)** However Katsurahira does not explicitly

teach_are supplied with a plurality of signals that are distinguishable from each other_. However in the same field of endeavor of active stylus construction, Chainer teaches are supplied with a plurality of signals that are distinguishable from each other **(See Chainer figure 3 and col 4 line 59- col 5 line 36 where Chainer discusses that a pen can have a capacitive transducer with a ground transducer 42 and a first set of electrodes to produce a first signal Ax and a second set of electrodes to produce a second signal Ay.)** Therefore, it would have been obvious for one of ordinary skill in the art to replace the electrode configuration (71, 72) of the pen in Katsurahira figure 4 with the configuration shown in Chainer figure 3 for the advantage of/ benefit of being able to gather accelerometer data using the capacitive transducers.

Katsurahira in view of Chainer teaches forming a capacitive relationship with the sensor surface, **(Katsurahira paragraph 92)** however Katsurahira does not explicitly teach detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships_However in the same field of endeavor Fukushima teaches detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)** Therefore, it would have been obvious for one of ordinary skill in the art at the time of filing to modify Katsurahira in view of Chainer by adding an additional signal of Fukushima for the advantage of/ benefit of using the difference between the two signals to gather additional data

Consider claim 37, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 36, comprising: forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied. **(See Katsurahira paragraph 40 where the pen is both receiving from and transmitting to the tablet via the resonant circuit.)**

Consider claim 38, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface. **(See Fukushima figure 2 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

Consider claim 39, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator. **(See Fukushima figure 7 paragraph 29, 81-83, where Fukushima discusses that the pen generates several signals to be detected by the coils to determine tilt angle.)**

10. Claims 2 and 29 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Chainer et al.

(US4,513,437) in view of Fukushima et al. (US2003/0142073) as applied to claim 1, in further view of Lee (US2010/0067674)

Consider claim 2, where Katsurahira in view of Chainer in view of Fukushima teaches the pen-shaped position indicator according to claim 1, however they do not explicitly teach wherein, the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**.** However in the same field of endeavor Lee teaches the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**. (See Lee figure 5 where one generator 1220 is stacked on top of another 1230 along the axis of the pen)** Therefore, it would have been obvious to one of ordinary skill in the art that the stacking of electrodes along an axis is an obvious matter of positioning.

Consider claim 29, where Katsurahira in view of Chainer in view of Fukushima teaches the method according to claim 28, however they do not explicitly teach wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator. However in the same field of endeavor Lee teaches the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen shaped indicator**. (See Lee figure 5 where one generator 1220 is stacked on top of another 1230 along the**

axis of the pen) Therefore, it would have been obvious to one of ordinary skill in the art that the stacking of electrodes along an axis is an obvious matter of positioning.

Response to Arguments

11. Applicant's arguments with respect to claims 1-9, 24-39 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM LU whose telephone number is (571)270-1809. The examiner can normally be reached on Monday - Friday 10am to 6pm.

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kent Chang can be reached on (571)272-7667. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

14. 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.

/WILLIAM LU/

Examiner, Art Unit 2624

/KENT CHANG/
Supervisory Patent Examiner, Art Unit 2624

Notice of References Cited	Application/Control No. 15/047,013	Applicant(s)/Patent Under Reexamination ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-4,263,592 A	04-1981	Takahashi; Hiromichi	G06F3/03542	178/19.01
*	B	US-4,513,437 A	04-1985	Chainer; Timothy J.	B43K8/22	382/120
*	C	US-5,422,959 A	06-1995	Lee; Michael E.	G06K9/00154	382/119
*	D	US-2010/0067674 A1	03-2010	Lee; Yong-Jik	G06F3/03545	379/100.01
	E	US-				
	F	US-				
	G	US-				
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	J	US-				
	K	US-				
	L	US-				
	M	US-				

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

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*		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
	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

CPC- SEARCHED		
Symbol	Date	Examiner
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	4/29/2016	WL
G06F3/033, G06F3/0334, G06F3/0338, G06F3/046, G06F3/03545, G06F2003/04105	11/28/2016	WL

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	4/29/2016	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	4/29/2016	WL
Searched in EAST: US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; & IBM_TDB	11/28/2016	WL
Searched by: Inventors, Assignee; Keywords and Class-subclass	11/28/2016	WL

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

Sheet 1 of 1

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
	INVENTOR(S) Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2624

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	NAME	FILING DATE IF APPROPRIATE
/W.L/	1	8,581,857	B2	11/12/13	Matsubara	
/W.L/	2	2010/0289758	A1	11/18/10	Matsubara	

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*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	COUNTRY	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	TRANSLATION YES	TRANSLATION NO
/W.L/	1	201011622	A	03/16/10	TW (W/ English Abstract)	Corresponds to U.S. 8,581,857 and US 2010/0289758		X

NON-PATENT LITERATURE DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

/W.L/	1		Taiwanese Office Action dated May 30, 2016, for corresponding TW Application No. 104126247, 7 pages.

EXAMINER /WILLIAM LU/	DATE CONSIDERED 11/23/2016

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

5060167_1 June 29, 2016

Sheet 1 of 1

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
	INVENTOR(S) Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2624

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	NAME	FILING DATE IF APPROPRIATE
/W.L/	1	7,064,750	B2	06/20/06	Duret	
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	4					
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*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	COUNTRY	TRANSLATION YES	TRANSLATION NO
	1						
	2						
	3						
	4						

NON-PATENT LITERATURE DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

/W.L/	1		Notice of Allowance, mailed August 17, 2016, for U.S. Application No. 14/542,438, 8 pages.
	2		
	3		
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	5		
	6		

EXAMINER /WILLIAM LU/	DATE CONSIDERED 11/23/2016

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

5229368_1 September 20, 2016

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	596	pen and rho and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S2	2101	pen and theta and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S3	565	pen and theta and phi and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S4	147	(sensor near10 pen) and theta and phi and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:47
S5	2081926	(sensor near10 pen) and theta and phi and signal g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S6	141	(sensor near10 pen) and theta and phi and signal and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S7	21	(sensor near10 pen) and theta and phi and second near2 signal and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S8	72	((Yasuo) near2 (Oda)).INV.	US-PGPUB;	OR	ON	2015/10/28

			USPAT			16:05
S9	54	((Sadao) near2 (Yamamoto)).INV.	US-PGPUB; USPAT	OR	ON	2015/10/28 16:05
S10	44	((Yoshihisa) near2 (Sugiyama)).INV.	US-PGPUB; USPAT	OR	ON	2015/10/28 16:05
S11	111	S8 or S9 or S10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S12	105	S8 or S9 or S10 and pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S13	69	(S8 or S9 or S10) and pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S14	8786	(pen or stylus) near10 electrode	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S15	284	(pen or stylus) near10 electrode and theta	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S16	46	(pen or stylus) near10 electrode and theta and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S17	48	G06f.cpcl. and (pen or stylus) near10 second near2 electrode near10 capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:59
S18	738	G06f.cpcl. and (pen or stylus) near10 second near2 signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2015/11/02 12:00

			IBM_TDB			
S19	275	G06f.cpcl. and (pen or stylus) near10 second near2 signal and angle	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:17
S20	104	G06f.cpcl. and (pen or stylus) near10 second near2 signal and angle and capacitive	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:18
S21	6	("20050184768" | "20100264958" | "6140846").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:21
S22	25	(pen or stylus) near10 second near2 electrode and second near2 signal and angle and capacitive	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:22
S23	38	("20050128191" | "20080149402" | "20050171714" | "20090078746" | "20030214490" | "20080238885" | "20100252335" | "7735024" | "20040201580" | "20090139780" | "5672852" | "5600105" | "6535206" | "20090278794" | "20090065268" | "5138118" | "5484251" | "20040160429" | "20040201580" | "20070227785" | "20090078746" | "20070146351" | "20080042998" | "20100026639" | "20100155153" | "20090184940" | "5128624" | "7570252" | "7474300" | "20010012002" | "20030095109" | "20080257613" | "20090078476" | "20090128249" | "20100051356" | "8604365" | "20060007164" | "6930672" | "20080156546" | "8546706").PN.	US-PGPUB; USPAT	OR	ON	2015/11/02 12:32
S24	2877	G06f.cpcl. and stylus and second near2 electrode	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S25	809	G06f.cpcl. and stylus and second near2 electrode and second near2 signal	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S26	260	G06f.cpcl. and stylus and second near2 electrode and second near2 signal and angle	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S27	43	stylus near5 angle and second near2 electrode and second near2 signal and angle	US-PGPUB; USPAT	OR	ON	2015/11/02 12:58
S28	43	stylus near5 angle and second near2	US-PGPUB;	OR	ON	2015/11/02

		electrode and second near2 signal	USPAT			12:58
S29	46	stylus near5 tilt near2 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:04
S30	47	stylus near10 tilt near2 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:05
S31	379	stylus near10 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:08
S32	2	stylus near10 angle and capacitive and segment near2 electrode	US-PGPUB; USPAT	OR	ON	2015/11/02 13:08
S33	41	("20040125430" | "20050231656" | "20050285985" | "20060007224" | "20060197753" | "20060250381" | "20080030461" | "20080111780" | "20080129909" | "20080158172" | "20100059296" | "4320292" | "4405921" | "4740782" | "4838655" | "5151688" | "5445871" | "5502514" | "5568292" | "5677744" | "5852487" | "5926238" | "5930591" | "5990980" | "5995172" | "6236063" | "6242729" | "6803906" | "6972753" | "7053967" | "7205988" | "7536557" | "7629945" | "6232607" | "20050040393" | "20050091297" | "20090225210" | "5182661" | "7612767" | "4439855" | "20040140962").PN.	US-PGPUB; USPAT	OR	ON	2015/11/02 13:10
S34	253	("20080049153" | "20080049154" | "20080055295" | "20080055496" | "20080055497" | "20080055498" | "20080055499" | "20080055507" | "20080062156" | "20080062157" | "20080062343" | "20080066972" | "20080084374" | "20080111780" | "20080129909" | "20080129913" | "20080129914" | "20080158172" | "20080165311" | "20080284925" | "20080297487" | "20090128529" | "20090135492" | "20090167728" | "20100001978" | "20100006350" | "20100013793" | "20100013794" | "20100013796" | "20100020044" | "20100045904" | "20100059296" | "20100118237" | "20100302419" | "20100315394" | "3970846" | "4220815" | "4320292" | "4334219" | "4345248" | "4405921" | "4476463" | "4481510" | "4484179" | "4490607" | "4496981" | "4542375" | "4577057" | "4602321" | "4603356" | "4642459" | "4644338" | "4655552" | "4662718" | "4671671" | "4677428" | "4679909" | "4684939" | "4698460" | "4705942" | "4720869" | "4736203" | "4740782" | "4759610" | "4767192" | "4772101" | "4782327" | "4782328" | "4785564" | "4794634" | "4814760" | "4823178" | "4838655" | "4846559" | "4877697" | "4893120" | "4904056" | "4917474" | "5003356" | "5037119" | "5039206" | "5051570" | "5083175" | "5105186" | "5140153" | "5151688" | "5153420" | "5172104" | "5204661" | "5236850" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:11

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S36	312	S34 or S35	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S37	312	S36	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S38	10	S37 and stylus near10 angle	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S39	21	("20030197691" | "20090065269" | "20100066693" | "20100073323" | "20110001708" | "20110175834" | "20120050207" | "20120062497" | "20120146958" | "20120154340" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:14

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S40	147	radial near2 electrodes and stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:21
S41	889	segment$4 near2 electrodes and stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:22
S42	37	segment$4 near2 electrodes near10 stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:23
S43	5	"12877780"	US-PGPUB; USPAT	OR	ON	2015/11/02 15:04
S44	1	"14542438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 15:11
S45	14	"12877780"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 15:17
S46	1566	G06F.cpcl. and (electrostatic or capacitive) near10 pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 13:20
S47	150	G06F.cpcl. and (electrostatic or capacitive) near10 pen near2 tip	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 13:20
S48	17	("2005/0128191").URPN.	USPAT	OR	OFF	2016/04/27 13:26
S49	25435	G06F.cpcl. and electrodes near "10" (pen or sylus) near5 (tip or distal)	US-PGPUB; USPAT; USOCR;	OR	OFF	2016/04/27 15:17

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S50	76	G06F.cpcl. and electrodes near10 (pen or sylus) near5 (tip or distal)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:17
S51	1	"14452438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:19
S52	1	"14542438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:19
S53	1117	G06F.cpcl. and electrodes and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S54	171371	G06F.cpcl. and electrodes and phi and pen or stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S55	378	G06F.cpcl. and electrodes and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S56	303	G06F.cpcl. and electrode and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:55
S57	23	G06F.cpcl. and electrode same phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:56
S58	146	G06F.cpcl. and electrode and theta and	US-PGPUB;	OR	OFF	2016/04/27

		phi and (pen or stylus)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:56
S59	590	electrode and theta and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 16:01
S60	75	electrode same (pen or stylus) and phi and theta	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 16:01
S61	4	("8154525" | "8253702" | "20030142073" | "20090065269").PN.	US-PGPUB; USPAT	OR	OFF	2016/04/28 14:40
S62	0	("032504" | "072805").PN.	US-PGPUB; USPAT	OR	OFF	2016/04/28 14:40
S63	0	"15047013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/30 16:14
S64	4	"13117954"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/30 17:28
S65	1	"15047013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/07/14 14:03
S66	314	stylus same second near2 electrode and angl$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:32
S67	418	stylus same second near2 signal and angl$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:32
S68	829	(pen or stylus) same second near2	US-PGPUB;	OR	ON	2016/11/28

		signal and angl$4	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			00:35
S69	3	(pen or stylus) same second near2 signal and angl$4 and capacit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:39
S70	486	(pen or stylus) same second near2 signal and angl$4 and capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:39
S71	475	(pen or stylus) same second near2 electrode and angl$4 and capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:42
S72	1313	(pen or stylus) and second near2 electrode and angl$4 and capacit$4 and ultrasonic	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:45
S73	1351	(pen or stylus) and second near2 signal and angl$4 and capacit$4 and ultrasonic	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:48
S74	238	(pen or stylus) same second near2 signal and angl$4 and capacit$4 and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 00:56
S75	44	("4513437").URPN.	USPAT	OR	ON	2016/11/28 01:06
S76	10	("4513437").URPN. and capacitive	USPAT	OR	ON	2016/11/28 01:09
S77	69	(pen or stylus) same second near2 signal and tilt and capacit$4 and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/28 06:20

11/28/2016 7:16:40 AM

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
	Examiner	**Art Unit**
	WILLIAM LU	2624

✓	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	04/30/2016	11/28/2016							
	37		✓							
	38		✓							
	39		✓							

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTOR(S) Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2624

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	NAME	FILING DATE IF APPROPRIATE
	1	7,064,750	B2	06/20/06	Duret	
	2	2011/0061948	A1	03/17/11	Krah et al.	
	3					
	4					
	5					

FOREIGN PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	COUNTRY	TRANSLATION YES	TRANSLATION NO
	1						
	2						
	3						
	4						

NON-PATENT LITERATURE DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

	1		Notice of Allowance, mailed August 17, 2016, for U.S. Application No. 14/542,438, 8 pages.
	2		
	3		
	4		
	5		
	6		

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

Electronic Acknowledgement Receipt

EFS ID:	26974482
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	John Joseph Wakeley/Nick Brandt
Filer Authorized By:	John Joseph Wakeley
Attorney Docket Number:	940131.442C4
Receipt Date:	20-SEP-2016
Filing Date:	18-FEB-2016
Time Stamp:	17:06:47
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	Transmittal Letter	442C4_IDS_Transmittal.pdf	69269 9c2de89031dca824f6dc28efe285e58a062294fc	no	2

Warnings:

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 237

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	442C4_IDS_1449.pdf	101778 9d4fd519cf3c31aed1250f44f1f9acf2f4d9ce8c	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	NPL_NOA_14542438_08_17_2016.pdf	434957 5f8de269306148498eec5eb2921cd15ad149f4e0	no	8
Warnings:					
Information:					
		Total Files Size (in bytes):	606004		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	September 20, 2016

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

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

Commissioner for Patents:

In accordance with 37 CFR 1.56 and 1.97 through 1.98, Applicant wishes to make known to the U.S. Patent and Trademark Office the references set forth on the attached Information Disclosure Statement. Copies of cited U.S. patents and published patent applications are not required and accordingly have not been provided. Copies of any other cited references are enclosed. As to any reference cited, Applicant does not admit that it is "prior art" under 35 U.S.C. §§ 101, 102 or 103. Although the aforesaid references are made known to the Patent and Trademark Office in compliance with Applicant's duty to disclose all information they are aware of which is believed relevant to the examination of the above-identified application, Applicant believes that their invention is patentable.

Per 37 CFR 1.97(e)(2), we hereby certify that no item of information contained in the attached Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to our knowledge, after making reasonable inquiry, no item of information contained in the attached Information Disclosure Statement was

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 239

known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of this Information Disclosure Statement.

Please acknowledge receipt of this Information Disclosure Statement and kindly make the cited references of record in the above-identified application.

Applicant believes this Information Disclosure Statement has been timely filed, however, the Director is authorized to charge any fee due by way of this Information Disclosure Statement to our Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC

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Enclosures:
Information Disclosure Statement
Cited Reference (1)

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 240

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	August 4, 2016

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

AMENDMENT

Commissioner for Patents:

In response to the Office Action dated May 4, 2016, please amend the application as follows:

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

Remarks begin on page 8 of this paper.

Amendments to the Claims:

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

Listing of Claims:

1. (Currently Amended) A pen-shaped position indicator configured to ~~be~~ capacitively ~~coupled~~ couple with a sensor surface ~~to indicate a position on the sensor surface~~, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a first electrode ~~extending from a distal end of the pen-shaped of the pen-shaped body and configured to be supplied with a first singal which, when detected by one or more conductors of the sensor surface indicates a position on the sensor surface~~ arranged at a first position of the pen-tip portion; [[and]]

a second electrode ~~provided near the distal end of the pen-shaped body, the second electrode surrounding a central axis of the pen-shaped body and configured to be supplied with a second signal to be detected by a plurality of conductors of the sensor surface~~ arranged at a second position of the pen-tip portion different from the first position; and

a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other;

wherein ~~angular information of the pen-shaped position indicator is obtained based on a reference point indicated by the first signal from the first electrode and plural capacitive relationships, which are respectively formed between the second electrode and the plurality of conductors of the sensor surface~~ the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

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2. (Currently Amended) The pen-shaped position indicator according to claim 1, wherein ~~the angular information includes at least one of: i) a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and ii) a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface~~ the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

3. (Currently Amended) The pen-shaped position indicator according to claim 1, wherein the ~~first electrode and the second electrode are respectively supplied with signals that are distinguishable from each other~~ second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

4. (Currently Amended) The pen-shaped position indicator according to claim 1, wherein the first ~~electrode and the second electrode are respectively supplied with signals having a time difference with each other~~ and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

5. (Currently Amended) The pen-shaped position indicator according to ~~claim 4~~ claim 1, wherein the ~~first and second electrodes are time-divisionally supplied with the first and second signals, respectively~~ angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

6. (Currently Amended) The pen-shaped position indicator according to claim 1, ~~which, in operation, controls selective supply of the second signal to the second electrode~~ wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

7. (Currently Amended) The pen-shaped position indicator according to ~~claim 6~~ claim 1, ~~further comprising a switch configured to control selective supply of the second~~

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~~signal to the second electrode~~ wherein the first and second signals are different in type from each other.

8. (Currently Amended) The pen-shaped position indicator according to claim 1, ~~which, in operation, constantly supplies the first signal to the first electrode while selectively supplying the second signal to the second electrode~~ wherein the first and second signals are of the same type but have a time difference from each other.

9. (Currently Amended) the pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

wherein the drive voltage is ~~used~~ supplied to the signal production circuit to generate the first and second signals ~~supplied to the first and second electrodes~~.

10-23. (Canceled)

24. (New) A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body having a pen-tip portion;

a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and

a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other;

wherein the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.

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25. (New) The pen-shaped position indicator according to claim 24, wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit provides one of the plurality of signals.

26. (New) The pen-shaped position indicator according to claim 24, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

27. (New) The pen-shaped position indicator according to claim 24, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

28. (New) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal produced in the pen-shaped position indicator;

forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal; and

detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.

29. (New) The method according to claim 28, wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.

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30. (New) The method according to claim 28, wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.

31. (New) The method according to claim 28, wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.

32. (New) The method according to claim 28, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

33. (New) The method according to claim 28, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

34. (New) The method according to claim 28, wherein the first and second signals are different in type from each other.

35. (New) The method according to claim 28, wherein the first and second signals are of the same type but have a time difference from each other.

36. (New) A method of detecting angle information of a pen-shaped position indicator, the method comprising:

forming a plurality of capacitive relationships between a sensor surface and a plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator and are supplied with a plurality of signals that are distinguishable from each other, respectively; and

detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships.

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37. (New) The method according to claim 36, comprising:

forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which one of the plurality of signals is supplied.

38. (New) The method according to claim 36, wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.

39. (New) The method according to claim 36, wherein the angle information is a rotation angle of the pen-shaped position indicator about the axis of the pen-shaped position indicator.

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REMARKS

The Examiner is thanked for the clearly stated action and for conducting a telephone interview. The present amendment is filed based on the discussion during the interview.

1. IDS filed on March 15, 2016 and IDS filed on June 29, 2016.

Applicant has filed two supplemental IDSs on March 15, 2016 and on June 29, 2016. Applicant respectfully requests consideration and returning of the two IDSs ("Lists of References cited by Applicant") in the next official communication.

2. 35 U.S.C. §112, first paragraph rejection has been Overcome.

In the Office Action, Claims 1-23 were rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. In response, applicant has amended Claims 1-9, canceled Claims 10-23, and added new Claims 24-39, as set forth above, which are clearly supported by the enabling disclosure of the application as filed.

Claim 1, as amended, recites a pen-shaped position indicator including "a pen-shaped body having a pen-tip portion," "a first electrode arranged at a first position of the pen-tip portion," "a second electrode arranged at a second position of the pen-tip portion different from the first position," and "a signal production circuit configured to supply first and second signals to the first and second electrodes, respectively, wherein the first and second signals are distinguishable from each other," wherein "the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable." Claim 1, as amended, is supported, for example, by FIGS. 19, 20 and 12A/B and their related description in the application as filed. Dependent Claims 2-9, as amended, are also supported, for example, by FIGS. 19, 20 and 12A/B and their related description.

Claims 1-9, as amended, are now clearly in compliance with 35 U.S.C. §112, first paragraph. Withdrawal of this basis of claim rejection is respectfully requested.

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New Claims 24-39, of which Claims 24, 28 and 36 are independent, are added to recite the subject matter that applicant considers as their invention.

Claim 24 recites a pen-shaped position indicator including "a pen-shaped body having a pen-tip portion," "a plurality of electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator," and "a signal production circuit configured to supply a plurality of signals to the plurality of electrodes, respectively, wherein the plurality of signals are distinguishable from each other," wherein "the plurality of electrodes are configured to form a plurality of capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable." Claim 24 as well as its dependent Claims 25-27 are supported, for example, by FIGS. 19, 20 and 12A/B and their related description in the application as filed.

Claim 28 recites a method of detecting angle information of a pen-shaped position indicator including "forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal produced in the pen-shaped position indicator," "forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and is supplied with a second signal produced in the pen-shaped position indicator and distinguishable from the first signal," and "detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships." Claim 28 as well as its dependent Claims 29-35 are supported, for example, by FIGS. 19, 20 and 12A/B and their related description in the application as filed.

Claim 36 recites a method of detecting angle information of a pen-shaped position indicator including "forming a plurality of capacitive relationship between a sensor surface and plurality of electrodes, which are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator and are supplied with a plurality of signals that are distinguishable from each other, respectively" and "detecting angular information of the pen-shaped position indicator based on the plurality of capacitive relationships." Claim 36

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as well as its dependent Claims 37-39 are supported, for example, by FIGS. 19, 20 and 12A/B and their related description in the application as filed.

3. Claims 1, 24, 28 and 36, and their dependent claims, are Allowable over Katsurahira, Fujioka and Fukushima under 35 U.S.C. §103.

Claims 1-23 were rejected under 35 U.S.C. §103 as obvious over Katsurahira (US 2005/0128191) in view of Fujioka (US 4,725,9778) in further view of Fukushima (US 2003/0142073). In response, applicant has amended independent Claim 1 and added new independent Claims 24, 28 and 36, as set forth above, to more particularly recite the subject matter that applicant considers as their invention and to more clearly distinguish the claims from the prior art. In view of the amendments and the remarks that follow, reconsideration and allowance of the present application are respectfully requested.

Katsurahira, in FIG.4, discloses an electric pen including an oscillator 70, which generates a high-frequency electric field between two electrodes 71 and 72 provided near the pen tip. *Katsurahira*, ¶[0073] ("If the electric power is supplied to the oscillator 70, a high-frequency electric field is generated between the electrodes 71 and 72"). Sense lines 61 are used to sense the high-frequency electric field to detect a position of the pen. *Katsurahira*, ¶¶[0069]&[0071]. Katsurahira does not teach or suggest that electrodes are supplied with "signals [that] are distinguishable from each other," respectively, to form "capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable" as recited in Claims 1 and 24. Similarly, Katsurahira does not teach or suggest forming capacitive relationships between a sensor surface and electrodes, which are supplied with signals that are distinguishable from each other, and detecting angular information of the pen-shaped position indicator based on the capacitive relationships, as recited in Claims 28 and 36.

Fujioka, in FIG. 1, teaches a "graphic pattern inputting apparatus" which allows a user to move a pen 4 to draw a desired graphic pattern on a sheet of paper 1 and displays the drawn graphic patter on a screen 7b of a processing apparatus 7. *Fujioka*, Col. 1, lines 52-55. The pen 4 is mounted in a pen holder 3, which is slidably fixed to a slidable arm 2. The pen

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holder is slidable in the X-direction while the arm 2 is slidable in the Y-direction and, as a result, the pen 4 can move in the X- and Y-directions. *Fujioka*, Col. 1, lines 56-65. Fujioka thus needs to determine the drawing direction in which the pen 4 moves. To that end, as shown in FIG. 2, Fujioka's pen 4 includes a common electrode 11 surrounded by eight (8) outer electrodes 12, which are all provided in the mid-section of the pen 4 along its axis. *Fujioka*, Col. 3, lines 7-14. When the pen 4 is moved, the common electrode 11 is inclined to be "close to one of the outer electrodes to change the capacitance between the common electrode 11 and the selected outer electrode. The strength and direction of a force which is applied to the inputting pen 4 are determined with the aid of an associated oscillator later described. Specifically, the strength of the force is determined in terms of the degree or extent of matching with the resonance frequency of the oscillator whereas the direction of the force is determined in terms of which outer electrode is selected as closest to the common electrode." *Fujioka*, Col., 3, lines 14-27 (emphases added).

Thus, Fujioka teaches a graphic pattern inputting apparatus capable of detecting the "direction of the force" of the pen 4, i.e., the drawing direction of the pen 4 so as to display a graphic pattern drawn by the pen 4 on the screen 7b.

Fujioka does not teach that its eight (8) outer electrodes 12 are supplied with "signals [that] are distinguishable from each other," respectively, to form "capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable" as recited in Claims 1 and 24. Similarly, Fujioka does not teach forming capacitive relationships between a sensor surface and the eight (8) outer electrodes 12, which are supplied with signals that are distinguishable from each other, and detecting angular information of the pen-shaped position indicator based on the capacitive relationships, as recited in Claims 28 and 36.

Fukushima, in FIG. 2, teaches a system including a "three-dimensional information-indicating device 101" and a "three-dimensional information sensor device 102." The indicating device 101 includes three indicating coils 103-105 wound about X-, Y- and Z-axes. The sensor device 102 "generates … signals of frequencies fu, fv, and fw, respectively, which correspond to the resonant frequencies fu, fv, and fw of indicating coils 103-105. Signals

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are selectively switched at a predetermined time by selector circuit 208. The selected signal are output … via transmitting circuit 209 and signal cable 208." *Fukushima*, ¶[0091]. "Thereby, indicating coils 103-105 are supplied with signals corresponding to the respective resonant frequencies of these indicating coils." "When signals are output from indicating coils 103-105, signals occur in sensor coils 109 by electromagnetic coupling," which are used to detect a position and angular information of the indicating device 101. *Fukushima*, ¶¶[0091]-[0093] & [0099].

Thus, Fukushima discloses an electromagnetic coupling system. Fukushima does not teach that its indicating coils 103-105 are supplied with "signals [that] are distinguishable from each other," respectively, to form "capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable" as recited in Claims 1 and 24. Similarly, Fukushima does not teach forming capacitive relationships between a sensor surface and the indicating coils 103-105, supplied with signals that are distinguishable from each other, and detecting angular information of the pen-shaped position indicator based on the capacitive relationships, as recited in Claims 28 and 36. Note also that in Fukushima the signals of frequencies fu, fv, and fw are generated in the sensor device 102 and are supplied to the indicating coils 103-105 via the transmitting circuit 209 and the signal cable 208. As such, Fukushima does not teach or suggest that the indicating device 101 itself would include "a signal production circuit" configured to generate distinguishable signals for the electrodes as required by Claims 1 and 24. Similarly, Fukushima does not teach or suggest that the distinguishable signals are "produced in the pen-shaped position indicator" as required by Claims 28 and 36. In Fujioka also, signals are generated in the processing apparatus 7 and supplied to the eight (8) outer electrodes 12 via cables (see FIG. 2). Thus, Fujioka too fails to teach or suggest that the pen 4 itself would include "a signal production circuit" configured to generate distinguishable signals for the electrodes as required by Claims 1 and 24. Similarly, Fujioka does not teach or suggest that the distinguishable signals are "produced in the pen-shaped position indicator" as required by Claims 28 and 36. Further additionally, Katsurahira does not teach or suggest that the electric pen includes "a signal production circuit" configured to generate "distinguishable"

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signals for the electrodes, respectively, as required by Claims 1 and 24. Similarly, Katsurahira does not teach or suggest that the "distinguishable" signals to be supplied to electrodes, respectively, are "produced in the pen-shaped position indicator" as required by Claims 28 and 36.

Based on these differences discussed above, applicant respectfully submits that independent Claims 1, 24, 28 and 36 are believed to be clearly allowable over Katsurahira, Fujioka and Fukushima, alone or in any combination. Allowance of these claims as well as their respective dependent claims is respectfully requested.

Favorable consideration and a Notice of Allowance are earnestly solicited. Should the Examiner find any further issue to resolve, he is invited to telephone applicant's undersigned attorney at the number set forth below.

Respectfully submitted,

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Exhibit 1002 Page 253

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	August 4, 2016

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

FEE DEFICIENCY AUTHORIZATION FORM

Commissioner for Patents:

Applicant(s) hereby authorize(s) the Director to charge any deficiencies or credit any overpayment in fees due by way of the enclosed papers only to Deposit Account No. 19-1090.

Respectfully submitted,

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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Electronic Patent Application Fee Transmittal

Application Number:	15047013
Filing Date:	18-Feb-2016
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Filer:	Shoko I. Leek/Maria Krebs
Attorney Docket Number:	940131.442C4

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Claims in Excess of 20	1202	5	80	400
Independent claims in excess of 3	1201	1	420	420
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**820**

Electronic Acknowledgement Receipt

EFS ID:	26550837
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Maria Krebs
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	04-AUG-2016
Filing Date:	18-FEB-2016
Time Stamp:	16:09:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$820
RAM confirmation Number	080516INTEFSW16095800
Deposit Account	1383
Authorized User	Maria Krebs

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		940131_442C4_Amendment.pdf	156841 9d464775999509c9f2d39a1b8703b99e2c87e35d	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	
	Applicant Arguments/Remarks Made in an Amendment		8	13	
Warnings:					
Information:					
2	Miscellaneous Incoming Letter	940131_442C4_FDA.pdf	47288 51911fed4981f9b57317e06847066a35888f7179	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32349 f2c7573af9afd0367fdba8cb6fbc070946d88bd6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	236478		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/047,013	Filing Date 02/18/2016	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

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

APPLICATION AS AMENDED – PART II

AMENDMENT

08/04/2016	(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))	* 25	Minus	** 23	= 2	X $80 =	160
Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	**160**

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
/JERMAINE MINOR/

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UNITED STATES PATENT AND TRADEMARK OFFICE

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Jul 12 2016

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Name(s):
Shoko Leek

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/Shoko Leek/

Registration Number:
43746

U.S. Application Number:
15047013

Confirmation Number:
1066

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Phone Number:
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Proposed Time of Interview:
7-20-2016 1:00 PM ET

Prefered Interview Type:
Telephonic

I am the applicant or applicant's representative for this application.

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTOR(S) Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2624

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	NAME	FILING DATE IF APPROPRIATE
	1	8,581,857	B2	11/12/13	Matsubara	
	2	2010/0289758	A1	11/18/10	Matsubara	

FOREIGN PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	COUNTRY	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	TRANSLATION YES	TRANSLATION NO
	1	201011622	A	03/16/10	TW (W/ English Abstract)	Corresponds to U.S. 8,581,857 and US 2010/0289758		X

NON-PATENT LITERATURE DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

	1		Taiwanese Office Action dated May 30, 2016, for corresponding TW Application No. 104126247, 7 pages.

EXAMINER	DATE CONSIDERED

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

Espacenet

Bibliographic data: TW201011622 (A) — 2010-03-16

Position detecting device and position detecting method

Inventor(s): MATSUBARA MASAKI [JP] ± (MATSUBARA, MASAKI)

Applicant(s): WACOM CO LTD [JP] ± (WACOM CO., LTD)

Classification: - international: *G06F3/044*
- cooperative: G06F3/0416; G06F3/044

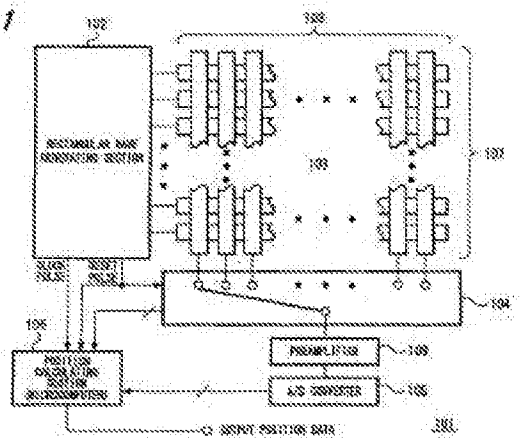
Application number: TW20090126366 20090805

Priority number (s): JP20080203325 20080806

Also published as: TWI469020 (B) EP2151743 (A2) EP2151743 (A3) US2010289758 (A1) US8581857 (B2) more

Abstract of TW201011622 (A)

FIG. 1



An electrostatic capacity type position detecting device having increased scanning speed is provided. The device includes a signal supplying electrode including a plurality of electrodes arranged in parallel with each other in a first direction, and a receiving electrode also including a plurality of electrodes arranged in parallel with each other in a second direction perpendicular to the first direction. A one-shot pulse having a predetermined time width is applied sequentially to the plurality of electrodes of the signal supplying electrode at a frequency equal to an integral multiple of 200 kHz. In other words, the sequential application of the one-shot pulse occurs with a time difference that is shorter than (e.g., 1/N of) the predetermined time width.; A current change caused at rising and falling edges of the one-shot pulse is detected through the receiving electrode, to thereby indicate a position on the position detecting device.

(19)中華民國智慧財產局
(12)發明說明書公開本 (11)公開編號：TW 201011622 A1
(43)公開日： 中華民國 99 (2010) 年 03 月 16 日

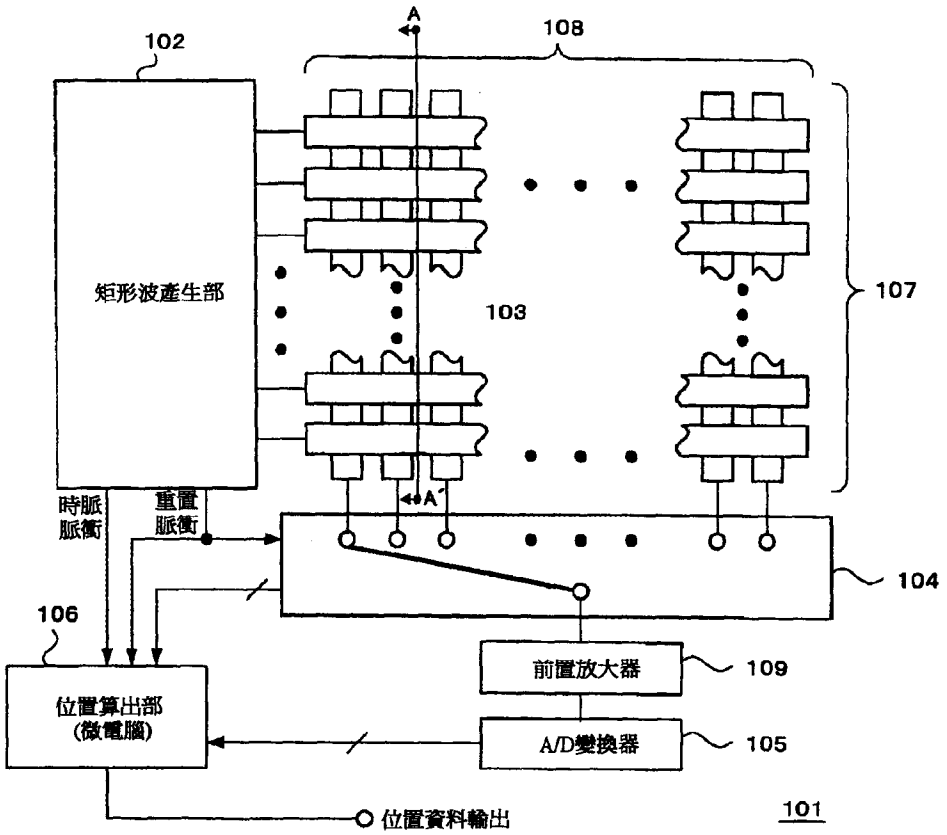
(21)申請案號：098126366 (22)申請日： 中華民國 98 (2009) 年 08 月 05 日
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(30)優先權：2008/08/06 日本 2008-203325
(71)申請人：和冠股份有限公司 (日本) WACOM CO., LTD. (JP)
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申請實體審查：無 申請專利範圍項數：9 項 圖式數：6 共 46 頁

(54)名稱

位置檢測裝置及位置檢測方法

(57)摘要

[課題]提供一種：能夠藉由較為簡單之電路構成而實行高速之掃描的靜電式之位置檢測裝置以及位置檢測方法。[解決手段]將 200kHz 之單擊脈衝（one-shot pulse），藉由 200kHz 之整數倍的頻率之週期，來依序賦予至複數之電極元件處。將經由此單擊脈衝之上揚與下挫所產生的電流變化，藉由正交之電極元件來作捕捉。



(19)中華民國智慧財產局
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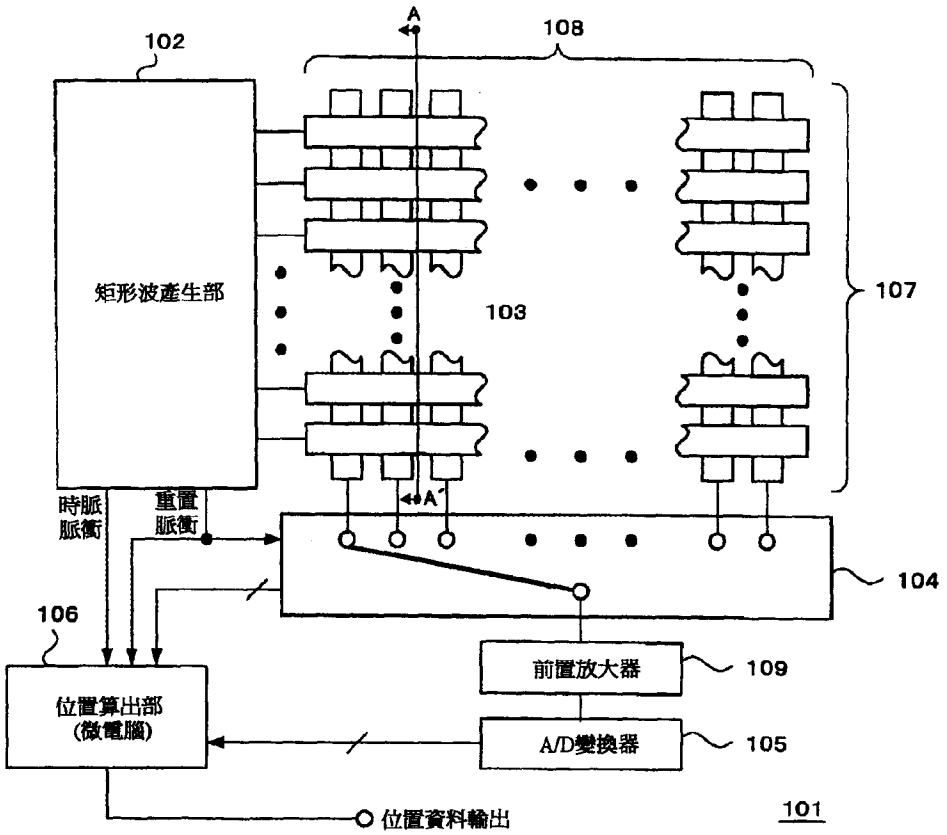
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六、發明說明：

【發明所屬之技術領域】

本發明，係有關於合適於適用在位置檢測裝置中之技術。

更詳細而言，係有關於使在靜電電容方式之位置檢測裝置中的掃描速度提升之技術。

【先前技術】

在將位置資訊賦予至電腦處的輸入裝置中，係存在有各種型態者。其中，係存在有被稱爲觸控面板之2維位置資訊輸入裝置。

觸控面板，係爲藉由以手指或是專用之筆等的輸入體來接觸檢測平面，而進行電腦等之操作的輸入裝置。對手指或是筆所接觸之位置作檢測，並指定畫面上之位置，而將指示賦予至電腦處。

此觸控面板，係在PDA（Personal Digital Assistant）或是銀行之ATM（Automated Teller Machine）、車站之售票機等處而被廣泛使用。

在被採用於觸控面板處之位置資訊檢測技術中，係存在有各種型態者。例如，係存在有藉由壓力之變化來進行位置檢測的電阻膜方式、或是藉由位置檢測平面之表面的膜之靜電電容的變化來進行位置檢測之靜電電容方式等。

根據圖6，對於靜電電容方式所致之位置檢測裝置作說明。

驅動部 602，例如，係產生身爲最容易被人體所吸收之頻率的 200kHz 之交流電壓。經由此驅動部 602 所產生之 200kHz 的交流電壓，係透過送訊選擇開關 603，而選擇性地被施加在矩陣電極 103 之 X 軸方向的電極（以下，稱爲「X 軸電極群」）107 處。

此矩陣電極 103，係將細長導體之電極作縱橫並排，而在縱方向並排之電極與橫方向並排之電極間，係介於存在有爲圖示之略板狀的絕緣薄片，而形成電容器。200kHz 之交流電壓，係被施加在此些之電容器處。

受訊選擇開關 104，係爲用以對於形成電容器之交點作決定開關。此受訊選擇開關 104 之輸出，係被供給至前置放大器 109 處，並在藉由 A/D 變換器 105 而被變換爲數位資料後，被輸入至位置算出部 605 處。

由微電腦所成之位置算出部 605，係接收從同步時脈產生部 606 所得到之位址資訊、和從 A/D 變換器 105 所得到之些微的訊號變化之資料，而將矩陣電極 103 上之手指的存在之有無、以及該位置之資訊作輸出。具體而言，係在對於從 A/D 變換器 105 所得到之資料進行了積算處理後，將峰值檢測出來。而後，根據峰值與其前後之值，而進行重心演算，並根據所得到之重心的時間軸上之位置，來演算出手指之位置。

另外，爲了說明上之方便，係將矩陣電極 103 之被與送訊選擇開關 603 相連接之側的電極群，稱作 X 軸電極群 107，並將被與受訊選擇開關 104 相連接之側的電極群

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，稱作 Y 軸電極群 108。

接著，對驅動部 605 之內部作說明。

時脈產生器 607，係爲產生時脈之震盪器。此時脈產生器 607 所產生之時脈，係被供給至讀出部 608 處。

正弦波 ROM609，係爲被記憶有 6 位元×256 樣本之擬似正弦波的 ROM。讀出部 608，係根據從時脈產生器 607 所供給而來之時脈，而指定此正弦波 ROM609 之位址，並將資料讀出。

從此正弦波 609 而經由讀出部 608 所讀出之資料，係經由 D/A 變換器 610 而被作 D/A 變換，之後，在 LPF611 處而被平滑化，藉由此，而被變換爲類比之正弦波訊號。而後，此正弦波訊號，係在驅動器 612 處被作電壓放大，並成爲被施加至 X 軸電極群 107 處之交流電壓。

另外，於專利文獻 1 中，係揭示有本申請人之發明的先前技術。

[專利文獻 1]日本特開平 10-20992 號公報

【發明內容】

[發明所欲解決之課題]

先前技術所致之靜電電容方式的位置檢測裝置，係對於 X 軸電極群與 Y 軸電極群之各交點的每一者，而進行積算處理。此積算處理，係在每一交點處而需要約 30 μsec 的時間。

在此積分處理中所需要的時間，若是小規模之位置檢

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測裝置，則並不會成爲太大的問題，但是，若是欲將位置檢測裝置之位置檢測平面增大，則問題係會顯著化。亦即是，若是將位置檢測平面增大，則由於交點之數量係增加，因此，若是交點之數量越多，則對位置檢測平面全體作掃描（scan）所需的時間亦會變長。

一般而言，位置檢測裝置或是滑鼠等之游標裝置的解析度，係以 10msec 左右爲理想。故而，若是在位置檢測裝置中，仍維持在一交點 30μsec 的限制下，則能夠在檢測面中所設置之交點的數量，係成爲約 333 個左右。

另一方面，申請人係希望能夠實現一種具備有廣大之面積的位置檢測平面之靜電電容方式的位置檢測裝置。所希望之位置檢測裝置的位置檢測平面內之交點數，係以約 15000 個左右作爲目標。故而，藉由先前技術所致之位置檢測裝置，係根本無法實現。

於此，若是電磁感應方式之位置檢測裝置，則係可考慮有藉由將施加在位置檢測平面處之交流電壓的頻率提升而使掃描速度提升的方法。但是，靜電電容之位置檢測裝置，由於係存在有必須使用人體最容易吸收的頻率之固有的限制，因此，係無法將所施加之交流電壓的頻率提高。

又，係存在有將交點分割爲數個群，並設置與各別之交點群相對應的複數之位置檢測電路的方法。然而，若是設置複數之與各別之交點群相對應的檢測電路，則位置檢測裝置係成爲大規模，而在使成本提升的同時，亦使設計變得更困難，而存在有大的缺點。

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本發明，係爲有鑑於此點所進行者，其目的，係在於提供一種：能夠藉由較爲簡單之電路構成而實行高速之掃描的靜電電容方式之位置檢測裝置以及位置檢測方法。

[用以解決課題之手段]

爲了解決上述課題，本發明所致之位置檢測裝置，其特徵爲，係具備有：訊號供給電極，係將複數之電極作平行並排配置；和受訊電極，係將複數之電極與前述訊號供給電極作正交配置；和訊號供給電路，係對於前述訊號供給電極中之第1以及第2電極的各個來供給具有特定之時間寬幅的訊號，並在供給至第1電極之訊號與供給至第2電極之訊號之間，設定有特定之時間差，同時，該特定之時間差，係被設定爲較時間寬幅爲更短；和位置算出部，係根據檢測出從受訊電極所輸出之訊號的變化，來計算出指示體所致之指示位置。

又，係爲一種位置檢測方法，係具備有將複數之電極作平行並排配置之訊號供給電極、和將複數之電極與前述訊號供給電極作正交配置之受訊電極，並對於訊號供給電極供給具有特定之時間寬幅的訊號，而根據從受訊電極所輸出之訊號的變化，來檢測出指示體所致之指示位置，該位置檢測方法，其特徵爲，係由以下步驟所成：將前述訊號供給至訊號供給電極中之第1電極處的步驟；和以較時間寬幅爲更短之特定的時間差，來將訊號供給至在訊號供給電極中之第2電極處的步驟。

[發明之效果]

藉由本發明，則能夠提供一種：能夠藉由較爲簡單之電路構成而實行高速之掃描的靜電電容方式之位置檢測裝置以及位置檢測方法。

【實施方式】

以下，參考圖 1~圖 5，對本發明之實施形態作說明。

圖 1，係爲展示本發明之實施型態之例，而爲位置檢測裝置的全體區塊圖。此位置檢測裝置 101，係由以下所構成：矩形波產生部 102、和被連接於矩形波產生部 105 之矩陣電極 103、和被連接於矩陣電極 103 之受訊選擇開關 104、和被連接於受訊選擇開關 104 之前置放大器 109、和被連接於前置放大器 109 之 A/D 變換器 105、和被連接於 A/D 變換器 105 之位置算出部 106。

矩形波產生部 102，係爲將矩形波形狀之單擊脈衝的電壓供給至後述之矩陣電極 103 處的訊號供給部。此矩形波產生部 102，係除了矩形波形狀之單擊脈衝的電壓以外，亦產生時脈脈衝和重置脈衝。經由此矩形波產生部 102 所產生之時脈脈衝，係被供給至後述之位置算出部 106 處。

經由此矩形波產生部 102 所產生之重置脈衝，係被供給至後述之 A/D 變換器 105 以及位置算出部 106 處。

另外，此矩形波產生部 102 所產生之單擊脈衝的脈衝寬幅，例如，係相等於從上體所最易於吸收之 200kHz 的

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矩形波而取出了半個週期份之訊號者，而被設定爲 2.5 μ sec。

矩陣電極 103，係爲用以將人體之手指係近接於位置檢測裝置 101 之未圖示的位置檢測平面上之何一位置處一事檢測出來的電極之群。此矩陣電極 103，係具備有：將 m 根之細長電極作平行並排所構成了的 X 軸電極群 107、和將 n 根之細長電極作平行並排所構成了的 Y 軸電極群 108。

構成此矩陣電極 103 之 X 軸電極群 107 與 Y 軸電極群 108，係隔著未圖示之絕緣薄片而相互維持在絕緣狀態下，並在縱橫方向上並排而構成。因此，X 軸電極群 107 與 Y 軸電極群 108 間之各交點，係形成電容器。

而後，X 軸電極群 107 係被連接於矩形波產生部 102 處，從此矩形波產生部 102，係對於此 X 軸電極群 107 而施加有單擊脈衝。亦即是，在被形成於 X 軸電極群 107 與 Y 軸電極群 108 間之各交點處的電容器中，由於係經由此 X 軸電極群 107 而被供給有單擊脈衝，因此，此 X 軸電極群 107，係作爲訊號供給電極而起作用。

受訊選擇開關 104，係爲對構成 Y 軸電極群 108 之複數的電極中之一個作週期性的選擇之開關。此受訊選擇開關 104M，係被與矩形波產生部 102 和前置放大器 109 以及位置算出部 106 相連接。而，在此受訊選擇開關 104 處，係被輸入有從矩形波產生部 102 所輸出之重置脈衝。

而後，此受訊選擇開關 104，係將從矩陣電極 103 所

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輸出之電流，輸出至前置放大器 109 處。亦即是，Y 軸電極群 108，係被作爲受訊電極而使用。

又，此受訊選擇開關 104，係將代表對於軸電極群 108 之何者的電極作了選擇一事之位址資訊，輸出至後述之位置算出部 106 處。

前置放大器 109，係將從矩陣電極 103 而經由受訊選擇開關 104 所輸出之微弱的電流變換爲電壓，並將此作放大，而輸出至 A/D 變換器 105 處。

A/D 變換器 105，係將從前置放大器 109 所輸入之類比訊號變換爲數位訊號，並輸出至位置算出部 106 處。

位置算出部 106，係爲對位址資訊以及數位資料進行特定之演算處理，並將矩陣電極 103 上之手指的存在之有無以及該位置之資訊作輸出的微電腦。

在此位置算出部 106 處，係被輸入有：從 A/D 變換器 105 所輸出之數位資料、和從矩形波產生部 102 所輸出之時脈脈衝、和從受訊選擇開關 104 所輸出之位址資訊。

接著，根據圖 2，對矩形波產生部 102 之構成以及動作作詳細說明。

圖 2，係爲矩形波產生部 102 之內部區塊圖。

此矩形波產生部 102，係由時脈產生部 202、和分頻器 203、和 AND 閘 204、和計數器 206、和數位比較器 205、和常數 n207、和橫移暫存器 208、以及單穩多諧振盪器 211 所構成。

時脈產生器 202，係爲產生一定之頻率的矩形波之時

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脈的震盪器。在本實施型態中，此時脈產生器 202，例如係產生 12MHz（一週期 8.33ns）的矩形波。時脈產生器 202 所產生之 12MHz 時脈，係被供給至分頻器 203 處。

此分頻器 203，係爲週知之可程式化計數器。而，此分頻器 203，係藉由對於從時脈產生器 202 所輸入而來之時脈而僅計數一定之數，來將時脈之頻率變換爲 1/N。在本實施型態中，此分頻器 203 之分頻比，係被設定爲 1/10，此時脈，係被分頻爲 1200kHz（一週期 0.833μs）。

從此分頻器 203 所輸出之 1200kHz 的矩形波訊號（以下，單純略稱爲矩形波），係作爲時脈脈衝，而被供給至 AND 閘 204 處，同時，亦被供給至橫移暫存器 208 和後述之位置算出部 106 處。

AND 閘 204，係爲將輸入數位值之邏輯積作輸出的週知之閘極。此 AND 閘 204，係僅在從數位比較器 205 所供給而來之訊號係爲代表邏輯值之「真」的高電位，亦即是在被輸入有「1」之值時，而將從分頻器 203 所輸入而來之時脈脈衝供給至計數器 206 處。

計數器 206，係爲在輸入訊號之上升邊緣處而將輸出數值作增量（Increment）之週知的計數器。此計數器 206 之輸出數值，若是在重置端子處被賦予有代表邏輯值之「真」的高電位，則係被重置。另外，此計數器 206，其初期值係被設定爲「0」。

而，此計數器 206 之輸入端子係被連接於 AND 閘 204 之輸出端子處，而重置端子係被連接於後述之單穩多

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諧震盪器 211 處。

而後，此計數器 206，若是從 AND 閘 204 而被輸入有時脈脈衝，則將在每次之時脈脈衝的上升邊緣被輸入時而被加算上了 1 的計數值（0，1，2，…）作輸出。又，此計數器 206，若是從後述之單穩多諧震盪器 211 所輸出之脈衝訊號被輸入至重置端子處，則計數值係被重置，並輸出「0」。

數位比較器 205，係爲對 2 個的輸入數值之大小作比較的比較器。此數位比較器 205，係將從正輸入所輸入而來之數值與從負輸入所輸入而來之數值作比較，當從正輸入所輸入而來之數值爲較大時，則輸出代表邏輯之「真」（=1）的高電位。

而，在此數位比較器 205 之正輸入處，係被連接有常數 n207，在負輸入處，係被連接有計數器 206。故而，數位比較器 205，係對於從負輸入所輸入而來之計數器 206 的計數值和從正輸入所輸入而來之常數 n207 的數值作比較，當常數 n207 之數值爲較計數器 206 之輸出值更大時，係輸出值「1」，而當常數 n207 之數值爲與計數值相同或是爲較小時，則輸出「0」。代表數位比較器 205 所致之比較結果的邏輯值輸出，係被輸入至 AND 閘 204 以及橫移暫存器 208 處。

常數 n207，係藉由暫存器等而被設置。此常數 n207，係被賦予有 200kHz 之自然數倍。於本實施型態之情況中，n 係被設定爲「3」。此常數 n207，係被輸入至數位

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比較器 205 之正輸入處。

橫移暫存器 208，係爲週知之串聯輸入並聯輸出型的橫移暫存器，例如，係爲將週知之 D 正反器作了級聯連接者。此橫移暫存器 208，係具備有複數個（m 個）的有效位元胞 209a~209m，和其終端處之 3 個的無效位元胞 210a、210b 以及 210c。有效位元胞 209a~209m，係分別被連接於構成 X 軸電極群 107 之各電極處。在無效位元胞 210a、210b 以及 210c 處，係並未與 X 軸電極群 107 相連接。

此無效位元胞 210a、210b 以及 210c 中的最後之無效位元胞 210c，係被連接於單穩多諧震盪器 211。

此單穩多諧震盪器 211，係將其之邏輯值輸出，供給至計數器 206 之重置端子和受訊選擇開關 104 以及位置算出部 106 處。

橫移暫存器 208，係依據從分頻器 203 所輸出之時脈脈衝的上升邊緣，而將數位比較器 205 之輸出值作記憶，同時，將各胞之記憶值移至相鄰接之旁鄰的胞（例如，若是有效位元胞 209a，則係移動至有效位元胞 209b）處。

此橫移暫存器 208 之有效位元胞 209a~209m，若是從數位比較器 205 或是前方之相鄰接的胞而被輸入有邏輯值「1」，且時脈脈衝之上升邊緣被輸入，則將高電位輸出至被與輸入有該邏輯值「1」之有效位元胞相連接的 X 軸電極群 107 之電極處。

同樣的，此橫移暫存器 208 之有效位元胞 209a~209m

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，若是從數位比較器 205 或是前方之相鄰接的胞而被輸入有邏輯值「0」，且時脈脈衝之上升邊緣被輸入，則將低電位輸出至相連接的 X 軸電極群 107 之電極處。

另一方面，若是在邏輯值「0」被輸入至各有效位元胞 209a~209m 中之際而被輸入有邏輯值「1」，則 X 軸電極群 107 之電位係從低電位而遷移至高電位。另一方面，若是在邏輯值「1」被輸入至各有效位元胞 209a~209m 中之際而被輸入有邏輯值「0」，則 X 軸電極群 107 之電位係從高電位而遷移至低電位。

亦即是，藉由使輸入至各有效位元胞 209a~209m 中之邏輯值作「0」→「1」→「0」之歷時性的變化，橫移暫存器 208 係對於 X 軸電極群 107 之各電極而供給單擊脈衝。

單穩多諧震盪器 211，係以輸入訊號（從無效位元胞 210c 而來之訊號）的上揚邊緣作爲觸發，而輸出一定寬幅之脈衝訊號。在本實施型態中，此一定寬幅之脈衝訊號的寬幅，係被設定爲上述之矩形波訊號的時脈之 1 時脈以內。亦即是，單穩多諧震盪器 211，係爲了由從無效位元胞 210c 所輸出之訊號的上揚來產生計數器 206 之重置脈衝，而被設置。

以下，對矩形波產生部 102 之動作作詳述。

由於計數器 206 之初期值係爲 0，因此，從該輸出端子，係輸出有數值「0」。數位比較器 205，係對於從常數 n207 所賦予而來之數值（n=3）和從計數器 206 所輸入

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而來之數值「0」作比較。於此時間點，由於常數 n207 之數值，係較從計數器 206 所輸入而來之值更大，因此，從數位比較器 205，係輸出有邏輯值「1」。其結果，在 AND 閘 204 處，由於係被輸入有從數位比較器 205 而來之邏輯值「1」，因此，此 AND 閘 204，係將從分頻器 203 所輸出之時脈脈衝供給至計數器 206 處。此計數器 206，由於係從 AND 閘 204 而被輸入有時脈脈衝，因此，係輸出值「1」。

之後，從此計數器 206 所輸出之值「1」，係被輸入至數位比較器 205 處，AND 閘 204、計數器 206 以及數位比較器 205，係反覆進行上述之動作，直到從計數器 206 而輸入至數位比較器 205 處之值成爲「3」爲止。

若是從計數器 206 而輸入至數位比較器 205 處的值到達了 3，則從負輸入所輸入而來之值（「3」），係成爲與從正輸入所輸入而來之常數 n207 的數值「3」相同。故而，數位比較器 205 係輸出「僞」，亦即是輸出值「0」。其結果，AND 閘 204 係成爲不將時脈脈衝供給至計數器 206 處。故而，在計數器 206 處之計數，係經由 AND 閘 204 而被阻止。之後，計數器 206 係經由 AND 閘 204 而使時脈之供給被阻止，其結果，計數係停止。亦即是，若是進行上述動作，則從數位比較器 205，係在時脈脈衝之每一時序中，以「111000…」之順序而輸出邏輯值。

接著，對橫移暫存器 208 之動作作說明。

從數位比較器 205 所輸出之邏輯值，係被供給至橫移

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暫存器 208 之有效位元胞 209a 中。此橫移暫存器 208，係因應於從分頻器 203 所供給而來之時脈脈衝的上揚邊緣，而將被保持在有效位元胞 209a 中之值「1」橫移至旁鄰之有效位元胞 209bn 處，同時，將從數位比較器 205 所新輸出之值「1」保存在有效位元胞 209a 中。之後，在每一次之時脈脈衝被輸入時，橫移暫存器 208，係將特定之有效位元胞 209x 的值依序橫移至相鄰接之旁鄰的有效位元胞 209（x＋1）處。

而後，在最後之有效位元胞 209m 中所保持之值，係被供給至最初之無效位元胞 210a 處。同樣的，最初之無效位元胞 210a 中所保持之值，係被供給至相鄰接之旁鄰的無效位元胞 210b 處，在無效位元胞 210b 中所保持之值，係被供給至最後之無效位元胞 210c 處。

而後，在最後之無效位元胞 210c 中所保持之值，若是時脈脈衝被輸入至橫移暫存器 208 中，則係被供給至單穩多諧震盪器 211 處。

如此這般，若是橫移暫存器 208 持續使資料移動，則在最初之階段所輸入的「111」之值，係到達無效位元胞 210a~210c 處。

若是在無效位元胞之最後的胞 210c 處被交付有邏輯值「1」，則無效位元胞 210c 之輸出端子，係從低電位而遷移至高電位。單穩多諧震盪器 211，係接收到此電壓之遷移，亦即是接收到上揚邊緣，並產生重置脈衝。重置脈衝，由於係被輸入至計數器 206 之重置端子處，因此，計

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數器 206 係被重置。

而後，若是在單穩多諧震盪器 211 處被輸入有下一個的值「1」，則此單穩多諧震盪器 211 由於係成爲並不進行對於計數器 206 之重置輸入的脈衝訊號之供給，因此，在此時間點，計數器 206 係再度開始計數。

如此這般，矩形波產生部 102，係對於 X 軸電極群 107 而供給單擊脈衝。

接下來，參考圖 3，針對本實施型態例中之位置算出部 106、受訊選擇開關 104 之構成以及此些之位置檢測動作作詳細說明。

首先，針對受訊選擇開關 104 之構成作說明。此受訊選擇開關 104，係由迴圈計數器 104a 和切換開關 104b 所構成。

迴圈計數器 104a，係爲被設定爲身爲受訊電極之 Y 軸電極群 108 的電極之數量的最大值（在本實施例中，係爲 n）之週知的可程式化 N 進計數器。此迴圈開關 104a，係對於從矩形波產生部 102 之單穩多諧震盪器 211 所輸出而來之重置脈衝作計數。

切換開關 104b，係爲具備有與身爲受訊電極之 Y 軸電極群的電極之數爲相等數量的切換端子之切換開關，例如，係使用有類比多工器。而，切換開關 104b，係從構成 Y 軸電極群 108 之 n 根的電極，而對於該當於從迴圈計數器 104a 所輸入而來之計數的一個的電極作選擇。

在與此切換開關 104b 相連接之構成 Y 軸電極群 108

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的各電極處，係分別被分配有 1~n 號之號碼。而，此切換開關 104b，係選擇被分配有與從計數器 104a 所輸入而來之計數值相同之號碼的電極。而後，從藉由此切換開關 104b 而被選擇之 Y 軸電極群 108 的電極所輸出之微弱的電流，係被輸入至後段之前置放大器 109 處。

迴圈計數器 104a 之計數值，係作爲切換開關 104b 之位址而被輸入。故而，切換開關 104b，係根據迴圈計數器 104a 之計數值，而對於所選擇之構成 Y 軸電極群 108 之 n 根的電極中的 1 個的電極依序作選擇。例如，若是迴圈計數器 104a 之輸出值係爲「1」，則切換開關 104b 係選擇 Y 軸電極群 108 之第 1 個的電極。若是迴圈計數器 104a 之輸出值係爲「2」，則切換開關 104b 係選擇 Y 軸電極群 108 之第 2 個的電極。

以下，同樣的，在選擇了身爲 Y 軸電極群 108 之最後的電極之第 n 個的電極後，迴圈計數器 104a，若是接受到下一個的重置脈衝，則係回到最初的數值（=1）。

接下來，參考圖 3，對位置算出部 106 作說明。

此位置算出部 106，係由積算部 302、和緩衝記憶體 303、和峰值算出部 304、和重心演算部 305、以及計數器 306 所構成。

又，此緩衝記憶體 303 之將積算部 302 的演算輸出值作記憶的資料之個數，係爲 X 軸電極群 107 之電極的根數之 3 倍。此係因爲，當後段之重心演算部 305 對重心作演算時，係亦有必要對 Y 軸方向之重心作演算之故。

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積算部 302，係爲對於從 A/D 變換器 105 所得到之數位值作積算的積分器。此積算部 302，例如，係藉由未圖示之記憶體與加算器所構成。而，此積算部 302，係被與 A/D 變換部 105 和緩衝記憶體 303 相連接。而後，此積算部 302，係將所輸入而來之值與被記憶在記憶體中之值作加算，並作記憶。

進而，在此積算部 302 處，係被輸入有從矩形波產生部 102 所輸出之時脈脈衝。而，此積算部 302，係在此時脈脈衝之每一次的被輸入時，將演算值作記憶。

緩衝記憶體 303，係爲將積算部 302 之輸出值暫時性地作記憶的 RAM。此緩衝記憶體 303，係具備有將 Y 軸電極群 108 中之至少 3 根份的電極之資料作記憶的記憶容量。此係因爲，後述之重心演算部 305 處的重心之演算，係不僅是對於矩陣電極 103 之 X 軸方向，而亦有必要在 Y 軸方向上作演算之故。而，此緩衝記憶體 303，係被與積算部 302 和峰值檢測部 304 以及重心演算部 305 相連接。

又，在此緩衝記憶體 303 處，係被輸入有從矩形波產生部 102 所輸出之時脈脈衝、和從後述之計數器 306 所輸出之 X 軸方向位址資訊。於此，此時脈脈衝，係作爲緩衝記憶體 303 將積算部 302 之輸出值作記憶的時序脈衝而被使用。另外，此 X 軸方向位址資訊，係作爲緩衝記憶體 303 將積算部 302 之輸出值作記憶的區域之位址而被使用。

又，此緩衝記憶體 303 之將積算部 302 的演算輸出值

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作記憶的資料之個數，係爲 X 軸電極群 107 之個數的 3 倍。此係因爲，當後段之重心演算部 305 對重心作演算時，係亦有必要對 Y 軸方向之重心作演算之故。

峰值檢測部 304，係爲用以將被記憶在緩衝記憶體 303 中之資料的峰值檢測出來者。此峰值檢測部 304，係被與緩衝記憶體 303 和重心演算部 305 相連接。而，此峰值檢測部 304，係將所檢測出之峰值所顯示的緩衝記憶體 303 上之位址，輸出至後段之重心演算部 305 處。

重心演算部 305，係爲用以從所取得了的資料來演算出重心、亦即是演算出人體之手指對位置檢測裝置 101 所指示了的位置之座標者。此重心演算部 305，係被與緩衝記憶體 303 和峰值演算部 304 相連接。而，在此重心算出部 305 處，係被輸入有：從受訊選擇開關 104 所輸出之 Y 軸方向位址、和從矩形波產生部 102 所輸出之時脈脈衝、和從計數器 306 所輸出之 X 軸方向位址。

又，重心演算部 305，係根據從峰值檢測部 304 所輸入而來之峰值所顯示的緩衝記憶體 303 上之位址，來從緩衝記憶體 303 而取得包含有該位址之前後的位址之資料的 3 個的資料。而後，此重心演算部 305，係從此些之 3 個的資料而算出重心。

身爲此重心演算部 305 之演算結果的重心之位置，係成爲矩陣電極 103 上之手指的位置，亦即是位置資料。

進而，重心演算部 305，在重心演算時，爲了對於矩陣電極 103 之顯示 X 軸方向與 Y 軸方向之峰值的位置作

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特定，係從計數器 306 而接收 X 軸方向之位址資料，並從受訊選擇開關 104 而接收 Y 軸方向之位址資料。

計數器 306，係對從矩形波產生部 102 所輸出之時脈脈衝作計數，並藉由從矩形波產生部 102 所輸出之重置脈衝而被作重置。此計數器 306 之輸出值（計數結果），係成爲對於構成軸電極群 107 之電極中之一作了選擇的值。

而，此計數器 306 之輸出值，係作爲 X 軸方向位址，而被供給至緩衝記憶體 303 以及重心演算部 305 處。

接著，根據圖 4，對於本實施型態之位置檢測裝置的動作原理作說明。另外，爲了使說明更簡單，對於在將矩形波供給至身爲構成 X 軸電極群 107 之任意的電極之第 1 之 X 軸電極 402 以及第 2 之 X 軸電極 403 時，從身爲 Y 軸電極群 108 之任意之一個的電極之 Y 軸電極 406 所輸出之訊號作例示。

若是對於此些之第 1 之 X 軸電極 402 以及第 2 之 X 軸電極 403 還有 Y 軸電極 406 作注目，則圖 3 中所示之矩形波產生部 102、X 軸電極群 107、Y 軸電極群 108 以及前置放大器 109，係可藉由圖 4（a）中所示之等價電路來作表示。將矩形波供給至此些之第 1 之 X 軸電極 402 與第 2 之 X 軸電極 403 處之矩形波產生部 102，由於係對於第 1 之 X 軸電極 402 與第 2 之 X 軸電極 403 之各個而供給矩形波，因此，係可視爲在各個的電極處而被連接有第 1 矩形波電壓源 404 以及第 2 矩形波電壓源 405。另外，在此圖 4（a）中，係以虛線來表示手指 407。

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於此，Y軸電極406，係被連接於前置放大器109處。此前置放大器109，係由以動作放大器412和電阻413所成之電流電壓變換電路414、以及驅動器418所構成。構成此電流電壓變換電路414之動作放大器412的輸入端子，係經由週知之假想短路現象，而被維持在假想性地短路之狀態下。故而，從Y軸電極406來看，係成爲與被作接地同等的狀態。

電流電壓變換電路414，係將微弱之電流變換爲電壓，同時，將此被作了變換的電壓作放大。進而，此被作了放大之電壓訊號，係被輸入至由電阻R415與R416以及動作放大器417所成之反轉放大器（驅動器）418處，並被放大至對後段之電路而言爲易於處理之訊號準位。另外，由於電流電壓變換電路414亦爲反轉放大器之其中一種，因此，被輸入之訊號，係被進行有「反轉之反轉」，其結果，相位係恢復至原本的狀態。

接著，根據圖4（b）~（f），對於當手指407接近於電極之交點的情況與並未接近的情況時之在Y軸電極406處所出現的電流波形之差異作說明。

不過，若是在電容器處被施加有矩形波之電壓，則僅在該矩形波之電壓的上揚時與下挫時，在該電容器中會流動電流。故而，在第1之X軸電極402與Y軸電極406之交點處，由於係被形成有電容器，因此，在此電容器處，係亦產生有同樣的現象。

故而，當手指407並未接近電極之交點的情況時，亦

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即是，當從第 2 矩形波電壓源 405 而對於第 2 之 X 軸電極 403 施加如同圖 4（b）所示一般之在時間點 t0 處而上揚之矩形波訊號的情況時，在第 2 之 X 軸電極 403 與 Y 軸電極 406 之間所構成之電容器中，係僅在該被施加之矩形波訊號的上揚時而流動電流。其結果，在此電容器中所流動之電流，係成爲圖 4（c）中所示之波形。

相對於此，當手指 407 接近於電極之交點的情況時，亦即是，當從第 1 矩形波電壓源 404 而對於第 1 之 X 軸電極 402 施加如同圖 4（b）中所示一般之矩形波訊號的情況時，從第 1 之 X 軸電極 402 所發出之電力線的一部分，係被手指 407 所吸收。其結果，相較於手指 407 並未接近於電極之交點的情況（圖 4（c）），由於手指 407 接近該交點處之情況（圖 4（d））時的被形成於電極之交點處的電容器之靜電電容係減少，因此相較於圖 4（c），圖 4（d）之電流波形的總面積係變小。另外，如同眾所周知一般，電流波形之總面積，係相當於在電容器中所蓄電之電荷。

又，當如圖 4（e）中所示一般之在 X 軸電極處被施加有於時間點 t0 處而下挫的矩形波訊號的情況時，係出現有與當被施加有在時間點 t0 處而上揚的矩形波訊號的情況時之電流波形而相位作了 180°反轉之波形。亦即是，當手指 407 係並未接近於電極之交點的情況時，若是從第 2 矩形波電壓源 405 而在第 2 之 X 軸電極 403 處施加有圖 4（e）中所示之矩形波訊號，則係出現如同圖 4（f）中所

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示一般之電流波形。

同樣的，雖並未特別圖示，但是，當手指 407 接近於電極之交點的情況時，若是從第 1 矩形波電壓源 404 而對於第 1 之 X 軸電極 402 施加如同圖 4（e）中所示一般之矩形波訊號，則從第 1 之 X 軸電極 402 所發出之電力線的一部分，係被手指 407 所吸收，並出現將圖 4（d）中所示之電流波形的相位作了 180°反轉之波形。

接著，針對對於第 1 之 X 軸電極 402 與第 2 之 X 軸電極 403 之雙方而在時刻 t0 之時間點下來同時施加了矩形波訊號的情況作說明。

首先，針對圖 4（a）中所示之手指 407 並未接近於第 1 之 X 軸電極 403 與 Y 軸電極 406 間之交點的情況作說明。

在時間點 t0 處，若是從第 1 矩形波電壓源 404 而對於第 1 之 X 軸電極 402 來施加有上揚電壓（圖 4（b）），並從第 2 矩形波電壓源 405 而對於第 2 之 X 軸電極 403 來施加有下挫電壓（圖 4（e）），則經由第 1 之 X 軸電極 402 與 Y 軸電極 406 間之交點所形成的電容器之靜電電容，和經由第 2 之 X 軸電極 403 與 Y 軸電極 406 間之交點所形成的電容器之靜電電容，由於係成爲相等，因此，在各別之交點處所產生的電流係相互抵消。其結果，在 Y 軸電極 406 處，係並不會產生電流波形。

相對於此，如圖 4（a）中所示一般，在時間點 t0 處，當手指 407 係接近於第 1 之 X 軸電極 403 與 Y 軸電極

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406 間之交點的情況時，若是從第 1 矩形波電壓源 404 而對於第 1 之 X 軸電極 402 來施加有上揚電壓（圖 4（b）），並從第 2 矩形波電壓源 405 而對於第 2 之 X 軸電極 403 來施加有下挫電壓（圖 4（e）），則經由第 1 之 X 軸電極 402 與 Y 軸電極 406 間之交點所形成的電容器之靜電電容，相較於經由第 2 之 X 軸電極 403 與 Y 軸電極 406 間之交點所形成的電容器，其靜電電容係減少。其結果，在 Y 軸電極 406 處，係於負方向上而產生電流波形。

如同上述一般，若是手指 407 接近於 X 軸電極與 Y 軸電極間之交點，則經由該交點所形成之電容器的靜電電容係減少。在靜電電容減少了的交點處施加上揚或是下挫之電壓變化，而與經由在其他之交點處所出現之電壓變化所產生的電流間之合成電流波形，係出現在 Y 軸電極處。

接著，根據於先前而藉由圖 4 所說明了的檢測出手指之存在的原理，來對於本實施型態之動作原理作說明。

矩陣電極 103，係具備有 X 軸電極群 107、和 Y 軸電極群 108，並具備有在此 X 軸電極群 107 與 Y 軸電極群 108 之間而介在設置的第 1 絕緣薄片 506。進而，矩陣電極 103，係在 X 軸電極群 108 之與第 1 絕緣薄片 505 相對向之面的相反面側處，具備有第 2 絕緣薄片 506。另外，在圖 5 中，係被圖示有身爲 Y 軸電極群 108 中之其中一根的 Y 軸電極 503。

第 1 絕緣薄片 505，例如，係爲略板狀之絕緣材，並

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爲用以將 X 軸電極群 107 與 Y 軸電極群 108 間之各交點作絕緣者。

第 2 絕緣薄片 506，係爲略板狀之絕緣材，並以使手指 407 在對位置作指示時不會直接接觸到 X 軸電極 107a~107g 的方式，而以此第 2 絕緣薄片 506 來作覆蓋。故而，在此第 2 絕緣薄片 506 之正下方，由於係位置有 X 軸電極 107a~107g，因此，從 X 軸電極群 107 所發出之電力線，係有效地被手指 407 所吸收。

圖 5（b）、（c）、（d）、（e）、（f）、（g）以及（h），係爲對於被施加在 X 軸電極群 107 中之任意的 X 軸電極 107a~107g 處之電壓的時序作展示之波形圖。於此，圖 5（b）~（h）中之時間點 t1~t7，係代表在各 X 軸電極 107a~107g 處而被施加了單擊脈衝的時間點，時間點 t2，係代表從時間點 t1 而經過了 1 個時脈後，同樣的，各時間點 tn，係代表從 t（n-1）而經過了 1 個時脈後之時間點。

另外，矩形波產生部 102 之有效位元胞 209a，係被輸入有值「1」，並且，當從分頻器 203 所輸出之時脈的上揚邊緣到達時，係對於被作連接之 X 軸電極 107a 而施加電壓。而後，有效位元胞 209a，係持續對於 X 軸電極 107a 施加電壓，直到下一個的時脈之上揚邊緣到達爲止。而後，有效位元胞 209a，係被輸入有值「0」，並且，當時脈的上揚邊緣到達時，對於 X 軸電極 107a 之電壓的施加係結束。以上之動作，在有效位元胞 209b 乃至 209m

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中，亦爲相同。

於此，有效位元胞 209a 所施加在 X 軸電極 107a 上之電壓的位元寬幅，係經由 AND 閘 204、計數器 206、常數 n207 以及數位比較器 205 而被形成，並經由從數位比較器 205 所輸出之邏輯訊號而被決定。此邏輯訊號，係經由被儲存在常數 n207 中之數值「3」，而被形成爲從分頻器 203 所輸出之時脈的 3 倍之週期。故而，由於值「1」係連續 3 次地被輸入至橫移暫存器 208 中，因此，係成爲相當於被輸入至橫移暫存器 208 中之時脈的 3 次份量之單擊脈衝。其結果，例如，若是以在 X 軸電極 107a 處被施加了單擊時脈的時間點 t1 作爲基準，則被施加在 X 軸電極 107a 處之單擊脈衝的下挫，係成爲在時間點 t4 時而到達。

如以上所說明一般，矩形波產生部 102，係在被連接於橫移暫存器 208 處之 X 軸電極 107a~107g 處，而依序施加單擊脈衝。藉由此，在被依序施加於各 X 軸電極 107a~107g 處之單擊脈衝的上揚與下挫同時發生的時間點中，於手指 407 並未接近之 X 軸電極的組之時間點處，由於係藉由在圖 4 中所說明之原理而被作抵消，因此，係不會從該當之 X 軸電極之組與 Y 軸電極 503 而產生電流波形。

例如，在圖 5（c）中所示之 X 軸電極 107b 的波形中，於 t5 之時間點時，係產生單擊脈衝之下挫。同樣的，在圖 5（f）中所示之 X 軸電極 107e 的波形中，於 t5 之時

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間點時，係產生單擊脈衝之上揚。而，在 X 軸電極 107b 以及 X 軸電極 107e 之任一者處，係均並未接近有手指 407。因此，在 t5 之時間點時，經由出現在 X 軸電極 107b 處之單擊脈衝的下挫而在 Y 軸電極 503 處所產生之電流、和經由出現在 X 軸電極 107e 處之單擊脈衝的上揚而在 Y 軸電極 503 處所產生之電流，由於係被作合成，因此，係不會從 Y 軸電極 503 而產生電流波形。

同樣的，在時間點 t5 以外的並未接近有手指 407 之 X 軸電極的組之時間點處，例如，在時間點 t6 的情況時，於圖 5（d）中所示之 X 軸電極 107c 處，係產生有單擊脈衝之下挫，同樣的，於圖 5（g）中所示之 X 軸電極 107e 處，係產生有單擊脈衝之上揚。而，在 X 軸電極 107c 以及 X 軸電極 107f 之任一者處，係均並未接近有手指 407。因此，在 t6 之時間點時，經由出現在 X 軸電極 107c 處之單擊脈衝的下挫而在 Y 軸電極 503 處所產生之電流、和經由出現在 X 軸電極 107f 處之單擊脈衝的上揚而在 Y 軸電極 503 處所產生之電流，由於係被作合成，因此，係不會從 Y 軸電極 503 而產生電流波形。

但是，如圖 5（a）以及圖 5（e）所示一般，在 X 軸電極 107e 與 Y 軸電極 108e 間之交點處，由於手指 407 係接近，因此，在 t4 之時間點時，藉由被施加在 X 軸電極 107a 與 107d 之各個處的單擊脈衝而於 Y 軸電極 503 處所產生之各別的電流彼此，係就算是作合成，亦不會變成 0。同樣的，在 t7 的時間點時，就算是將藉由被施加在 X

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軸電極 107d 與 107g 之各個處的單擊脈衝而在軸電極 503 處所產生的各別之電流彼此作合成，亦不會成爲 0。

其結果，在 Y 軸電極 503 處，係如圖 5（i）中所示一般，當在手指 407 所接近之 X 軸電極 107d 所施加之單擊脈衝的上揚出現之 t4 時間點和單擊脈衝之下挫出現的 t7 時間點時，係產生有電流波形。

如圖 5（i）中所示一般，在 Y 軸電極 108e 處所出現之電流波形，係成爲以 0 電位爲中心而略對稱之正弦波交流波形。於此，若是將此電流波形直接作積分，則係得到如圖 5（j）中所示一般之在負方向上具備有峰值之波形。峰值檢測部 304，係對於最接近於此波形之峰值的樣本時脈之值作掌握。而後，重心演算部 305，係根據峰值檢測部 304 所得到之值和其前後之值之 3 個的值，來進行重心演算。

重心演算部 305，係爲了對於矩陣電極 103 之顯示 X 軸方向與 Y 軸方向之峰值的位置作特定，而從計數器 306 而接收 X 軸方向之位址資料，並從受訊選擇開關 104 而接收 Y 軸方向之位址資料。而後，根據該些之位址資料與重心演算之結果，而將真正的峰值與其之時間軸上的位置計算出來。重心演算部 305，係將其作爲代表接近了所計算出之矩陣電極 103 處的手指之位置的位置資料而輸出。

被施加在 X 軸電極 107a~107g 之各個處的單擊脈衝，係爲 200kHz 之半個週期份，另一方面，被施加在 X 軸

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電極 107a~107g 之各個處的單擊脈衝之施加時序，係爲 200kHz 之整數倍。在本實施型態的情況中，係爲 3 倍。

於此，若是對於軸電極群 107 全體而從縱方向視之，則係可將其視爲與藉由 3 倍之速度而進行掃描一事同等者。

在先前技術中，係有必要對於 200kHz 之交流進行複數週期份同步檢波，並作積分。就算是假設將先前技術之同步檢波以及積分設爲 1 週期份的來設計，亦由於係存在有 200kHz 之限制，因此，係無法期望有根本上之速度的改善。

本實施型態，係爲能夠將在先前技術中所無法達成之「200kHz 之障礙」作克服之技術的其中一種實際型態。

於此，當在 X 軸電極 107 處，而將使相位作了橫移之單擊脈衝依序作賦予時，在 Y 軸電極群 108 處，係有必要成爲能夠對於單擊脈衝之上揚與下挫同時作掌握，並將其之差檢測出來。因此，相位橫移之頻率，係被設定爲 200kHz 之整數倍。

另外，本實施型態，係可考慮有下述一般之應用例。

（1）被施加在軸電極群 107 的各電極處之訊號的波形，係並非一定需要爲矩形波。

例如，在從 0V 起直到特定之電壓爲止的期間中，亦即是在上揚期間中，和在從特定之電壓起直到 0V 爲止的期間中、亦即是下挫期間中，其兩者間的電壓之積分值若是分別爲相同，則係可得到於圖 4（2）中所示之電流變

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化之相互抵消的效果。

例如，在橫移暫存器 208 之各有效位元胞 209a~209m 與 X 軸電極群 107 的各電極之間，插入使 200kHz 通過之帶通濾波器。如此一來，在 X 軸電極群 107 之各電極處，係成爲被施加有正弦波形之半波長。就算是此種波形，亦能夠與上述實施例同樣的而檢測出手指的存在。

（2）又，由於施加在 X 軸電極群 107 處之電壓，其高電位與低電位亦係爲相對性之關係，因此，低電位之電壓，係並非一定需要爲 0V。

（3）進而，在 X 軸電極群 107 之各個處而附加有時間差地被施加之單擊脈衝，係並非一定需要爲嚴密性的 200kHz 之整數倍的頻率。此係因爲，就算在該種情況中，亦同樣的，若是手指接近於矩陣電極 103，則係會產生存在於 X 軸電極與 Y 軸電極間之交點處的靜電電容之變化，因此，會成爲較手指未接近的狀態時而更大之訊號變化而出現之故。

又，藉由在 X 軸電極之各個處，附加相當於 200kHz 之整數倍的頻率之時間差而賦予單擊脈衝，並從 Y 軸電極而將在單擊脈衝之上揚以及下挫之時間點處所產生的電流變化檢測出來，不需要採用將檢測面作分割等之複雜的電路構成，便能夠實現具備有廣大之檢測面積的靜電電容方式位置檢測裝置。

如上述一般，而針對本發明之實施型態作了說明，但是，本發明，係並不被上述之實施型態例所限定，在不脫

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離申請專利範圍中所記載之本發明的要旨之範圍內，不用說，係可包含有其他之變形例、應用例。

【圖式簡單說明】

[圖 1]展示身爲本發明之實施型態之例的位置檢測裝置之全體區塊圖。

[圖 2]矩形波產生部之內部區塊圖。

[圖 3]位置算出部之內部區塊圖。

[圖 4]本實施型態之位置檢測裝置的等價電路與波形圖。

[圖 5]對於矩陣電極之一部分剖面圖、和對 X 軸電極施加電壓之狀態、和所產生之電流波形以及電流積分波形作展示的圖。

[圖 6]展示先前技術之靜電電容方式的位置檢測裝置之區塊圖。

【主要元件符號說明】

101：位置檢測裝置

102：矩形波產生部

103：矩陣電極

104：受訊選擇開關

105：A/D 變換器

106：位置算出部

107：X 軸電極群

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108：Y 軸電極群

109：前置放大器

202：時脈產生器

203：分頻器

204：AND 閘

205：數位比較器

206：計數器

207：常數 n

208：橫移暫存器

209a~209m：有效位元胞

210a、210b、210c：無效位元胞

211：單穩多諧震盪器

302：積算部

303：緩衝記憶體

304：峰值檢測部

305：重心演算部

306：計數器

402：第 1X 軸電極

403：第 2X 軸電極

404：第 1 矩形波電壓源

405：第 2 矩形波電壓源

406：Y 軸電極

407：手指

412：動作放大器

R413：電阻

414：電流電壓變換電路

R415、R416：電阻

417：動作放大器

418：驅動器

419：反轉放大器

107a、107b、107c、107d、107e、107f、107g：X軸電極

108e：Y軸電極

505：絕緣薄片

506：介電薄片

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發明專利說明書

（本申請書格式、順序，請勿任意更動，※記號部分請勿填寫）

※申請案號：98126366

※申請日：98 年 08 月 05 日　　**※IPC 分類：**G06F 3/044　(2006.01)

一、發明名稱：（中文／英文）

位置檢測裝置及位置檢測方法

二、中文發明摘要：

[課題]提供一種：能夠藉由較爲簡單之電路構成而實行高速之掃描的靜電式之位置檢測裝置以及位置檢測方法。

[解決手段]將 200kHz 之單擊脈衝（one-shot pulse），藉由 200kHz 之整數倍的頻率之週期，來依序賦予至複數之電極元件處。將經由此單擊脈衝之上揚與下挫所產生的電流變化，藉由正交之電極元件來作捕捉。

三、英文發明摘要：

七、申請專利範圍：

1.一種位置檢測裝置，其特徵爲，係由以下所成：

訊號供給電極，係將複數之電極作平行並排配置；和

受訊電極，係將複數之電極與前述訊號供給電極作正交配置；和

訊號供給電路，係對於前述訊號供給電極中之第 1 以及第 2 電極的各個來供給具有特定之時間寬幅的訊號，並在供給至前述第 1 電極之訊號與供給至前述第 2 電極之訊號之間，設定有特定之時間差，同時，該特定之時間差，係被設定爲較前述時間寬幅爲更短；和

位置算出部，係根據檢測出從前述受訊電極所輸出之訊號的變化，來計算出指示體所致之指示位置。

2.如申請專利範圍第 1 項所記載之位置檢測裝置，其中，係將前述時間差設定爲前述訊號之特定之時間寬幅的整數分之一。

3.如申請專利範圍第 2 項所記載之位置檢測裝置，其中，前述訊號供給電路，係以使前述時間差成爲一定的方式，來對前述訊號之相位作控制並作供給。

4.如申請專利範圍第 3 項所記載之位置檢測裝置，其中，前述訊號供給電路供給至前述訊號供給電極之各個處的訊號，該訊號之上揚時以及下挫時之訊號準位的變化量，係爲略相同。

5.如申請專利範圍第 4 項所記載之位置檢測裝置，其中，前述訊號供給電路供給至構成前述訊號供給電極的各

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電極處之訊號，係藉由空出特定的時間間隔而反覆供給脈衝波形之訊號，而形成之。

6.如申請專利範圍第 5 項所記載之位置檢測裝置，其中，係更進而具備有：用以將訊號選擇性地供給至前述訊號供給電極處之選擇電路，該選擇電路，係對於被連接於前述訊號供給電路處之電極作歷時性的切換。

7.如申請專利範圍第 6 項所記載之位置檢測裝置，其中，係更進而設置有將前述輸出訊號作差動放大之差動放大電路。

8.一種位置檢測方法，係爲使用有位置檢測裝置之位置檢測方法，該位置檢測裝置，係具備有將複數之電極作平行並排配置之訊號供給電極、和將複數之電極與前述訊號供給電極作正交配置之受訊電極，並對於前述訊號供給電極供給具有特定之時間寬幅的訊號，而根據從前述受訊電極所輸出之訊號的變化，來檢測出指示體所致之指示位置，

該位置檢測方法，其特徵爲，具備有：

將前述訊號供給至前述訊號供給電極中之第 1 電極處的步驟；和

以較前述時間寬幅爲更短之特定的時間差，來將訊號供給至在前述訊號供給電極中之第 2 電極處的步驟。

9.如申請專利範圍第 8 項所記載之位置檢測方法，其中，係更進而具備有：以使前述時間差成爲一定的方式，來對前述訊號之相位作控制的步驟。

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775193

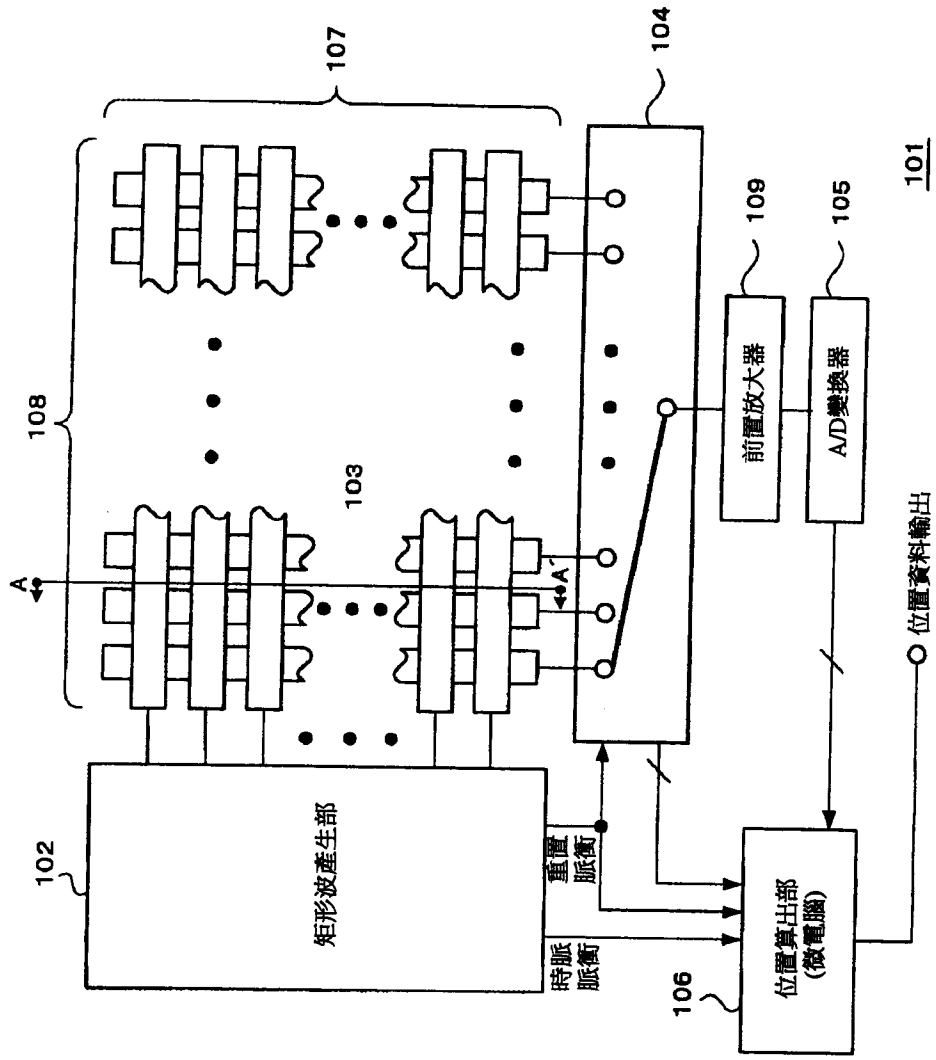
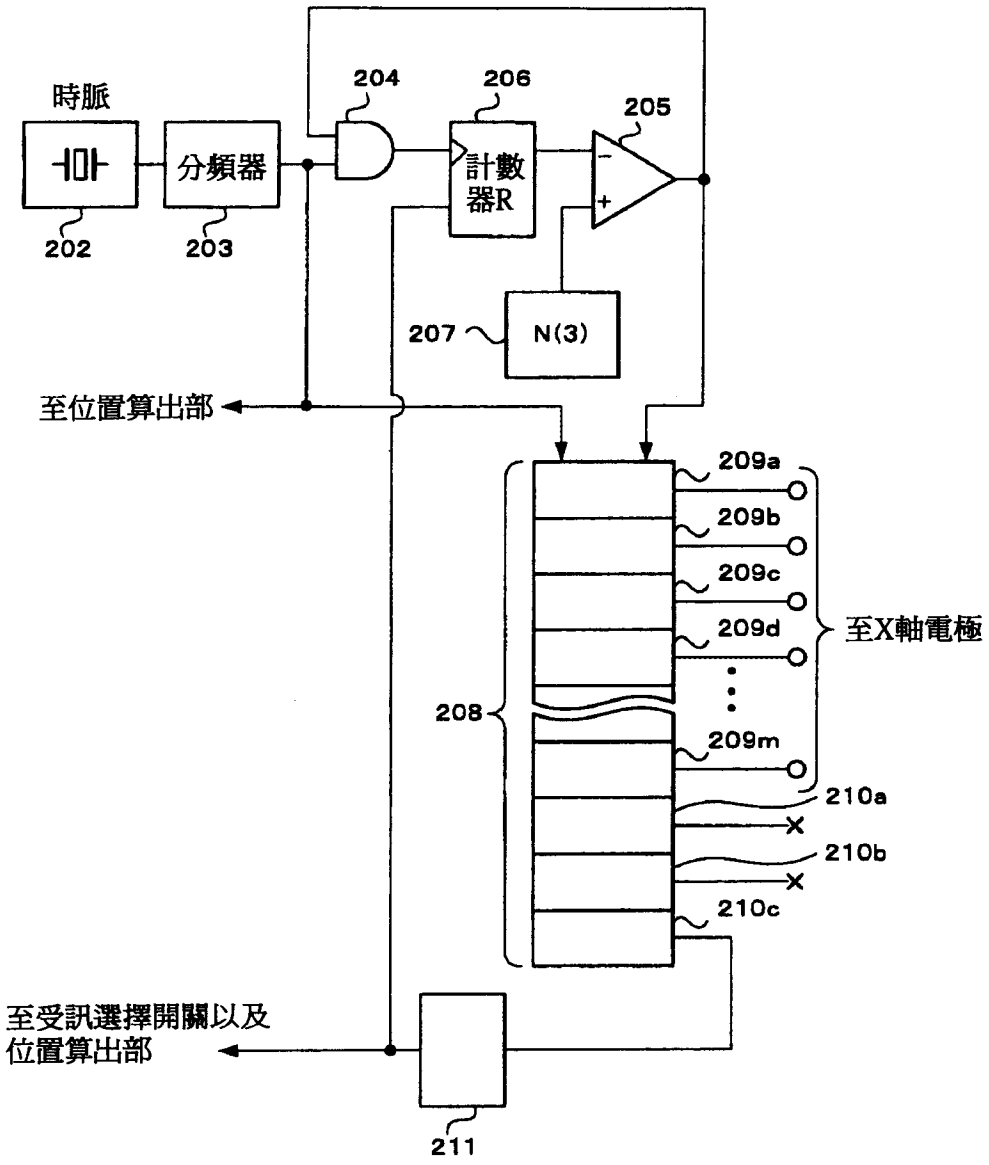

107
104
101
109
105
108
103
A
A'
前置放大器
A/D變換器
位置資料輸出
矩形波產生部
102
重置脈衝
時脈脈衝
位置算出部
(微電腦)
106

圖1


時脈
202
分頻器
203
204
206
計數器R
205
207
N(3)
至位置算出部
209a
209b
209c
209d
209m
至X軸電極
208
210a
210b
210c
至受訊選擇開關以及位置算出部
211

102

圖2

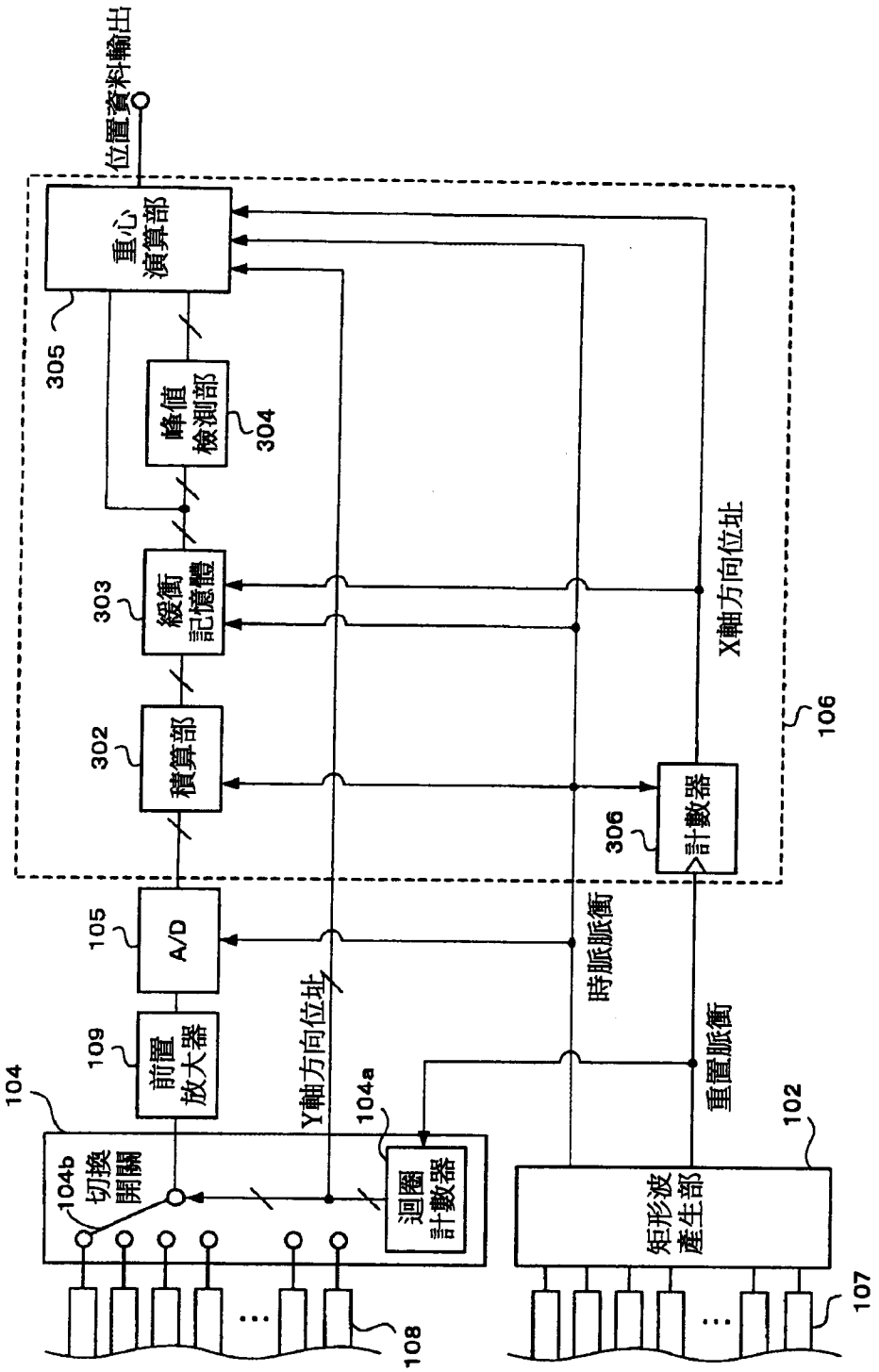

位置資料輸出
重心演算部
305
峰值檢測部
304
緩衝記憶體
303
積算部
302
A/D
105
前置放大器
109
104
104b 切換開關
104a
迴圈計數器
108
Y軸方向位址
X軸方向位址
106
計數器
306
時脈脈衝
重置脈衝
矩形波產生部
102
107

圖3

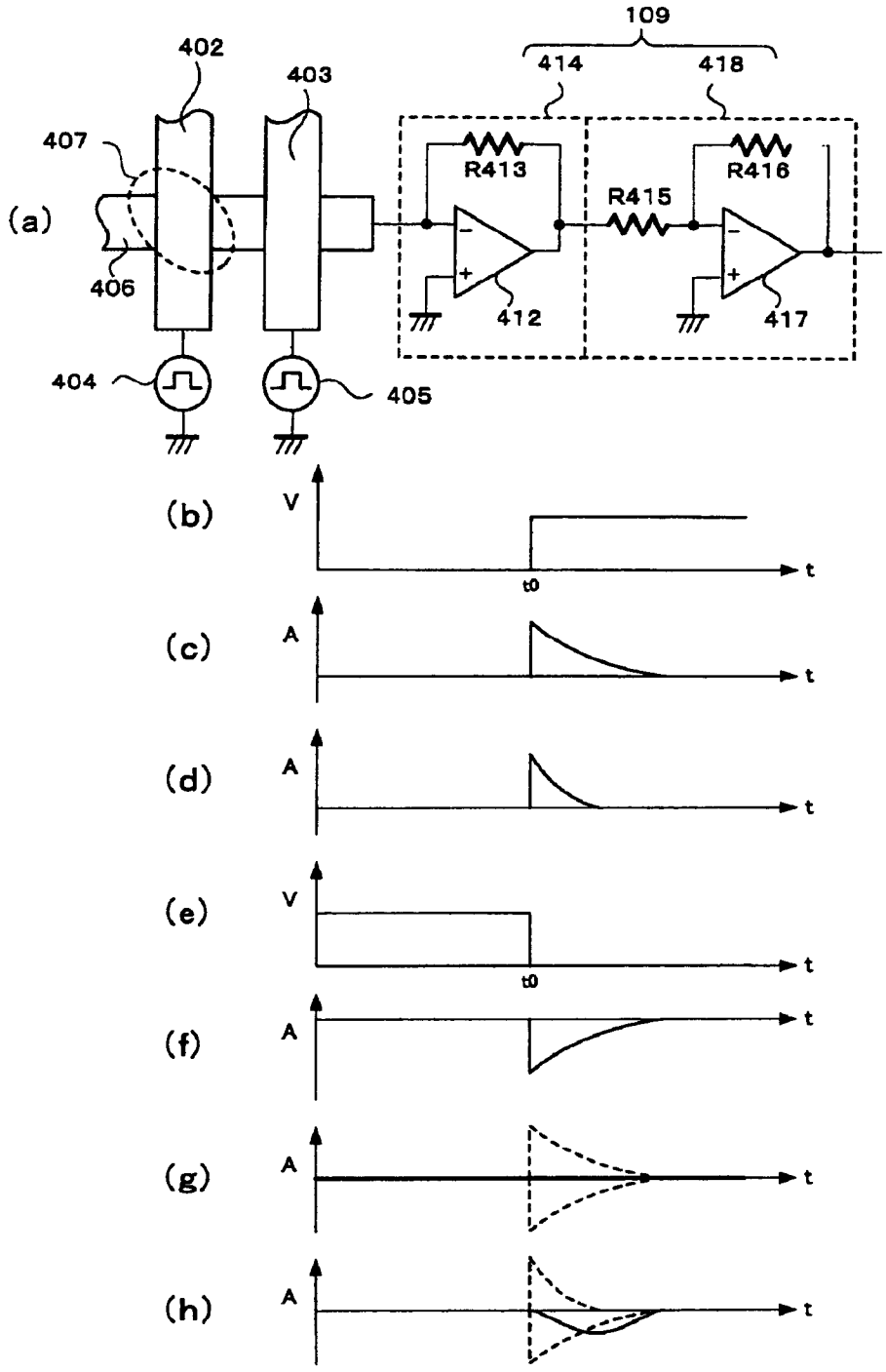

109
402
403
414
418
407
R413
R415
R416
(a)
406
412
417
404
405
(b)
V
t
t0
(c)
A
t
(d)
A
t
(e)
V
t
t0
(f)
A
t
(g)
A
t
(h)
A
t

圖4

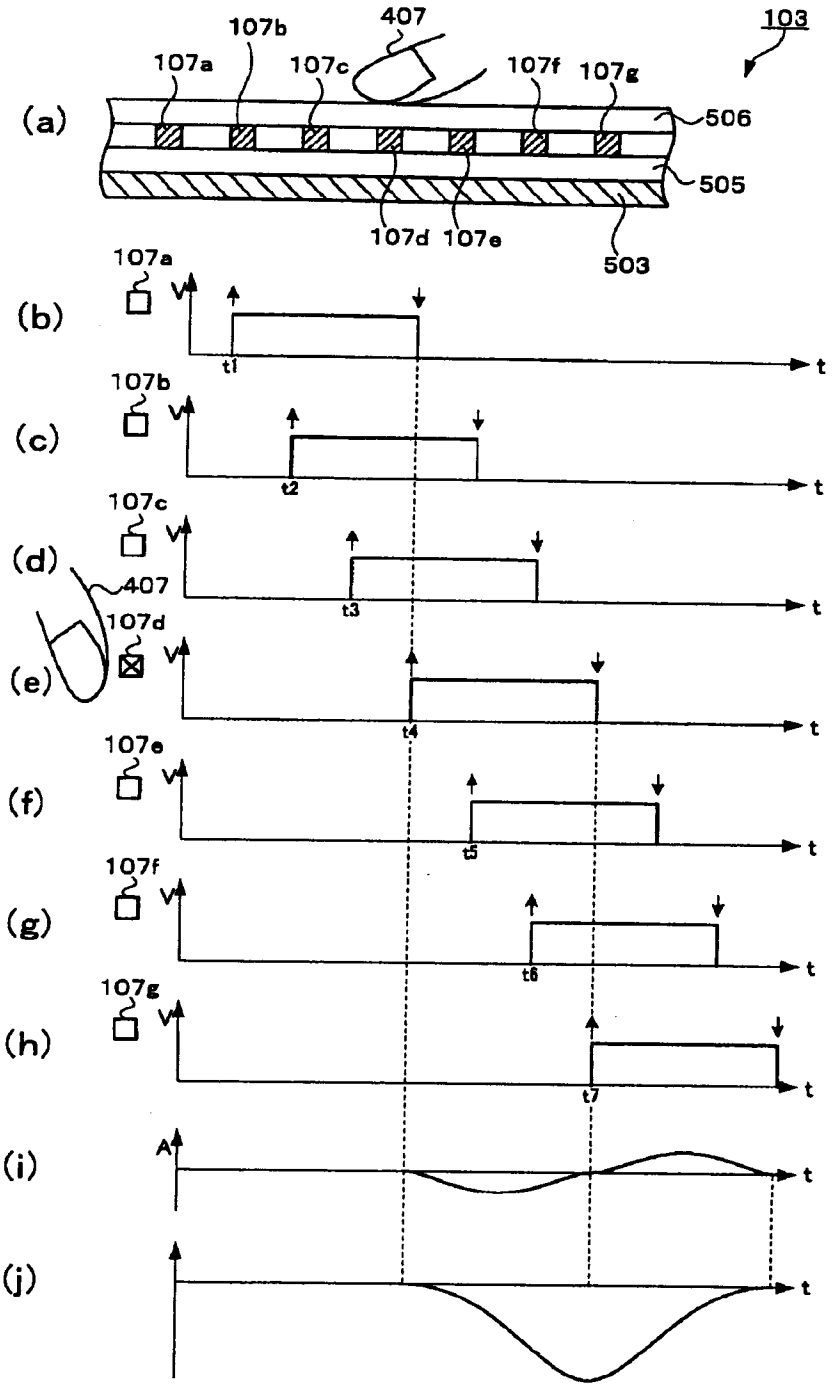

(a)
103
107a
107b
107c
407
107f
107g
506
505
503
107d
107e
(b)
(c)
(d)
(e)
(f)
(g)
(h)
(i)
(j)
V
A
t
t1
t2
t3
t4
t5
t6
t7

圖5

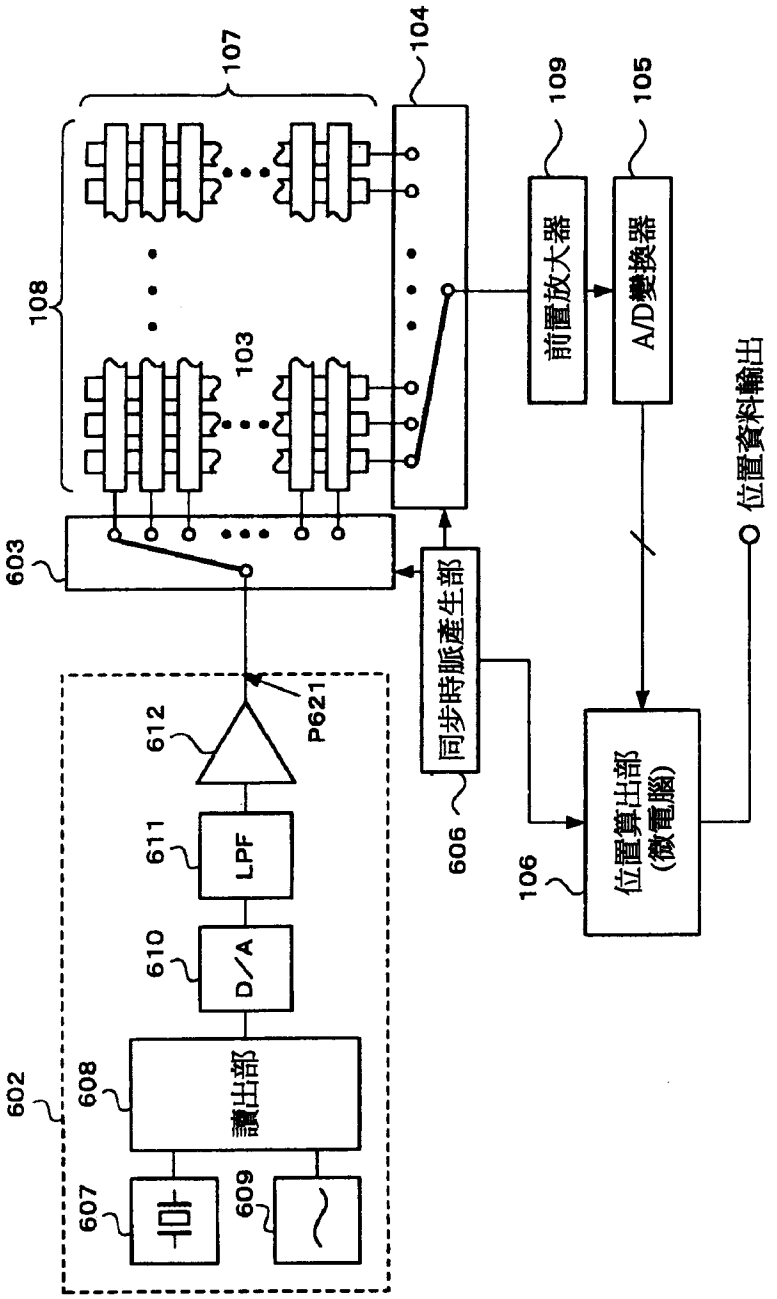

107
104
109
105
108
103
前置放大器
A/D變換器
603
位置資料輸出
同步時脈產生部
P621
612
606
611
LPF
106
位置算出部
(微電腦)
610
D/A
602
608
讀出部
607
609

圖6

四、指定代表圖：

（一）本案指定代表圖為：第 1 圖。

（二）本代表圖之元件符號簡單說明：

101：位置檢測裝置

102：矩形波產生部

103：矩陣電極

104：受訊選擇開關

105：A/D 變換器

106：位置算出部

107：X 軸電極群

108：Y 軸電極群

109：前置放大器

五、本案若有化學式時，請揭示最能顯示發明特徵的化學式：

Electronic Acknowledgement Receipt

EFS ID:	26213472
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	John Joseph Wakeley/Jessica Hernandez
Filer Authorized By:	John Joseph Wakeley
Attorney Docket Number:	940131.442C4
Receipt Date:	29-JUN-2016
Filing Date:	18-FEB-2016
Time Stamp:	17:05:52
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	Transmittal Letter	940131_442C4_IDS_TRANSMITTAL.pdf	70068 39685fbbedf47d27ccb42f3a063b26ba341ef8be	no	2

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	940131_442C4_IDS_FORM.pdf	102872 e16c79137835160966 7b8ddfd1544554c8f5e620	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	TW_201011622.pdf	4611403 81b1425abae44e70a541a2f871fa5b70e10dfe33	no	47
Warnings:					
Information:					
4	Non Patent Literature	NPL_OA.pdf	1486086 1bf856851e87aebef1d9ba8592b688b8d0efc81f	no	7
Warnings:					
Information:					
		Total Files Size (in bytes):	6270429		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Examiner	:	William Lu
Art Unit	:	2624
Docket No.	:	940131.442C4
Date	:	June 29, 2016

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

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

Commissioner for Patents:

In accordance with 37 CFR 1.56 and 1.97 through 1.98, Applicant wishes to make known to the U.S. Patent and Trademark Office the references set forth on the attached Information Disclosure Statement. Copies of cited U.S. patents and published patent applications are not required and accordingly have not been provided. Copies of any other cited references are enclosed. As to any reference cited, Applicant does not admit that it is "prior art" under 35 U.S.C. §§ 101, 102 or 103. Although the aforesaid references are made known to the Patent and Trademark Office in compliance with Applicant's duty to disclose all information they are aware of which is believed relevant to the examination of the above-identified application, Applicant believes that their invention is patentable.

Per CFR 1.704 (d)(1)(i), we hereby certify that each item of information contained in the attached Information Disclosure Statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and that this communication was not received by any individual designated in §1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

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Per 37 CFR 1.704(d)(1)(ii), we hereby certify that each item of information contained in the attached Information Disclosure Statement is a communication by a patent office in a counterpart foreign or international application or by the Office, and that this communication was not received by any individual designated in §1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

Per 37 CFR 1.97(e)(1), we hereby certify that each item of information contained in the attached 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 this Information Disclosure Statement.

Please acknowledge receipt of this Information Disclosure Statement and kindly make the cited references of record in the above-identified application.

Applicant believes this Information Disclosure Statement has been timely filed, however, the Director is authorized to charge any fee due by way of this Information Disclosure Statement to our Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC

/John Wakeley/
John Wakeley
Registration No. 60,418

JJW:jh1

Enclosures:
Information Disclosure Statement
Cited References (2)

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Phone: (206) 622-4900
Fax: (206) 682-6031

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Exhibit 1002 Page 313

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/047,013	02/18/2016	Yasuo Oda	940131.442C4	1066

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EXAMINER
LU, WILLIAM

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
05/04/2016	PAPER

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.

Office Action Summary	Application No. 15/047,013	Applicant(s) ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	AIA (First Inventor to File) Status No

-- 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 *18 February 2016*.

☐ 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) *1-23* 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) *1-23* 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 *18 February 2016* 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: _____.

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DETAILED ACTION

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

2. Claims 1-23 filed February 18th 2016 are pending in the current application

Priority

3. Receipt is acknowledged of certified copies of papers required by 37 CFR 1.55.

Information Disclosure Statement

4. The information disclosure statement (IDS) submitted on February 18th 2016 was filed after the mailing date of the initial application on February 18th 2016. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

5. The information disclosure statement (IDS) submitted on March 15th 2016 was filed after the mailing date of the initial application on February 18th 2016. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-23 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The limitation "and **a second electrode** provided near the distal end of the pen-shaped body, the second electrode surrounding a central axis of the pen-shaped body and configured to be supplied with **a second signal** to be detected by a plurality of conductors of the sensor surface wherein **angular information** of the pen-shaped position indicator is obtained based on a reference point indicated by the first signal from the first electrode and plural capacitive relationships, which are respectively formed between the second electrode and the plurality of conductors of the sensor surface." is not adequately enabled by the specification. In the applicant's specification, angular information is obtained by the pen in the description of modification 5 (Applicant's specification paragraphs 114-126). In this description, the second electrode is comprised of a plurality of electrode pieces, each of which carries a code (Applicant's specification paragraph 119 and figure 20). Thus, there isn't support for a singular electrode which is provided **a single signal** that provides the angular

information. Instead each of the electrodes are provided different signals such that the tablet can detect the position of the different electrode pieces and extrapolate angular information of the pen. The single second electrode with a single code is provided in the applicant's specification (Applicant's specification paragraphs 19-31 and figure 2), however, this embodiment is not capable of detecting angular information. Instead, this embodiment is focused upon capturing pressure information based upon the difference between the first and second signal.

8. There is ambiguity over which embodiment the applicant is attempting to claim. The difference between the two embodiments are: 1.) a second electrode comprised of a plurality of electrode pieces where each of the electrode pieces has a distinct signal to provide angular information or 2.) a second electrode with a single signal which is used to capture pressure information using the difference between the first and second signal forming a plurality of capacitive relationships with different intersections on the table. Regardless of which interpretation, there is insufficient support in the specification to enable the claims as they stand. Since the dependent claims are centered around the first embodiment, examination will proceed assuming that there are multiple electrode pieces in the second electrode, where each of the electrode pieces carries a distinct signal.

9. Independent claims 10, 11, and 18 recite similar limitations and are rejected for similar reasons to those stated above.

Claim Rejections - 35 USC § 103

10. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

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

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

12. Claims 1-23 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Katsurahira et al. (US2005/0128191) in view of Fujioka (US4,725,978) in view of Fukushima et al. (US2003/0142073)

Consider claim 1, where Katsurahira teaches a pen-shaped position indicator configured to be capacitively coupled with a sensor surface to indicate a position on the sensor surface, **(See Katsurahira figure 4)** the penshaped position indicator comprising: a pen-shaped body; **(See Katsurahira figure 4)** a first electrode extending from a distal end of the pen-shaped body and configured to be supplied with a first signal which, when detected by one or more conductors of the sensor surface indicates a position on the sensor surface; **(See Katsurahira figure 4 and paragraphs 71-73**

where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Thus the distal tip 71 is driven with one end of the oscillator providing a first signal) and a second electrode provided near the distal end of the pen-shaped body, the second electrode surrounding a central axis of the pen-shaped body and configured to be supplied with a second signal to be detected by a plurality of conductors of the sensor surface; **(See Katsurahira figure 4 and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Where the electrode 72 is driven with the other end of the oscillator.)**

Katsurahira teaches detecting pressure and position **(See Katsurahira paragraph 40)** however Katsurahira does not explicitly teach wherein angular information of the pen-shaped position indicator is obtained based on a reference point indicated by the first signal from the first electrode and plural capacitive relationships However, in an analogous field of endeavor Fujioka teaches wherein angular information of the pen-shaped position indicator is obtained based on a reference point indicated by the first signal from the first electrode and plural capacitive relationships **(See Fujioka col 4 line 45 – col 5 line 18 and col 8 where Fujioka discusses that the second electrode can be broken into eight outer electrodes where each of the electrodes is provided with a unique frequency branched from the oscillator and tuned with the an inductor/ capacitor combination. Note that the comparator uses**

the signal from inner electrode 11 as a reference signal (col 7).) Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Katsurahira teaches using a signal generated from the second electrode to extract position and Fujioka teaches wherein multiple electrodes can be used to present angular information. However they do not explicitly teach the combination where the signals which are respectively formed between the second electrode and the plurality of conductors of the sensor surface. However in an analogous field of endeavor Fukushima teaches signals which are respectively formed between the second electrode and the plurality of conductors of the sensor surface. **(See Fukushima paragraph 90-99 where three coils in the pen are used to generate signals at different timings captured by the tablet in order to calculate the angular information such as an azimuth angle phi.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of

ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 2, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 1, wherein the angular information includes at least one of: i) a tilt angle "θ" of an axis of the penshaped position indicator relative to the sensor surface, and ii) a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface. **(See Fujioka col 8 where Fujioka discusses the calculation of theta and phi)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 3, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 1, wherein the first electrode and the second electrode are respectively supplied with signals that are distinguishable from each other. **(See Fukushima paragraph 83 where Fukushima discusses driving at different frequencies.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with

Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 4, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 1, wherein the first electrode and the second electrode are respectively supplied with signals having a time difference with each other. **(See Fukushima paragraph 83 where Fukushima discusses selectively switching the signals between fu, fv, and fw at predetermined times thus the signals are time divided.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 5 where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 4, wherein the first and second electrodes are time-divisionally supplied with the first and second signals, respectively. **(See Fukushima paragraph 83 where Fukushima discusses selectively switching the signals between fu, fv, and fw at predetermined times thus the signals are time divided.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 6, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 1, which, in operation, controls selective supply of the second signal to the second electrode. **(See Fujioka figure 9 and col 7 where Fujioka discusses selectively driving the outer electrodes a-h)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary

skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 7, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 6, further comprising a switch configured to control selective supply of the second signal to the second electrode. **(See Fujioka figure 9 where Fujioka shows the switch structure used to selectively supply the second signal to the eight outer electrodes)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 8, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 1, which, in operation, constantly supplies the first signal to the first electrode while selectively supplying the second signal to the second electrode. **(See Fujioka figure 9 and col 7 where Fujioka discusses selectively driving the outer electrodes a-h, while the common electrode A is held at a specific voltage.)** Therefore, it would have been obvious for

one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 9, where Katsurahira in view of Fujioka in view of Fukushima teaches the pen-shaped position indicator according to claim 1, further comprising: a coil configured to receive an excitation signal; **(See Katsurahira figure 4 where Katsurahira discloses a coil 75)** and a power generation circuit configured to generate a drive voltage based on the excitation signal; wherein the drive voltage is used to generate the first and second signals supplied to the first and second electrodes.**(See Katsurahira paragraph 73 where Katsurahira discusses wherein detection of an electromagnetic wave results in the detection of an induced voltage which supplies power to the oscillator and drives the electrodes.)**

Consider claim 10, where Katsurahira teaches a pen-shaped position indicator configured to be capacitively coupled with a sensor surface to indicate a position on the sensor surface, the penshaped position indicator comprising: a pen-shaped body; a first electrode extending from a distal end of the pen-shaped body and configured to be supplied with a first signal which, when detected by one or more conductors of the sensor surface indicates a position on the sensor surface; **(See Katsurahira figure 4**

and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Thus the distal tip 71 is driven with one end of the oscillator providing a first signal) and a second electrode provided near the distal end of the pen-shaped body, the second electrode having a columnar shape that surrounds a central axis of the penshaped body and configured to be supplied with a second signal to be detected by a plurality of conductors of the sensor surface; **(See Katsurahira figure 4 and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Where the electrode 72 is driven with the other end of the oscillator.)**

Katsurahira teaches a single capacitive relationship **(See Katsurahira paragraph 40)** however Katsurahira does not explicitly teach plural capacitive relationships However, in an analogous field of endeavor Fujioka teaches plural capacitive relationships. **(See Fujioka col 4 line 45 – col 5 line 18 and col 8 where Fujioka discusses that the second electrode can be broken into eight outer electrodes where each of the electrodes is provided with a unique frequency branched from the oscillator and tuned with the an inductor/ capacitor combination. Note that the comparator uses the signal from inner electrode 11 as a reference signal (col 7).)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus,

one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Katsurahira teaches using a signal generated from the second electrode to extract position and Fujioka teaches wherein multiple electrodes can be used to present angular information. However they do not explicitly wherein plural capacitive relationships are respectively formed between the second electrode and the plurality of conductors of the sensor surface. However in an analogous field of endeavor Fukushima teaches wherein plural capacitive relationships are respectively formed between the second electrode and the plurality of conductors of the sensor surface. **(See Fukushima paragraph 90-99 where three coils in the pen are used to generate signals at different timings captured by the tablet in order to calculate the angular information such as an azimuth angle phi.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 11, where Katsurahira teaches a detection circuit configured to detect angular information of a pen-shaped position indicator on a sensor surface, the circuit comprising: reception circuitry which, in operation, receives: a first signal transmitted from a first electrode extending from a distal end of the pen-shaped position indicator and received by the sensor surface, **(See Katsurahira figure 4 and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Thus the distal tip 71 is driven with one end of the oscillator providing a first signal)** and a second signal transmitted from a second electrode provided near the distal end of the pen-shaped position indicator and detected by a plurality of conductors of the sensor surface; **(See Katsurahira figure 4 and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Where the electrode 72 is driven with the other end of the oscillator.)** and detection circuitry which, in operation, detects: a reference position indicated by the pen-shaped position indicator on the sensor surface based on the first signal, **(See Katsurahira paragraph 70-73)**

Katsurahira teaches detecting pressure and position **(See Katsurahira paragraph 40)** however Katsurahira does not explicitly teach and at least one of a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface, based on the reference position indicated by the first signal. However,

in an analogous field of endeavor Fujioka teaches and at least one of a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface, based on the reference position indicated by the first signal **(See Fujioka col 4 line 45 – col 5 line 18 and col 8 where Fujioka discusses that the second electrode can be broken into eight outer electrodes where each of the electrodes is provided with a unique frequency branched from the oscillator and tuned with the an inductor/ capacitor combination. Note that the comparator uses the signal from inner electrode 11 as a reference signal (col 7).)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Katsurahira teaches using a signal generated from the second electrode to extract position and Fujioka teaches wherein multiple electrodes can be used to present angular information. However they do not explicitly teach and based on plural capacitive relationships that are respectively formed between the second electrode of the pen-shaped position indicator and the plurality of conductors of the sensor surface. However in an analogous field of endeavor Fukushima teaches based on plural capacitive relationships that are respectively formed between the second electrode of the pen-shaped position indicator and the plurality of conductors of the sensor surface. **(See**

Fukushima paragraph 90-99 where three coils in the pen are used to generate signals at different timings captured by the tablet in order to calculate the angular information such as an azimuth angle phi.) Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 12, where Katsurahira in view of Fujioka in view of Fukushima teaches the detection circuit according to claim 11, wherein the first signal and the second signal are distinguishable from each other. **(See Fukushima paragraph 83 where Fukushima discusses driving at different frequencies.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in

order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 13, where Katsurahira in view of Fujioka in view of Fukushima teaches the detection circuit according to claim 11, wherein the first signal and the second signal have a time difference with each other. **(See Fukushima paragraph 83 where Fukushima discusses selectively switching the signals between fu, fv, and fw at predetermined times thus the signals are time divided.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 14, where Katsurahira in view of Fujioka in view of Fukushima teaches the detection circuit according to claim 13, wherein the first and second signals are time-divisionally transmitted from the first and second electrodes, respectively. **(See Fukushima paragraph 83 where Fukushima discusses selectively switching the signals between fu, fv, and fw at predetermined times thus the signals are time**

divided.) Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 15, where Katsurahira in view of Fujioka in view of Fukushima teaches the detection circuit according to claim 11, wherein the reception circuitry intermittently receives the second signal. **(See Fujioka figure 9 and col 7 where Fujioka discusses selectively driving the outer electrodes a-h. Thus, the detection unit intermittently receives the second signal.)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 16, where Katsurahira in view of Fujioka in view of Fukushima teaches the detection circuit according to claim 11, wherein the reception circuitry

continuously receives the first signal. **(See Fujioka figure 9 and col 7 where Fujioka discusses selectively driving the outer electrodes a-h while holding the inner electrode at a specific voltage. Thus the detection unit continuously receives this signal)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 17, where Katsurahira in view of Fujioka in view of Fukushima teaches the detection circuit according to claim 16, wherein the reception circuitry non-continuously receives the second signal. **(See Fujioka figure 9 and col 7 where Fujioka discusses selectively driving the outer electrodes a-h. Thus, the detection unit intermittently receives the second signal.)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Consider claim 18, where Katsurahira teaches a position detection device comprising: (i) a sensor surface; **(See Katsurahira figure 4)**

(ii) a receiver coupled to the sensor surface and configured to receive:

a first signal transmitted from a first electrode extending form a distal end of a pen-shaped position indicator and received by the sensor surface, **(See Katsurahira figure 4 and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Thus the distal tip 71 is driven with one end of the oscillator providing a first signal)** and a second signal transmitted from a second electrode provided near the distal end of the pen-shaped position indicator and detected by a plurality of conductors of the sensor surface; **(See Katsurahira figure 4 and paragraphs 71-73 where Katsurahira discusses driving an oscillator to the electrodes 71 and 72 in order to generate an electric field picked up by the sense electrodes 61 on the surface of the tablet. Where the electrode 72 is driven with the other end of the oscillator.)** and (iii) a detector coupled to the receiver and configured to detect: a reference position indicated by the pen-shaped position indicator on the sensor surface based on the first signal, **(See Katsurahira paragraphs 70-73)**

Katsurahira teaches detecting pressure and position **(See Katsurahira paragraph 40)** however Katsurahira does not explicitly teach and at least one of a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface, based on the reference position indicated by the first signal. However,

in an analogous field of endeavor Fujioka teaches and at least one of a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface, based on the reference position indicated by the first signal **(See Fujioka col 4 line 45 – col 5 line 18 and col 8 where Fujioka discusses that the second electrode can be broken into eight outer electrodes where each of the electrodes is provided with a unique frequency branched from the oscillator and tuned with the an inductor/ capacitor combination. Note that the comparator uses the signal from inner electrode 11 as a reference signal (col 7).)** Therefore, it would have been obvious for one of ordinary skill in the art to modify Katsurahira with Fujioka by splitting the second electrode 72 into many pieces and providing tuning circuitry in order to generate multiple signal. Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for drawing in order to provide more accurate representations of brush strokes for the user.

Katsurahira teaches using a signal generated from the second electrode to extract position and Fujioka teaches wherein multiple electrodes can be used to present angular information. However they do not explicitly teach and based on plural capacitive relationships that are respectively formed between the second electrode of the pen-shaped position indicator and the plurality of conductors of the sensor surface. However in an analogous field of endeavor Fukushima teaches based on plural capacitive relationships that are respectively formed between the second electrode of the pen-shaped position indicator and the plurality of conductors of the sensor surface. **(See**

Fukushima paragraph 90-99 where three coils in the pen are used to generate signals at different timings captured by the tablet in order to calculate the angular information such as an azimuth angle phi.) Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 19, where Katsurahira in view of Fujioka in view of Fukushima teaches the position detection device according to claim 18, wherein the detector detects at least one of θ and φ based on comparison of levels of signals that are generated in the plurality of conductors. **(See Fujioka col 4 line 45 – col 5 line 18 and col 8 where Fujioka discusses that the second electrode can be broken into eight outer electrodes where each of the electrodes is provided with a unique frequency branched from the oscillator and tuned with the an inductor/ capacitor combination. Note that the comparator uses the signal from inner electrode 11 as a reference signal (col 7).) (See Fukushima paragraph 90-99 where three coils in**

the pen are used to generate signals at different timings captured by the tablet in order to calculate the angular information such as an azimuth angle phi.)

Consider claim 20, where Katsurahira in view of Fujioka in view of Fukushima teaches the position detection device according to claim 18, wherein the first signal and the second signal are distinguishable from each other. **(See Fukushima paragraph 83 where Fukushima discusses driving at different frequencies.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 21, where Katsurahira in view of Fujioka in view of Fukushima teaches the position detection device according to claim 18, wherein the first signal and the second signal have a time difference with each other. **(See Fukushima paragraph 83 where Fukushima discusses selectively switching the signals between fu, fv, and fw at predetermined times thus the signals are time divided.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to

modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 22, where Katsurahira in view of Fujioka in view of Fukushima teaches the position detection device according to claim 21, wherein the first and second signals are time-divisionally transmitted from the first and second electrodes, respectively. **(See Fukushima paragraph 83 where Fukushima discusses selectively switching the signals between fu, fv, and fw at predetermined times thus the signals are time divided.)** Therefore it would have been obvious for one of ordinary skill in the art at the time of invention to modify Katsurahira with Fukushima by using the teachings of Fukushima to incorporate multiple sensors to calculate angular information. **(See Katsurahira paragraph 78 where Katsurahira discusses that this transformation from using electrostatic induction to electromagnetic induction is made through simple substitution.)** Thus, one of ordinary skill in the art would be motivated to modify Katsurahira with Fukushima in order to calculate useful parameters for digital drawing in order to provide more accurate brush strokes for the user.

Consider claim 23, where Katsurahira in view of Fujioka in view of Fukushima teaches the position detection device according to claim 18, further comprising: (iv) a transmitter configured to transmit an excitation signal to power the pen-shaped position indicator to generate the first and second signals. **(See Katsurahira paragraph 73 where Katsurahira discusses wherein detection of an electromagnetic wave results in the detection of an induced voltage which supplies power to the oscillator and drives the electrodes.)**

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM LU whose telephone number is (571)270-1809. The examiner can normally be reached on Monday - Friday 10am to 6pm.

14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kent Chang can be reached on (571)272-7667. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15. 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.

/WILLIAM LU/

Examiner, Art Unit 2624

Notice of References Cited	Application/Control No. 15/047,013	Applicant(s)/Patent Under Reexamination ODA ET AL.	
	Examiner WILLIAM LU	Art Unit 2624	Page 1 of 2

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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(Not for submission under 37 CFR 1.99)

Application Number	15047013
Filing Date	2016-02-18
First Named Inventor	Ysauo Oda
Art Unit	2624
Examiner Name	William Lu
Attorney Docket Number	940131.442C4

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Filing Date	2016-02-18
First Named Inventor	Ysauo Oda
Art Unit	
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/W.L/	1	Extended European Search Report, dated July 14, 2014, for corresponding European Application No. 11150998.0 - 1959 / 2354909, 6 pages.	

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Examiner Signature	/WILLIAM LU/	Date Considered	04/28/2016

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Examiner Name	
Attorney Docket Number	940131.442C4

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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	/Shoko Leek/	Date (YYYY-MM-DD)	2016-02-18
Name/Print	Shoko I. Leek	Registration Number	43,746

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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.

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

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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CONFIRMATION NO. 1066

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/047,013	02/18/2016	345	2624	940131.442C4

APPLICANTS

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INVENTORS

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Sadao Yamamoto, Saitama, JAPAN;
Yoshihisa Sugiyama, Saitama, JAPAN;

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

This application is a CON of 14/542,438 11/14/2014
which is a CON of 12/877,780 09/08/2010 PAT 8963889

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

JAPAN 2010-024858 02/05/2010

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

03/02/2016

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged /WILLIAM LU/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		JAPAN	15	23	4

ADDRESS

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UNITED STATES

TITLE

POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

FILING FEE RECEIVED	FEES: Authority has been given in Paper	☐ All Fees
2260	No._____ to charge/credit DEPOSIT ACCOUNT	☐ 1.16 Fees (Filing)
	No._____ for following:	☐ 1.17 Fees (Processing Ext. of time)
		☐ 1.18 Fees (Issue)
		☐ Other _____
		☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	596	pen and rho and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S2	2101	pen and theta and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S3	565	pen and theta and phi and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:44
S4	147	(sensor near10 pen) and theta and phi and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:47
S5	2081926	(sensor near10 pen) and theta and phi and signal g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S6	141	(sensor near10 pen) and theta and phi and signal and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S7	21	(sensor near10 pen) and theta and phi and second near2 signal and g06f.cpcl.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 15:50
S8	72	((Yasuo) near2 (Oda)).INV.	US-PGPUB;	OR	ON	2015/10/28

			USPAT			16:05
S9	54	((Sadao) near2 (Yamamoto)).INV.	US-PGPUB; USPAT	OR	ON	2015/10/28 16:05
S10	44	((Yoshihisa) near2 (Sugiyama)).INV.	US-PGPUB; USPAT	OR	ON	2015/10/28 16:05
S11	111	S8 or S9 or S10	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S12	105	S8 or S9 or S10 and pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S13	69	(S8 or S9 or S10) and pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/10/28 16:05
S14	8786	(pen or stylus) near10 electrode	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S15	284	(pen or stylus) near10 electrode and theta	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S16	46	(pen or stylus) near10 electrode and theta and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:08
S17	48	G06f.cpcl. and (pen or stylus) near10 second near2 electrode near10 capacit$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 11:59
S18	738	G06f.cpcl. and (pen or stylus) near10 second near2 signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2015/11/02 12:00

			IBM_TDB			
S19	275	G06f.cpcl. and (pen or stylus) near10 second near2 signal and angle	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:17
S20	104	G06f.cpcl. and (pen or stylus) near10 second near2 signal and angle and capacitive	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:18
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S22	25	(pen or stylus) near10 second near2 electrode and second near2 signal and angle and capacitive	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 12:22
S23	38	("20050128191" | "20080149402" | "20050171714" | "20090078746" | "20030214490" | "20080238885" | "20100252335" | "7735024" | "20040201580" | "20090139780" | "5672852" | "5600105" | "6535206" | "20090278794" | "20090065268" | "5138118" | "5484251" | "20040160429" | "20040201580" | "20070227785" | "20090078746" | "20070146351" | "20080042998" | "20100026639" | "20100155153" | "20090184940" | "5128624" | "7570252" | "7474300" | "20010012002" | "20030095109" | "20080257613" | "20090078476" | "20090128249" | "20100051356" | "8604365" | "20060007164" | "6930672" | "20080156546" | "8546706").PN.	US-PGPUB; USPAT	OR	ON	2015/11/02 12:32
S24	2877	G06f.cpcl. and stylus and second near2 electrode	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S25	809	G06f.cpcl. and stylus and second near2 electrode and second near2 signal	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S26	260	G06f.cpcl. and stylus and second near2 electrode and second near2 signal and angle	US-PGPUB; USPAT	OR	ON	2015/11/02 12:52
S27	43	stylus near5 angle and second near2 electrode and second near2 signal and angle	US-PGPUB; USPAT	OR	ON	2015/11/02 12:58
S28	43	stylus near5 angle and second near2	US-PGPUB;	OR	ON	2015/11/02

		electrode and second near2 signal	USPAT			12:58
S29	46	stylus near5 tilt near2 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:04
S30	47	stylus near10 tilt near2 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:05
S31	379	stylus near10 angle and capacitive	US-PGPUB; USPAT	OR	ON	2015/11/02 13:08
S32	2	stylus near10 angle and capacitive and segment near2 electrode	US-PGPUB; USPAT	OR	ON	2015/11/02 13:08
S33	41	("20040125430" | "20050231656" | "20050285985" | "20060007224" | "20060197753" | "20060250381" | "20080030461" | "20080111780" | "20080129909" | "20080158172" | "20100059296" | "4320292" | "4405921" | "4740782" | "4838655" | "5151688" | "5445871" | "5502514" | "5568292" | "5677744" | "5852487" | "5926238" | "5930591" | "5990980" | "5995172" | "6236063" | "6242729" | "6803906" | "6972753" | "7053967" | "7205988" | "7536557" | "7629945" | "6232607" | "20050040393" | "20050091297" | "20090225210" | "5182661" | "7612767" | "4439855" | "20040140962").PN.	US-PGPUB; USPAT	OR	ON	2015/11/02 13:10
S34	253	("20080049153" | "20080049154" | "20080055295" | "20080055496" | "20080055497" | "20080055498" | "20080055499" | "20080055507" | "20080062156" | "20080062157" | "20080062343" | "20080066972" | "20080084374" | "20080111780" | "20080129909" | "20080129913" | "20080129914" | "20080158172" | "20080165311" | "20080284925" | "20080297487" | "20090128529" | "20090135492" | "20090167728" | "20100001978" | "20100006350" | "20100013793" | "20100013794" | "20100013796" | "20100020044" | "20100045904" | "20100059296" | "20100118237" | "20100302419" | "20100315394" | "3970846" | "4220815" | "4320292" | "4334219" | "4345248" | "4405921" | "4476463" | "4481510" | "4484179" | "4490607" | "4496981" | "4542375" | "4577057" | "4602321" | "4603356" | "4642459" | "4644338" | "4655552" | "4662718" | "4671671" | "4677428" | "4679909" | "4684939" | "4698460" | "4705942" | "4720869" | "4736203" | "4740782" | "4759610" | "4767192" | "4772101" | "4782327" | "4782328" | "4785564" | "4794634" | "4814760" | "4823178" | "4838655" | "4846559" | "4877697" | "4893120" | "4904056" | "4917474" | "5003356" | "5037119" | "5039206" | "5051570" | "5083175" | "5105186" | "5140153" | "5151688" | "5153420" | "5172104" | "5204661" | "5236850" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:11

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S36	312	S34 or S35	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S37	312	S36	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S38	10	S37 and stylus near10 angle	US-PGPUB; USPAT	OR	ON	2015/11/02 13:12
S39	21	("20030197691" | "20090065269" | "20100066693" | "20100073323" | "20110001708" | "20110175834" | "20120050207" | "20120062497" | "20120146958" | "20120154340" |	US-PGPUB; USPAT	OR	ON	2015/11/02 13:14

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S40	147	radial near2 electrodes and stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:21
S41	889	segment$4 near2 electrodes and stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:22
S42	37	segment$4 near2 electrodes near10 stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 13:23
S43	5	"12877780"	US-PGPUB; USPAT	OR	ON	2015/11/02 15:04
S44	1	"14542438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 15:11
S45	14	"12877780"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/11/02 15:17
S46	1566	G06F.cpcl. and (electrostatic or capacitive) near10 pen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 13:20
S47	150	G06F.cpcl. and (electrostatic or capacitive) near10 pen near2 tip	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 13:20
S48	17	("2005/0128191").URPN.	USPAT	OR	OFF	2016/04/27 13:26
S49	25435	G06F.cpcl. and electrodes near "10" (pen or sylus) near5 (tip or distal)	US-PGPUB; USPAT; USOCR;	OR	OFF	2016/04/27 15:17

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S50	76	G06F.cpcl. and electrodes near10 (pen or sylus) near5 (tip or distal)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:17
S51	1	"14452438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:19
S52	1	"14542438"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:19
S53	1117	G06F.cpcl. and electrodes and phi	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S54	171371	G06F.cpcl. and electrodes and phi and pen or stylus	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S55	378	G06F.cpcl. and electrodes and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:30
S56	303	G06F.cpcl. and electrode and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:55
S57	23	G06F.cpcl. and electrode same phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 15:56
S58	146	G06F.cpcl. and electrode and theta and	US-PGPUB;	OR	OFF	2016/04/27

		phi and (pen or stylus)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:56
S59	590	electrode and theta and phi and (pen or stylus)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 16:01
S60	75	electrode same (pen or stylus) and phi and theta	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/27 16:01
S61	4	("8154525" | "8253702" | "20030142073" | "20090065269").PN.	US-PGPUB; USPAT	OR	OFF	2016/04/28 14:40
S62	0	("032504" | "072805").PN.	US-PGPUB; USPAT	OR	OFF	2016/04/28 14:40
S63	0	"15047013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/04/30 16:14
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
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	WILLIAM LU	2624

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Symbol	Date	Examiner
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US CLASSIFICATION SEARCHED			
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SEARCH NOTES		
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INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15047013	ODA ET AL.
	Examiner	Art Unit
	WILLIAM LU	2624

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 15/047,013

1. THE REQUEST FILED February 18, 2016 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination

A. ☒ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;
B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
C. filing a **request for continued examination**;
D. filing a notice of appeal;
E. filing a request for suspension of action;
F. mailing of a notice of allowance;
G. mailing of a final Office action;
H. completion of examination as defined in 37 CFR 41.102; or
I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to Irvin Dingle at (571)272-3210, Office of Petitions.

Irvin Dingle
/Irvin Dingle/
[*Signature*]

Lead Paralegal Specialist
(Title)

日 本 国 特 許 庁
JAPAN PATENT OFFICE

別紙添付の書類に記載されている事項は下記の出願書類に記載されている事項と同一であることを証明する。

This is to certify that the annexed is a true copy of the following application as filed with this Office.

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出 願 人 Applicant(s):	株式会社ワコム

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伊藤 仁

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【書類名】明細書
【発明の名称】指示体、位置検出装置及び位置検出方法
【技術分野】
【０００１】
本発明は指示体、位置検出装置及び位置検出方法に関し、より詳細には、静電結合方式における指示体、位置検出装置及び位置検出方法に関する。
【背景技術】
【０００２】
従来、コンピュータ装置上で描画やイラスト作成などに用いられるポインティングデバイスの一つとして、タブレットと呼ばれる位置検出装置が開発されている。このような位置検出装置は、通常、略平板状の位置検出器と、ユーザが位置検出器上で操作するペン形状の指示体とで構成される。
【０００３】
上述のような位置検出装置において、従来、静電結合方式を採用した位置検出装置が提案されている。静電結合方式の位置検出装置は、主に、集積回路（ＩＣ：Integrated Circuit）を含む指示体と、所定パターンで配列された導体群を有するセンサ部を備える位置検出器とで構成される。そして、センサ部上の指示体から導体群に所定の信号を送信し、位置検出器でその送信信号の受信位置を特定することにより指示体の指示位置を検出する。
【先行技術文献】
【特許文献】
【０００４】
【特許文献１】特開平８－５０５３５号公報
【発明の概要】
【発明が解決しようとする課題】
【０００５】
静電結合方式の位置検出装置において、通常、指示体からセンサ部に送信される信号は指示体が指示する位置を検出するために用いられる。それゆえ、このような位置検出装置では、指示体が指示する位置の検出は可能であるが、例えば指示体の筆圧情報、指示体が位置検出器にコンタクトしたことを示すペンダウン情報等の、位置情報以外の情報を検出することができないという課題があった。更には、ペン形状の指示体と指示体としての指など、複数種類の指示体を同時に検出できないという課題もあった。
【０００６】
本発明は、上記課題を解決するためになされたものである。本発明の目的は、静電結合方式を採用した位置検出装置において、相関演算処理が行われる符号を用いることで、指示体が指示する位置だけでなく、例えば筆圧情報、あるいは指示体のペンチップを回転の中心点として指示体を位置検出器上で回転させた場合のその回転位置、あるいは傾きなど、位置情報以外の情報を検出可能とすることである。更には、指示体としての指による位置指示情報など、複数種類の指示体による情報をも同時に検出可能とする。
【課題を解決するための手段】
【０００７】
上記問題を解決するために、本発明の位置検出装置は、指示体に印加された圧力を２つの符号間の時間差に対応づけて送信するための送信信号生成部を備え前記送信信号生成部によって生成された信号を送信するための指示体と、所定方向に配置された複数の第１の導体と前記所定方向と交差する方向に配置された複数の第２の導体を備え前記指示体から送信された信号を受信するためのセンサ部と、前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号と前記２つの符号に対応した相関演算用符号との相関演算を行うための相関演算回路と、前記相関演算回路によって算出された少なくとも１つの符号に基づく相関演算結果から前記指示体によって指示されたセンサ部上の位置を検出するための位置算出回路と、前記相関演算回路によって算出され

た２つの符号に基づく相関演算結果から前記２つの符号間の時間差に対応して前記指示体に印加された圧力を検出する筆圧算出回路と、を備える。また、指示体のペンチップを回転の中心点として指示体を位置検出器上で回転させた場合のその回転位置、あるいは傾きなど、位置情報以外の情報を検出可能とするために、指示体にはその中心軸の周囲に電気的に分割された複数の電極片が配置され、それぞれの電極片に、種類の異なる符号を供給する。更には、指による指示操作をも同時検出可能とするために、位置検出器内に符号生成部とセンサ部を構成する導体を信号受信用と信号送信用に切り替えるための切替部を備える。

【０００８】

なお、上記２つの符号は、符号パターンが同一の符号であっても良いし、互いに異なる符号パターンを用いることもできる。なお、同一の符号パターンを使用する場合には、この符号パターンに対応した同一の相関演算用符号を使用することができる。

【０００９】

また、本発明の指示体は、位置を指示するための先端部（ペンチップ）が筐体から突出して備えられた指示体であって、符号パターンが互いに異なる第１の符号及び第２の符号が生成されるとともに前記指示体の先端部に印加された圧力に対応して、斯かる２つの符号が生成されるタイミングすなわち符号間の時間差（位相差）を制御し、あるいは所定の符号パターンを有する１つの符号が生成されるとともに前記指示体の先端部に印加された圧力に対応して、斯かる符号の最初の生成に対する次の生成のタイミングすなわち符号間の時間差（位相差）を制御する符号生成回路と、前記符号生成回路によって生成された符号を送信するための送信信号生成部と、を備える。

【００１０】

本発明は、位置検出装置に静電結合方式を採用した場合に好適な発明であり、指示体から時間差を有して送信された、同一の符号パターンを有する、あるいは符号パターンが互いに異なる、第１及び第２の符号を受信し、第１の符号を用いて指示体の位置検出を行い、更には、第２の符号との間の時間差に基づいて、例えば筆圧情報、あるいは指示体の回転位置情報などの位置情報以外の情報を得る。

【発明の効果】

【００１１】

上述のように、本発明では、指示体から、互いの符号パターンが同一、あるいは異なる、第１の符号および第２の符号を送信し、信号受信時には受信信号と、第１および第２の符号に対応したそれぞれの相関演算用符号との間の相関演算を行うことで、指示体の指示位置だけでなく、例えば筆圧情報等の位置情報以外の情報を検出することができる。

【図面の簡単な説明】

【００１２】

【図１】本発明の実施形態に係る位置検出装置の外観斜視図である。

【図２】本発明の実施形態に係る指示体の概略構成図である。

【図３】図３（ａ）及び（ｂ）は、指示体内の送信符号生成部の回路構成図である。

【図４】本発明の実施形態に係る位置検出器の概略構成図である。

【図５】相関演算部の概略構成図である。

【図６】相関器の概略構成図である。

【図７】図７（ａ）～（ｃ）は、相関器の動作を説明するための図である。

【図８】指示体の動作手順を示すフローチャートである。

【図９】位置検出器の動作手順を示すフローチャートである。

【図１０】図１０（ａ）～（ｃ）は、第１及び第２の符号を時間多重させて送信する場合における指示体の位置検出及び筆圧検出の原理を説明するための図である。

【図１１】変形例１の指示体の概略構成図である。

【図１２】図１２（ａ）及び（ｂ）は、変形例２の指示体の概略構成図である。

【図１３】図１３（ａ）は、変形例３の指示体で送信する信号のＰＳＫ変調前の符号の波形図であり、図１３（ｂ）は、ＰＳＫ変調後の信号波形図である。

【図１４】変形例３の指示体の概略構成図である。
【図１５】変形例３の位置検出器の受信系回路群の概略構成図である。
【図１６】図１６（ａ）は、変形例４の指示体で送信する信号のＦＳＫ変調前の符号の波形図であり、図１６（ｂ）は、ＦＳＫ変調後の信号波形図である。
【図１７】変形例４の指示体の概略構成図である。
【図１８】変形例４の位置検出器の受信系回路群の概略構成図である。
【図１９】変形例５における指示体の回転検出、傾き検出を説明するための図である。
【図２０】変形例５の指示体の概略構成図である。
【図２１】変形例６の位置検出器の概略構成図である。
【図２２】変形例７の位置検出器の概略構成図である。
【図２３】変形例７の位置検出器の動作を説明するための図である。
【発明を実施するための形態】
【００１３】
以下、本発明の位置検出装置の一実施形態を、図面を参照しながら具体的に説明する。ただし、本発明は下記実施形態に限定されるものではない。
【００１４】
本実施形態では、互いに符号パターンが異なる２つの符号、あるいは互いが同一の符号パターンを有する２つの符号を用いて指示体の位置及び筆圧、すなわち指示体に印加した圧力を検出する。使用する符号としては、例えば８ビットコードであれば、「１１１１００００」、「１１００１１００」、及び「１０１０１０１０」の中から必要に応じて１つあるいは複数の符号パターンを使用する。また、「００１０１１０１」、「１１００１１００」、及び「１０１０１０１０」の符号パターンも使用し得る。
【００１５】
これらの符号パターンを使用すれば、受信時の相関演算処理によって互いの符号パターンを識別できる。他の符号としては、例えばM系列、ゴールド符号系列等を含む拡散符号や、例えばアダマール符号、ウォルシュ符号等の直交符号を用いてもよい。なお、直交符号を用いることで、受信時の相関演算処理によって互いの符号パターンの識別感度を高めることができる。
【００１６】
［位置検出装置の構成］
図１に、本実施形態の位置検出装置の外観斜視図を示す。なお、本実施形態では、位置検出装置としてタブレットを用いた例を説明する。位置検出装置１は、ペン形状の指示体２と、平板形状の位置検出器３とで構成され、外部機器接続ケーブル４を介してパーソナルコンピュータ（ＰＣ）などの外部機器に接続される。
【００１７】
指示体２は、位置検出器３のスキャン可能領域３ａ上で使用する。このスキャン可能領域３ａ上では、位置検出器３により指示体２の指示位置（座標）や筆圧などが検出できるようになっている。
【００１８】
位置検出器３は、指示体２が指示した位置の座標を検出し、その座標情報を外部機器に出力する。そして、外部機器の表示画面（不図示）上では、位置検出器３から入力された座標情報に対応する位置にポインタ等が表示される。
【００１９】
［指示体の構成］
図２に、本実施形態の指示体２の概略構成を示す。指示体２は、第１電極２０と、第２電極２１と、可変容量コンデンサ２２と、集積回路２３と、コイル２４と、電源生成回路２５と、これらの構成部材を内包する筐体１２９とを備える。可変容量コンデンサ２２は、印加される圧力に応じて容量値を変化させるコンデンサである。筐体１２９は金属などの導電性を有する材質で構成される。

【００２０】
第１電極２０は、棒形状を有しており、その一方の先端部は筐体１２９の一方の端部から突き出るように配置される。また、その先端部は、導電性を備えることでペンチップとして機能する。すなわち、筐体１２９から突き出た先端部は、指示体２のペンチップとして機能すると共に第１電極２０としても機能する。一方、第２電極２１は、この例では略円筒状の電極であり、第１電極２０を取り囲むように配置される。すなわち、棒形状の第１電極２０を中心として筐体１２９の内周面に沿って配置される。また、集積回路２３から出力される符号（Ｃ１、Ｃ２）は、抵抗（Ｒ１、Ｒ２）を介して信号加算された後、第１電極２０及び第２電極２１に供給される。従って、集積回路２３から出力された２つの符号パターンにそれぞれ対応した信号が信号加算された形態で第１電極２０及び第２電極２１に印加されることにより、第１電極２０及び第２電極２１を介して位置検出器３に信号が送信される。
【００２１】
圧力検出素子として配置された可変容量コンデンサ２２は、ペンチップに加えられた圧力、いわゆる筆圧により容量が変化する構成を備える。具体的には、可変容量コンデンサ２２を構成する一対の電極（不図示）のうち一方の電極が、第１電極２０の端部と係合するように構成される。それゆえ、指示体２を位置検出器３に接触させて第１電極２０がスキャン可能領域３ａ上で押されると、可変容量コンデンサ２２の一方の電極も押圧される。これにより可変容量コンデンサ２２の一対の電極間の電気的特性が変化することで、コンデンサの容量が変化する。すなわち、可変容量コンデンサ２２の容量変化量は筆圧と対応することになる。なお、圧力検出素子としては、筆圧に応じてインダクタンスが変化するように構成されたインダクタンス可変コイルまたは筆圧に応じて抵抗値が変化するように構成された可変抵抗を用いてもよい。また、可変容量コンデンサ、インダクタンス可変コイル及び可変抵抗のいずれかを含む共振回路を用いてもよい。要は、圧力検出素子は、指示体２の先端部（ペンチップ）に印加された圧力（筆圧）が送信符号生成部２８から出力される符号信号の生成開始タイミング（位相）に作用する構成を備えていればよい。
【００２２】
第１符号生成部２６及び第２符号生成部２７を含む送信符号生成部２８は、集積回路２３を構成する。本実施形態では、第１符号生成部２６から出力される第１符号Ｃ１を用いて位置検出を行い、更には第２符号生成部２７から出力される第２符号Ｃ２をも用いて筆圧検出を行う。
【００２３】
また、集積回路２３の各出力端子は、抵抗（Ｒ１、Ｒ２）を介して第１電極２０及び第２電極２１にそれぞれ接続されており、所定のタイミングで第１符号Ｃ１及び／又は第２符号Ｃ２に対応した送信信号を第１電極２０及び第２電極２１に出力する。なお、本実施形態では、第１符号生成部２６から出力される第１符号Ｃ１と、第２符号生成部２７から出力される第２符号Ｃ２とは、符号パターンが互いに異なるものとする。ただし、本発明はこれに限定されず、後述するように、同じ符号パターンを使用し、互いの符号間の信号生成開始タイミング（位相）を制御することにより、２つの符号を生成してもよい。
【００２４】
第２符号生成部２７は、可変容量コンデンサ２２に接続される。そして、第２符号生成部２７は、筆圧に対応した可変容量コンデンサ２２の容量変化に基づいて、第２符号Ｃ２の信号生成開始タイミング（位相）を変化させる。すなわち、本実施形態では、第１符号生成部２６から出力される第１符号Ｃ１の生成タイミングと、第２符号Ｃ２の生成タイミングとの間の時間差（位相差）が、指示体２に印加された筆圧に対応するように構成される。
【００２５】
さらに、集積回路２３は、送信符号生成部２８の動作を制御する制御回路（不図示）を備え、その制御に必要なクロック信号等は制御回路により生成される。なお、集積回路２３は、後述するコイル２４及び電源生成回路２５により生成される電圧により駆動される

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【００２６】

コイル２４は、位置検出器３に備えられた、後述のセンサ部３０の励磁コイル３５から送出される励磁信号を受信する。これにより、コイル２４に高周波信号が誘起される。そして、この誘起された高周波信号は、電源生成回路２５に入力される。電源生成回路２５は、整流回路（不図示）を有し、コイル２４から供給された高周波信号を、整流回路により、整流して直流電圧に変換する。そして、電源生成回路２５は、変換された直流電圧を集積回路２３の駆動用電源として集積回路２３に供給する。

【００２７】

なお、本実施形態では、集積回路２３内に第１符号Ｃ１及び第２符号Ｃ２をそれぞれ生成する第１符号生成部２６及び第２符号生成部２７を設ける例を説明したが、本発明はこれに限定されない。集積回路２３内に例えばＲＯＭ（Read Only Memory）を設け、このＲＯＭに予め第１符号Ｃ１及び第２符号Ｃ２を記憶しておき、符号送信時にこのＲＯＭからこれらの符号パターンを読み出して送信する構成にしてもよい。なお、この場合、可変容量コンデンサ２２の容量変化量ΔＣと、第１符号Ｃ１の信号生成開始タイミングと第２符号Ｃ２の信号生成開始タイミングとの対応関係を予めテーブル化してＲＯＭに記憶しておく。

【００２８】

図３（ａ）及び（ｂ）は、図２に示す指示体２内の送信符号生成部２８の回路構成例を示す。図３（ａ）は、第１符号Ｃ１及び第２符号Ｃ２の符号パターンが互いに異なる場合の送信符号生成部２８の回路構成例である。第１電極２０を介して印加される圧力に応じて容量が変化する可変容量コンデンサ２２の一端は、グラウンドに接続される。その他端は、抵抗１４４を介して電源生成回路２５に接続されて所定の電圧Ｖｃｃが供給される。

【００２９】

タイミング制御回路１４１は、所定の周期ｔ１でスイッチ１４３のＯＮ／ＯＦＦ制御を行う。すなわち、スイッチ１４３は、タイミング制御回路１４１により、一旦ＯＮとされて可変容量コンデンサ２２の電荷を放電し、その後、ＯＦＦとされる。また、タイミング制御回路１４１は、スイッチ１４３をＯＦＦにするとともに、第１符号生成部２６に作用して第１符号Ｃ１の生成を指示する。スイッチ１４３がＯＦＦされると、可変容量コンデンサ２２は抵抗１４４を介して次第に充電される。この際、可変容量コンデンサ２２の両端での電位は、筆圧に対応して変化した容量値に依存して、次第に上昇する。

【００３０】

遅延設定回路１４２は、タイミング制御回路１４１からの制御信号の供給に対応して、可変容量コンデンサ２２の電位と所定の電位Ｖｔｈとの比較を行う。可変容量コンデンサ２２の電位が所定の電位Ｖｔｈに達すると第２符号生成部２７に作用して第２符号Ｃ２の生成を指示する。この構成により、ペンチップに印加された筆圧に対応して変化した容量値に基づいて、第１符号生成部２６による第１符号Ｃ１の符号生成タイミングと第２符号生成部２７による第２符号Ｃ２の符号生成タイミングとの間の差、すなわち第１符号Ｃ１と第２符号Ｃ２との間の位相が変化することになる。この位相変化を検出することで筆圧が検出可能となる。

【００３１】

図３（ｂ）は、第１符号Ｃ１及び第２符号Ｃ２に同じ符号パターンを使用する場合の送信符号生成部２８の回路構成例である。すなわち、１種類の符号を使用する場合の回路構成例を示す。この例では、図３（ａ）における第２符号生成部２７に代えて、第１符号生成部２６を使用するものであり、それ以外の構成は同一である。この例のように第１符号Ｃ１と第２符号Ｃ２が同一の符号パターンであっても、両者の間の位相は筆圧に応じて変化するので、この位相変化を検出することで筆圧が検出可能となる。

【００３２】

［位置検出器の構成］

図４に、位置検出器３の概略構成を示す。位置検出器３は、主に、指示体２の指示位置

を検出するためのセンサ部３０と、センサ部３０を構成する複数の導体を選択する選択回路４０と、位置検出回路５０とで構成される。なお、図４では、受信信号の処理の流れを実線矢印で示し、制御信号、クロック信号等の流れは破線矢印で示す。ただし、図４では、説明を簡略化するため、受信系回路群５１の制御信号、クロック信号等の流れを示す破線矢印は省略する。

【００３３】

センサ部３０は、図４中のｘ方向（所定方向）に延在した複数の第１導体３１からなる第１導体群３２と、第１導体３１の延在方向と交差する方向、すなわち、図４中のｙ方向に延在した複数の第２導体３３からなる第２導体群３４と、それらの導体群の周囲に設けられた励磁コイル３５とを備える。第１導体群３２を構成する複数の第１導体３１は、所定間隔で図４中のｙ方向に並列配置される。一方、第２導体群３４を構成する複数の第２導体３３は、所定間隔で図４中のｘ方向に並列配置される。

【００３４】

なお、第１導体３１及び第２導体３３は、例えば、ＩＴＯ（Indium Tin Oxide）膜からなる透明電極膜や、銅箔等で形成される。また、第１導体群３２及び第２導体群３４は、樹脂材料等からなるスペーサやガラス基板等（不図示）を介して積層される。また、第１導体群３２及び第２導体群３４の各導体は、選択回路４０に接続される。励磁コイル３５は、位置検出回路５０内の後述するドライブ回路６１に接続される。

【００３５】

第１導体３１及び第２導体３３の本数及びピッチは、センサ部３０のサイズや必要とする検出精度等に応じて適宜設定される。また、本実施形態では、第１導体３１及び第２導体３３として直線状の導体を例示しているが、本発明はこれに限定されない。例えば、第１導体３１及び第２導体３３がともに延在方向に対して交差する方向に蛇行していてもよい。また、例えば、第１導体３１及び第２導体３３の一方をリング状の導体で構成し、他方をリング状導体の中心から半径方向に延在する導体で構成してもよい。

【００３６】

選択回路４０は、第１導体群３２及び第２導体群３４から所定の導体を、例えば順次選択するなど、所定の順序で選択する。この選択回路４０による導体選択制御は、後述する中央演算処理部６２と協働する制御部６３から出力される制御信号（図４中の破線矢印）により制御される。なお、この実施態様においては、センサ部３０は少なくとも指示体２から送信された所定の信号を受信する構成を備えるものである。また、本実施形態は、受信系回路群５１を時分割動作させるために、選択回路４０によって第１導体群３２及び第２導体群３４から、それぞれ所定の導体を選択することで指示体２が指示する位置（Ｘ座標、Ｙ座標）を検出する構成を備える。なお、センサ部３０を構成する導体の数に対応した複数の受信系回路群５１を備える構成を採用すれば、選択回路４０を省略することができることは明らかである。

【００３７】

位置検出回路５０は、受信系回路群５１と、発振器６０と、ドライブ回路６１と、中央演算処理部６２（ＣＰＵ：Central Processing Unit）と、制御部６３とを備える。

【００３８】

発振器６０は、所定周波数の交流信号又はパルス信号をドライブ回路６１に出力する。ドライブ回路６１は、発振器６０から入力された信号を電流に変換して励磁コイル３５に出力する。

【００３９】

制御部６３は、中央演算処理部６２と協働して、位置検出回路５０内の各部に制御信号（図４中の破線矢印）を出力するとともに、受信系回路群５１内の後述する位置及び筆圧算出部５８の算出結果を外部機器に出力する。また、中央演算処理部６２は、ソフトウェアプログラムを含み、制御部６３の動作を制御する。

【００４０】

受信系回路群５１は、主に、受信アンプ５２と、Ａ／Ｄ（Analog to Digital）変換回

路５３と、シリアルパラレル変換部５４と、シフトレジスタ５５と、相関演算部５６と、メモリ５７と、位置及び筆圧算出部５８（検出部）とで構成される。そして、受信アンプ５２、Ａ／Ｄ変換回路５３、シリアルパラレル変換部５４、シフトレジスタ５５、相関演算部５６、メモリ５７、並びに、位置及び筆圧算出部５８は、選択回路４０側からこの順で接続される。

【００４１】

受信アンプ５２は、選択回路４０で選択された所定の導体から入力される受信信号を増幅する。そして、受信アンプ５２は、この増幅された受信信号をＡ／Ｄ変換回路５３に出力する。Ａ／Ｄ変換回路５３は、増幅された受信信号をアナログデジタル変換して、変換したデジタル信号をシリアルパラレル変換部５４に出力する。

【００４２】

シリアルパラレル変換部５４は、例えば、直列入力並列出力型のシフトレジスタで構成されており、使用する符号の符号長に対応した段数のフリップフロップを有する。シリアルパラレル変換部５４は、実行プログラムが収納された中央演算処理部６２と協働する、制御部６３によってその動作が制御される。なお、シリアルパラレル変換部５４を構成する各段のフリップフロップは、１ビットの情報を保持できるフリップフロップを用いてもよいし、マルチビット（例えば１０ビット等）の情報を保持できるフリップフロップを用いてもよい。

【００４３】

シリアルパラレル変換部５４を構成する各段のフリップフロップは、入力された受信信号を順次次段のフリップフロップにシフトする。また、各フリップフロップの出力端子は、多段フリップフロップで構成される後述のシフトレジスタ５５内の対応するフリップフロップの入力端子に接続される。その結果、シリアルパラレル変換部５４からは、使用する符号の符号長と同じ数の出力信号がシフトレジスタ５５にパラレル出力される。

【００４４】

シフトレジスタ５５は、並列入出力型のシフトレジスタであり、使用する符号の符号長と同じ段数のフリップフロップにて構成される。なお、シフトレジスタ５５を構成する各段のフリップフロップには、１ビットの情報を保持できるフリップフロップを用いてもよいし、マルチビット（例えば１０ビット等）の情報を保持できるフリップフロップを用いてもよい。

【００４５】

シフトレジスタ５５内の各フリップフロップは、中央演算処理部６２と協働する制御部６３によってその動作が制御される。また、シフトレジスタ５５を構成する各フリップフロップは、入力された信号を次段のフリップフロップに巡回的にシフトさせるとともに、その信号を後述する相関演算部５６内の対応する積算器５６ｄに出力する。

【００４６】

なお、シリアルパラレル変換部５４とシフトレジスタ５５との間にシリアルパラレル変換部５４から出力される信号を一時的に保持するバッファとして機能するレジスタを設けてもよい。この場合には、シフトレジスタ５５に保持された受信信号を巡回させながら相関値を演算する間に、次の相関値演算に必要な信号をそのレジスタに一時的に保持させることができる。

【００４７】

相関演算部５６は、シフトレジスタ５５から出力された受信信号と、所定の符号パターンを有する符号（以下、相関演算用符号という）との相関値を演算して、受信信号の相関特性を出力する。

【００４８】

図５に、指示体２から送信される符号として、互いの符号パターンが異なる２種類の符号を使用する場合の相関演算部５６の概略構成を示す。相関演算部５６は、２つの相関器（第１相関器５６ａ及び第２相関器５６ｂ）で構成される。

【００４９】

第１相関器５６ａは、指示体２の第１符号生成部２６から出力される第１符号Ｃ１に対応する相関演算用符号（第１相関演算用符号）を用いて相関値を算出する。この際、例えば、拡散符号を代表するＰＮ符号を用いる場合には、第１符号Ｃ１と同じ符号パターンを有する相関演算用符号を用いる。一方、第２相関器５６ｂは、指示体２の第２符号生成部２７から出力される第２符号Ｃ２に対応する相関演算用符号（第２相関演算用符号）を用いて相関値を算出する。この際、例えば、ＰＮ符号を用いる場合には、第２符号Ｃ２と同じ符号パターンを有する相関演算用符号を用いる。

【００５０】

なお、指示体２から送信される２つの符号が同一の符号パターンを有する場合、第１相関器５６ａ及び第２相関器５６ｂでは、同一の相関演算用符号が使用される。また、この場合には、１つの相関器を用いて信号処理することもできる。更に、２種類の符号を使用する場合、指示体２によって指示される位置（Ｘ座標、Ｙ座標）を求めるための位置算出処理において、第１導体３１からの出力信号に基づく位置（Ｙ座標）の算出処理には一方の符号を使用し、第２導体３３からの出力信号に基づく位置（Ｘ座標）の算出処理には他方の符号を使用する構成を採用することもできる。

【００５１】

図６に、第１相関器５６ａの概略構成を示す。なお、第２相関器５６ｂの構成は、用いる相関演算用符号が異なること以外は、図６に示す第１相関器５６ａの構成と同様である。それゆえ、ここでは、第２相関器５６ｂの構成の説明は省略する。

【００５２】

第１相関器５６ａは、相関演算用符号生成部５６ｃと、相関演算用符号の符号長に対応した数の積算器５６ｄと、加算器５６ｅとを備える。なお、本実施形態では、各積算器５６ｄは、シフトレジスタ５５内の対応する一つのフリップフロップの出力端子に接続される。また、図６に示す例では、相関演算用符号の符号長が１１の場合を示す。それゆえ、図６に示す例では、１１個の積算器５６ｄ（図６中の積算器$Ｉ_{1}$～$Ｉ_{11}$）が設けられる。

【００５３】

図６に示す例では、ＰＮ符号を使用する例を示しており、シフトレジスタ５５から出力される符号長１１の受信信号（$ＰＳ_{1}$～～$ＰＳ_{11}$）が、積算器$Ｉ_{1}$～$Ｉ_{11}$にそれぞれ入力される。さらに、積算器$Ｉ_{1}$～$Ｉ_{11}$には、相関演算用符号生成部５６ｃから出力される符号長１１の相関演算用符号（$ＰＮ_{1}$～$ＰＮ_{11}$）がそれぞれ入力される。積算器$Ｉ_{1}$～$Ｉ_{11}$は、シフトレジスタ５５から出力される信号$ＰＳ_{1}$～$ＰＳ_{11}$と、相関演算用符号生成部５６ｃから出力される符号$ＰＮ_{1}$～$ＰＮ_{11}$とをそれぞれ積算して、その結果を加算器に出力する。

【００５４】

加算器５６ｅは、それぞれの積算器５６ｄからの出力信号を加算して、その値を相関値として出力する。この際、シフトレジスタ５５から出力される受信信号$ＰＳ_{1}$～$ＰＳ_{11}$の信号列パターンと、相関演算用符号生成部５６ｃから出力される符号$ＰＮ_{1}$～$ＰＮ_{11}$の符号パターンとが一致した場合、すべての積算器５６ｄから同じ極性の信号が出力され、加算器５６ｅから最大の相関値が出力される。それ以外の場合には、積算器５６ｄ毎に出力される信号の極性が異なるため、加算器５６ｅからは、非相関を示す低い値が出力される。

【００５５】

なお、この例のようにシフトレジスタ５５に保持された受信信号の符号長が１１の場合、第１相関器５６ａでは、シフトレジスタ５５に保持された受信信号$ＰＳ_{1}$～$ＰＳ_{11}$を１０回巡回的にシフトさせて、相関演算用符号生成部５６ｃから出力される符号$ＰＮ_{1}$～$ＰＮ_{11}$の符号パターンとの一致が検証される。ただし、本発明はこれに限定されず、シフトレジスタ５５からの受信信号$ＰＳ_{1}$～$ＰＳ_{11}$を巡回的にシフトさせて各積算器５６ｄに供給する代わりに、相関演算用符号生成部５６ｃから出力される符号$ＰＮ_{1}$～$ＰＮ_{11}$の符号パターンを巡回的にシフトさせて各積算器５６ｄに供給する構成にしても良い。

【００５６】
図７（ａ）～（ｃ）に、上述した第１相関器５６ａの動作内容及び相関特性の算出原理を具体的に示す。いま、シフトレジスタ５５から出力される受信信号が、相関演算用符号に対して例えば８チップ長（８τ）に相当する時間差（位相差）を有する場合を考える（図７（ａ）及び（ｂ）参照）。
【００５７】
この場合、相関値の算出開始から８チップ長に対応する時刻８τ（τ：符号処理のための単位時間）までは、シフトレジスタ５５から出力される受信信号の符号パターンと、相関演算用符号生成部５６ｃから出力される相関演算用符号の符号パターンとが異なるため、非相関を示す低い値が第１相関器５６ａから出力される（図７（ｃ）参照）。そして、時間８τが経過すると、両者の符号パターンが一致する。この際、上述のように、すべての積算器５６ｄから同じ極性の信号が出力されることとなり、相関値が最大となる。その後（時間８τ経過後）は、両者の符号パターンが異なるので、再び相関値は低い値で推移する。それゆえ、相関器において受信信号と相関演算用符号との相関をとると、図７（ｃ）に示すように、両者の符号パターンが所定の位相関係を満たした時点で、両者の間の相関値がピーク（特異値）となる相関特性が得られる。
【００５８】
相関演算部５６では、信号検出のために選択された導体毎に、上述した相関特性（相関値）の算出原理に基づいて、位置検出用の第１符号Ｃ１に対する相関特性を第１相関器５６ａで求め、筆圧検出用の第２符号Ｃ２に対する相関特性を第２相関器５６ｂで求める。そして、それらの相関特性をメモリ５７に出力する。なお、位置検出用の第１符号Ｃ１と筆圧検出用の第２符号Ｃ２の符号パターンを同一とした場合には、１つの相関器でそれぞれの相関特性を求めることもできる。
【００５９】
また、位置及び筆圧算出部５８は、メモリ５７に記憶された、各導体に生起した信号に基づいて算出された相関特性から指示体２の指示位置（座標）及び筆圧を算出する。具体的には、位置及び筆圧算出部５８は、位置検出用の第１符号Ｃ１に対する相関特性から相関値のピークを検出して、指示体２の位置検出を行う。この際、位置検出回路５０で使用される相関演算用符号の符号パターンに対応した符号パターンを送信する指示体２が識別されるとともに、選択回路４０における導体選択制御と協働して指示体２が指示する位置（Ｘ座標、Ｙ座標）が求められる。
【００６０】
また、本実施形態では、上述のように、指示体２は、筆圧に応じて位置検出用の第１符号Ｃ１と筆圧検出用の第２符号Ｃ２との間の時間差（位相差）が変化する構成を備えている。すなわち、本実施形態では、第１符号Ｃ１の生成時刻に対し、筆圧に応じて第２符号Ｃ２の生成タイミングが制御されて送信される。それゆえ、筆圧に応じて、第２符号Ｃ２に対する相関特性で得られる相関値のピーク位置（時間）と、第１符号Ｃ１に対する相関特性で得られる相関値のピーク位置（時間）とが異なる。本実施形態では、両者の相関値のピーク位置の時間差（位相差）に基づいて、筆圧を求める。なお、指示体２の位置及び筆圧の算出原理については、後でより具体的に説明する。
【００６１】
［位置検出装置の動作］
次に、本実施形態の位置検出装置１の動作、並びに、位置及び筆圧検出の原理を図８～図１０を参照しながら説明する。図８は、本実施形態の指示体２の動作を示すフローチャートである。図９は、位置検出器３の動作を示すフローチャートである。また、図１０（ａ）～（ｃ）は、本実施形態の位置検出装置１の動作時における送信動作、受信信号の波形及び相関特性をそれぞれ示す図である。
【００６２】
最初に、指示体２の動作を、図８及び図１０（ａ）を参照しながら説明する。まず、指示体２は、第１符号生成部２６から位置検出用の第１符号Ｃ１を、第１電極２０及び第２

電極２１を介して送信する（ステップＳ１）。次いで、指示体２は、筆圧に応じた時間（位相）が経過した時点で、第２符号生成部２７から筆圧検出用の第２符号Ｃ２を、第１電極２０及び第２電極２１を介して送信する（ステップＳ２）。

【００６３】

次いで、指示体２は、第１符号Ｃ１の送信開始（ステップＳ１）からの処理時間が、第２符号Ｃ２の符号パターンを送信するに十分な所定の時間ｔ１に達したか否かを判定する（ステップＳ３）。第１符号Ｃ１の送信開始からの処理時間が、第２符号Ｃ２の符号パターンを送信するに十分な所定の時間ｔ１に達していない場合、すなわち、ステップＳ３がＮＯ判定の場合には、所定の時間ｔ１の経過を待つ。一方、第１符号Ｃ１の送信開始からの処理時間が、所定の時間ｔ１が経過した場合、すなわち、ステップＳ３がＹＥＳ判定の場合には、ステップＳ１に戻る。

【００６４】

指示体２内では、上述のように、第１符号Ｃ１の送信後、筆圧に応じた時間経過した時点で第２符号Ｃ２を送信するという一連の処理が繰り返し実行される。この動作の様子を示したのが、図１０（ａ）である。この例では、図１０（ａ）に示すように、指示体２からは、指示体が指示する位置を求めるための第１符号Ｃ１と、第１符号Ｃ１の送信開始時刻から筆圧に応じた所定の時間（位相）Ｔｄが経過した時点にて送信開始される第２符号Ｃ２とが、第１電極２０および第２電極２１を介して、時間的に多重化されて送信される。

【００６５】

なお、第２符号Ｃ２の送信が完了した後、第１符号Ｃ１の送信開始からの処理時間が所定の時間（ｔ２）の経過を待って再び第１符号Ｃ１の送信（ステップＳ１）が開始される。

【００６６】

なお、第１符号Ｃ１の符号パターンと第２符号Ｃ２の符号パターンを同一とすることもできることは既述した通りである。

【００６７】

次に、位置検出器３の動作を、図９並びに図１０（ｂ）及び（ｃ）を参照しながら説明する。位置検出器３は、最初に指示体２の位置及び筆圧検出を次のようにして行う。まず、選択回路４０は、センサ部３０の導体群から所定の導体を選択する（ステップＳ１１）。次いで、受信系回路群５１は、受信信号を検出する（ステップＳ１２）。次いで、受信系回路群５１は、受信信号を増幅及びアナログデジタル変換する。次いで、図４に示す相関演算部５６を用いて、第１符号Ｃ１及び第２符号Ｃ２にそれぞれ対応した相関演算用符号と受信信号との相関値をそれぞれ算出して相関特性（第１及び第２の相関特性）を求め、メモリ５７に記憶する（ステップＳ１３）。

【００６８】

次いで、位置検出器３は、受信導体の選択処理（ステップＳ１１）からの処理時間が、受信導体の選択の開始から指示体２の指示位置及び筆圧の検出までに至る一連の処理のために必要とされる所定の時間ｔ２を経過したか否かを判定する（ステップＳ１４）。なお、所定の時間ｔ２は、上述した指示体２における所定時間ｔ１よりも長い時間で設定される。

【００６９】

なお、受信導体の選択処理からの処理時間が、所定の時間ｔ２を経過していない場合（ステップＳ１４がＮＯ判定の場合）には、該処理時間が所定の時間ｔ２を経過するまで待機する。

【００７０】

処理時間が、所定期間ｔ２経過した場合、すなわち、ステップＳ１４がＹＥＳ判定となった場合、全受信導体が選択されたかどうかを判定する（ステップ１５）。そして、ステップＳ１５においてＮＯ判定の場合には、ステップ１１の受信導体選択に戻る。一方、ステップＳ１５においてＹＥＳ判定の場合には、受信系回路群５１内の位置及び筆圧算出部

５８は、メモリ５７に記憶された第１の相関特性、具体的にはその相関値のピークに基づいて指示体２が指示する位置（座標）を算出する。また、第１の相関特性と第２の相関特性の間の位相差、具体的には、それぞれの相関値のピークの間の時間差に基づいて、指示体２に印加された圧力、いわゆる筆圧を算出する（ステップＳ１６）。

【００７１】

ここで、上記ステップＳ１６における指示体２の位置及び筆圧の検出の原理を図１０（ｂ）及び（ｃ）を参照しながら具体的に説明する。上記ステップＳ１１で選択した導体上に指示体２が存在する場合、位置検出及び筆圧検出のための所定期間ｔ１において、指示体２からは、第１符号Ｃ１及び第２符号Ｃ２を含む信号が送信され、選択された受信導体ではこの送信信号に対応した受信信号Ｓｐ１が生起する（図１０（ｂ）参照）。

【００７２】

相関演算部５６に供給された受信信号Ｓｐ１は、第１相関器５６ａ及び第２相関器５６ｂに並列的に入力される。第１相関器５６ａでは、第１符号Ｃ１に対応した相関演算用符号を用いて受信信号Ｓｐ１との間での相関特性ｐ１が算出される。なお、この例では、第１符号Ｃ１としてＰＮ符号を用いる。従って、第１相関演算用符号としては第１符号Ｃ１と同じＰＮ符号が用いられる。第１相関器５６ａからは、受信信号Ｓｐ１と第１相関演算用符号との符号パターンが一致する時点で相関値が最大（図１０（ｃ）中のピークｐ１）となり、それ以外の時間では低い相関値が出力される。

【００７３】

一方、第２相関器５６ｂでは、第２符号Ｃ２に対応した相関演算符号を用いて受信信号Ｓｐ１との間での相関特性ｐ２が算出される。第１相関器５６ａの場合と同様に、この例では、第２符号Ｃ２としてＰＮ符号を用いているので、第２相関演算用符号としては第２符号Ｃ２と同じＰＮ符号が用いられる。第２相関器５６ｂからは、受信信号Ｓｐ１と第２相関演算用符号との符号パターンが一致する時点で相関値が最大（図１０（ｃ）中のピークｐ２）となり、それ以外の時間では低い相関値が出力される。

【００７４】

なお、選択した導体上に指示体２が存在しない場合には相関値のピークは現れない。また、２つの相関値のピークｐ１及びｐ２間の時間差、すなわち位相差（図１０（ｃ）中のΔＣ）は筆圧に対応して変化する。従って、図１０（ｃ）に示す相関特性において、相関値のピークｐ１あるいはピークｐ２から指示体２の位置を検出することができ、更には、２つの相関値のピークｐ１及びｐ２間との間の時間差ΔＣを検出することにより指示体２に印加された筆圧を検出することができる。

【００７５】

そして、本実施形態では、位置及び筆圧算出部５８は、相関特性ｐ１における相関値のピークレベルを求めることで、選択した導体上に指示体２が存在するか否かを判定する。また、相関特性ｐ１における相関値のピークレベルと相関特性ｐ２における相関値のピークレベルとの間の時間差（ΔＣ）を求めることで、指示体２に印加された圧力、すなわち筆圧を求める。

【００７６】

上述したように、本実施形態では、指示体２から第１及び第２の符号を送信することで、第１の符号に基づいて指示体の位置検出を行い、第１の符号と第２の符号との間の時間差（位相差）に基づいて、例えば筆圧情報などの、位置情報以外の情報を検出する。なお、第１及び第２の符号は、符号パターンが互いに異なる符号であっても、同じ符号パターンであってもよい。

【００７７】

同じ符号パターンを使用する場合においても、指示体２は、一方の符号の信号送出開始タイミングに対して他方の符号の信号送出タイミングを筆圧に対応して変化させる。それゆえ、この場合においても相関演算処理を行うことで、相関特性に２つにピークが現れ、指示体２の位置のみならず筆圧をも検出することができる。なお、指示体２から送信する２つの符号の符号パターンを同じにした場合、１種類の相関器を設ければよいので、相関

演算部５６の構成がより簡易になる。また、符号としては、相関演算処理によって所望の相関演算結果が算出されれば良く、例えばＰＮ符号（拡散符号）が適用可能である。

【００７８】

［変形例１］

上記実施形態では、指示体２から送信される２つの符号（第１符号Ｃ１及び第２符号Ｃ２）を用いて、指示体２の位置及び筆圧を求める例を説明したが、本発明はこれに限定されない。指示体から送信される２つの符号を用いて、指示体の位置だけでなく、例えば指示体がセンサ部に接しているか否かの情報（以下、ペンダウン情報という）を検出することができる。変形例１では、指示体から送信される２つの符号を用いて、指示体の位置、指示体がセンサ部に近接している状態（ホバリング状態）及び指示体がセンサ部に接している状態（ペンダウン状態）を検出する例について説明する。

【００７９】

最初に、図２を参照して第１の例を説明する。この第１の例では、既述した筆圧検出の構成を適用する。すなわち、指示体に所定値以上の筆圧が印加されたか否かを検出することによって、指示体がセンサ部に近接している状態（ホバリング状態）か、あるいは指示体がセンサ部に接している状態（ペンダウン状態）かを検出する。この第１の例においても、指示体から送信される２つの符号は、互いに異なる符号パターンであっても、同一の符号パターンであっても適用可能であることは明らかである。

【００８０】

次に、第２の例を説明する。図１１に、この第２の例の指示体の概略構成を示す。なお、図１１において、上記実施形態（図２）と同様の構成には、同じ符号を付して示す。また、第１符号及び第２符号としては、例えば、ＰＮ符号（拡散符号）が使用される。

【００８１】

この例の指示体１００は、棒形状の第１電極２０と、スイッチ１０１（第１スイッチ）と、集積回路１０２と、コイル２４と、電源生成回路２５と、これらの構成部材を内包する筐体１２９とを備える。スイッチ１０１及び集積回路１０２以外の構成は、上記実施形態と同様であるので、ここでは、スイッチ１０１及び集積回路１０２の構成についてのみ説明する。

【００８２】

スイッチ１０１は、筐体１２９と集積回路１０２内の後述する切替スイッチ１０３との間に設けられる。また、スイッチ１０１は、第１電極２０に係合され、ペンチップとしての第１電極２０がスキャン可能領域３ａ上で押されると、スイッチ１０１がＯＮ状態となるように構成される。

【００８３】

集積回路１０２は、第１符号生成部２６及び第２符号生成部２７を含む送信符号生成部２８と、切替スイッチ１０３（第２スイッチ）とを備える。なお、送信符号生成部２８は、上記実施形態と同様の構成である。

【００８４】

切替スイッチ１０３は、その入力端子が第１符号生成部２６及び第２符号生成部２７の出力端子に接続され、出力端子が第１電極２０に接続される。そして、切替スイッチ１０３は、第１符号Ｃ１及び第２符号Ｃ２のいずれの符号を送信するかを選択する。この切替スイッチ１０３の切替動作は、スイッチ１０１の接続状態（ＯＮまたはＯＦＦ状態）により制御される。具体的には、スイッチ１０１がＯＦＦ状態の場合（指示体１００がセンサ部上に浮いているホバリング状態の場合）には、切替スイッチ１０３は第２符号生成部２７に接続され、スイッチ１０１がＯＮ状態の場合（指示体１００がセンサ部に接しているペンダウン状態となった場合）には、切替スイッチ１０３は第１符号生成部２６に接続される。

【００８５】

すなわち、指示体１００がセンサ部上に浮いている場合には、指示体１００からは第２符号Ｃ２がセンサ部に送信される。この場合、センサ部は、第２符号Ｃ２に対応する受信

信号から相関値のピークを検出することで、指示体１００がホバリング状態にあること、及びホバリング状態における指示体１００の位置を検出する。一方、指示体１００がセンサ部に接している場合には、指示体１００からは第１符号Ｃ１がセンサ部に送信される。この場合、センサ部は、第１符号Ｃ１に対応する受信信号から相関値のピークを検出して位置検出を行う。このように、送信される符号の種類（Ｃ１、Ｃ２）を識別することにより、指示体１００がセンサ部に接しているペンダウンの状態にあるか、あるいはホバリング状態にあるかを判定することができる。これは、例えば、受信系回路群内の相関演算部の第１相関器及び第２相関器のいずれの出力から相関値のピークが得られたかを判定することにより行うことができる。

【００８６】

なお、この例においても、集積回路１０２内に第１符号生成部２６及び第２符号生成部２７を設ける例を説明したが、本発明はこれに限定されない。集積回路１０２内に例えばＲＯＭを設け、このＲＯＭに予め第１符号Ｃ１及び第２符号Ｃ２を記憶しておき、拡散符号の送信時にこのＲＯＭから符号を読み出して送信する構成にしてもよい。

【００８７】

［変形例２］

変形例２では、指示体から送信される複数の符号を用いて、指示体の位置、筆圧の他に、サイドスイッチの操作有無情報を検出することのできる指示体の構成例を説明する。

【００８８】

図１２（ａ）及び（ｂ）に、この例の指示体の概略構成を示す。なお、図１２（ａ）及び（ｂ）において、上記実施形態（図２）と同様の構成には、同じ符号を付して示す。

【００８９】

図１２（ａ）に例示する指示体１１０は、棒形状の第１電極２０と、円筒状の第２電極２１と、可変容量コンデンサ２２と、集積回路１１１と、コイル２４と、電源生成回路２５と、これらの構成部材を内包する筐体１２９とを備える。さらに、指示体１１０は、筐体１２９の側面の一部に設けられた、指などで設定の操作が可能な操作スイッチ、いわゆるサイドスイッチ１１３を備える。集積回路１１１及びサイドスイッチ１１３以外の構成は、上記実施形態と同様であるので、ここでは、集積回路１１１及びサイドスイッチ１１３の構成についてのみ説明する。

【００９０】

集積回路１１１は、第１符号生成部２６及び第２符号生成部２７を含む送信符号生成部１１５と、切替スイッチ１１４と、インバータ回路１２８とを備える。

【００９１】

第１符号生成部２６及び第２符号生成部２７は、上記実施形態と同様の構成であり、それぞれ、第１符号Ｃ１及び第２符号Ｃ２を生成して出力する。また、生成される符号としては、ＰＮ符号で代表される拡散符号を適用することができる。なお、既述したように、指示体１１０が指示するセンサ部上の位置は第１符号生成部２６によって生成される第１符号Ｃ１によって検出される。また、指示体１１０に印加される圧力、いわゆる筆圧の検出は、棒形状の第１電極２０が筆圧に応じて可変容量コンデンサ２２を押圧することにより生じるコンデンサの容量値変化を検出して行う。具体的には、図３（ａ）及び（ｂ）に示したように、可変容量コンデンサ２２の容量に対応して、第２符号生成部２７によって生成される第２符号Ｃ２の生成開始タイミング、すなわち、位相を変化させる。従って、第２符号Ｃ２と第１符号Ｃ１との間の符号生成開始タイミングの時間差（位相）を位置検出回路５０で検出することで筆圧を求めることができる。

【００９２】

また、第２符号生成部２７によって生成された第２符号Ｃ２は、インバータ回路１２８に供給されて得られた出力反転信号とともに、信号切替回路１１４に供給される。操作スイッチ（サイドスイッチ）１１３の操作に対応して信号切替回路１１４が制御されることで、第２符号生成部２７によって生成された第２符号Ｃ２がインバータ回路１２８を介して第２電極２１に供給される。なお、インバータ回路１２８と信号切替回路１１４は、符

号反転回路１１６を構成する。

【００９３】

この構成によれば、操作スイッチ（サイドスイッチ）１１３の操作に対応して、第２符号生成部２７によって生成された第２符号Ｃ２の信号反転を行うインバータ回路１２８の介在が制御されることとなる。位置検出回路５０では、第２符号生成部２７によって生成された第２符号Ｃ２が信号反転されているか否かを相関演算部５６における処理で検出することで、操作スイッチ（サイドスイッチ）１１３が操作されたか否かを検出できる。なお、操作スイッチ１１３は、例えば、パーソナルコンピューターで使用されるマウスの右クリックボタンあるいは左クリックボタンの機能を実現するために設けられている。

【００９４】

図１２（ａ）に示した構成においては、指示体１１０にインバータ回路１２８を設け、操作スイッチ（サイドスイッチ）１１３の操作に対応して、インバータ回路１２８から出力される信号を第２電極に供給することで操作スイッチ（サイドスイッチ）１１３の操作有無を検出するものである。これに対し、図１２（ｂ）に示す指示体１１７の構成においては、第２電極２１を第１の電極片２１ａと第２の電極片２１ｂで構成する。さらに、指示体１１７は、第１符号生成部２６及び第２符号生成部２７に加えて第３符号生成部２９を備える。なお、第３符号生成部２９によって生成される第３符号Ｃ３の符号パターンを、第１符号生成部２６及び第２符号生成部２７からそれぞれ生成される第１符号Ｃ１及び第２符号Ｃ２とは異なる符号パターンにすることで、位置検出回路５０を構成する相関演算部５６によってそれぞれの符号が識別可能とされる。

【００９５】

第３符号生成部２９によって生成される第３符号Ｃ３は、操作スイッチ（サイドスイッチ）１１３が操作されたことに対応してＯＮとなるスイッチ１１２を介して第２の電極片２１ｂに供給される。第２の電極片２１ｂから送信された第３符号Ｃ３を位置検出回路５０で検出することで、操作スイッチ（サイドスイッチ）１１３が操作されたか否かが検出できる。なお、第２符号生成部２７によって生成された第２符号Ｃ２は第１の電極片２１ａに供給されて、筆圧検出のために使用される。この例では、第２電極２１を第１の電極片２１ａ及び第２の電極片２１ｂに２分割した構成を備えるが、本発明はこれに限定されず、更に細分化することができる。第２電極２１を、偶数個の電極片に分割して略円筒状に配置し、奇数番目の電極片には第２符号Ｃ２を供給し、偶数番目の電極片には第３符号Ｃ３が供給される構成にしてもよい。この場合には、センサ部と指示体の周面との位置関係に関わらず、安定した電気的結合特性を確保することができる。

【００９６】

なお、この例においても、集積回路１１１内に例えばＲＯＭを設け、このＲＯＭに予め第１符号Ｃ１、第２符号Ｃ２、及び第３符号Ｃ３を記憶しておき、符号の送信時にこのＲＯＭから各符号を読み出す構成にしてもよい。また、図３（ａ）及び（ｂ）を参照して説明したように、第１符号Ｃ１、第２符号Ｃ２、及び第３符号Ｃ３の各符号は互いに異なる符号パターンであってもよいし、同一の符号パターンであってもよい。ただし、各符号を同一の符号パターンとする場合には、それらの符号間に所定の時間差（位相差）を設ける。更には、この例ではそれぞれの符号を対応する電極に供給する構成を示したが、既述したように、例えば互いの符号を、抵抗などを介する、いわゆる抵抗加算することで、同一の電極に供給することもできる。

【００９７】

［変形例３］

上記実施形態及び変形例１、２では、指示体２から符号そのものを直接に位置検出器３に送信する例を説明したが、本発明はこれに限定されない。拡散符号に対して所定の変調を施して、その変調した符号（送信符号）を指示体２から位置検出器３に送信してもよい。そこで、変形例３では、第１及び第２の符号として拡散符号を使用し、ＰＳＫ（Phase Shift Keying）変調する例を説明する。

【００９８】

図１３（ａ）及び（ｂ）に、拡散符号のＰＳＫ変調前後の波形を示す。なお、図１３（ａ）がＰＳＫ変調前の拡散符号の波形であり、図１３（ｂ）がＰＳＫ変調後の送信符号の波形である。

【００９９】

この例では、変調前の拡散符号の符号周期の２倍のクロック周期の信号でＰＳＫ変調する例を説明する。なお、変調時のクロック周期と符号周期との比は用途等に応じて適宜変更可能である。この例のＰＳＫ変調では、変調前の拡散符号（図１３（ａ））において、レベルがＨｉｇｈからＬｏｗ、または、ＬｏｗからＨｉｇｈに遷移するタイミングで位相を反転させることにより変調信号（図１３（ｂ））を生成する。

【０１００】

図１４に、上記ＰＳＫ変調を可能とする指示体の概略構成を示す。なお、図１４において、上記実施形態（図２）と同様の構成には、同じ符号を付して示す。指示体１２０は、第１電極２０と、第２電極２１と、可変容量コンデンサ２２と、集積回路１２１と、コイル２４と、電源生成回路２５と、これらの構成部材を内包する筐体１２９とを備える。なお、この例の指示体１２０は、集積回路１２１以外の構成は、上記実施形態と同様であるので、ここでは、集積回路１２１についてのみ説明する。

【０１０１】

集積回路１２１は、第１符号生成部２６、第２符号生成部２７及び２つのＰＳＫ変調器１２３，１２４からなる送信符号生成部１２２を備える。そして、一方のＰＳＫ変調器１２３は、第１符号生成部２６の出力側に接続され、他方のＰＳＫ変調器１２４は、第２符号生成部２７の出力側に接続される。第１符号生成部２６及び第２符号生成部２７は、上記実施形態と同様の構成であり、ＰＳＫ変調器１２３及び１２４は、ともに、通信技術の分野で従来用いられているＰＳＫ変調器で構成することができる。

【０１０２】

なお、この例では、集積回路１２１の送信符号生成部１２２内で第１符号Ｃ１及び第２符号Ｃ２を生成し且つＰＳＫ変調する例を説明したが、本発明はこれに限定されない。集積回路１２１内に例えばＲＯＭを設け、このＲＯＭに予めＰＳＫ変調された第１符号Ｃ１及び第２符号Ｃ２を記憶しておき、拡散符号の送信時にこのＲＯＭから所定の変調された拡散符号を読み出して送信する構成にしてもよい。なお、この場合、可変容量コンデンサ２２の容量変化量と、ＰＳＫ変調された第２符号Ｃ２の位相の変化量との対応を予めテーブルにしてＲＯＭに記憶しておく。

【０１０３】

また、この例では、導体群に供給される信号はＰＳＫ変調されているので、その受信信号の検出時にはＰＳＫ変調された信号を復調する回路が必要になる。図１５に、この例における位置検出器内の受信系回路群の構成を示す。なお、図１５において、上記実施形態（図４）と同様の構成には、同じ符号を付して示す。

【０１０４】

受信系回路群１２５は、主に、受信アンプ５２と、Ａ／Ｄ変換回路５３と、ＰＳＫ復調器１２６と、シリアルパラレル変換部５４と、シフトレジスタ５５と、相関演算部５６と、メモリ５７と、位置及び筆圧算出部５８とで構成される。そして、受信アンプ５２、Ａ／Ｄ変換回路５３、ＰＳＫ復調器１２６、シリアルパラレル変換部５４、シフトレジスタ５５、相関演算部５６、メモリ５７、並びに、位置及び筆圧算出部５８は、受信信号の入力側からこの順で接続される。すなわち、この例の受信系回路群１２５では、Ａ／Ｄ変換回路５３と、シリアルパラレル変換部５４との間に、ＰＳＫ復調器１２６を設ける。それ以外は、上記実施形態と同様の構成である。なお、ＰＳＫ復調器１２６は、通信技術の分野で従来用いられているＰＳＫ復調器で構成することができる。

【０１０５】

この例のように送信する拡散符号をＰＳＫ変調すると、拡散符号の符号周期より短い周期のクロック信号を用いるので、受信系回路群１２５で検出する拡散符号の立ち上がり及び立ち下がり時の信号遷移の頻度をより多くすることができ、位置及び筆圧検出の誤差を

より小さくすることができる。また、拡散符号をＰＳＫ変調することにより、送信信号の帯域幅を広くすることができ、ノイズ耐性を向上させることができる。

【０１０６】

［変形例４］

変形例４では、第１及び第２の符号として拡散符号を使用し、ＦＳＫ（Frequency Shift Keying）変調する例を説明する。図１６（ａ）及び（ｂ）に、拡散符号のＦＳＫ変調前後の波形を示す。なお、図１６（ａ）がＦＳＫ変調前の拡散符号の波形であり、図１６（ｂ）がＦＳＫ変調後の送信符号の波形である。

【０１０７】

この例では、変調前の拡散符号の符号周期の２倍及び４倍のクロック周期の信号を用いてＦＳＫ変調する例を説明する。この例のＦＳＫ変調では、変調前の拡散符号（図１６（ａ））中のＨｉｇｈレベル状態を、変調前の拡散符号の４倍の周波数の信号に対応させ、Ｌｏｗレベル状態を変調前の拡散符号の２倍の周波数の信号に対応させて変調信号（図１６（ｂ））を得る。なお、変調時のクロック周期と符号周期との比は用途等に応じて適宜変更可能である。

【０１０８】

図１７に、上記ＦＳＫ変調を可能とする指示体の概略構成を示す。なお、図１７において、上記実施形態（図２）と同様の構成には、同じ符号を付して示す。指示体１３０は、第１電極２０と、第２電極２１と、可変容量コンデンサ２２と、集積回路１３１と、コイル２４と、電源生成回路２５と、これらの構成部材を内包する筐体１２９とを備える。なお、この例の指示体１３０は、集積回路１３１以外の構成は、上記実施形態と同様であるので、ここでは、集積回路１３１についてのみ説明する。

【０１０９】

集積回路１３１は、第１符号生成部２６、第２符号生成部２７及び２つのＦＳＫ変調器１３３，１３４からなる送信符号生成部１３２を備える。そして、一方のＦＳＫ変調器１３３は、第１符号生成部２６の出力側に接続され、他方のＦＳＫ変調器１３４は、第２符号生成部２７の出力側に接続される。第１符号生成部２６及び第２符号生成部２７は、上記実施形態と同様の構成であり、ＦＳＫ変調器１３３及び１３４は、ともに、通信技術の分野で従来用いられているＦＳＫ変調器で構成することができる。

【０１１０】

なお、この例では、集積回路１３１の送信符号生成部１３２内で第１符号Ｃ１及び第２符号Ｃ２を生成し且つＦＳＫ変調する例を説明したが、本発明はこれに限定されない。集積回路１３１内に例えばＲＯＭを設け、このＲＯＭに予めＦＳＫ変調された第１符号Ｃ１及び第２符号Ｃ２を記憶しておき、拡散符号の送信時にこのＲＯＭから所定の変調された拡散符号を読み出して送信する構成にしてもよい。なお、この場合、可変容量コンデンサ２２の容量変化量と、ＦＳＫ変調された第２符号Ｃ２の位相の変化量との対応を予めテーブルにしてＲＯＭに記憶しておく。

【０１１１】

また、この例では、導体群に供給される信号はＦＳＫ変調されているので、その受信信号の検出時にはＦＳＫ変調された信号を復調する回路が必要になる。図１８に、この例における位置検出器内の受信系回路群の構成を示す。なお、図１８において、上記実施形態（図４）と同様の構成には、同じ符号を付して示す。

【０１１２】

受信系回路群１３５は、主に、受信アンプ５２と、Ａ／Ｄ変換回路５３と、ＦＳＫ復調器１３６と、シリアルパラレル変換部５４と、シフトレジスタ５５と、相関演算部５６と、メモリ５７と、位置及び筆圧算出部５８とで構成される。そして、受信アンプ５２、Ａ／Ｄ変換回路５３、ＦＳＫ復調器１３６、シリアルパラレル変換部５４、シフトレジスタ５５、相関演算部５６、メモリ５７、並びに、位置及び筆圧算出部５８は、受信信号の入力側からこの順で接続される。すなわち、この例の受信系回路群１３５では、Ａ／Ｄ変換回路５３と、シリアルパラレル変換部５４との間に、ＦＳＫ復調器１３６を設ける。それ

以外は、上記実施形態と同様の構成である。なお、ＦＳＫ復調器１３６は、通信技術の分野で従来用いられているＦＳＫ復調器で構成することができる。

【０１１３】

この例のように送信する拡散符号をＦＳＫ変調すると、拡散符号の符号周期より短い周期のクロック信号を用いるので、受信系回路群１３５で検出する拡散符号の立ち上がり及び立ち下がり時の信号遷移の頻度をより多くすることができ、位置及び筆圧検出の誤差をより小さくすることができる。また、拡散符号をＦＳＫ変調することにより、送信信号の帯域幅を広くすることができ、ノイズ耐性を向上させることができる。

【０１１４】

[変形例５]

図１２（ａ）及び（ｂ）を参照して説明した変形例２においては、センサ部と指示体の周面との位置関係に関わらず、センサ部と指示体との間で安定した電気的結合特性を確保するための構成を説明した。変形例５では、図１９を参照して、指示体の操作状態を検出する構成について説明する。具体的には、次の３つの操作状態を検出するための構成について説明する。

（１）指示体１４６のペンチップを回転中心とした周面の回転角ｒの検出

（２）指示体１４６のペンチップを基点としたスキャン可能領域３ａの平面（位置検出回路５０を構成するセンサ部３０が形成される平面）に対する傾きθの検出

（３）指示体１４６がペンチップを基点として所定の傾きθを保持して回転した場合、すなわち、指示体１４６がペンチップを基点として傾きθを保持して円錐体を描くようにして回転した場合の指示体１４６をスキャン可能領域３ａの平面（または該平面と平行な面）に投射したときの指示体１４６の回転角φの検出

【０１１５】

なお、既に説明した構成については同様の符号を付してその説明を省略する。また、後述するように、指示体１４６の筐体内に配置された所定の電極片を基準としてそれぞれの情報（ｒ、θ、φ）が設定される。

【０１１６】

図１９においては、第１電極２０を構成するペンチップを回転中心として指示体１４６自体が所定の回転角ｒの位置にあるものとする。また、指示体１４６は第１電極２０を構成するペンチップを基点として位置検出器３のスキャン可能領域３ａの平面に対して傾きθにて位置指示するものとする。更には、指示体１４６はペンチップを基点として傾きθを保持してスキャン可能領域３ａの平面上で円を描くように回転させた場合、すなわち指示体１４６の移動軌跡によってペンチップを頂点とした円錐体が形成されるように指示体１４６を回転させた場合、指示体１４６をスキャン可能領域３ａの平面（図１９では、該平面と平行な面）に投射した際に回転角φを有するものとして説明する。

【０１１７】

また、図１９に示す複数の受信導体Ｘ１、Ｘ２、Ｘ３、Ｙ１、Ｙ２、Ｙ３は、指示体１４６の各情報（ｒ、θ、φ）を検出するために模式的に表現したものである。なお、受信導体Ｘ１、Ｘ２、Ｘ３は、第２導体群３４を構成する第２導体３３に相当する。また、複数の受信導体Ｙ１、Ｙ２、Ｙ３は、第１導体群３２を構成する第１導体３１に相当する。理解し易いようにするために、指示体１４６のペンチップは受信導体Ｘ２及びＹ２の交点上に配置され、また、指示体１４６は受信導体Ｙ１、Ｙ２、Ｙ３とは直交する方向、すなわち、受信導体Ｘ１、Ｘ２、Ｘ３が延伸する方向に沿って、受信導体Ｙ３の側に角度θで傾いているものとして説明する。

【０１１８】

図２０に示す実施態様において、指示体１４６に収納された集積回路７２の送信信号生成部７３は、第１符号生成部２６、第２符号生成部２７、第３符号生成部２９、第４符号生成部６５、及び第５符号生成部６６を備えており、それぞれ第１符号Ｃ１、第２符号Ｃ２、第３符号Ｃ３、第４符号Ｃ４、及び第５符号Ｃ５を生成して出力する。なお、各符号が互いに異なる符号パターンを備えることで各符号が互いに識別可能とされる構成であっ

てもよいし、それぞれの符号が互いに所定の時間差（位相）を有して生成されることで各符号が互いに時間軸上で識別可能とされる構成であっても良い。なお、各符号が所定の時間差（位相）を有して生成される場合には、各符号は複数の符号パターンを備えた構成であってもよいし、同一の符号パターンによる構成であっても良い。要は、それぞれの符号は、位置検出器３の側で互いに識別されて検出できる構成であれば良い。この実施態様では、第１符号Ｃ１，第２符号Ｃ２、第３符号Ｃ３、第４符号Ｃ４、及び第５符号Ｃ５は互いに異なる符号パターンを有するものとして説明する。

【０１１９】

第２電極２１１は、電気的に分割された複数の電極片（２１１a、２１１ｂ、２１１ｃ、２１１ｄ）から構成されており、指示体１４６のペンチップの近傍に、筐体１２９の内部の周面に沿って配置されている。電極片２１１ａには第３符号Ｃ３の信号が供給され、電極片２１１ｂには第２符号Ｃ２の信号が供給され、電極片２１１ｃには第４符号Ｃ４が供給され、電極片２１１ｄには第５符号Ｃ５が供給される。また、第１電極２０には第１符号Ｃ１の信号が供給される。第１電極２０に印加される圧力によって可変容量コンデンサ２２が押圧されることでその容量が変化し、その結果として、筆圧が検出できることは記述したとおりである。この実施形態では、第２電極２１１が複数の電極片から構成されており、互いに符号パターンの異なる複数の符号が、複数の電極片にそれぞれ供給される。なお、上述したように、互いに異なる時間差を有し且つ同一の符号パターンを有する複数の符号を、複数の電極片にそれぞれ供給することもできる。

【０１２０】

次に、各情報（ｒ、θ、φ）の検出原理について説明する。また、各情報を検出するに際し、指示体１４６の筐体内における電極片２１１ａの配置位置及び電極片２１１ａに供給された符号を各情報（ｒ、θ、φ）の基準として説明する。

【０１２１】

まずは、回転角ｒ（回転位置ｒ）の検出に関して説明する。理解し易いように、指示体１４６は、受信導体Ｘ２と受信導体Ｙ２の交点を指示し、スキャン可能領域３ａの平面に対してその垂直方向から位置指示しているものとする。すなわち、傾きθが９０度であるとする。この状態において、指示体１４６を、ペンチップを回転中心としてその周面に沿って回転させると、例えば受信導体Ｙ２と、第２電極２１１を構成するそれぞれの電極片（２１１a、２１１ｂ、２１１ｃ、２１１ｄ）との距離が指示体１４６の回転に対応して変化する。これにより、受信導体Ｙ２で各電極片を介して各符号を受信した際のそれぞれの検出信号レベルが変化する。したがって、この各符号の検出信号レベルの変化を検出することにより、電極片２１１ａからの検出信号を基準として、指示体１４６の回転位置ｒを検出することができる。

【０１２２】

なお、回転角ｒの検出する際に用いる受信導体としては、受信導体Ｙ２に代えて、受信導体Ｘ２を使用することもできる。また、複数の受信導体（例えばＹ１、Ｙ２、Ｙ３、あるいはＸ１、Ｘ２、Ｘ３）あるいは全ての受信導体（例えば、Ｘ１、Ｘ２、Ｘ３、Ｙ１、Ｙ２、Ｙ３）によって検出される複数の符号の検出信号レベルを使用することで一層詳細な回転位置ｒを求めることができる。

【０１２３】

次に、指示体１４６のペンチップを基点としたスキャン可能領域３ａの平面に対する傾きθの検出について説明する。図１９に示すように、回転位置ｒを維持した状態で、指示体１４６を受信導体Ｘ２の延伸方向に沿って、傾きθとなるように傾けたとする。この状態では、受信導体Ｙ３からの検出信号レベルが受信導体Ｙ１からの検出信号レベルよりも大きくなる。従って、指示体１４６の傾きθは、指示体１４６が指示する位置の近傍に配置される複数の受信導体からの検出信号レベルを比較することで求めることができる。なお、指示体１４６を受信導体Ｙ２の延伸方向に沿って傾きθとなるように傾けた場合でも、同様の原理で指示体１４６の傾きを検出できることは容易に理解される。

【０１２４】
更には、指示体１４６をペンチップを基軸として傾きθを保持しながら回転させた際の指示体１４６の位置をスキャン可能領域３ａの平面に投射することにより得られる指示体１４６の回転角φは、上記の傾きθの検出原理を発展させることで検出することができる。具体的には、複数の受信導体、例えば受信導体Ｙ１、Ｙ２及びＹ３及び／または受信導体Ｘ１、Ｘ２及びＸ３、からの検出信号レベルを比較することで、指示体１４６の回転角φを検出することができる。
【０１２５】
図２０に示すような構成によれば、指示体１４６の筐体内に配置されたそれぞれの電極片と所定の受信導体との距離が異なることにより、その結果として、それぞれの電極片と受信導体との電気的結合関係が異なることになる。従って、所定の受信導体にてそれぞれの符号（Ｃ２、Ｃ３、Ｃ４、Ｃ５）を検出した際の信号レベルを互いに比較することで、指示体１４６の状態を示す各情報（ｒ、θ、φ）を検出することができる。
【０１２６】
なお、この実施態様では、４つの電極片から成る第２電極２１１を使用して、各情報（ｒ、θ、φ）の検出原理を説明したが、電極片の数は、この数に限るものではない。また、指示体１４６の指示位置を検出するために使用される符号Ｃ１には、他の符号と同じ符号パターンの符号を使用することができることは既述したとおりである。この実施態様では、複数の電極片（２１１ａ、２１１ｂ、２１１ｃ、２１１ｄ）は、指示体１４６の筐体１２９の内部に円形状に配置される構造を備えているが、指示体１４６の、例えばペンチップに近い場所の、外周部に配置される構造とすることもできる。
【０１２７】
［変形例６］
図４に示す実施形態の位置検出器３では、選択回路４０により、第１導体群３２及び第２導体群３４内から所定の導体を選択する例を説明したが、本発明はこれに限定されない。選択回路を２つの選択回路で構成し、その一方を第１導体群３２から所定の導体を選択する選択回路として用い、他方を第２導体群３４から所定の導体を選択する選択回路として用いてもよい。この例においても、第１及び第２の符号として拡散符号を使用するものとする。
【０１２８】
図２１に、変形例６の位置検出器の概略構成を示す。なお、図２１において、上記実施形態（図４）と同様の構成には、同じ符号を付して示す。また、図２１では、説明を簡略化するため、選択回路２０１周辺の構成のみを示す。
【０１２９】
この例の位置検出器２００の選択回路２０１は、第１導体群３２から所定の第１導体３１を所定の順序で選択する第１選択回路２０２と、第２導体群３４から所定の第２導体３３を所定の順序で選択する第２選択回路２０３で構成される。また、第１選択回路２０２及び第２選択回路２０３は、受信系回路群５１に接続される。なお、この例の位置検出器２００における、選択回路２０１以外の構成は、上記実施形態と同様である。
【０１３０】
この例の位置検出器２００では、第１導体群３２から所定の第１導体３１を選択する第１選択回路２０２の動作と、第２導体群３４から所定の第２導体３３を選択する第２選択回路２０３の動作を同時に行う。それゆえ、この例では、第１選択回路２０２の出力信号と第２選択回路２０３の出力信号とが受信系回路群５１に入力される。この場合、２つの拡散符号Ｃ１、Ｃ２に対応したそれぞれの相関演算用符号を用いて相関値を算出することで、指示体の位置検出及び筆圧検出を行う。
【０１３１】
また、変形例６の位置検出器２００の構成において、第１選択回路２０２の出力信号を処理する受信系回路群と、第２選択回路２０３の出力信号を処理する受信系回路群とを別個に設けてもよい。ただし、この場合には、両方の受信系回路群で指示体の位置検出及び

筆圧検出の両方を行ってもよいし、一方の受信系回路群で指示体の位置検出及び筆圧検出を行い、他方の受信系回路群では指示体の位置検出のみを行うようにしてもよい。前者では高速検出を行うことができる。また、後者を適用した場合、その構成は、前者の構成より簡易になる。更には、第１選択回路２０２の出力信号と第２選択回路２０３の出力信号を切替回路にて選択し、共通の受信系回路群に時分割的に供給することで指示体の位置検出及び筆圧検出を行うこともできる。

【０１３２】

［変形例７］

上記実施形態及び変形例１～６では、位置検出装置がタブレットである場合について説明したが、本発明はこれに限定されない。位置検出装置が、タブレットの機能だけでなく、ユーザが指を位置検出器の画面にタッチして所定の操作を行うタッチパネルの機能を備えていてもよい。変形例７では、タブレット及びタッチパネル兼用の位置検出装置について説明する。この例においても、第１及び第２の符号として拡散符号を使用するものとする。

【０１３３】

図２２に、この例の位置検出装置における位置検出器の概略構成を示す。なお、この例の位置検出装置では、指示体は、上記実施形態及び変形例１～５のいずれかを用いることができる。それゆえ、ここでは、位置検出器の構成についてのみ説明する。なお、図２２において、図４に示す実施形態と同様の構成には、同じ符号を付して示す。また、図２２では、受信信号の処理の流れを実線矢印で示し、制御信号、クロック信号等の流れは破線矢印で示す。ただし、図２２では、説明を簡略化するため、受信系回路群５１の制御信号、クロック信号等の流れを示す破線矢印は省略する。

【０１３４】

この例の位置検出器２１０は、主に、ペン形状の指示体１４７、指示体としての複数の指１４８ａ、１４８ｂなど、種類の異なる複数の指示体の指示位置を検出するセンサ部３０と、センサ部３０を構成する複数の導体を選択・切替する選択回路２２０と、位置検出回路２３０とで構成される。なお、センサ部３０は、図４に示す実施形態と同様の構成であるので、ここでは、センサ部３０の構成の説明は省略する。

【０１３５】

選択回路２２０は、第１選択回路２２１と、第２選択回路２２２とから構成される。第１選択回路２２１は、図２２中のｙ方向に並列配置された複数の第１導体３１からなる第１導体群３２に接続され、第１導体群３２から所定の第１導体３１を所定の順序で選択する。一方、第２選択回路２２２は、図２２中のｘ方向に並列配置された複数の第２導体３３からなる第２導体群３４に接続され、第２導体群３４から所定の第２導体３３を所定の順序で選択する。なお、第１選択回路２２１及び第２選択回路２２２の切替え制御は、中央演算処理部６２と協働する制御部６３から出力される制御信号により制御される。

【０１３６】

位置検出回路２３０は、受信系回路群５１と、発振器６０と、ドライブ回路６１と、中央演算処理部６２と、制御部６３と、拡散符号生成部２３１（符号供給部）と、第１切替部２３２と、第２切替部２３３とを備える。この例の位置検出回路２３０は、上記実施形態（図４）の位置検出回路５０の構成において、さらに拡散符号生成部２３１、第１切替部２３２、及び第２切替部２３３を備える構成である。拡散符号生成部２３１、第１切替部２３２及び第２切替部２３３以外の構成は、上記実施形態と同様である。

【０１３７】

拡散符号生成部２３１は、位置検出器２１０を指による操作を受け付けるタッチパネルとして動作させる際に、第１導体群３２内の所定の第１導体３１に拡散符号を供給する。なお、拡散符号生成部２３１では、ペン形状の指示体１４７から送信される第１符号Ｃ１の信号または第２符号Ｃ２の信号とは異なる新たな拡散符号Ｃ３を有する信号を生成することが好ましい。ただし、本発明はこれに限定されず、拡散符号生成部２３１は、ペン操作が同時に認識できる構成、すなわち、指あるいはペンなどの指示体の種類を識別するた

めの所定の符号を生成する構成を備えていればよい。また、位置検出器２１０がタッチパネルとして動作している際、ユーザの指が接している位置では、例えば指を介して電流がアースに分流されることによって、あるいは交差する導体間における電流移動が生じることによって、タッチ位置における導体の交差点を介して得られる受信信号のレベルが変化する。それゆえ、このレベル変化を受信系回路群５１で検出することにより、タッチ位置を２次元的に検出することもできる。

【０１３８】

第１切替部２３２は、位置検出器２１０を、ペン操作を受け付けるタブレットとして動作させる際の信号の流れと、指による操作を受け付けるタッチパネルとして動作させる際の信号の流れを切替える。具体的には、位置検出器２１０をタブレットとして動作させる際には、第１導体群３２は受信導体として作用するので、第１選択回路２２１の出力端子は第１切替部２３２のスイッチＳＷ２を介して第２切替部２３３の入力端子に接続される。この時、第１切替部２３２のスイッチＳＷ１は、拡散符号生成部２３１と第１選択回路２２１とを非接続状態とする。また、位置検出器２１０をタッチパネルとして動作させる際には、第１導体群３２は送信導体として作用するので、拡散符号生成部２３１の出力端子は第１切替部２３２のスイッチＳＷ１を介して第１選択回路２２１に接続される。この時、第１切替部２３２のスイッチＳＷ２は、第１選択回路２２１と第２切替部２３３とを非接続状態とする。なお、この第１切替部２３２の切り替え動作は、中央演算処理部６２と協働する制御部６３から出力される制御信号（図２２中の破線矢印）により制御される。

【０１３９】

また、指による操作を受け付けるタッチパネルとして動作させる際には、第２切替部２３３は、中央演算処理部６２と協働する制御部６３の制御に従い、第１切替部２３２を介した拡散符号生成部２３１と第１選択回路２２１との接続に連動して、第２選択回路２２２と受信アンプ５２を接続する。第１切替部２３２及び第２切替部２３３がこのように制御されることで、第１選択回路２２１を介して第１導体群３２を構成する第１導体３１に拡散符号生成部２３１によって生成された送信信号が順次供給されるとともに、第２選択回路２２２によって第２導体群３４を構成する第２導体３３が順次選択されて受信アンプ５２に接続されることで、指による操作を２次元的に検出することができる。

【０１４０】

一方、ペンの操作を受け付けるタブレットとして動作させる際には、第２切替部２３３は、中央演算処理部６２と協働する制御部６３の制御に従い、第１切替部２３２を介して接続された第１選択回路２２１と、第２選択回路２２２とを交互に受信アンプ５２に接続する。第１切替部２３２及び第２切替部２３３がこのように制御されることで、ペンの操作による指示位置を２次元的に検出することができる。

【０１４１】

ここで、この例の位置検出器２１０におけるタッチパネルとしての機能とタブレットとしての機能の動作例を簡単に説明する。図２３に示す例では、タッチパネルの動作とタブレットとしての動作を所定時間毎に切り換える。具体的には、中央演算処理部６２と協働する制御部６３の制御に従い、第１切替部２３２及び第２切替部２３３を所定時間毎に連動させて切り換えることで、指及びペン等の指示体の存在あるいは指示体が指示する位置を検出する。この例では、所定間隔（図２３の例では例えば１０ｍｓ）でペン形状の指示体１４７の位置検出動作（タブレット機能）と、指１４８ａ，１４８ｂによるタッチ位置の検出動作（タッチパネル機能）とを交互に繰り返す。

【０１４２】

なお、この例の位置検出装器２１０の動作は、図２３の例に示す時分割動作に限定されない。例えば、時分割動作を採用することなく、センサ部３０上で指及びペンで代表される複数種類の指示体の存在を同時に検出することもできる。この場合、位置検出装器２１０は、次のようにして動作する。なお、以下の動作例では、ペンからは、第１の拡散符号及び該第１の拡散符号とは異なる第２の拡散符号が送信され、図２２における拡散符号生

成部２３１からは、ペンに割り当てられた第１及び第２の拡散符号とは異なる第３の拡散符号を備える送信信号を生成して出力される場合を想定する。

【０１４３】

まず、拡散符号生成部２３１は、第３の拡散符号を備える送信信号を生成し、その送信信号を第１切替部２３２のスイッチＳＷ１、第１選択回路２２１を介して第１導体群３２を構成する複数の第１の導体３１に所定の順序で繰り返し供給する。この際、受信系回路群５１を構成する受信アンプ５２には、第２選択回路２２２及び第２切替部２３３を介して、選択された導体が接続される。なお、第２選択回路２２２は、第２導体群３４を構成する複数の第２導体３３に対して、所定の順序による選択動作によって所定の導体を選択する。

【０１４４】

次いで、Ａ／Ｄ変換回路５３は、受信アンプ５２から出力されたアナログ信号を、１ワードが所定のビット数から成るデジタル信号に変換する。次いで、シリアルパラレル変換部５４及びシフトレジスタ５５は、使用する拡散符号（Ｃ１、Ｃ２、Ｃ３）の符号長に対応したワード長に直列並列変換し、その変換した信号を相関演算器５６に供給する。

【０１４５】

次いで、相関演算器５６は、供給されたデジタル信号と各相関演算用符号との相関演算を行う。これにより、第１、第２、及び第３の拡散符号（Ｃ１、Ｃ２、Ｃ３）のそれぞれの有無を検出するとともに、その信号レベルも検出する。

【０１４６】

すなわち、上記の動作は、タッチ位置の検出動作（タッチパネル機能）を検出するための動作と同じである。従って、この動作状態における指位置の検出動作は既述した通りである。この動作状態において、ペンが操作された場合には、ペンから送信された第１の拡散符号Ｃ１及び第２の拡散符号Ｃ２の少なくとも一方の拡散符号を相関演算器５６にて検出することでペンの存在の確認あるいはペンの指示位置を認識できる。そして、ペン操作の有無の認識に基づいて位置検出器２１０の機能をタブレットとしての機能に切り換えることで、ペン位置が２次元的に検出できる。

【０１４７】

また、位置検出回路２３０において、指及びペンという２つの種類の指示体が同時に検出された場合には、図２３に示したようにタッチパネル機能とタブレット機能を時分割的に切り換えることで、あたかも指とペンの操作を同時に検出しているかのような状態にすることができる。また、ペンと指が同時に検出された場合には、ペンあるいは指の一方を検出するための動作（タッチパネル機能あるいはタブレット機能）に移行するように機能設定を切り換えることもできる。

【０１４８】

また、この例において、位置検出器２１０をタッチパネルとして動作させる際、互いに位相の異なる複数の拡散符号を対応する複数の第１導体３１に同時供給して、複数の拡散符号を位相多重送信してもよい。例えば、ｎ本から構成される第１導体３１に対して、拡散符号生成部２３１で１つの符号パターンの拡散符号から互いに位相の異なるｎ本の拡散符号を生成し、第１導体３１の各々に対応させて供給する。あるいは、ｎ本から構成される第１導体３１に対して、互いに符号パターンが異なるｎ種類の符号パターンの拡散符号を生成して、第１導体３１の各々に対応させて供給してもよい。

【０１４９】

この場合、受信系回路群５１においては、拡散符号生成部２３１で生成された拡散符号に対応した相関演算用符号を備え、受信された各々の拡散符号との相関演算を同時に行う構成を採用することができる。なお、この構成においては、選択回路２２０を構成する第１選択回路２２１及び第２選択回路２２２の少なくとも一方の回路は必ずしも必要とされない。

【０１５０】

また、この例の位置検出器２１０では、指示体としての指を検出するためのタッチパネ

ル機能と、他の種類の指示体としてのペンを検出するためのペンタブレット機能とを時分割で切り替える構成を備えるものであるが、いずれの機能で動作する場合でも第２導体群３４を構成する第２導体３３は常に信号受信に供される。従って、上述したように、受信系回路群５１が、指示体としての指を検出するために使用される拡散符号生成部２３１から供給される送信信号と、他の種類の指示体としてのペンから供給される送信信号とを同時に検出可能な回路構成を備えることで、ｘ方向における指位置を求める際にペン位置も同時に求めることができる。それゆえ、ペン位置を求める次の処理としては、ｘ方向でのペン位置は既に取得されているために、ｙ方向におけるペン位置を求めれば良いことになる。したがって、この例の位置検出器２１０では、上述のような回路構成を備えることで、センサ部３０におけるペンと指の同時検出を高速に行うことができる。

【０１５１】

更には、図１２（変形例２）に示すサイドスイッチ１１３の操作有無の検出に関し、サイドスイッチ１１３からの操作信号を図３の遅延設定回路１４２に供給し、電位Ｖｔｈを切り替える構成を備えることでサイドスイッチ１１３が操作されたことを検出することができる。すなわち、サイドスイッチ１１３が操作されたことに対応して遅延設定回路１４２で設定される電位Ｖｔｈを、例えば高電位に切り替える。電位Ｖｔｈが高電位に設定されると、指示体による押圧力が同一であっても、遅延設定回路１２からの出力される信号が更に所定の時間遅延されて出力されることになる。この構成によって、サイドスイッチ１１３の操作に対応して、第１符号生成部から出力される信号に対する第２符号生成部から出力される信号の生成タイミングが制御されることになり、この結果、サイドスイッチ１１３の操作有無を検出することができる。

【０１５２】

更には、図２に示す指示体２、図１２（ａ）及び（ｂ）に示す指示体１１０及び１１７、図１４に示す指示体１２０、図１７に示す指示体１３０などでは、第１符号生成部２６、第２符号生成部２７、あるいは第３符号生成部２９から出力されるそれぞれの信号を対応する第１電極２０及び第２電極２１に供給する構成が示されているが、この構成に限るものではない。すなわち、各々の信号を、抵抗などを介して信号加算し、第１電極２０あるいは第２電極２１に供給することもできる。この構成によれば、第１電極２０あるいは第２電極２１への信号供給点を少なくすることができ、指示体としての構成を簡単化することができる。

【０１５３】

上記実施形態及び変形例１～７では、センサ部の励磁コイルからの励磁信号を受信して、指示体内の集積回路の駆動電圧を生成する例を説明したが、本発明はこれに限定されず、指示体内部に例えば蓄電池のような電源を備えていてもよい。

【符号の説明】

【０１５４】

１…位置検出装置、２…指示体、３…位置検出器、２０…第１電極、２１…第２電極、２２…可変容量コンデンサ、２３…集積回路、２４…コイル、２５…電源生成回路、２６…第１符号生成部、２７…第２符号生成部、２８…送信符号生成部、３０…センサ部、３１…第１導体、３２…第１導体群、３３…第２導体、３４…第２導体群、４０…選択回路、５０…位置検出回路、５１…受信系回路群、５２…受信アンプ、５３…Ａ／Ｄ変換回路、５４…シリアルパラレル変換部、５５…シフトレジスタ、５６…相関演算部、５６ａ…第１相関器、５６ｂ…第２相関器、５７…記憶部、５８…位置及び筆圧算出部、６０…発振器、６１…ドライブ回路、６２…中央演算処理部、６３…制御部、１２９…筐体

【書類名】特許請求の範囲
【請求項１】
印加された圧力を２つの符号間の時間差に対応づけて前記２つの符号を送信するための送信信号生成部を備え前記送信信号生成部によって生成された信号を送信するための指示体と、
所定方向に配置された複数の第１の導体と前記所定方向と交差する方向に配置された複数の第２の導体を備え前記指示体から送信された信号を受信するためのセンサ部と、
前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号と前記２つの符号に対応した相関演算用符号との相関演算を行うための相関演算回路と、
前記相関演算回路によって算出された少なくとも１つの符号に基づく相関演算結果から前記指示体によって指示されたセンサ部上の位置を検出するための位置算出回路と、
前記相関演算回路によって算出された２つの符号に基づく相関演算結果から前記２つの符号間の時間差に対応して前記指示体に印加された圧力を検出する筆圧算出回路と、
を備えたことを特徴とする位置検出装置。
【請求項２】
前記複数の第１の導体から所定の手順で導体を選択するとともに前記複数の第２の導体から所定の手順で導体を選択するための選択回路を備え、該選択回路によって選択されたそれぞれの導体に生起した信号が前記相関演算回路に供給されるようにしたことを特徴とする請求項１に記載の位置検出装置。
【請求項３】
前記２つの符号は、同一の符号パターンを備えていることを特徴とする請求項１に記載の位置検出装置。
【請求項４】
前記２つの符号は、互いに異なる符号パターンを備えていることを特徴とする請求項１に記載の位置検出装置。
【請求項５】
前記送信信号生成部に符号を変調するための変調回路を備えるとともに、前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号を復調するための復調回路を備えることを特徴とする請求項１に記載の位置検出装置。
【請求項６】
前記指示体は筐体から突出した先端部を備えるとともに、前記先端部に印加された圧力を検出するための圧力検出素子を備え、前記圧力検出素子によって検出された信号に対応して前記符号間の時間差が設定されることを特徴とする請求項１に記載の位置検出装置。
【請求項７】
前記圧力検出素子は、前記先端部に印加された圧力に対応して押圧されることで容量が変化する可変容量コンデンサを備え、前記可変容量コンデンサの容量変化に応じて前記符号間の時間差が制御されるようにしたことを特徴とする請求項６に記載の位置検出装置。
【請求項８】
前記センサ部には励磁コイルが備えられており、前記指示体には前記励磁コイルから送出された励磁信号を受信して前記指示体に備えられた送信信号生成部を駆動するための電源を生成するための電源生成回路を備えることを特徴とする請求項１に記載の位置検出装置。
【請求項９】
前記筆圧算出回路によって検出された筆圧に対応して前記指示体のホバリング状態及びペンダウン状態を識別可能としたことを特徴とする請求項１に記載の位置検出装置。
【請求項１０】
前記２つの符号は互いに異なる符号パターンであり、前記指示体から送信された信号が前記相関演算回路に供給されて得られた相関演算結果に基づいて一方の符号から他方の符号へと符号が変化したことが検出されることで、前記指示体のホバリング状態及びペンダ

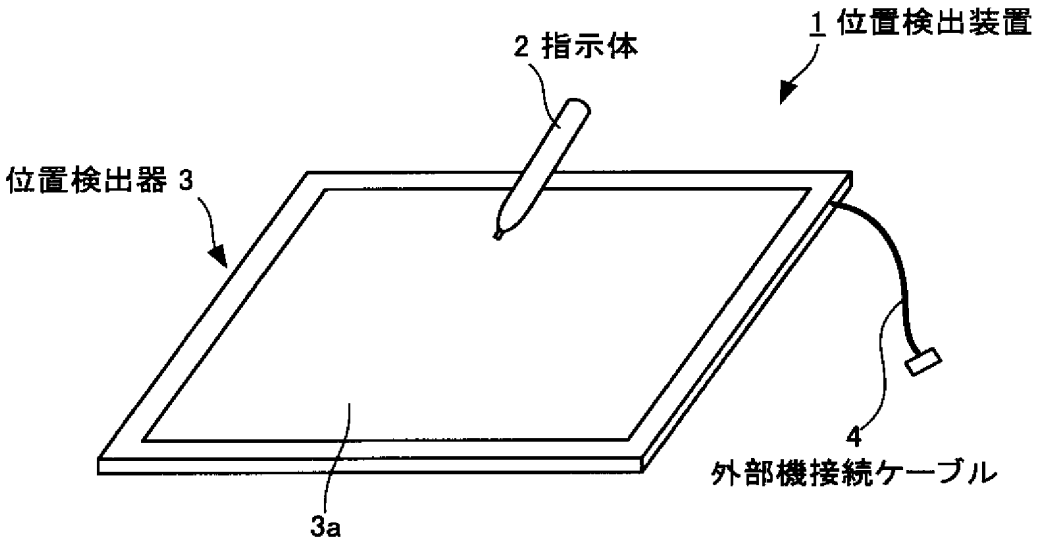
ウン状態を識別可能としたことを特徴とする請求項１に記載の位置検出装置。
【請求項１１】
前記指示体の側面には操作スイッチが設けられているとともに、前記指示体には前記操作スイッチの操作に対応して符号を反転させるための符号反転回路が備えられており、前記操作スイッチの操作に対応して生成された符号反転信号が前記相関演算回路によって相関演算されることで前記操作スイッチの操作を検出可能とした請求項１に記載の位置検出装置。
【請求項１２】
前記指示体の側面には操作スイッチが設けられているとともに、前記送信信号生成部から前記操作スイッチの操作に対応した符号が送信されることで、前記操作スイッチの操作に対応して生成された符号が前記相関演算回路によって相関演算されることで前記操作スイッチの操作を検出可能とした請求項１に記載の位置検出装置。
【請求項１３】
前記指示体の筐体には、位置指示及び前記指示体に印加される圧力を検出するための先端部が突出して備えられているとともに、前記先端部は導電性を有しており、前記先端部を介して前記送信信号生成部によって生成された信号が送信されるようにしたことを特徴とする請求項１に記載の位置検出装置。
【請求項１４】
所定の符号を生成するための符号生成部と、前記符号生成部にて生成された符号の前記所定方向に配置された複数の第１の導体への供給処理、及び、前記所定方向に配置された複数の第１の導体に生起した信号の受信処理を切り替えるための第１切替部とが更に備えられており、前記第１切替部で前記供給処理及び受信処理を交互に切替制御することで前記指示体とは種類が異なる指示体によって指示されたセンサ部上の位置を検出するようにしたことを特徴とする請求項１に記載の位置検出装置。
【請求項１５】
前記第１切替部から出力された前記所定方向に配置された第１の導体に生起した信号と、前記所定方向と交差する方向に配置された第２の導体に生起した信号とを時分割で切り替えて前記相関演算回路に供給するための第２切替部を備えたことを特徴とする請求項１４に記載の位置検出装置。
【請求項１６】
前記符号生成部によって生成される符号は、前記指示体に備えられた送信信号生成部によって生成される符号とは異なっていることを特徴とする請求項１４に記載の位置検出装置。
【請求項１７】
前記指示体には、前記送信信号生成部によって生成された複数の信号を送信するために、前記複数の信号のそれぞれに対応した複数の電極片が配置されており、前記複数の電極片のそれぞれを介して送信された信号を前記センサ部にて受信することで前記指示体の操作状態を検出するようにしたことを特徴とする請求項１に記載の位置検出装置。
【請求項１８】
前記指示体の操作状態の検出とは、前記指示体のペンチップを回転中心とした指示体自体の回転状態、センサ部によって形成される平面に対する前記指示体の傾き、及び、前記指示体のペンチップを基点として操作したした場合の前記センサ部によって形成される平面に投影された前記指示体の回転角の少なくとも１つを検出することであることを特徴とする請求項１７の位置検出装置。
【請求項１９】
位置を指示するための先端部が筐体から突出して設けられた指示体であって、
前記先端部に印加された圧力を２つの符号間の時間差に対応づけて前記２つの符号を送信するための送信信号生成部を備え、
前記送信信号生成部によって生成された複数の符号が送信されるようにしたことを特徴とする指示体。

【請求項２０】
前記２つの符号は、同一の符号パターンを備えることを特徴とする請求項１９に記載の指示体。
【請求項２１】
前記２つの符号は、互いに異なる符号パターンを備えていることを特徴とする請求項１９に記載の指示体。
【請求項２２】
前記送信信号生成部に符号を変調するための変調回路を備えたことを特徴とする請求項１９に記載の指示体。
【請求項２３】
筐体から突出した先端部に印加される圧力を検出するための圧力検出素子を備え、前記圧力検出素子によって検出された信号に対応して前記符号間の時間差が設定されることを特徴とする請求項１９に記載の指示体。
【請求項２４】
前記圧力検出素子は、前記先端部に印加された圧力に対応して押圧されることで容量が変化する可変容量コンデンサであり、前記可変容量コンデンサの容量変化に応じて前記符号間の時間差が制御されるようにしたことを特徴とする請求項２３に記載の指示体。
【請求項２５】
前記指示体の側面には操作スイッチが設けられているとともに、前記指示体には前記操作スイッチの操作に対応して符号を反転させるための符号反転回路が備えられていることを特徴とする請求項１９に記載の指示体。
【請求項２６】
前記指示体の側面には操作スイッチが設けられているとともに、前記送信信号生成部から前記操作スイッチの操作に対応した符号が送信されるようにしたことを特徴とする請求項１９に記載の指示体。
【請求項２７】
前記位置を指示するための先端部は導電性を有しており、前記送信信号生成部によって生成された少なくとも１つの符号が前記先端部を介して送信されるようにしたことを特徴とする請求項１９に記載の指示体。
【請求項２８】
前記送信信号生成部によって生成された複数の符号のそれぞれが前記先端部を介して送信されるようにしたことを特徴とする請求項２７に記載の指示体。
【請求項２９】
前記先端部の近傍には、前記送信信号生成部によって生成された複数の信号を送信するための、前記複数の信号のそれぞれに対応した複数の電極片が配置されていることを特徴とする請求項１９に記載の指示体。
【請求項３０】
位置指示のために指示体に備えられたペンチップに印加された圧力に対応した時間差を有する２つの符号を送信するための符号送信ステップと、
所定方向に配置された複数の第１の導体と前記所定方向と交差する方向に配置された複数の第２の導体を介して前記指示体から送信された符号を受信する信号受信ステップと、
前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号を受信し前記２つの符号に対応した相関演算用符号との相関演算を行う相関演算処理ステップと、
前記相関演算処理ステップによって算出された１つの符号に基づく相関演算結果から前記指示体によって指示されたセンサ部上の位置を検出する位置算出ステップと、
前記相関演算処理ステップによって算出された２つの符号に基づく相関演算結果から前記指示体に印加された圧力を検出する筆圧算出ステップと、
を備えたことを特徴とする位置検出方法。
【請求項３１】

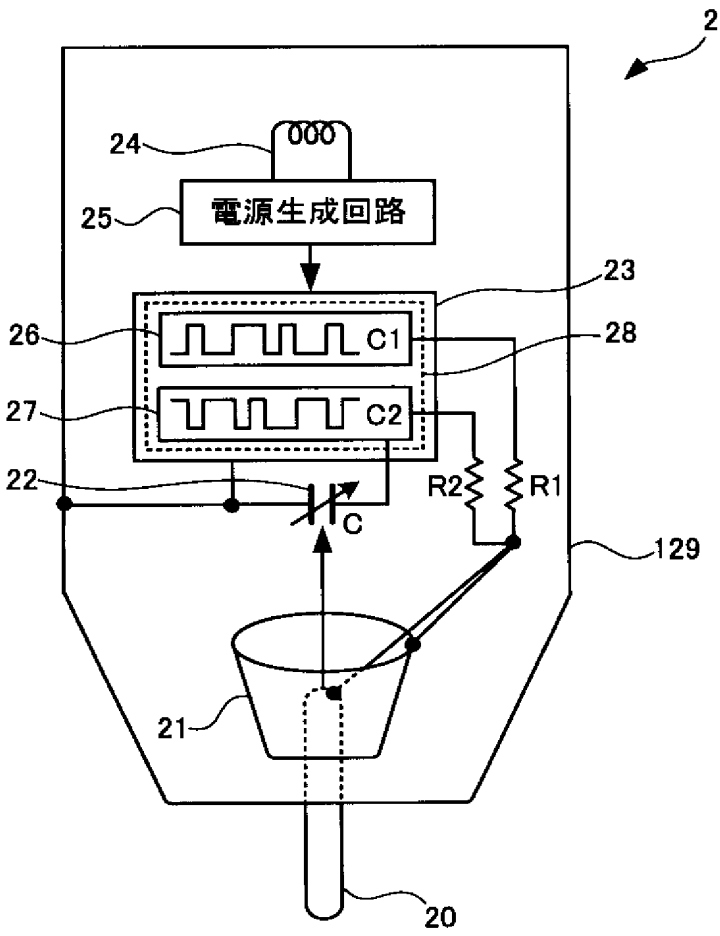
前記２つの符号は、同一の符号パターンを備えることを特徴とする請求項３０に記載の位置検出方法。
【請求項３２】
前記２つの符号は、互いに異なる符号パターンを備えることを特徴とする請求項３０に記載の位置検出方法。
【請求項３３】
位置を指示するための先端部が筐体から突出して設けられた指示体の前記先端部に印加された圧力を２つの符号間の時間差に対応づけて前記２つの符号を送信するようにしたことを特徴とする圧力情報送信方法。
【請求項３４】
複数の符号を生成するための符号生成ステップと、
前記複数の符号を電気的に分離された対応する複数の電極片にそれぞれ供給するステップと、
前記複数の電極片からそれぞれ対応する複数の符号を送信するステップと、
を備えたことを特徴とする指示体信号送信方法。

【書類名】要約書
【要約】
【課題】静電結合方式の位置検出装置において、複数の符号を用いて、指示体の指示位置だけでなく、例えば筆圧、サイドスイッチ情報など位置情報以外の情報の検出を可能にする。
【解決手段】指示体側は、ペンチップに印加された圧力を２つの符号間の時間差に対応づけて送信し、位置検出器は、受信導体に生起した信号と前記２つの符号に対応した相関演算用符号との相関演算を行うことで少なくとも１つの符号に基づく相関演算結果から前記指示体によって指示されたセンサ部上の位置を検出し、前記相関演算によって算出された２つの符号に基づく相関演算結果から前記２つの符号間の時間差に対応して前記指示体に印加された圧力を検出する筆圧算出回路を備える。更には、受信の際の符号の有無、あるいは指示体内に備えられた複数の電極片のそれぞれから送信された符号を受信し信号レベルを比較することで位置情報以外の情報の検出を行う。
【選択図】図２

【書類名】図面
【図１】

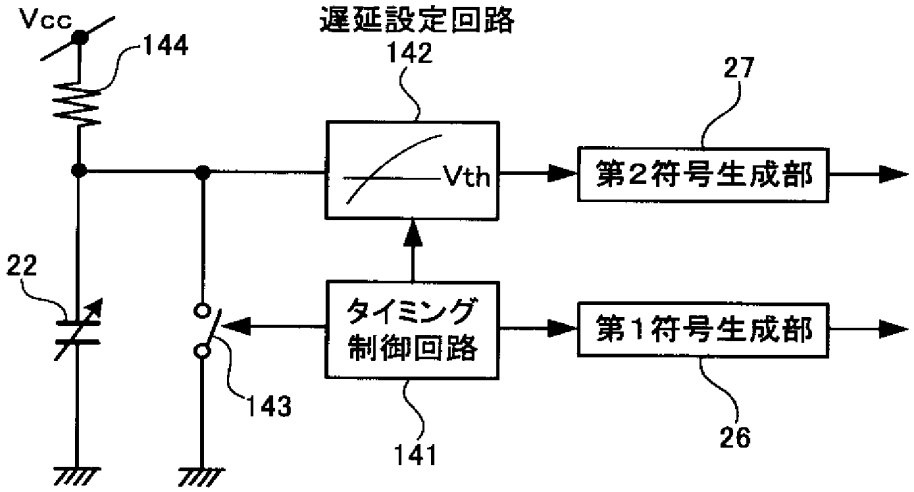

1 位置検出装置
2 指示体
位置検出器 3
4
外部機接続ケーブル
3a

【図２】

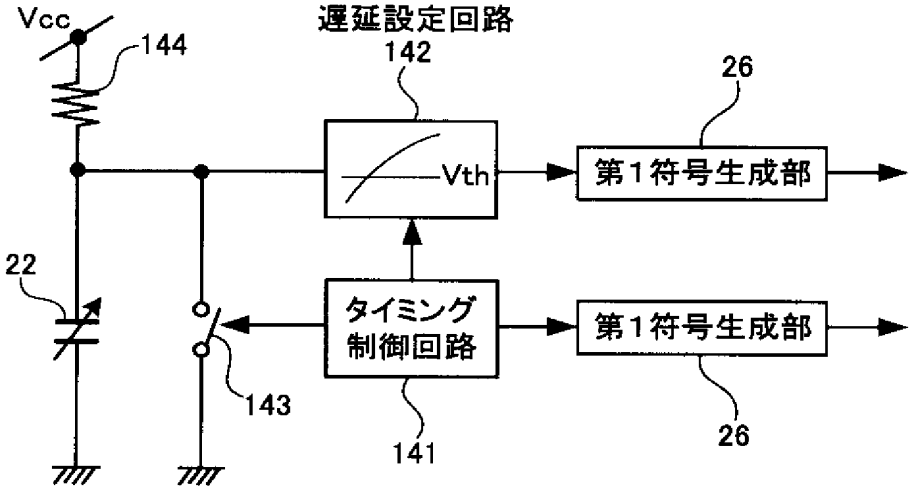

2 指示体
24
25
電源生成回路
23
26
C1
28
27
C2
22
R2
R1
C
129
21
20

【図３】

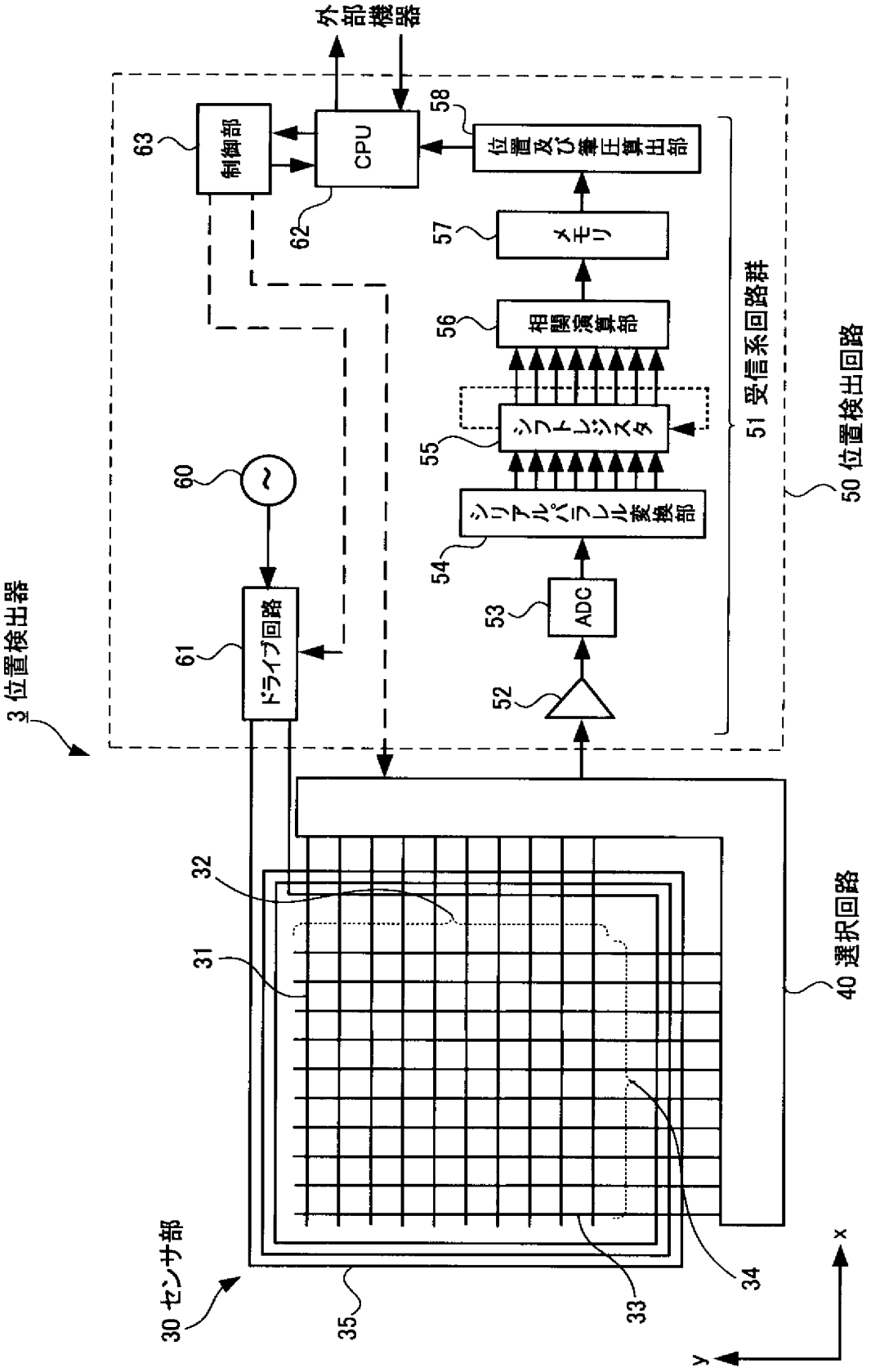
（a）


Vcc
144
遅延設定回路
142
27
Vth
第２符号生成部
22
タイミング
制御回路
第１符号生成部
143
141
26

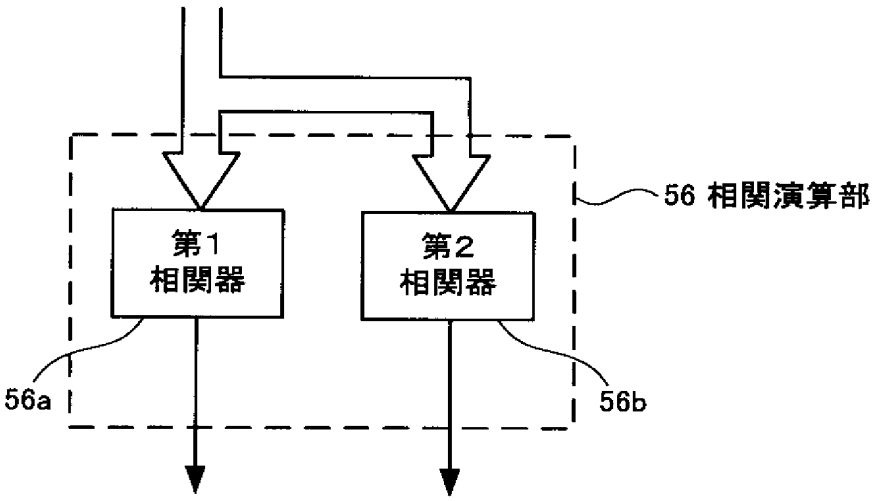
（b）


Vcc
144
遅延設定回路
142
26
Vth
第１符号生成部
22
タイミング
制御回路
第１符号生成部
143
141
26

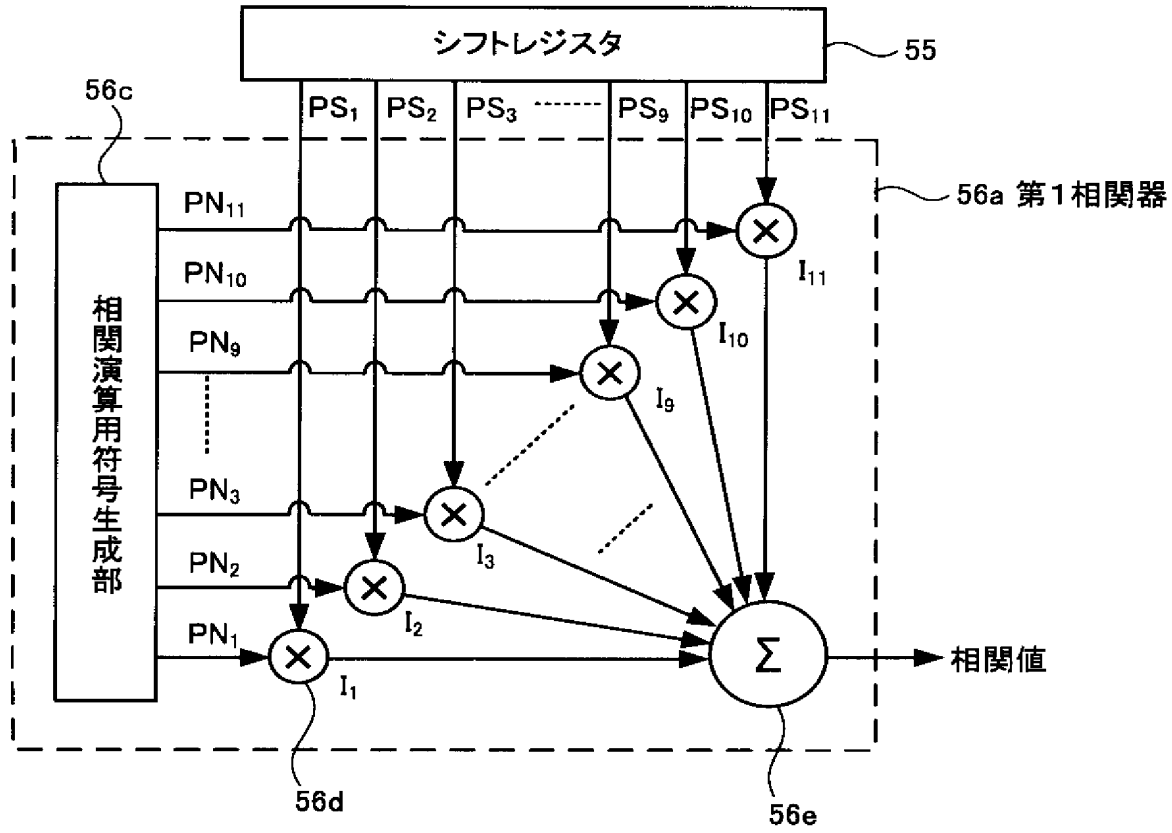
【図４】


外部機器
制御部
CPU
位置及び筆圧算出部
メモリ
相関演算部
シフトレジスタ
シリアルパラレル変換部
ADC
ドライブ回路
51 受信系回路群
50 位置検出回路
3 位置検出器
40 選択回路
30 センサ部
63
62
58
57
56
55
54
53
52
61
60
32
31
35
33
34
x
y

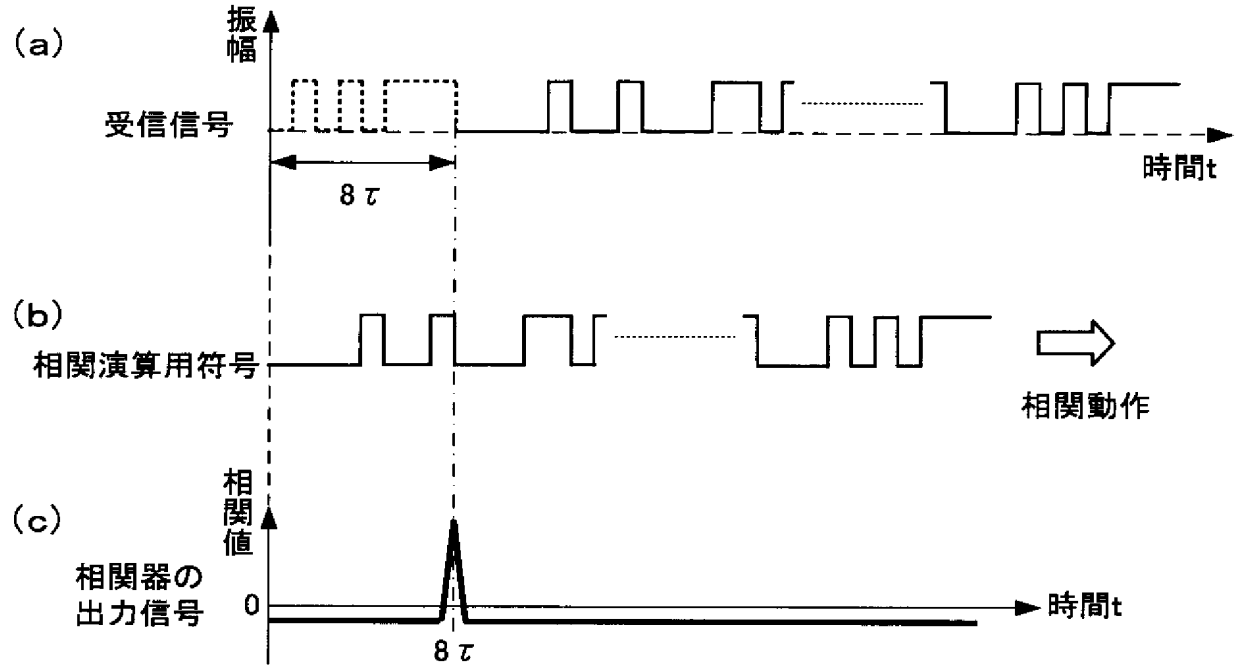
【図５】


56 相関演算部
第1
相関器
第2
相関器
56a
56b

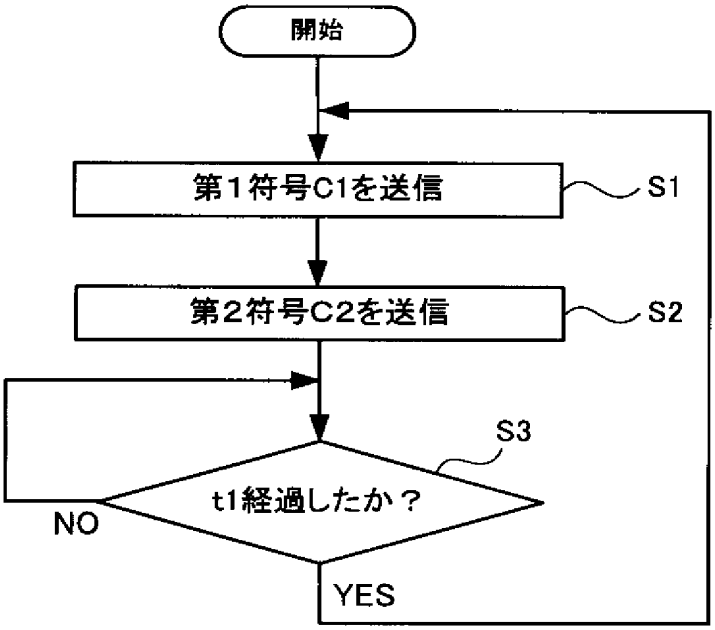
【図６】


シフトレジスタ
55
56c
PS1
PS2
PS3
PS9
PS10
PS11
56a 第1相関器
PN11
PN10
PN9
PN3
PN2
PN1
相関演算用符号生成部
I11
I10
I9
I3
I2
I1
Σ
相関値
56d
56e

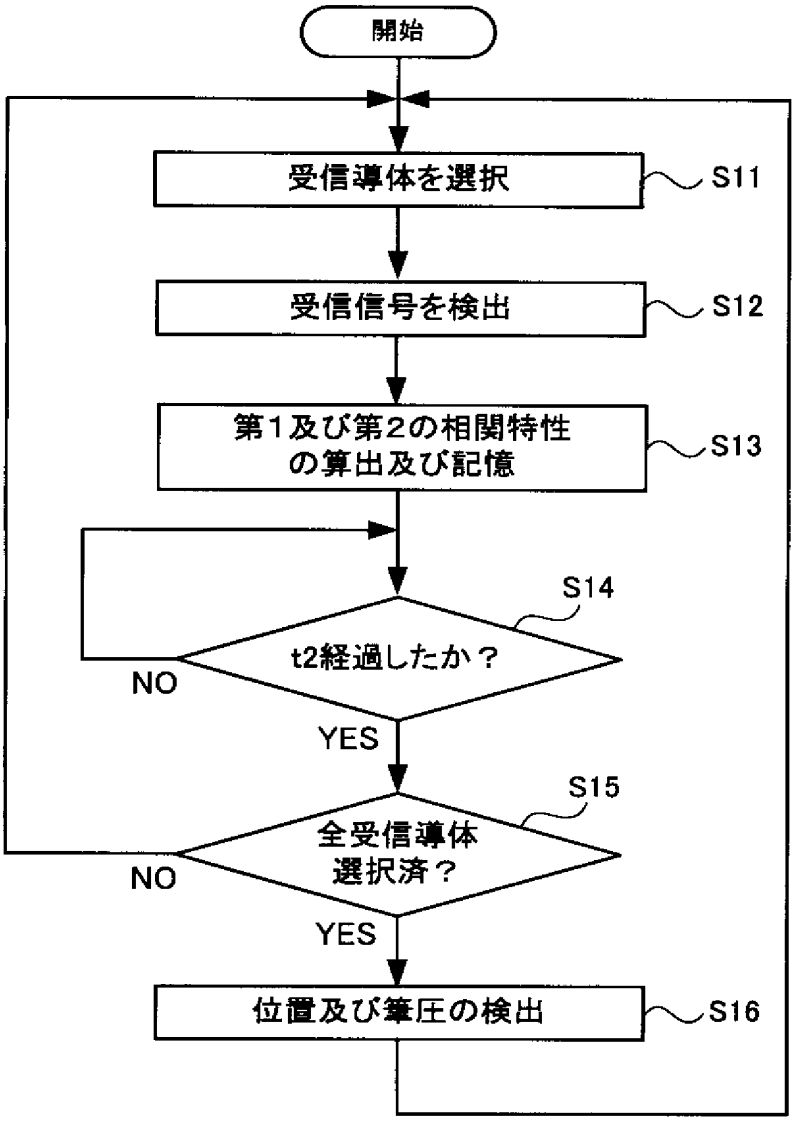
【図７】


(a)
振幅
受信信号
時間t
8τ
(b)
相関演算用符号
相関動作
(c)
相関値
相関器の出力信号
0
時間t
8τ

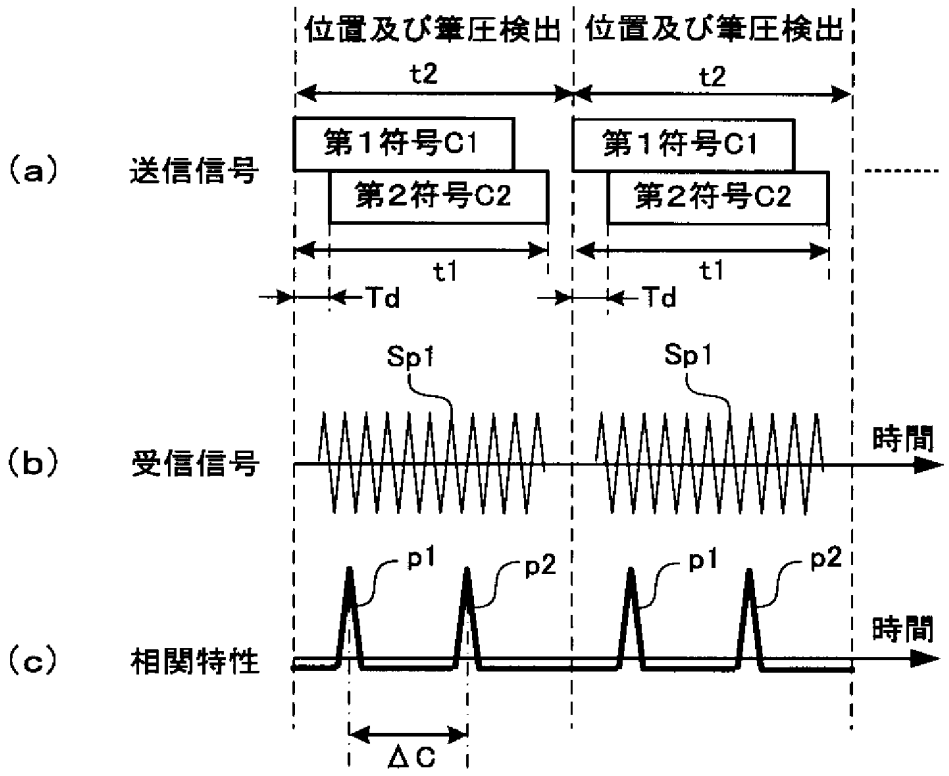
【図８】


開始
第１符号C1を送信
S1
第２符号C2を送信
S2
S3
t1経過したか？
NO
YES

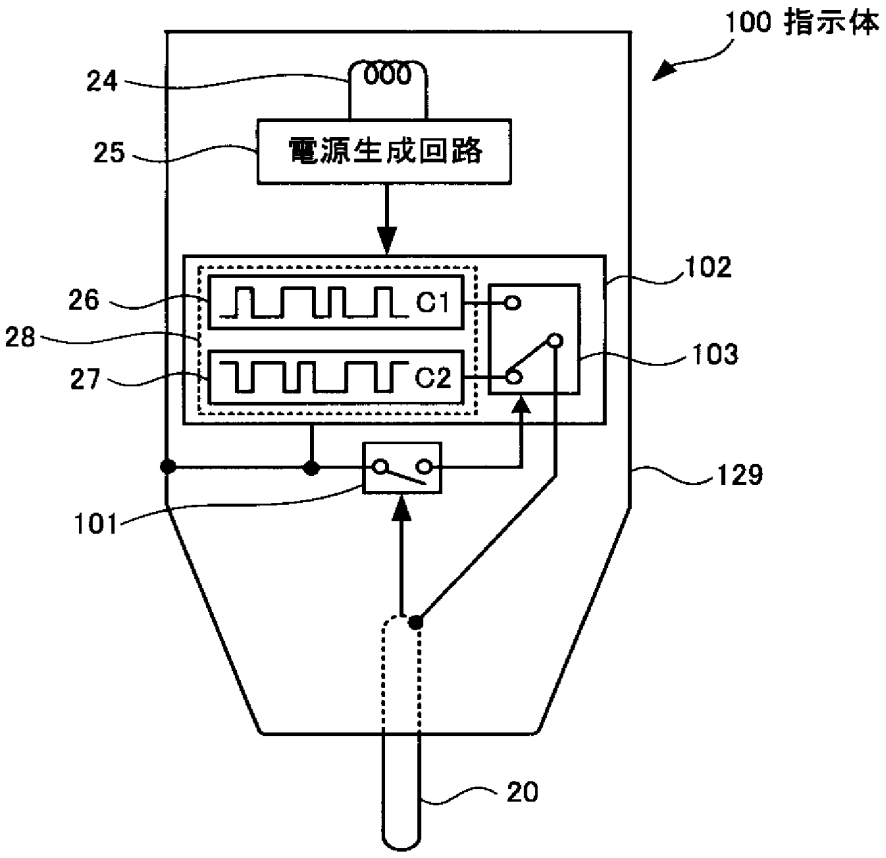
【図９】


開始
受信導体を選択
S11
受信信号を検出
S12
第１及び第２の相関特性
の算出及び記憶
S13
S14
t2経過したか？
NO
YES
S15
全受信導体
選択済？
NO
YES
位置及び筆圧の検出
S16

【図１０】

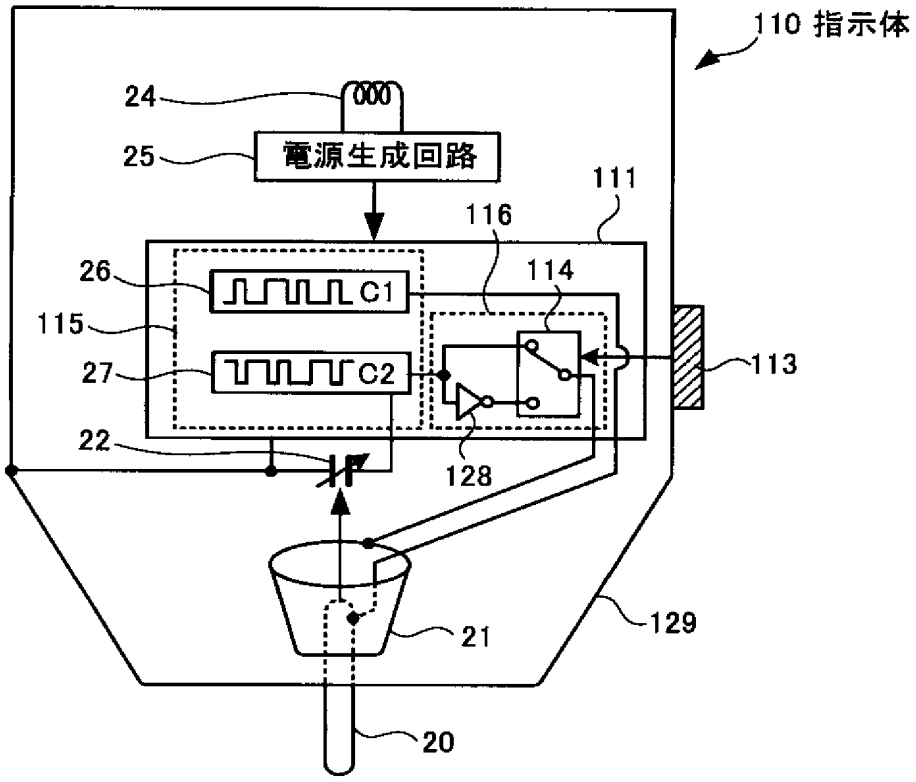

位置及び筆圧検出
位置及び筆圧検出
t2
t2
(a)
送信信号
第１符号C1
第２符号C2
第１符号C1
第２符号C2
t1
t1
Td
Td
Sp1
Sp1
(b)
受信信号
時間
p1
p2
p1
p2
(c)
相関特性
時間
ΔC

【図１１】

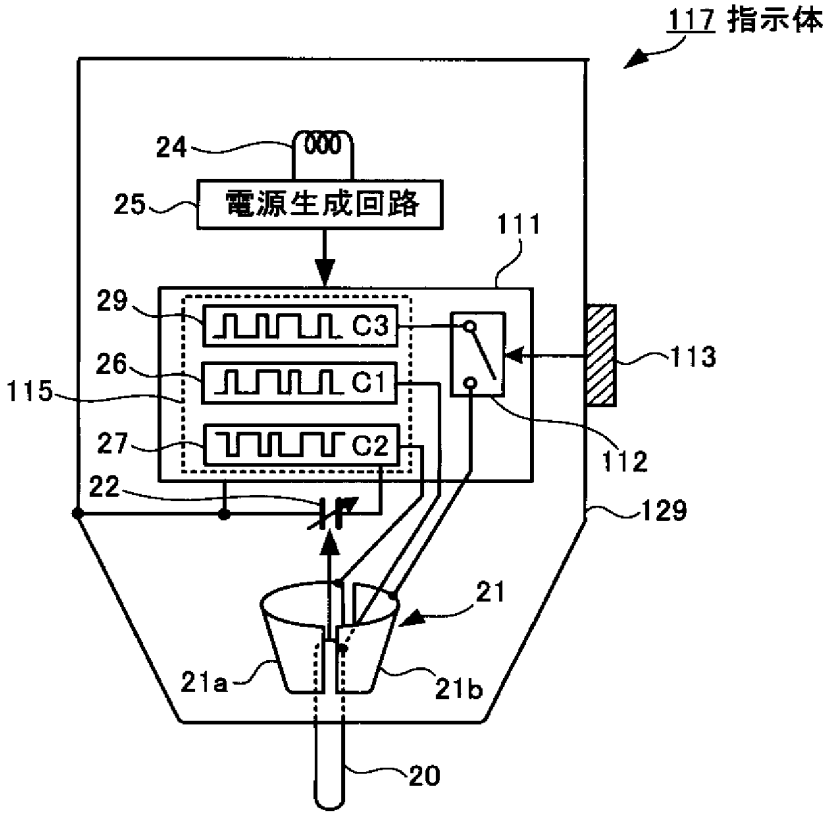

100 指示体
24
25
電源生成回路
102
26
C1
28
27
C2
103
129
101
20

【図１２】

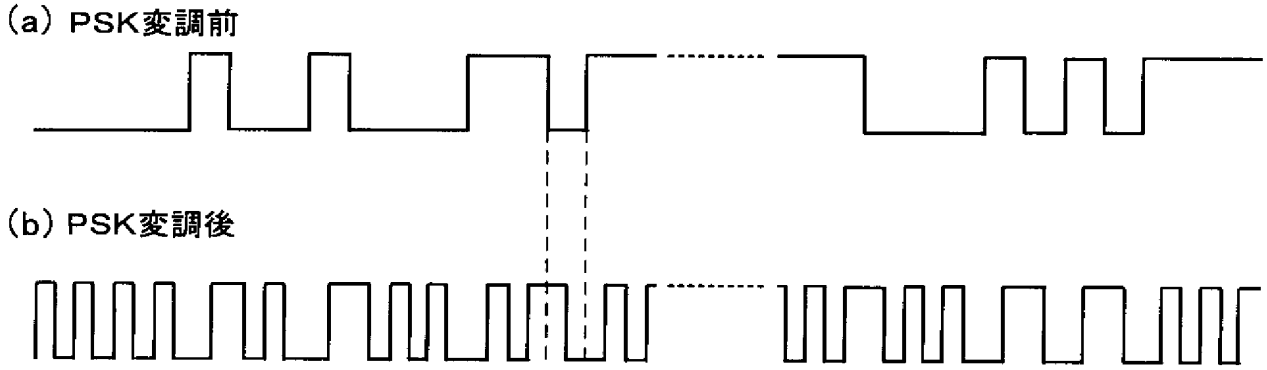
(a)


110 指示体
24
25
電源生成回路
111
116
114
26
C1
115
27
C2
113
22
128
21
129
20

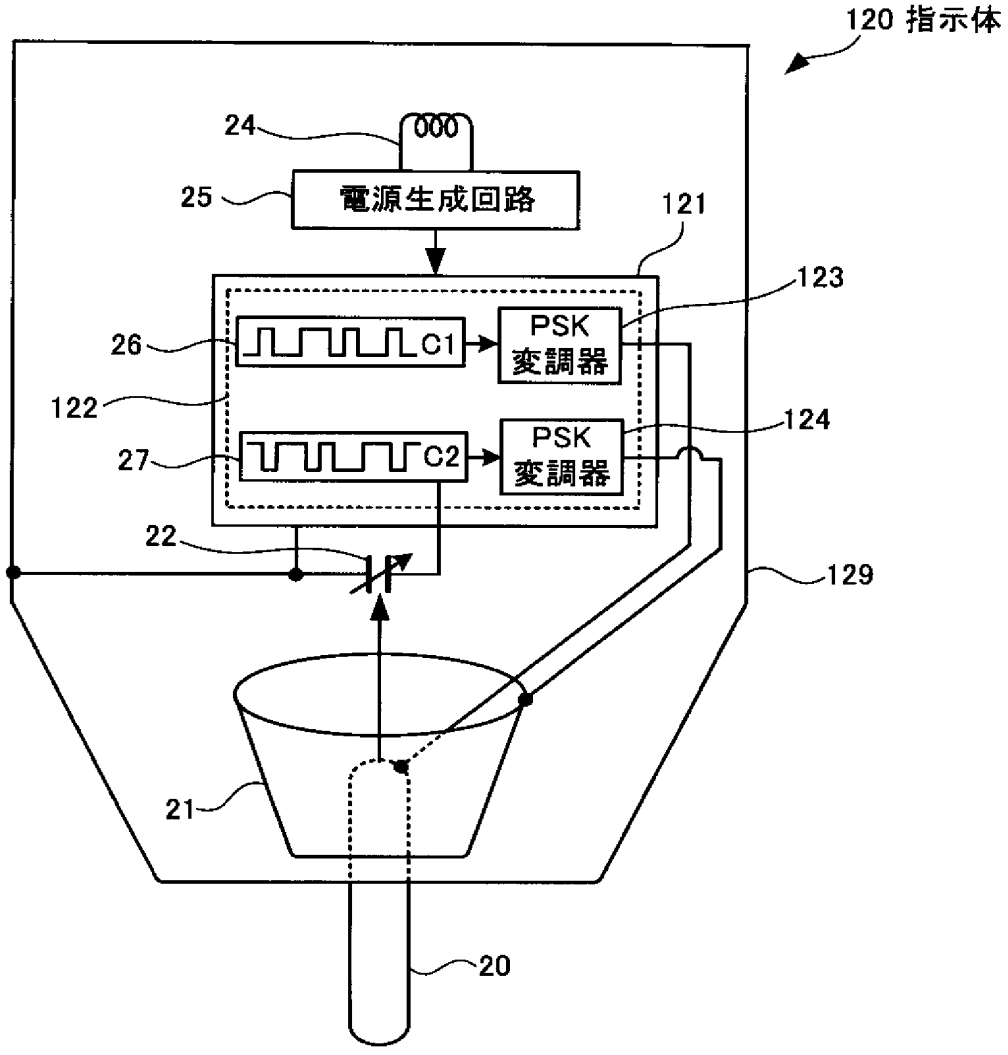
(b)


117 指示体
24
25
電源生成回路
111
29
C3
26
C1
115
27
C2
113
112
22
129
21
21a
21b
20

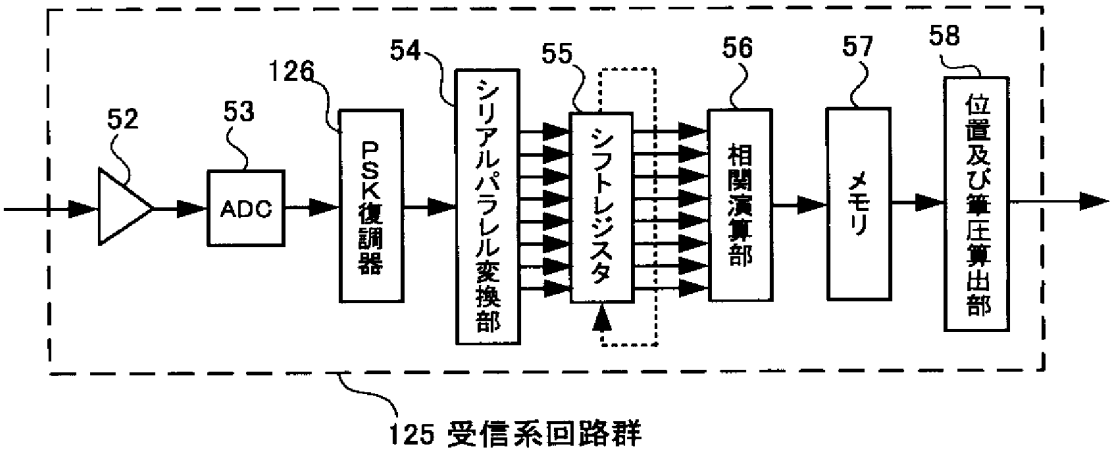
【図１３】


(a) PSK変調前
(b) PSK変調後

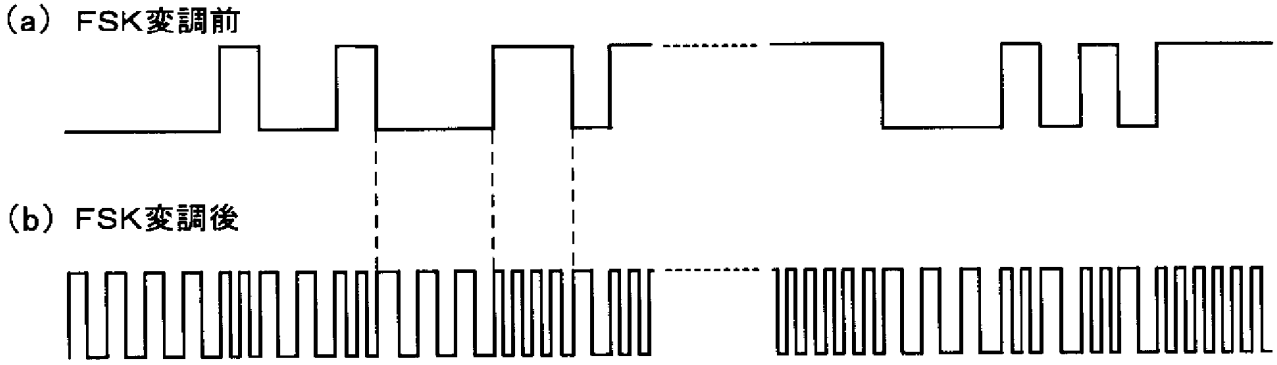
【図１４】


120 指示体
24
25
電源生成回路
121
123
26
C1
PSK
変調器
122
124
27
C2
PSK
変調器
22
129
21
20

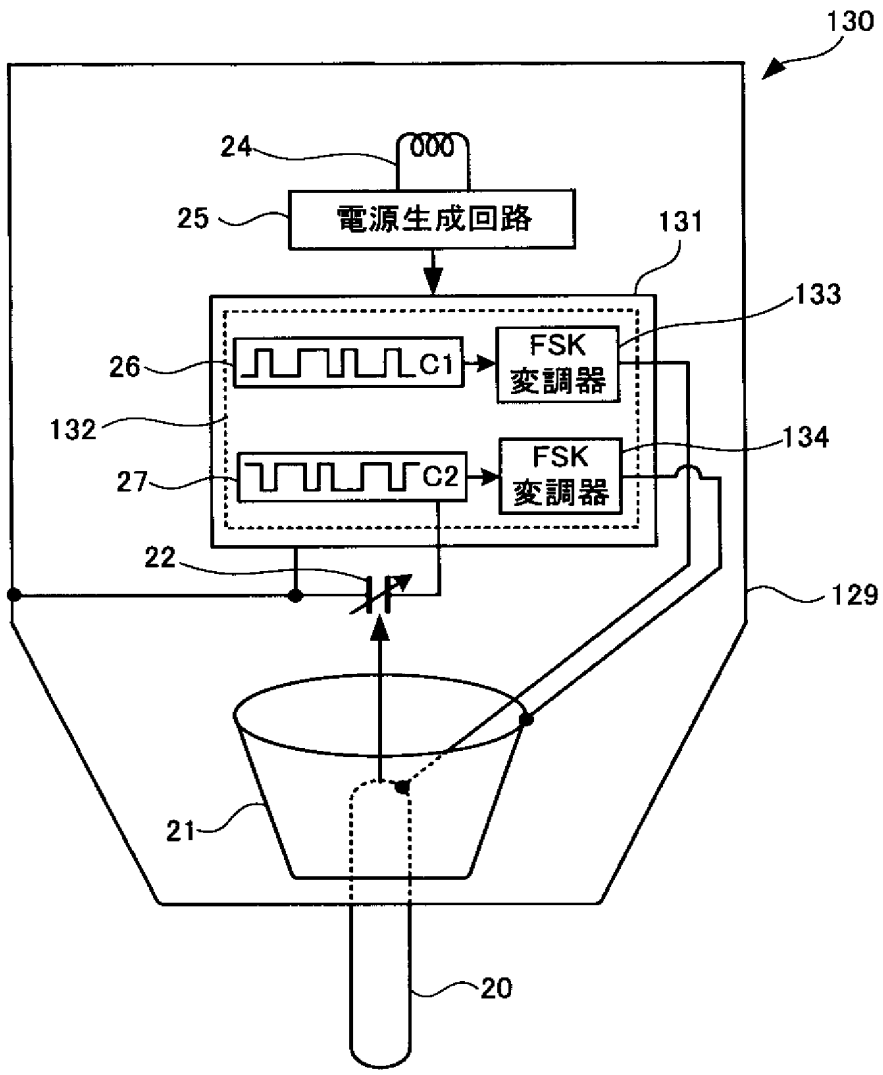
【図１５】


52
53
ADC
126
PSK復調器
54
シリアルパラレル変換部
55
シフトレジスタ
56
相関演算部
57
メモリ
58
位置及び筆圧算出部
125 受信系回路群

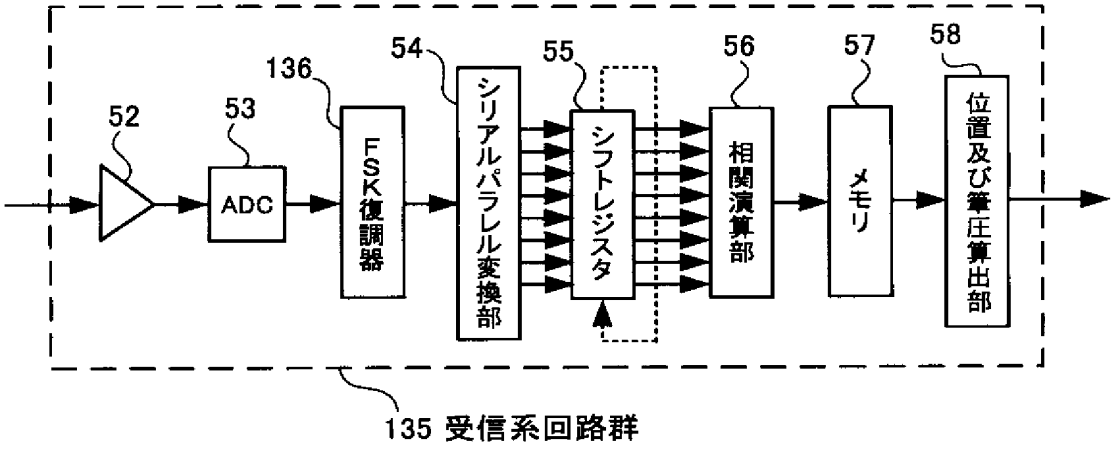
【図１６】


(a) FSK変調前
(b) FSK変調後

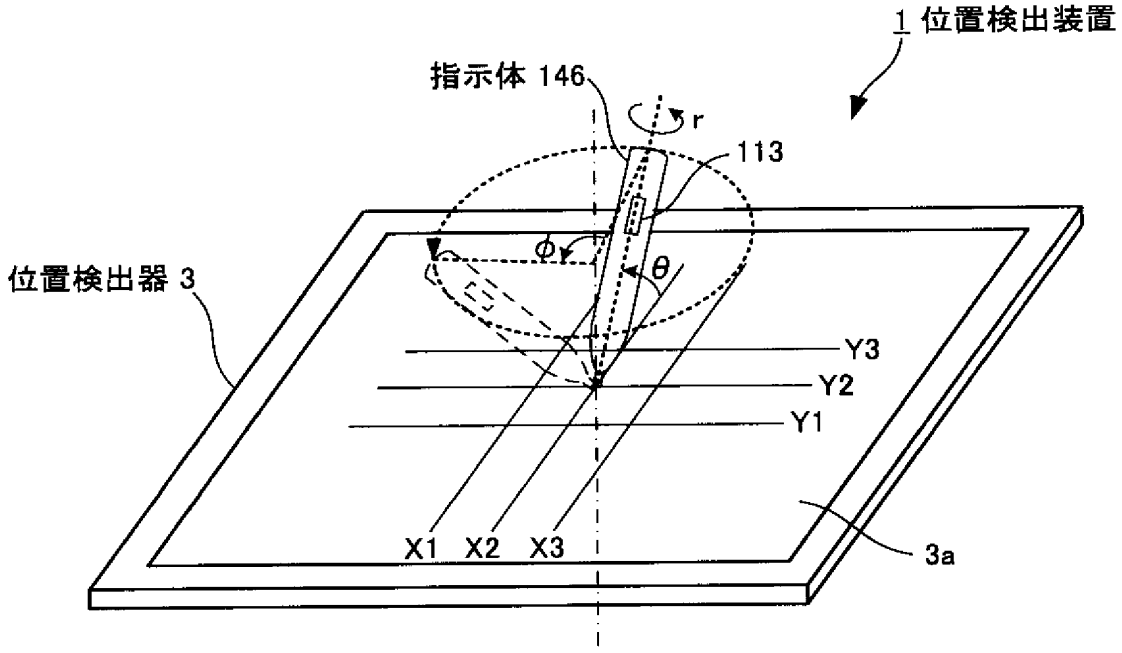
【図１７】


130 指示体
24
25
電源生成回路
131
133
26
C1
FSK
変調器
132
134
27
C2
FSK
変調器
22
129
21
20

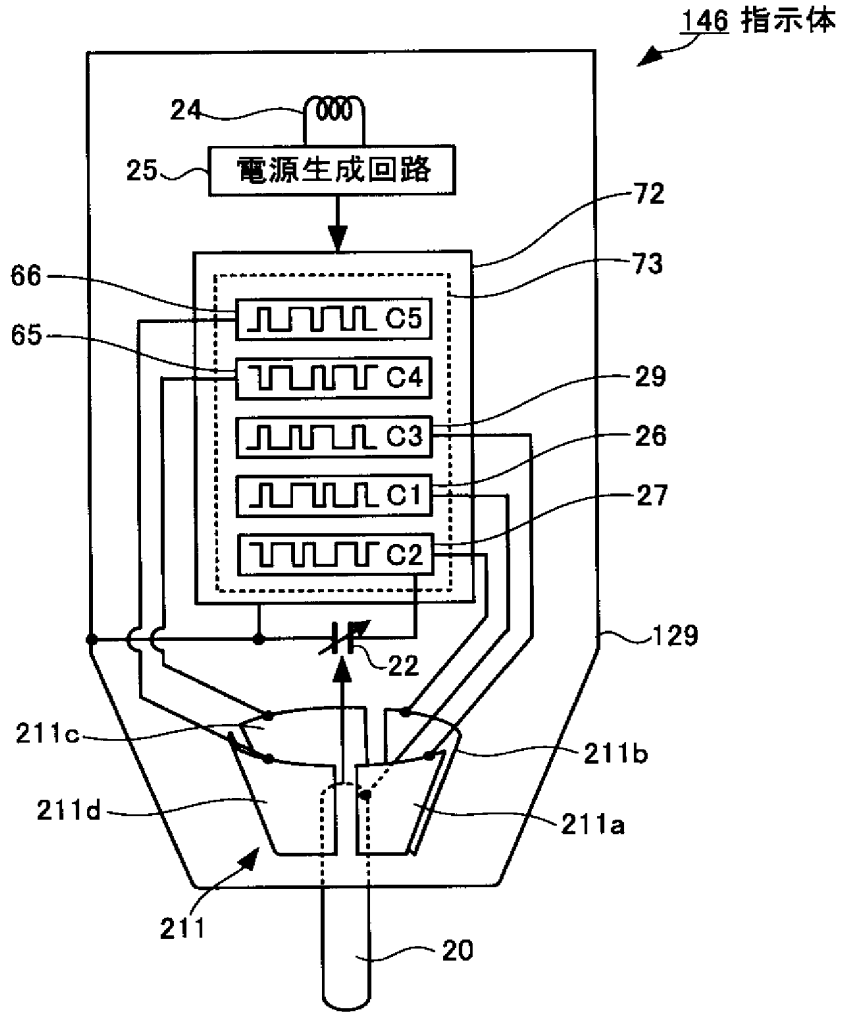
【図１８】


52
53
ADC
136
FSK復調器
54
シリアルパラレル変換部
55
シフトレジスタ
56
相関演算部
57
メモリ
58
位置及び筆圧算出部
135 受信系回路群

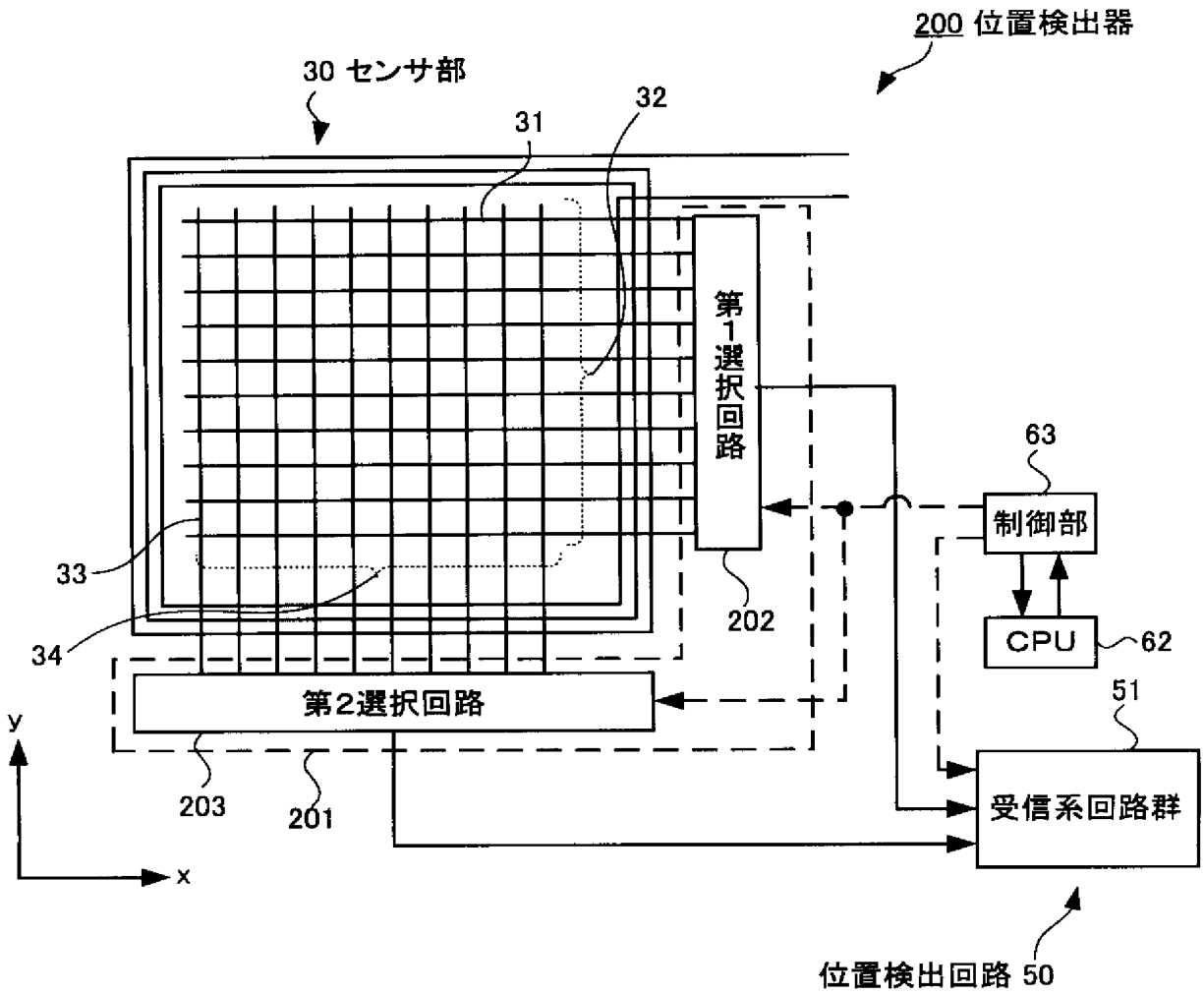
【図１９】


1 位置検出装置
指示体 146
r
113
位置検出器 3
Y3
Y2
Y1
X1 X2 X3
3a

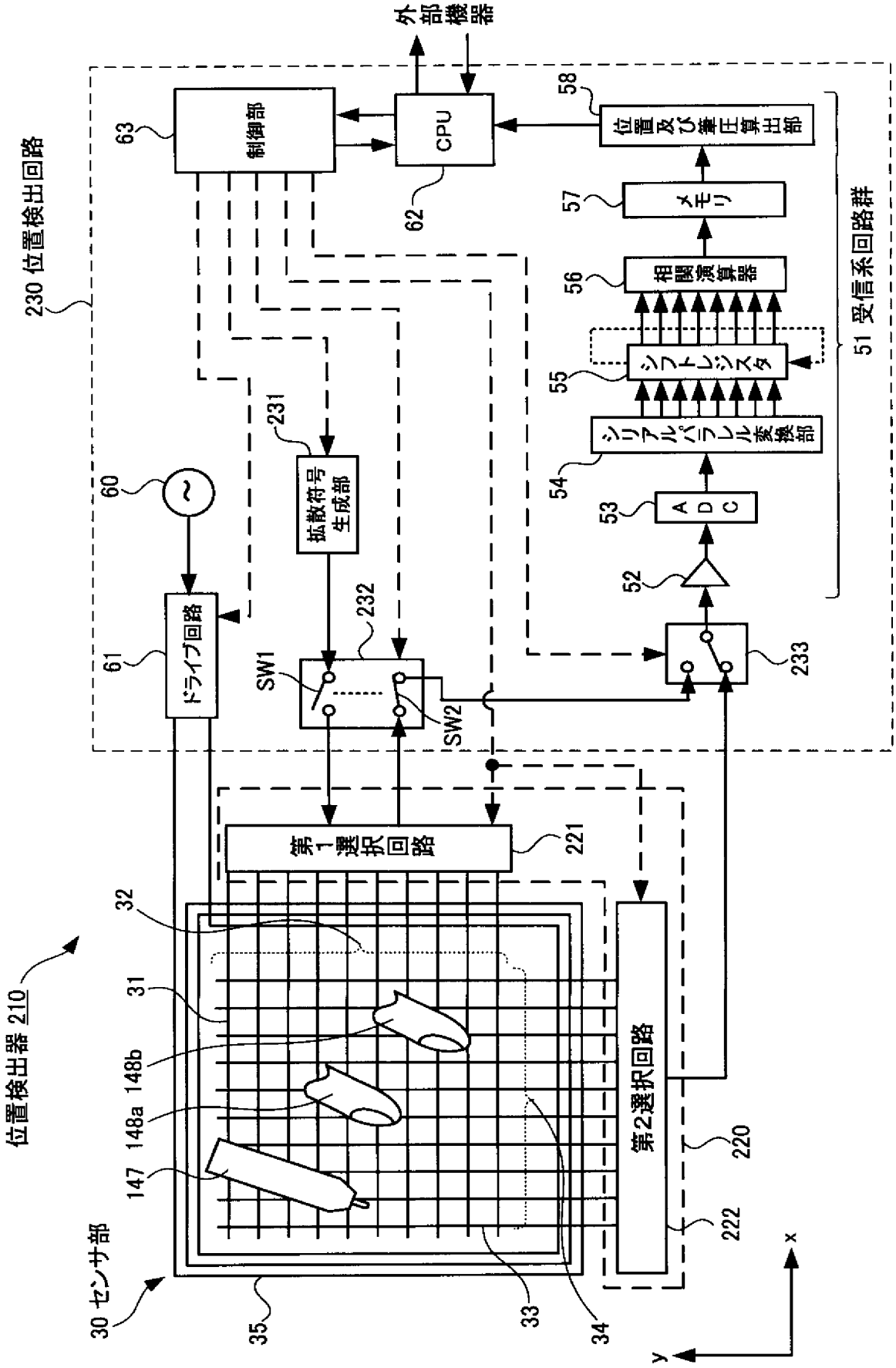
【図２０】


146 指示体
24
25
電源生成回路
72
73
66
65
C5
C4
C3
C1
C2
29
26
27
129
22
211c
211b
211d
211a
211
20

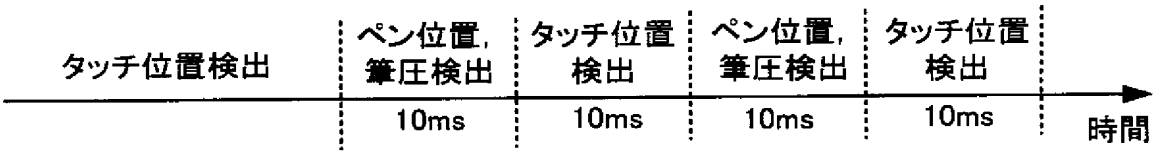
【図２１】


200 位置検出器
30 センサ部
31
32
第1選択回路
63
制御部
33
202
CPU
62
34
第2選択回路
51
y
203
201
受信系回路群
x
位置検出回路 50

【図２２】


外部機器
230 位置検出回路
63 制御部
CPU
62
58 位置及び筆圧算出部
57 メモリ
56 相関演算器
55 シフトレジスタ
54 シリアルパラレル変換部
53 ADC
52
51 受信系回路群
231 拡散符号生成部
60
61 ドライブ回路
232
SW1
SW2
233
第1選択回路
221
第2選択回路
220
222
位置検出器 210
30 センサ部
32
31
148b
148a
147
35
33
34
x
y

【図２３】


タッチ位置検出
ペン位置，筆圧検出
タッチ位置検出
ペン位置，筆圧検出
タッチ位置検出
10ms
10ms
10ms
10ms
時間

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【整理番号】　　2008LP24
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【あて先】　　特許庁長官殿
【事件の表示】
　【出願番号】　　特願2010- 24858
【補正をする者】
　【識別番号】　　000139403
　【氏名又は名称】　株式会社ワコム
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　【識別番号】　　110000925
　【氏名又は名称】　特許業務法人信友国際特許事務所
　【代表者】　　角田　芳末
　【電話番号】　　03-5365-3313
【手続補正1】
　【補正対象書類名】　明細書
　【補正対象項目名】　００７０
　【補正方法】　　変更
　【補正の内容】
　　【００７０】
　処理時間が、所定期間ｔ２経過した場合、すなわち、ステップＳ１４がＹＥＳ判定となった場合、全受信導体が選択されたかどうかを判定する（ステップＳ１５）。そして、ステップＳ１５においてＮＯ判定の場合には、ステップＳ１１の受信導体選択に戻る。一方、ステップＳ１５においてＹＥＳ判定の場合には、受信系回路群５１内の位置及び筆圧算出部５８は、メモリ５７に記憶された第１の相関特性、具体的にはその相関値のピークに基づいて指示体２が指示する位置（座標）を算出する。また、第１の相関特性と第２の相関特性の間の位相差、具体的には、それぞれの相関値のピークの間の時間差に基づいて、指示体２に印加された圧力、いわゆる筆圧を算出する（ステップＳ１６）。

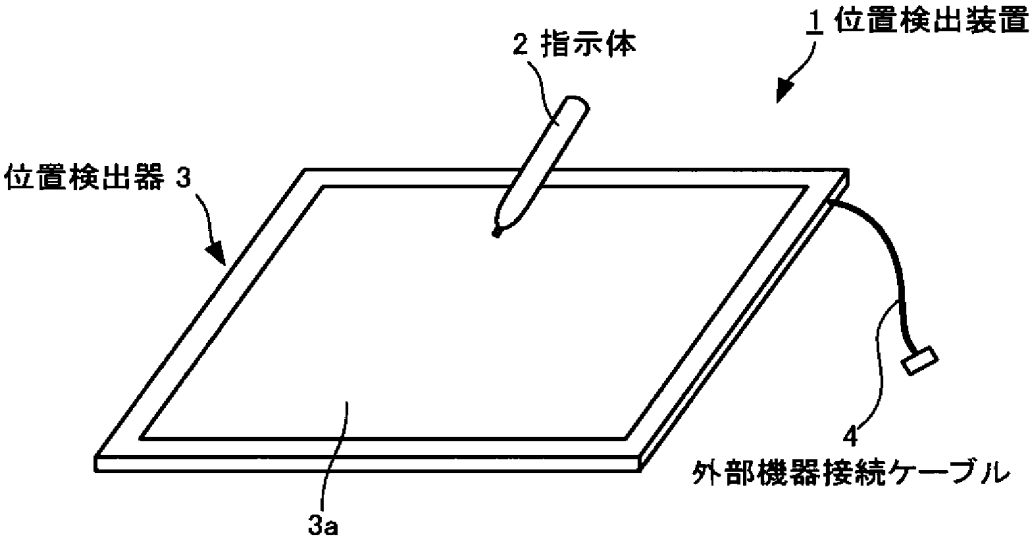
【手続補正2】
　【補正対象書類名】　明細書
　【補正対象項目名】　００７７
　【補正方法】　　変更
　【補正の内容】
　　【００７７】
同じ符号パターンを使用する場合においても、指示体２は、一方の符号の信号送出開始タイミングに対して他方の符号の信号送出タイミングを筆圧に対応して変化させる。それゆえ、この場合においても相関演算処理を行うことで、相関特性に２つのピークが現れ、指示体２の位置のみならず筆圧をも検出することができる。なお、指示体２から送信する２つの符号の符号パターンを同じにした場合、１種類の相関器を設ければよいので、相関演算部５６の構成がより簡易になる。また、符号としては、相関演算処理によって所望の相関演算結果が算出されれば良く、例えばＰＮ符号（拡散符号）が適用可能である。

【手続補正3】
　【補正対象書類名】　明細書
　【補正対象項目名】　００９２
　【補正方法】　　変更
　【補正の内容】
　　【００９２】
　また、第２符号生成部２７によって生成された第２符号Ｃ２は、インバータ回路１２８

に供給されて得られた出力反転信号とともに、切替スイッチ１１４に供給される。操作スイッチ（サイドスイッチ）１１３の操作に対応して切替スイッチ１１４が制御されることで、第２符号生成部２７によって生成された第２符号Ｃ２がインバータ回路１２８を介して第２電極２１に供給される。なお、インバータ回路１２８と切替スイッチ１１４は、符号反転回路１１６を構成する。

【手続補正4】
【補正対象書類名】　明細書
【補正対象項目名】　０１４２
【補正方法】　変更
【補正の内容】
【０１４２】
なお、この例の位置検出器２１０の動作は、図２３の例に示す時分割動作に限定されない。例えば、時分割動作を採用することなく、センサ部３０上で指及びペンで代表される複数種類の指示体の存在を同時に検出することもできる。この場合、位置検出器２１０は、次のようにして動作する。なお、以下の動作例では、ペンからは、第１の拡散符号及び該第１の拡散符号とは異なる第２の拡散符号が送信され、図２２における拡散符号生成部２３１からは、ペンに割り当てられた第１及び第２の拡散符号とは異なる第３の拡散符号を備える送信信号を生成して出力される場合を想定する。

【手続補正5】
【補正対象書類名】　図面
【補正対象項目名】　図１
【補正方法】　変更
【補正の内容】
【図１】



【書類名】　手続補正書
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　【出願番号】　特願2010- 24858
【補正をする者】
　【識別番号】　000139403
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【代理人】
　【識別番号】　110000925
　【氏名又は名称】　特許業務法人信友国際特許事務所
　【代表者】　角田　芳末
　【電話番号】　03-5365-3313
【発送番号】　552018
【手続補正1】
　【補正対象書類名】　特許請求の範囲
　【補正対象項目名】　全文
　【補正方法】　変更
　【補正の内容】
　　【書類名】特許請求の範囲
　　【請求項１】
　印加された圧力を２つの符号間の時間差に対応づけて前記２つの符号を送信するための送信信号生成部を備え前記送信信号生成部によって生成された信号を送信するための指示体と、
　所定方向に配置された複数の第１の導体と前記所定方向と交差する方向に配置された複数の第２の導体を備え前記指示体から送信された信号を受信するためのセンサ部と、
　前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号と前記２つの符号に対応した相関演算用符号との相関演算を行うための相関演算回路と、
　前記相関演算回路によって算出された少なくとも１つの符号に基づく相関演算結果から前記指示体によって指示されたセンサ部上の位置を検出するための位置算出回路と、
　前記相関演算回路によって算出された２つの符号に基づく相関演算結果から前記２つの符号間の時間差に対応して前記指示体に印加された圧力を検出する筆圧算出回路と、
　を備えたことを特徴とする位置検出装置。
　　【請求項２】
　前記複数の第１の導体から所定の手順で導体を選択するとともに前記複数の第２の導体から所定の手順で導体を選択するための選択回路を備え、該選択回路によって選択されたそれぞれの導体に生起した信号が前記相関演算回路に供給されるようにしたことを特徴とする請求項１に記載の位置検出装置。
　　【請求項３】
　前記２つの符号は、同一の符号パターンを備えていることを特徴とする請求項１に記載の位置検出装置。
　　【請求項４】
　前記２つの符号は、互いに異なる符号パターンを備えていることを特徴とする請求項１に記載の位置検出装置。
　　【請求項５】
　前記送信信号生成部に符号を変調するための変調回路を備えるとともに、前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号を復調するための復調回路を備えることを特徴とする請求項１に記載の位置検出装置。

【請求項６】
前記指示体は筐体から突出した先端部を備えるとともに、前記先端部に印加された圧力を検出するための圧力検出素子を備え、前記圧力検出素子によって検出された信号に対応して前記符号間の時間差が設定されることを特徴とする請求項１に記載の位置検出装置。
【請求項７】
前記圧力検出素子は、前記先端部に印加された圧力に対応して押圧されることで容量が変化する可変容量コンデンサを備え、前記可変容量コンデンサの容量変化に応じて前記符号間の時間差が制御されるようにしたことを特徴とする請求項６に記載の位置検出装置。
【請求項８】
前記センサ部には励磁コイルが備えられており、前記指示体には前記励磁コイルから送出された励磁信号を受信して前記指示体に備えられた送信信号生成部を駆動するための電源を生成するための電源生成回路を備えることを特徴とする請求項１に記載の位置検出装置。
【請求項９】
前記筆圧算出回路によって検出された筆圧に対応して前記指示体のホバリング状態及びペンダウン状態を識別可能としたことを特徴とする請求項１に記載の位置検出装置。
【請求項１０】
前記２つの符号は互いに異なる符号パターンであり、前記指示体から送信された信号が前記相関演算回路に供給されて得られた相関演算結果に基づいて一方の符号から他方の符号へと符号が変化したことが検出されることで、前記指示体のホバリング状態及びペンダウン状態を識別可能としたことを特徴とする請求項１に記載の位置検出装置。
【請求項１１】
前記指示体の側面には操作スイッチが設けられているとともに、前記指示体には前記操作スイッチの操作に対応して符号を反転させるための符号反転回路が備えられており、前記操作スイッチの操作に対応して生成された符号反転信号が前記相関演算回路によって相関演算されることで前記操作スイッチの操作を検出可能とした請求項１に記載の位置検出装置。
【請求項１２】
前記指示体の側面には操作スイッチが設けられているとともに、前記送信信号生成部から前記操作スイッチの操作に対応した符号が送信されることで、前記操作スイッチの操作に対応して生成された符号が前記相関演算回路によって相関演算されることで前記操作スイッチの操作を検出可能とした請求項１に記載の位置検出装置。
【請求項１３】
前記指示体の筐体には、位置指示及び前記指示体に印加される圧力を検出するための先端部が突出して備えられているとともに、前記先端部は導電性を有しており、前記先端部を介して前記送信信号生成部によって生成された信号が送信されるようにしたことを特徴とする請求項１に記載の位置検出装置。
【請求項１４】
所定の符号を生成するための符号生成部と、前記符号生成部にて生成された符号の前記所定方向に配置された複数の第１の導体への供給処理、及び、前記所定方向に配置された複数の第１の導体に生起した信号の受信処理を切り替えるための第１切替部とが更に備えられており、前記第１切替部で前記供給処理及び受信処理を交互に切替制御することで前記指示体とは種類が異なる指示体によって指示されたセンサ部上の位置を検出するようにしたことを特徴とする請求項１に記載の位置検出装置。
【請求項１５】
前記第１切替部から出力された前記所定方向に配置された第１の導体に生起した信号と、前記所定方向と交差する方向に配置された第２の導体に生起した信号とを時分割で切り替えて前記相関演算回路に供給するための第２切替部を備えたことを特徴とする請求項１４に記載の位置検出装置。
【請求項１６】

前記符号生成部によって生成される符号は、前記指示体に備えられた送信信号生成部によって生成される符号とは異なっていることを特徴とする請求項１４に記載の位置検出装置。

【請求項１７】

前記指示体には、前記送信信号生成部によって生成された複数の信号を送信するために、前記複数の信号のそれぞれに対応した複数の電極片が配置されており、前記複数の電極片のそれぞれを介して送信された信号を前記センサ部にて受信することで前記指示体の操作状態を検出するようにしたことを特徴とする請求項１に記載の位置検出装置。

【請求項１８】

前記指示体の操作状態の検出とは、前記指示体のペンチップを回転中心とした指示体自体の回転状態、センサ部によって形成される平面に対する前記指示体の傾き、及び、前記指示体のペンチップを基点として操作したした場合の前記センサ部によって形成される平面に投影された前記指示体の回転角の少なくとも１つを検出することであることを特徴とする請求項１７に記載の位置検出装置。

【請求項１９】

位置を指示するための先端部が筐体から突出して設けられた指示体であって、

前記先端部に印加された圧力を、相関演算により識別可能なパターンを有する２つの符号間の時間差に対応づけて前記２つの符号を送信するための送信信号生成部を備え、

前記送信信号生成部によって生成された複数の符号が送信されるようにしたことを特徴とする指示体。

【請求項２０】

前記２つの符号は、同一の符号パターンを備えることを特徴とする請求項１９に記載の指示体。

【請求項２１】

前記２つの符号は、互いに異なる符号パターンを備えていることを特徴とする請求項１９に記載の指示体。

【請求項２２】

前記送信信号生成部に符号を変調するための変調回路を備えたことを特徴とする請求項１９に記載の指示体。

【請求項２３】

筐体から突出した先端部に印加される圧力を検出するための圧力検出素子を備え、前記圧力検出素子によって検出された信号に対応して前記符号間の時間差が設定されることを特徴とする請求項１９に記載の指示体。

【請求項２４】

前記圧力検出素子は、前記先端部に印加された圧力に対応して押圧されることで容量が変化する可変容量コンデンサであり、前記可変容量コンデンサの容量変化に応じて前記符号間の時間差が制御されるようにしたことを特徴とする請求項２３に記載の指示体。

【請求項２５】

前記指示体の側面には操作スイッチが設けられているとともに、前記指示体には前記操作スイッチの操作に対応して符号を反転させるための符号反転回路が備えられていることを特徴とする請求項１９に記載の指示体。

【請求項２６】

前記指示体の側面には操作スイッチが設けられているとともに、前記送信信号生成部から前記操作スイッチの操作に対応した符号が送信されるようにしたことを特徴とする請求項１９に記載の指示体。

【請求項２７】

前記位置を指示するための先端部は導電性を有しており、前記送信信号生成部によって生成された少なくとも１つの符号が前記先端部を介して送信されるようにしたことを特徴とする請求項１９に記載の指示体。

【請求項２８】

前記送信信号生成部によって生成された複数の符号のそれぞれが前記先端部を介して送信されるようにしたことを特徴とする請求項２７に記載の指示体。

【請求項２９】

前記先端部の近傍には、前記送信信号生成部によって生成された複数の信号を送信するための、前記複数の信号のそれぞれに対応した複数の電極片が配置されていることを特徴とする請求項１９に記載の指示体。

【請求項３０】

位置指示のために指示体に備えられたペンチップに印加された圧力に対応した時間差を有する２つの符号を送信するための符号送信ステップと、

所定方向に配置された複数の第１の導体と前記所定方向と交差する方向に配置された複数の第２の導体を介して前記指示体から送信された符号を受信する信号受信ステップと、

前記複数の第１の導体を構成する導体と前記複数の第２の導体を構成する導体にそれぞれ生起した信号を受信し前記２つの符号に対応した相関演算用符号との相関演算を行う相関演算処理ステップと、

前記相関演算処理ステップによって算出された１つの符号に基づく相関演算結果から前記指示体によって指示されたセンサ部上の位置を検出する位置算出ステップと、

前記相関演算処理ステップによって算出された２つの符号に基づく相関演算結果から前記指示体に印加された圧力を検出する筆圧算出ステップと、

を備えたことを特徴とする位置検出方法。

【請求項３１】

前記２つの符号は、同一の符号パターンを備えることを特徴とする請求項３０に記載の位置検出方法。

【請求項３２】

前記２つの符号は、互いに異なる符号パターンを備えることを特徴とする請求項３０に記載の位置検出方法。

【請求項３３】

位置を指示するための先端部が筐体から突出して設けられた指示体の前記先端部に印加された圧力を送信する圧力情報送信方法であって、

他の符号と相関演算により識別可能なパターンを有する第１の符号を送信するステップと、

前記他の符号と相関演算により識別可能なパターンを有する第２の符号を、前記先端部に印加された圧力に対応する時間をおいて送信するステップと、

を含む圧力情報送信方法。

【請求項３４】

所定の情報を送信信号に対応付けて送信する指示体からの情報送信方法であって、

他の符号と相関演算により識別可能なパターンを有する第１の符号を電極片に供給するステップと、

前記他の符号と相関演算により識別可能なパターンを有する第２の符号を他の電極片に供給し、所定の情報を送信するステップと、

を含む情報送信方法。

【手続補正2】

【補正対象書類名】　明細書

【補正対象項目名】　０００９

【補正方法】　変更

【補正の内容】

【０００９】

また、本発明の指示体は、位置を指示するための先端部（ペンチップ）が筐体から突出して備えられた指示体であって、符号パターンが互いに異なる第１の符号及び第２の符号が生成されるとともに前記指示体の先端部に印加された圧力を、相関演算により識別可能

なパターンを有する２つの符号が生成されるタイミングすなわち符号間の時間差（位相差）を制御し、あるいは所定の符号パターンを有する１つの符号が生成されるとともに前記指示体の先端部に印加された圧力に対応して、斯かる符号の最初の生成に対する次の生成のタイミングすなわち符号間の時間差（位相差）を制御する符号生成回路と、前記符号生成回路によって生成された符号を送信するための送信信号生成部と、を備える。

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U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. 940131.442C4	APPLICATION NO. 15/047,013
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)	INVENTORS Yasuo Oda et al.	
	FILING DATE February 18, 2016	GROUP ART UNIT 2183

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	NAME	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	2002/0148655	A1	10/17/02	Cho et al.	
	2	2003/0112220	A1	06/19/03	Yang et al.	
	3	2003/0151596	A1	08/14/03	Moyne et al.	
	4	2004/0056849	A1	03/25/04	Lohbihler et al.	
	5	2004/0169439	A1	11/02/04	Toda	
	6	2004/0260507	A1	12/23/04	Chang et al.	
	7	2005/0162398	A1	07/28/05	Eliasson et al.	
	8	2006/0279549	A1	12/14/06	Zhang et al.	
	9	2007/0205996	A1	11/06/07	Huang	
	10	2008/0076351	A1	03/27/08	Washiro	
	11	2008/0150918	A1	06/26/08	Hagen et al.	
	12	2010/0085325	A1	04/08/10	King-Smith et al.	

FOREIGN PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	KIND CODE	DATE	COUNTRY	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	TRANSLATION YES	TRANSLATION NO
	1	200305826	A	11/01/03	TW (with English Abstract)	Corresponds to US 2005/162398A1		X

NON-PATENT LITERATURE DOCUMENTS *(Including Author, Title, Date, Pertinent Pages, Etc.)*

	1		Taiwanese Office Action issued January 29, 2016, for TW Application No. 104126245, 9 pages.
	2		Communication pursuant to Article 94(3) EPC dated November 25, 2015, for EP Application No. 11 150 998.0-1959, 7 pages.

EXAMINER	DATE CONSIDERED

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

Electronic Acknowledgement Receipt

EFS ID:	25204760
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/David Sitthideth
Filer Authorized By:	Shoko I. Leek
Attorney Docket Number:	940131.442C4
Receipt Date:	15-MAR-2016
Filing Date:	18-FEB-2016
Time Stamp:	18:47:34
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	Non Patent Literature	NPL_OA_TW104126245_Jan_29_16.pdf	302608 db18c812af7605045bf0c979237dae28b602f1b6	no	9

Warnings:	
Information:	

2	Non Patent Literature	NPL_OC_EP11150998_Nov_25_15.pdf	325426 a9b61c79343277d872ca2f1224e42e46742 14b7e	no	7
Warnings:					
Information:					
3	Foreign Reference	TW200305826A_with_English_Abstract.pdf	6211520 737e5bf474b1586e0bb51c1b21bbe971d6 da0f94	no	57
Warnings:					
Information:					
4	Transmittal Letter	940131_442C4_IDS_transmittal.pdf	50312 3508cdb6227ef793fff0f0efd216f9bf504d7b 29	no	2
Warnings:					
Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	940131_442C4_IDS_1449.pdf	105064 e966cfa4842b1dae5c72c54369b18ab45ba 626b7	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
		Total Files Size (in bytes):	6994930		

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.

Espacenet

Bibliographic data: TW200305826 (A) — 2003-11-01

A touch pad, a stylus for use with the touch pad, and a method of operating the touch pad

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Applicant(s): ELIASSON JONAS OVE PHILIP [SE]; OESTERGAARD JENS WAGENBLAST STUBBE [DK] ± (ELIASSON, JONAS OVE PHILIP, ; OESTERGAARD, JENS WAGENBLAST STUBBE, ; JONAS OVE PHILIP ELIASSON, ; JENS WAGENBLAST STUBBE OESTERGAARD)

Classification: **- international:** ***G06F3/0354; G06F3/041; G06F3/042; G06F3/0488***
- cooperative: **G06F3/03545**; **G06F3/0428**; **G06F3/04886**

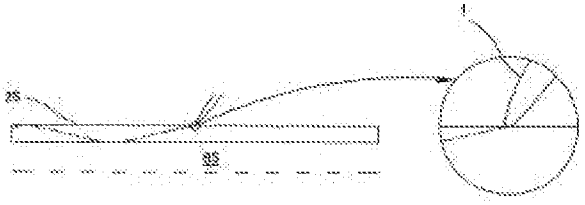
Application number: TW20030105717 20030313

Priority number(s): DK20020000375 20020313

Also published as: TWI292120 (B) WO03077192 (A1) US2005162398 (A1) MXPA04008817 (A) KR20040107479 (A) KR100921543 (B1) JP2005520239 (A) ES2270062 (T3) EP1493124 (A1) EP1493124 (B1) DE60307077 (T2) CN1647100 (A) CN100511115 (C) CA2478967 (A1) AU2003227021 (A1) AT334441 (T) less

Abstract of TW200305826 (A)

A touch pad or touch screen having a light transmissive means having a surface receiving light, such as from a stylus or pen emitting light at a point thereof, transmitting the light along the surface and determining the position at the surface receiving the light. This touch pad may be made of a hard material. A flexible



element is provided on top of the surface and light transmitted into the flexible element. Depression of the element directs light into the surface for detection. A keyboard may be positioned on the surface of flexible element. Lenses or mirrors may be provided for receiving light from outside the pad/screen for determining a position also outside the pad on a working surface, such as a white board, a desk, or a newspaper.

申請日期： 92105717	IPC分類 G06K 11/18, 11/18
申請案號： 92.3.13	

(以上各欄由本局填註)

發明專利說明書 200305826

一、發明名稱	中文	觸控板，觸控板使用之觸控筆及操作此觸控板之方法
	英文	A TOUCH PAD, A STYLUS FOR USE WITH THE TOUCH PAD, AND A METHOD OF OPERATING THE TOUCH PAD
二、發明人(共2人)	姓名(中文)	1. 強納斯 歐夫 菲律浦 伊里雅森 2. 簡斯 汪簡布萊斯特 史圖伯 歐斯特蓋德
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	名稱或姓名(英文)	1. Jonas Ove Philip ELIASSON 2. Jens Wagenblast Stubbe OESTERGAARD
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	住居所(營業所)(中文)	1. 丹麥哥本哈根市V, DK-1705, 英格史雷夫蓋德, 178街 (本地址與前向貴局申請者不同) 2. 丹麥利瑞市DK-4320, 利瑞斐8號 (本地址與前向貴局申請者不同)
	住居所(營業所)(英文)	1. 2.
	代表人(中文)	1. 2.
	代表人(英文)	1. 2.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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一、本案已向

國家(地區)申請專利	申請日期	案號	主張專利法第二十四條第一項優先權
丹麥 DK	2002/03/13	PA 2002 00375	有

二、□主張專利法第二十五條之一第一項優先權:

申請案號:

無

日期:

三、主張本案係符合專利法第二十條第一項□第一款但書或□第二款但書規定之期間

日期:

四、□有關微生物已寄存於國外:

寄存國家:

寄存機構: 無

寄存日期:

寄存號碼:

□有關微生物已寄存於國內(本局所指定之寄存機構):

寄存機構:

寄存日期: 無

寄存號碼:

□熟習該項技術者易於獲得,不須寄存。

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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五、發明說明（1）

發明所屬之技術領域：

本發明係有關於一種改良式觸控板，特別是於光傳送裝置中用以接收光線，並決定光線於何處進入之觸控板。此類型式之觸控螢幕（touch screen）之優點為可製造堅固，並具有更高的抗壓性。此外還有些其他功能，如可做為額外附加的鍵盤等。

先前技術：

觸控板以及其他電腦相關之輸入裝置可參考US-A-4772763、JP-A-58010232、JP-A-11232025、WO02/095668、WO02/077915、US-A-4692809、US-A-5945981、US-A-5227622、US-A-5166668、EP-A-1209554。

發明內容：

根據本發明之一特徵，本發明提供一種觸控板，包括：

一組光傳送裝置，具有一第一表面以接收光線，該光傳送裝置於內部沿該第一表面傳送所接收之光線；

一第一與一第二裝置，用以接收該傳送裝置沿該第一表面傳送所接收之光線，並輸出複數相對應之信號；以及

一組決定裝置，依據來自該接收裝置之光線為基礎，以決定該第一表面上已接收光線之位置。

所以，光線係在內部傳送至光接收器，以取代經由光

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五、發明說明（2）

傳送裝置的方式。

在本發明中，當光線傳送時，光線中至少有一波長成分被接收，雖然光線成份會被吸收，但至少使光線足以被接收裝置接收到。此單一或多重波長可於可見光譜、紅外線光譜、亦/或深紫外光光譜中。在第一表面與接收裝置之主要位置間距裡，較佳的狀態下可傳送至少50％的絕大部分可見光譜波長。

光傳送裝置之較佳材質可為玻璃、聚碳酸酯（polycarbonate）、聚乙烯（polyethylenes）、PET、丙烯（acrylate）、ABS、尼龍（nylon）、苯乙烯（styrene）、或其他類似材質。

本發明一有趣特徵為接收之光線在光傳送裝置內沿第一表面傳遞。所以，接收之光線被重新導向且至少部分被此裝置導引，而並不是只穿透如反射螢幕等之類的模具。自然地，光線實際被接收量與被光傳送裝置重新導向之量將依據光入射下之角度與波長而定。所以，為取得合適的角度，較佳的情況下最好使光線以非平行光束之型態接近第一表面。

在本發明中，其他元件，如後文將描述之彈性元件亦可重新導向部分光線。配置接收裝置後可接收沿第一表面傳送至之光線。此裝置可配置於光傳送裝置之平面上，或是與第一表面平行之一平面上。

光傳送裝置內所接收與導引之光線根據其該裝置之外型、其表面（反射原理）與吸收率（absorbance）而傳

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五、發明說明（3）

遞。根據光線分佈之強度，光線傳送之方向可能同時為第一表面以及其垂直方向。至少部分接收光線將由光傳送裝置之表面反射以導向接收裝置。

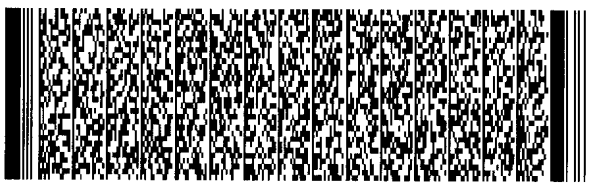
在較佳的條件下，光傳送裝置至少應為平坦的。在此條件下可提供平面觸控螢幕。平面裝置可改善光導性能與接收光線之能力。

光傳送裝置在較佳的條件下可為平坦式外型以利於書寫。然而，只要可於光線進入位置與接收裝置間導引光線，任何外型之傳送裝置皆可適用。事實上，彎曲之觸控板有其優點，如平坦區域可做為正常「書寫」之用，而觸控板的測邊區域則可做為按鍵或預設用途之區域（下文將詳述）。

下述係數個由接收光線中取得資訊的實施例。接收裝置之輸出係為位置資訊（如最大接收光線強度所在之角度）或所接收光線強度之對應電壓/電流。其他資訊還包括光強度之變化（下文將詳述）或光線之波長或波長之間隔/混和（interval / mix）。

在一實施例中，決定方法係以標準三角量測（triangulation）以確定位置。利用兩組以上之接收裝置以增加決定之準確度，或是增加可判定、接收、或決定之光線或位置之區域。

本發明中接收光線之位置係位於第一表面上光線實際進入光傳送裝置之位置，並開始於傳送裝置中傳遞。此位置可由任何座標系統來定位，如觸控板上任何點或位置之




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五、發明說明（4）

絕對或相對的距離/角度予以定位。

上述觸控板可結合顯示裝置或監視器而構成觸控螢幕，配置此監視器或顯示裝置後可提供藉由光傳送裝置之第一表面提供或顯示之資訊。

在另一實施例中，光傳送裝置至少還包括一平面光傳送元件，其表面具有一光傳送塗佈（coating）或材料層，其上表面則構成光傳送裝置之第一表面。

此塗佈或材料層可保護裝置免於擦刮，或可提供一反射或非反射表面。此塗佈可為硬式（hard），如硬式矽層，或一親水性表層。

在另一實施例中，觸控板還包括一彈性元件配置於第一表面，以及一光射器以傳送光進入彈性元件，此彈性元件具有一部份向第一表面下壓，並使光線自下壓部分導入。此下壓部分會縮短該點之光路徑。彈性元件之下壓表面會形成一曲面，將來自彈性元件之光線鏡射向或穿越第一表面。此彈性元件可為聚氨基甲酸脂（polyurethane）、尼龍（nylon）、PVC、亦/或透光性聚乙烯（polyethylenes），且其厚度可為0.01mm至10mm，如0.25mm至5mm之間，較佳為1/2至1mm。

在上述實施例中，彈性元件具有一第一側，包含複數預設第一區域以朝第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上與該第一表面具有一距離，以及於一第二下壓位置上緊鄰第一表面。此彈性元件可為鍵盤，第一區域可用

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五、發明說明（5）

以定義按鍵。在較佳的條件下，每一第一區域有一相對應之第二區域，反之亦然。彈性元件一與空氣（彈性元件與第一表面之間距）間、二與第一表面間互異之反射係數（reflective index）確保（至少基本上）無光線傳送至第一表面之第一位置，而是傳送至第二位置。

由上述第二區域之位置得知，觸控板可決定第一區域何處被按壓，藉以進行相對應之反應。

此處值得注意的是如上所述，現已通過第一表面之光線由光傳送裝置與彈性元件根據其邊緣而予以導引。假若光通過邊緣部分，則會進入彈性元件並返回光傳送裝置。此舉不會影響接收裝置之位置或觸控板的操作。

第二區域之兩位置則為另一種方式（相較如僅採用彈性元件與光傳送裝置間之互異反射係數，或是未照射於表面之平行光線）以防止光線自彈性元件傳遞至第一表面之非預期位置。在較佳的狀況下，彈性元件於第二區域間具有防止非預期光線自彈性元件傳送至第一表面之裝置。

本發明亦提供類似鍵盤之特徵，此觸控板還包括一組下壓裝置，具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上對該彈性元件無任何程度之下壓，以及於一第二下壓位置上下壓該彈性元件。在較佳的狀況下，此下壓元件為一平坦元件，具有一第一上側與一第二下側，其相對位置互為上與下。

此處可提供各類下壓裝置，如可為簡易置換之鍵盤、

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五、發明說明（6）

特定用途之鍵盤（如遊戲用途）、以及相同基本模組但是用於不同國家之觸控板。

本發明之觸控板還包括一種裝置以得知哪一鍵盤被使用，以及如何阻斷自第一表面上之預設點上的傳送光線。

此下壓裝置包括至少一堅硬元件，該堅硬元件可根據該等下壓元件之一剩餘部分而旋轉，該堅硬元件於其第一側具有複數個該等第一區域，且於其第二側具有複數該等下壓元件。

此堅硬元件可為一可下壓之板或區域，可於與第一表面平行之一平面上旋轉，形成一可旋轉元件（如可用以滾動選單或控制其他裝置）。利用此方法可取得第一表面上接收光線之位置，且轉動該板時會移動該位置。另一方法為於與第一表面平行之一軸上旋轉，在第二側上僅一組或數組下壓元件同時與彈性元件結合。此外可選擇結合兩種轉動方式之方法。

第三種方法為提供如一鍵盤，其包括一元件，具有一第一側，該第一側具有預設的複數第一位置以與一使用者結合（engage）；以及一第二側，具有對應該等第一位置之複數第二位置或區域；其中，當一第一位置與使用者結合時，於該第二側上定位之對應之該第二位置會發射光線，並被該第一表面接收。

在一較佳實施例中，該接收裝置包括一組裝置以偵測於至少兩互異區域或點上所接收之光線，該偵測裝置用以決定每一區域或點所測得光線之一入射角。利用此方法可

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五、發明說明（7）

採用簡單三角量測以確定位置。

在較佳的情況下，該偵測裝置包括至少一偵測器，且每一區域或點上具有一組反射裝置或透鏡（len）裝置以偵測該區域或點測得之光線至一至少一偵測器。

在一較佳實施例中，該接收裝置包括一組裝置以偵測該第一表面之一預定點上兩互異方向射出之光線，以及包括一組裝置依據光線被偵測之該等方向以決定該預設點之位置。

在較佳的情況下，該偵測裝置包括至少一偵測器與一組反射裝置或透鏡裝置，將該兩互異方向之發射光線導入該至少一偵測器。

此觸控板還包括至少兩偵測器，其中每一至少為單向偵測器，且具有複數偵測點或區域，配置該偵測器與反射/透鏡裝置，可於至少該一偵測器之互異點/區域上偵測來自該第一表面上兩互異點之光線。

此觸控板還包括還包括複數狹縫（slot）或細縫（aperture），位於該第一表面之該預設點與該等單向偵測器之間，該等單向偵測器之該等偵測點/區域基本上至少為等距，且兩相鄰狹縫之間距非為一偵測器之兩相鄰區域/點間距之倍數（multipla）。

若偵測點/區域排列方式為列或線型，狹縫或細縫則移動角度對準偵測器之列與行方向，此時於同一方向使用數組一維（one-dimension）偵測器將可增加解析度。若列與行相互呈直角則可採用偏向細縫（slanted aperture

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五、發明說明（8）

）。而當列與行非呈現直角時則可採用垂直細縫。

在較佳的情況下，一偵測器包括一CCD偵測器，其為一兩向偵測器，具有複數列之複數偵測點/區域，且其中每一偵測器包括至少一列該CCD。

接著，此觸控板還包括一組裝置以偵測該觸控板周圍導入其他複數列之該CCD的光線。

其中，本發明還配置一濾波器裝置或該反射/透鏡裝置以傳送僅含一預設波長間隔之光線。

在較佳的情況下，此觸控板還包括一觸控筆（stylus）或筆從該觸控板之一點上發射光線，當該觸控筆或筆接觸亦/或於該第一表面經轉換後，將光線傳送至該該光傳送裝置。

在本發明之一實施例中還包括一組裝置以接收該觸控板外部之光線，與該第一表面之一平面傳送光線至該光傳送裝置，該決定裝置決定該觸控板外部光線之發射位置。

在上述實施例中，該等接收裝置包括至少兩透鏡裝置或鏡片裝置，用以將該觸控板外部光線（如來自陽光或光發射器/燈管等）沿該平面導入該光線傳送裝置。

在較佳的情況下，此觸控板還包括一組裝置利用該傳送裝置至該決定裝置之方式將光線傳送至該光線傳送裝置。

在此實施例中，實際上可由觸控板外部取得位置資訊。觸控板可置於工作表面上，接著由工作表面上描繪之圖形或軌跡取得資訊。

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五、發明說明（9）

事實上，透鏡/鏡片裝置中可取得之3D位置資訊，亦可作為來自平面外的接收光線。此接收光線亦傳送至偵測/接收裝置。利用特定波長（如用濾波器或發射特定光線的方式）可自其中分離出額外的資訊，或者光線可傳送至其所屬的偵測器，如分隔的CCD列。

本發明還包括特定用途之一觸控筆或筆，其中包括：

一第一光傳送通道，係沿該觸控筆或筆之一預設軸；

一組提供光線進入並沿該傳送通道之裝置；

一組輸出來自該傳送通道之光線之裝置；

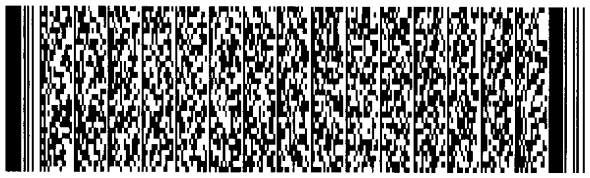
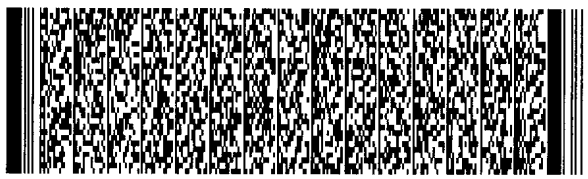
一接收通道，用以接收來自該傳送通道與被該筆或觸控筆外部反射之光線；以及

一組用以將光線自該接收通道導向該觸控板之該接收裝置之裝置。

此觸控筆/筆可用於如條碼之讀取，條碼可擁有不同的反射性質，使光反射量發生變化，藉此導向觸控板。

外部工作區域可作為如報紙或小冊子，由使用者確認之（如利用條碼或其他資訊-如拍照）。經確認後，使用者可利用觸控筆或其他光源供應器以區分或確認使用者欲購買或填入表格之產品。接著，觸控板取得此資訊，透過無線乙太網路（Ethernet）或行動電話（若觸控板非為行動電話的一部份）傳送至產品供應者或小冊子/報紙之發行處。

本發明中觸控筆之另一特徵為具有一組光源提供裝置，以及該觸控筆之一點上之一組發射光源裝置。觸控筆

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五、發明說明（10）

之端點具有彈性。此彈性端點可由矽或聚氨基甲酸脂（polyurethane）所組成。此外，此端點可由親水性（hydrophilic）物質構成以減少摩擦或刮痕。光源提供裝置為一光發射器。此外，光源提供裝置可包括一組裝置以接收一組或多組周邊光發射器，如太陽能電池或透鏡-或觸控筆端點上之鏡射表面。此鏡射表面可反射觸控板自身提供之光線-如接近第一表面傳送之光線。

具彈性端點之觸控筆可提供不同的線寬，如當畫/寫時施力所提供之資訊。此觀念可應用於電子簽章中，不僅可辨識位置（簽名本身的字型），以及依照書寫速度所產生之預測落點位置辨認簽名者，甚至可根據落點之壓力來辨識。

此外，觸控筆還包括一組裝置以改變該發射光線之一強度（intensity）亦/或波長，該改變可由一使用者藉由一組控制裝置予以控制。利用此方法，觸控筆可當作現今所使用具一或多個按鍵之滑鼠。其中，該控制裝置包括該觸控筆之一區域，該區域為裸露且供該使用者施予向下壓力，該控制裝置會依裸露並被向下施壓之舉而改變該強度亦/或波長。

此類改變具有幾個目的：觸控板可調整成僅對一隻或一組觸控筆產生作用，藉此觸控板將不會對未具預設的強度變化/波長成分/極性之入射光線發生反應。不同觸控筆之書寫將於螢幕上呈現不同顏色。此外，此類變化可視為滑鼠按壓（mouse click）動作，觸控板可如同使用PC一

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五、發明說明 (11)

般地對照該動作而反應。

本發明亦提供一種觸控筆或筆，包括：

一第一光傳送通道，係沿該觸控筆或筆之一預設軸；

一組提供光線進入並沿該傳送通道之裝置；

一組輸出來自該傳送通道之光線之裝置；

一接收通道，用以接收來自該傳送通道與被該筆或觸控筆外部反射之光線；以及

一組用以輸出來自該接收通道之光線之裝置。

為達本發明之一目的，本發明提供一種操作一觸控板的方法，包括下列步驟：

提供一組光傳送裝置，具有一第一表面用以接收光線；

於該第一表面接收光線；

將該接收之光線傳沿該第一表面送至該光傳送裝置之內部；

利用一第一與一第二裝置接收該傳送該傳送光線；

自該第一與該第二裝置輸出複數對應信號；以及

根據該等接收裝置之該等信號決定該第一表面上已接收之一位置。

如上所述，此方法還包括一顯示裝置或監視器，該監視器或顯示裝置藉由該光傳送裝置之該第一表面提供顯示資訊。

在此方法中，該光傳送裝置至少包括一平面光傳送元件，其表面具有一光傳送塗佈或材料層，其一上表面則形

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五、發明說明（12）

成該光傳送裝置之該第一表面。該平面光傳送元件包括一光傳送顯示裝置或監視器-再次提供一觸控板。

其中該觸控板還包括一彈性元件配置於該第一表面，以及一光射器以傳送光（平行光）進入該彈性元件，該彈性元件具有一部份向該第一表面下壓，並使光線自該下壓部分導入。

此下壓動作提供彈性元件之上表面反射通過第一表面之光線。

其中，該彈性元件具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上與該第一表面具有一距離，以及於一第二下壓位置上緊鄰該第一表面。此方法還包括一步驟，係於該等第二區域之間防止光線自該彈性元件傳送至該第一表面。

此外，該觸控板還包括一組下壓裝置，具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上對該彈性元件無任何程度之下壓，以及於一第二下壓位置上下壓該彈性元件。

在此實施例中，該下壓裝置包括至少一堅硬元件，該堅硬元件可根據該等下壓元件之一剩餘部分而旋轉，該堅硬元件於其第一側具有複數個該等第一區域，且於其第二側具有複數該等下壓元件。

在另一實施例中，該觸控板還包括一元件，具有一第

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一側，該第一側具有預設的複數第一位置以與一使用者結合；以及一第二側，具有對應該等第一位置之複數第二位置或區域；其中，當一第一位置與使用者結合時，於該第二側上定位之對應之該第二位置會發射光線，並被該第一表面接收。

在一實施例中，該偵測步驟係偵測於至少兩互異區域或點上所接收之光線，該偵測步驟決定每一區域或點所測得光線之一入射角。

在較佳的情況下，該觸控板包括至少一偵測器，該方法包括一偵測步驟，於每一區域或點上具有一組反射裝置或透鏡（len）裝置以偵測該區域或點測得之光線至一至少一偵測器。

上述偵測與決定步驟係偵測該第一表面之一預定點上兩互異方向射出之光線，以及依據光線被偵測之該等方向以決定該預設點之位置。其中，該觸控板包括至少一偵測器與一組反射裝置或透鏡裝置，將該兩互異方向之發射光線導入該至少一偵測器。

在較佳的情況下，觸控板包括至少兩偵測器，其中每一至少為單向偵測器，且具有複數偵測點或區域，配置該偵測器與反射/透鏡裝置，可於至少該一偵測器之互異點/區域上偵測來自該第一表面上兩互異點之光線。為提升解析度，其步驟還包括提供複數狹縫或細縫，位於該第一表面之該預設點與該等單向偵測器之間，該等單向偵測器之該等偵測點/區域基本上至少為等距，且兩相鄰狹縫之間

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距非為一偵測器之兩相鄰區域/點間距之倍數。

在較佳實施例中，該觸控板包括一兩向CCD偵測器，具有複數列之複數偵測點/區域，且其中該偵測步驟包括利用一或複數該等列之該等偵測點/元件以偵測經該傳送裝置傳送之光線。其步驟還包括偵測該觸控板周圍導入其他複數列之該CCD的光線。此外，其步驟還包括傳送僅含一預設波長間隔之光線，以降低入射光線（陽光或其他）之雜訊。

如上所述，其步驟還包括提供從一觸控筆（stylus）或筆一點上發射光線，當該觸控筆或筆接觸亦/或於該第一表面經轉換後，將光線傳送至該該光傳送裝置。

在本發明之一實施例中，還包括下列步驟：

接收該觸控板外部且至少與該第一表面平行之一平面上之光線；

傳送該光線進入該光傳送裝置；

該決定步驟包括決定該觸控板外部光線發射之一位置。

本實施例還包括提供少兩透鏡裝置或鏡片裝置，用以將該觸控板外部光線沿該平面導入該光線傳送裝置。其中，該提供該光傳送裝置與該透鏡或鏡片裝置之步驟包括構成該光傳送裝置與該透鏡或鏡片裝置成為一單一元件。此外，還包括下列步驟：利用該傳送裝置至該決定裝置之方式將光線傳送至該光線傳送裝置。

在上述之方法中，還包括轉化（translate）一觸控

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五、發明說明（15）

筆或筆之步驟，包括：

一第一光傳送通道，係沿該觸控筆或筆之一預設軸；

一組提供光線進入並沿該傳送通道之裝置；

一組輸出來自該傳送通道之光線之裝置；

一接收通道，用以接收來自該傳送通道與被該筆或觸控筆外部反射之光線；以及

一組裝置用以將光線自該接收通道導向該觸控板之該接收裝置；

一表面具有改變光反射之複數區域，該光線或該觸控筆將強度變化之光線導向該觸控板；

其中，該決定步驟包括決定來自光強度變化之資訊。

此外，上述之方法中包括提供利用一觸控筆或筆於該第一表面上提供光線，還包括改變該發射光線之一強度（intensity）亦/或波長，該改變可由一使用者藉由一組控制裝置予以控制，且其中決定步驟包括偵測此改變。其中，該改變步驟包括該使用者下壓該觸控筆之一區域，該下壓動作促使該光強度亦/或波長發生變化。

為讓本發明之上述和其他目的、特徵、和優點能更明顯易懂，下文特舉一較佳實施例，並配合所附圖式，作詳細說明如下。

實施方式：

1. 0-pen 觸控螢幕

本實施例係有關製造一種被動式亦/或主動式亦/或反應式亦/或內部亦/或外部光學觸控螢幕之製造方法，利用

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五、發明說明（16）

各類裝置產生輕擊鍵盤（包括搖桿）與滾動的功能，此類裝置可「量身訂作」或是由許多電子裝置整合而成，如數位CCD、光源、軟體、ROM、處理器、電源供應器、列印裝置、螢幕、以及含特殊材料層、鏡射裝置、細縫、與濾波器之穿透式螢幕（25），還有利用光射或反射點工具組合成的各類書寫裝置，以及顯示條碼反射之裝置。

下述功能特徵在較佳的情況下由觸控板之單一控制器64所控制。

1.1 數位式位置偵測CCD

採用CCD作為光偵測器係因其價格便宜、耗電低、且為100％數位式，且可建構於未來的單晶片數位行動電話中。數位影像感測器預期將依照莫爾定律（Moore's Law），關鍵性參數之效能如解析度、能量消耗、定點更新頻率敏感度（position update frequency sensitivity）每18個月將會倍增。與類比元件競爭下，觸控螢幕技術無法跟上品質發展的進度。

1.2 CCD與入射光線信號及周遭光線同步

為在最佳信號/雜訊比的條件下擷取出最大可能的的信號，軟體將CCD調整成與光源射出信號完全相同之頻率。觸控筆與CCD調整成與區域電極網柵（local electric grid net）同步之頻率。

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五、發明說明（17）

1.3 CCD使螢幕亮度（luminance）與周遭光線相匹配

CCD量測周遭光線並設定適當的螢幕亮度。此特性可最佳化螢幕亮度成最小量以節省耗能。

1.4 螢幕覆蓋光學元件（25）做為內部與外部觸控螢幕

O-pen技術係利用進入螢幕上方或下方之穿透層光線之數位影像。假若光線角度大於布魯斯特角（Brewster angle），則可通過大部分的光線；假若光線角度小於布魯斯特角，則會大部分的光線會彈開表面。僅接近螢幕覆蓋（25）-請參閱第1-3圖-與發射光源如觸控筆端點（1）間之光學接觸可讓光線穿透此螢幕覆蓋（25），因布魯斯特角的緣故，光線在螢幕覆蓋（25）內前進直到被吸收為止。在功能上，觸控螢幕可配至於穿透式螢幕覆蓋（25）之下方或上方，甚至360度環繞不平整之物體（irregular object）。

第1圖係顯示顯示裝置或監視器65，具有做為觸控螢幕之觸控板。

利用O-pen技術，對螢幕覆蓋（25）稍加改變，或簡單地改良軟體亦/或電子元件，即可整合入如行動端點（mobile terminal）等裝置。

此螢幕覆蓋（25）包括堅硬的穿透層，如PET，以及軟式、防刮的上層，如矽層。與阻抗式觸控螢幕相較下，在功能上此螢幕覆蓋（25）具有絕佳的穿透性。其他延續的特性如高亮度（brilliance）、高流明（luminance

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五、發明說明（18）

）、廣可視角、以及低失真性，同時因低耗能，故可減低電池容量，在設計上可減少容積的需求。

一主要凹面鏡（10）-見第11圖-配置於螢幕的每一邊，將入射光線從螢幕的廣角投射至左與右第二凹面鏡（13），將光線投射出預設區域，如CCD。主要凹面鏡（10）之每側垂直平面亦為凹型鏡面，可使入射光線以最小角度反射至第二凹面鏡（13）。此主要凹面鏡（10）將光線聚焦，並作為光信號放大器與2D至1D的轉換系統，此僅需一CCD外一小型延伸區域即可達成。

鏡面上覆蓋有選擇性紅外線（IR）鏡面層與透鏡（lens）（27、28、29），看似著色的內部螢幕可僅讓預設的紅外線波長穿越。

螢幕覆蓋（25）下方則覆蓋選擇性紅外線鏡面層，避免螢幕覆蓋（25）與螢幕間因光學接觸而產生不預期的光學效應。

作為投射光線至CCD之兩組第二凹面鏡（13）下方則無紅外線鏡射層覆蓋於螢幕覆蓋（25）上。

在單一模組中利用兩次模組製程可製造螢幕覆蓋（25），第一製程可形成含所有光學元件之第一硬塑膠層，而最後製程可形成軟表層。此螢幕覆蓋（25）邊緣具讓光線通過之角度，且除配置用以傳送光線至光學系統之鏡面（30、31、32）-請參閱第14圖-與透鏡（27、28、29）處外，皆覆蓋吸收層。

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五、發明說明（19）

1.5 三角量測狹縫與攝影功能狹縫

薄膜（19）-請參閱第9-10圖-至少一列狹縫位於可辨識的「條碼型」圖案（20）中，左右皆排列出線條，以及攝影功能之狹縫置於第二凹面鏡下方。每一狹縫產生由螢幕覆蓋（25）進入光線的圖像。因我們注意在點（23）上，故多重曝光並不會造成問題，且因每一狹縫加入一可視角度，所以增加了可得解析度。

若稍微傾斜狹縫使光線通過，將可藉由稍微錯位（dislocate）的CCD各互異列而接收到光線。此錯位方法產生較佳的信號以作為三角量測之用。因圖案稍微與下方列與上方列不同，故每一列需個別分析。進行分析時，軟體利用找尋每側第一黑色像素，也可利用峰值強度（peak indensity）找尋像素的方式，決定出CCD上光線強度分佈延伸的情形。接著，軟體會比對所有列以找出具有最高峰值強度之列，並藉由發現接近光強度分佈之最黑像素的方式決定正確的光線強度分佈延伸的情形。在來自傳送層（25、26）光線照射下，每一列上的每一狹縫後皆須完成光強度分佈之分析。光強度分佈之大型/中型/小型延伸情形對應大型/中型/小型之接觸區域，或因具/或不具內部光線發射器之觸控筆下壓所造成凹型的軟質表面（26）。最高峰值則對應接觸區域之中央區域。

用於右與左通道與攝影之三組分離穿透式間隔片（separate transparent spacing piece）（45、46、47）置於具狹縫之薄膜（19）下方。CCD利用如矽連接至間

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五、發明說明（20）

隔片（45、46、47）-請參閱第11圖-在遺失最小量的光資訊前提下，達到最佳穩定度、震動保護、以及光學接觸。

攝影透鏡（22）之下方覆蓋IR反射材質，利用如矽與攝影狹縫與CCD（21）上之螢幕覆蓋（25）連結，使CCD可偵測數位三角量測定位之光線，以及偵測光線而產生數位圖像。

1.6 被動式內部觸控螢幕

在螢幕覆蓋（25）邊緣-請參閱第1-3圖-對應CCD之一側，光線以接近平角（straight angle）的角度經透鏡送入上部軟螢幕覆蓋層（26）。兩層間些微的反射係數差異產生了布魯斯特角（Brewster angle）。任何物件如手指、筆等物品下壓上部軟層時，會產生凹陷使鏡射光束朝下行進，所有光束不會超越螢幕覆蓋（25、26）間之布魯斯特角，空氣仍陷於螢幕覆蓋（25、26）中，並傳送至CCD由軟體進行三角量測。

光線可具有顏色選擇性，對應選取的濾波器可讓特定光線通過狹縫而達成此項特定功能。

1.7 被動式外部2D觸控螢幕

兩廣角透鏡（27、28）-請參與第14圖-置於內部螢幕覆蓋（25）之邊緣，且兩凹面鏡（30、31）位於投射自廣角透鏡入射光線之對應側。凹面鏡（31）自CCD反射由最遠透鏡（28）經位於一般主凹面鏡（10）下方或上方之特

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五、發明說明（21）

殊主凹面鏡（60）之光線至第二級（13），並經含狹縫（19）之薄膜至CCD。此特殊主凹面鏡（60）之塗佈僅反射來自外部提供信號波長之光線，而各列CCD，其用以偵測外部提供信號且具有濾波器，僅接收與外部提供信號相類似波長之光線。最接近CCD之凹面鏡將來自最近廣角透鏡（27）之光線直接反射至最近第二級之凹面鏡（10），並通過含狹縫（19）之薄膜至CCD。調整此通道（canal）之光學裝置以覆蓋所需的外角，如90度，以建立外部觸控螢幕，此可用於小範圍（close range）之手寫區域（52）或白板尺寸的觸控螢幕（51）上-請參閱第16圖。

1.8 主動式外部2D觸控螢幕

若主動式螢幕前或後反射至如白板或桌面，外部觸控螢幕則成為主動式-請參閱第16圖。為準確地使用主動式外部2D觸控螢幕，必須進行測試程序以建立反射螢幕相對內建於外部觸控設備之裝置的相對位置。讓螢幕反射出觸控點，接著讓使用者利用主動式觸控筆（1）觸控此觸控點，軟體依此進行三角量測並計算相對位置。在內建於行動通信設備或小範圍通信設備上，使用者可於主動式外部2D觸控螢幕分享描繪與投射之影像與訊息。此分享過程可透過無線LAN技術如藍牙、IRDA、內部網路、網際網路等方式進行。

1.9 外部3D觸控螢幕

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五、發明說明（22）

配置一組第三廣角透鏡於螢幕覆蓋（25）彎曲90度處可將3D訊息加入三角量測程序中-請參閱第14圖。來自3D廣角透鏡（32）之入射光線利用最近2D廣角透鏡（31）之方式傳送至CCD。

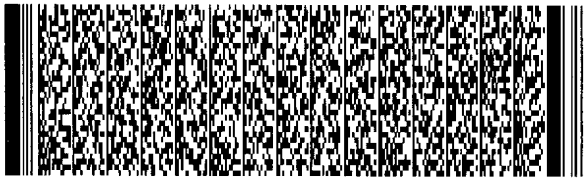
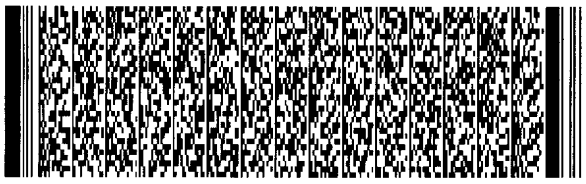
1.10 客戶定義、選擇、或設計之代表圖案（icon）

對被動式或主動式外部觸控螢幕而言，使用者可將代表圖案置於可視或不可視位置，當觸控時可執行如數位裝置或滑鼠等功能指令。固定的代表圖案可置於桌面，方便桌上型電腦或膝上型電腦執行指令。固定的代表圖案可為如標準鍵盤或任何其他客製鍵盤。任何數位裝置之代表圖案可被顯示（printed）並建立與外部觸控螢幕裝置之相對位置，以結合適當的指令。

當點選接觸到電話簿時，代表圖案可顯示為一肖像圖。此「接觸」代表圖案（36）-請參閱第6圖-為一環狀，一般相關資訊之接觸係順時鐘排列，對應之指令亦相似如此，故利用觸控筆簡單的點選可啟動如SMS、MMS、郵件、傳真等。代表圖案可具有外環以建立更多的指令結構。

1.11 鍵盤、滾輪、與搖桿

鍵盤（35）-請參閱第4-8圖-可封裝於軟質、堅固、高感度、以及穿透性材質如矽或聚胺酯（polyurethane）中。鍵盤係封裝於觸控螢幕之吸入墊上。紅外線光線送入

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五、發明說明（23）

鍵盤，直接通過螢幕覆蓋（25）進入吸入墊（43）。鍵盤係以光擴散微粒封裝製成。部分覆蓋紅外線鏡射層（41）以光學式截斷鍵盤與螢幕覆蓋（25）之連接。每一按鍵置於螢幕覆蓋（25）上方，當下壓時可光學式地經由觸控點（40）連接螢幕覆蓋（25）。入射光線可被量測並進行三角量測。觸控點（40）的配置如為環形者可做為搖桿或滾輪之功能。使用者可下壓或拉動觸控點（40）並傳送信號。此按鍵光學接觸點為3D設計，可確使壓力增加時加大接觸區或形成特殊圖形。將偵測與分析做為反應信號，並根據形狀結合特殊之指令。此設計允許客製商品可選擇在鍵盤敲擊，並在按鍵下方製造出圖案。鍵盤可具有觸覺特徵之外觀，幫助視覺障礙者可方便地使用該產品。製造者或個別使用者之代表圖案可嵌於鍵盤上，其為觸控螢幕下方無主動螢幕之區域。

鍵盤上觸控感的敲擊可結合軟體與聲音亦/或視覺反饋，將合適的對話結構（dialog structure）運用於各類裝置與產品製造出一介面，重要的是不需依賴直接地視覺控制。此類觸控感介面可控制如車輛之周邊功能，例如溫度、濕度、收音機、CD或MP3放音機、照後鏡之定位、光線等等。

1.12 主動輸入至內部觸控螢幕之觸控筆

主動輸入至內部觸控螢幕之觸控筆（1）具有一內部光源，此觸控筆之端點具化學性塗佈以結合一分子厚度之

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五、發明說明（24）

水，進而增加光學接觸並確保使用時具低摩擦特性。觸控筆之端點完全為圓弧狀，不論使用者選擇如何傾斜此觸控筆，皆可確保形成相同地接觸面積。觸控筆接觸內部觸控螢幕之軟質上表層時（26）會形成一小凹陷（15），其作用類似廣角透鏡可增加螢幕覆蓋（25、26）中擷取入射光線之能力。

此觸控筆具光發射器（63），由按鍵（62）致動之控制器（61）控制其波長亦/或強度。

1.13 輸入至外部觸控螢幕之觸控筆

一般觸控筆或白板標記裝置（white board marker）內建壓力感測接觸裝置，當觸控筆或標記裝置抵住書寫表面時將啟動內建紅外線光源，廣角透鏡（27、28）將偵測此射出光線並以軟體進行三角量測。

此觸控筆亦可如前所述改變其強度/波長。

1.14 讀取條碼之觸控筆

掃瞄條碼（5）之觸控筆-請參閱第15圖-包括有一共軸管（co-axial pipe），分割為一中央光線射出管（8），經由光線導引連接至紅外線光源；一光線遮蔽管（7），具條狀化光線環（stripped light ring）（18），使擴散管中之光線可被廣角透鏡（27、28）捕捉到。當使用者在條碼上方豎直觸控筆掃瞄時，條碼讀取器係靠於其外管上。條碼交錯以變化光線色彩，並反射光束進入擴散

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管，經由廣角透鏡偵測到光環。在三角量測定位中，陰暗/光線信號為交互作用，因可對速度與暗光兩部分分析，使軟體可以適當地讀取條碼內容。使用者在掃瞄條碼前區點觸其邊角以加強條碼讀取的準確性。此舉可使軟體決定條碼讀取器觸控筆讀取條碼之方向與速度。

1.15 利用0-pen點選產品與資訊

每一具有獨一條碼辨識之物品皆賦予內容資訊。當使用者在外部觸控螢幕中讀取此獨一條碼辨識時，會被導引至回答是否願意繼續取得對應此條碼之主網頁（homepage）。若使用者接受讀取之要求，條碼資訊之主網頁會載入裝置中並進行後續之程序（可於線上完成）。使用者利用觸控筆於外部觸控螢幕上點選此物品之邊角（corner）做為標記。此時裝置中包含有指引至任何特定位置之資訊，以及任何特定位置之相對位置。使用者可點選出任何位置以存取此特定位置之資訊與指令。例如，一位女士駕車通過一飯店之圖片之資訊可包含此女士之服裝、飯店、以及如何訂購上述物品。任何標的如商品、報紙、雜誌等可經網際網路並透過此方式取得無限的資訊。使用手冊、出處、進一步詳細的後勤維護（logistics）、冷卻鍊資訊（cooling chain information）、健全狀況警示（health warning）、法律事項、測試方案（test scheme）、內容列表、價格、商家保證等皆可成為上述資訊之一部份。使用者可事先進入個人主網頁，並進入任何

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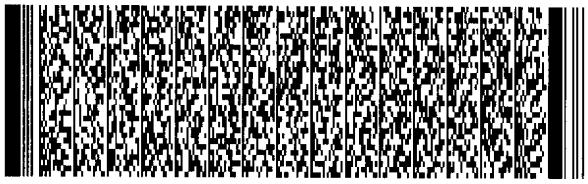
其欲取得的且匹配的資訊設定中。此設定可為關於個人購物之喜好資訊，如身材尺寸、過敏原風險評估資料、忌口食物、財務狀況、購物清單、禮品清單、各類興趣之資訊需求等。所有商品之資訊與選擇之資訊可儲存於虛擬購物車中，方便使用者決定購買時取得資訊。部分個人設定可連接至軟體商並自動地搜尋網際網路上更廉價之商品供應者。使用者可據此將購物與相關資訊系統化以節省開銷並增進消費品質。

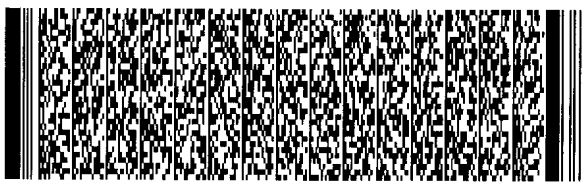
1.16 主動式信號供應器之單一辨識功能

所有主動式信號供應器具有單一的識別方式，即為可被軟體辨識之重複的特定振幅圖案（37）。此方式適用於數位使用者一起使用同一螢幕，或需區分顏色或其他信號供應器之特定元件時。裝置僅允許單一識別資訊之特定信號供應器依據主要使用者設定取得相關資訊。

1.17 校準主動信號供應器

工業用種類係一次形成，且適用於0-pen觸控螢幕中所有點接觸上的漸增壓力。壓力會增加觸控螢幕上光學接觸之面積亦/或改變接觸區域之形狀。接著，軟體會儲存因壓力所形成之形狀的資訊，並可確認此壓力。此舉使軟體可利用相對應的方式顯示所有主動信號供應器。軟體可進一步內建如模擬不同觸控筆筆端之書寫工具。





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五、發明說明（27）

1.18 反應準確可確保高品質之數位簽章

高品質手寫之量測包括特定之觸控筆端點之速度變化與壓力改變，再加上信號供應器之獨一振幅圖案（37）辨識，讓使用者每次需簽章確認時加強數位簽章的可信度。數位簽章之安全性可因0-pen觸控螢幕裝置而大幅提昇，信號供應器、位址、個人、簽章、以及內建相機所拍攝之圖像皆可獲得確認。0-pen技術之裝置可同時在一般購物與在網路交易時做為額外的安全性信用卡。

此特徵之整體操作係結合在簽寫時增加壓力而擴張上述觸控筆端之特性。所以不僅跟實際簽寫的位置有關，亦與位移之速度有關，且其所施的壓力可進一步地辨識簽寫者。

1.19 校準觸控螢幕

置於觸控螢幕上的係為熟知的簡單外型，且可用觸控筆描繪出此型式。假若軟體可三角量測出與外型相關之描繪影像，則觸控螢幕為正確的。若否，則軟體可重置（reset）角度並利用精確的光學元件予以補償（compensate）。此使產品準確度提高，而校準僅需在所有生產流程進行一次即可。

2. 軟式鍵盤、滾輪、與搖桿（joystick）之其他型式

鍵盤可由硬塑膠封裝取代整片為軟式的鍵盤，其可形成小接觸區域，適合於上部軟層（26）中產生小型凹陷，

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五、發明說明（28）

使光束經傳送層（25、26）之下方硬質部分與上方軟質部分上下反射至CCD。此鍵盤具有堅硬的支撐結構以分散傳送層（26）上部大區域所承受之壓力，抵抗意外的凹陷，以及後續上下反射光束所產生之雜訊。而個別的按鍵則由支撐結構支撐，且僅此類個別按鍵在下壓時可通過支撐結構中之穿越洞，並進入傳送層之上部軟層（26）。滾輪與搖桿可藉由彈性黏著劑如矽與支撐結構相結合。當使用者下壓滾輪外圍按鍵時，一或多個接處區域在傳送層之上部軟區（26）中形成可偵測的凹陷。形成接觸區域可使增加之下壓力加大凹陷，使觸控板與軟體測得一反應信號。在滾輪按鍵上可增加一中央桿，以拉動取代下壓動作，即可形成一搖桿裝置。

3. 辨識主動式供應器之其他型式

若採用彩色CCD或以色鏡或濾波器分離色彩之光學系統，則可同時使用數種不同的觸控筆。每支觸控筆之射出光線具有單一色彩，可利用軟體將各色彩分離。

4. 全像（holographic）光學元件之其他型式

整體光學系統可利用全像生產製程來製造。此可降低產品變異並增加準確性。在存在複雜變異的生產方式中具有較經濟之優勢。

5. 觸控筆端點設計之其他型式

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五、發明說明（29）

軟式觸控筆端點可取代具圓筆端之硬式觸控筆以增加接觸區域。此觸控筆之優點在使用與接觸硬式表面時特別顯著。具羽毛（feather）之觸控筆可降低施於表面與觸控筆筆端之過度壓力所產生之應力。

6. 主動式信號供應器之其他型式

內部光發射器可設置於裝置中以取代主動式信號供應器。結合塗佈反射層之觸控筆後，不需內部光線發射器即可使用非主動式觸控筆。發射的光線最好集中接近於表面，觸控筆僅能反射某一區域或非常接近觸控筆端點之區域。反射式觸控筆（3）可虛擬生產而不需成本，或甚至僅是觸控筆端點之覆蓋層。此外，透光材質構成之收集周圍光線之觸控筆（4）可收集並傳送光線至螢幕覆蓋（25）。

此外，觸控筆可利用熱的型式發射光線，如可經由微波、摩擦、感應、或內建無線主動式加熱的方式進行。

7. 嵌入鍵盤之其他型式

鍵盤之正面（flip）部分可嵌入按鍵或滑入把手（holder）內，或是利用溶劑、接著劑、或以熔接、螺栓等方式固定。

8. 主凹面鏡之其他型式

主凹面鏡（11）可反射但不能放大光線。

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五、發明說明（30）

狹縫或狹縫（19）可置於主鏡面（10）前。

狹縫或狹縫（19）與鏡面（10、13）可與透鏡相結合。

一組廣角透鏡可置於一或多個狹縫前。光線由觸控筆端點直接穿過此透鏡，由內部螢幕邊緣反射之光線利用選色鏡將來自觸控筆之光線分離成兩種色彩，並投射至影像感測器。此舉將在影像感測器上投射至少三個清晰的定義點，使軟體可正確地進行三角量測。

在上方使用更多相互錯位之透鏡可將強解析度。故可使用更多透鏡以及僅覆蓋整體螢幕之較小角度的一或多個狹縫。

9. 第二級凹面鏡之其他型式

光學膠帶（optical tape）（57）可於狹縫（19）將光線集中於小部分影像感測器後取代第二集鏡面。

10. 觸控螢幕之部分放大

特定部分具較平坦或更曲面之主凹面鏡（10）會產生角差（angle-differentiated）解析度，可補償如遠角之較低解析度。

11. 多狹縫之其他型式

部分單色（monochrome）影像感測器之數量為彩色影像感測器之四倍，故可將強解析度。

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五、發明說明（31）

除多狹縫或組合多狹縫的方法之外，影像感測器可採用些微錯位之像素列（row of pixels）（39）。此錯位可為如1/10的像素寬度。此舉可於每列間製造出些微的差距以增加解析度。

多狹縫可予以色彩分離處理並於影像感測器前方配予一特定色彩濾波器。此可與內部觸控螢幕之色彩選擇反射側邊結合以增加解析度。

12. 條碼讀取器之其他型式

可利用內建攝影器、或連接至攝影器、或無線攝影器拍攝肉眼無法辨識之含微型圖案的條碼。可利用可見光波長外之光譜的墨水列印出此不可見的圖案，或結合圖案與光柵完成。此類不可見光之方式可增加虛擬設計的機會，且仍可藉由攝影器掃瞄或建立於標準右上角位置的方式偵測到條碼。

13. 2D未降至1D之影像感測器

透鏡罩（lens cap）可確使影像感測器僅接收來自觸控筆筆端之光線。紅外線濾波器則確保當未使用觸控螢幕時，來自觸控螢幕之光線不會干擾到拍攝之影像。更先進之透鏡罩可根據攝影快門來製造，其可關閉來自攝影鏡頭之光線，使影像感測器在新位置間交替地攝影。

任何熟習此技藝者，在不脫離本發明之精神和範圍內，當可作更動與潤飾，因此本發明之保護範圍當視後附

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五、發明說明 (32)

之申請專利範圍所界定者為準。



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圖式簡單說明

第1-3圖係顯示彈性觸控筆端點與彈性層不同的選取狀態；

第4圖係顯示一重疊鍵盤（overlay keyboard）；

第5圖係顯示用於第4圖鍵盤之轉盤搖桿；

第6圖係顯示本系統之新型代表圖像（icon）與導航（navigation）；

第7與8圖係顯示不同型式之重疊鍵盤；

第9圖係顯示運用細縫/狹縫的狀態；

第10圖係顯示細縫/狹縫的功能；

第11與12圖係顯示本發明較佳之設定；

第13圖係顯示本發明中採用CCD之特殊狀態；

第14圖係顯示較佳實施例中觸控板外部用以3D定位之狀態；

第15圖係顯示觸控板外部作為條碼讀取器之狀態；以及

第16圖係顯示較佳實施例中觸控板外一白板用以取得資訊之狀態。

符號說明：

1～觸控筆端點；　3～反射式觸控筆；

4～收集周圍光線之觸控筆；

5～條碼；　7～光線遮蔽管；

8～中央光線射出管；　10、11、60～主要凹面鏡；

13～第二級；　15～凹陷；

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圖式簡單說明

18～條狀化光線環；　19～薄膜；
20～「條碼型」圖案；21～CCD；
22～攝影透鏡；　23～點；
25～穿透式螢幕；　25、26～傳送層；
27、28、29～透鏡；　30、31、32～鏡面；
35～鍵盤；　36～代表圖案；
37～振幅圖案；　39～像素列；
40～觸控點；　41～紅外線鏡射層；
43～吸入墊；　45、46、47～間隔片；
51～觸控螢幕；　52～手寫區域；
57～光學膠帶；　61、64～控制器；
62～按鍵；　63～光發射器；
65～顯示裝置或監視器。

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四、中文發明摘要　（發明名稱：觸控板，觸控板使用之觸控筆及操作此觸控板之方法）

本發明提供一種一種觸控板或觸控螢幕，具有一光傳送裝置，其表面接收如來自觸控筆或比發射之點光線，並沿表面傳送且決定表面上接收此光線之位置。此觸控板由硬質材料製成。表面為彈性材料且光線可進入此彈性元件中。下壓元件時會將光線導入表面做為偵測。彈性元件的表面可配置鍵盤。透鏡或鏡面可接收觸控板/螢幕外之光線以決定位置，亦可使用於觸控板外部之工作平面，如白板、桌面、或報紙等。

五、（一）、本案代表圖為：第___1___圖

（二）、本案代表圖之元件代表符號簡單說明：

1～觸控筆端點；　　25～傳送層；

65～顯示裝置或監視器。

六、英文發明摘要　（發明名稱：A TOUCH PAD, A STYLUS FOR USE WITH THE TOUCH PAD, AND A METHOD OF OPERATING THE TOUCH PAD）

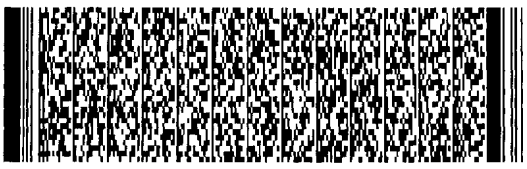
A touch pad or touch screen having a light transmissive means having a surface receiving light, such as from a stylus or pen emitting light at a point thereof, transmitting the light along the surface and determining the position at the surface receiving the light. This touch pad may be made of a hard material. A flexible element is provided on top of the surface and light

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四、中文發明摘要　（發明名稱：觸控板，觸控板使用之觸控筆及操作此觸控板之方法）

六、英文發明摘要　（發明名稱：A TOUCH PAD, A STYLUS FOR USE WITH THE TOUCH PAD, AND A METHOD OF OPERATING THE TOUCH PAD）

transmitted into the flexible element. Depression of the element directs light into the surface for detection. A keyboard may be positioned on the surface of flexible element. Lenses or mirrors may be provided for receiving light from outside the pad/screen for determining a position also outside the pad on a working surface, such as a white board, a desk, or a newspaper.



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六、申請專利範圍

1. 一種觸控板，包括：

一組光傳送裝置，具有一第一表面以接收光線，該光傳送裝置於內部沿該第一表面傳送所接收之光線；

一第一與一第二裝置，用以接收該傳送裝置沿該第一表面傳送所接收之光線，並輸出複數相對應之信號；以及

一組決定裝置，依據來自該接收裝置之光線為基礎，以決定該第一表面上已接收光線之位置。

2. 如申請專利範圍第1項所述之觸控板，其中還包括一顯示裝置或監視器，該監視器或顯示裝置藉由該光傳送裝置之該第一表面所提供或顯示之資訊，進而予以定位（position）。

3. 如申請專利範圍第1或2項所述之觸控板，其中該光傳送裝置至少包括一平面光傳送元件，其表面具有一光傳送塗佈（coating）或材料層，其一上表面則形成該光傳送裝置之該第一表面。

4. 如申請專利範圍第3項所述之觸控板，其中該平面光傳送元件包括一光傳送顯示裝置或監視器。

5. 如申請專利範圍第1至4項中任一項所述之觸控板，其中還包括一彈性元件配置於該第一表面，以及一光射器以傳送光進入該彈性元件，該彈性元件具有一部份向該第一表面下壓，並使光線自該下壓部分導入。

6. 如申請專利範圍第5項所述之觸控板，其中該彈性元件具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之

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六、申請專利範圍

複數第二區域，其於一第一無下壓位置上與該第一表面具有一距離，以及於一第二下壓位置上緊鄰該第一表面。

7. 如申請專利範圍第6項所述之觸控板，其中該彈性元件位於該等第二區域之間，具有一組裝置以防止光線自該彈性元件傳送至該第一表面。

8. 如申請專利範圍第5項所述之觸控板，其中還包括一組下壓裝置，具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上對該彈性元件無任何程度之下壓，以及於一第二下壓位置上下壓該彈性元件。

9. 如申請專利範圍第8項所述之觸控板，其中該下壓裝置包括至少一堅硬元件，該堅硬元件可根據該等下壓元件之一剩餘部分而旋轉，該堅硬元件於其第一側具有複數個該等第一區域，且於其第二側具有複數該等下壓元件。

10. 如申請專利範圍第1至9項中任一項所述之觸控板，其中還包括一元件，具有一第一側，該第一側具有預設的複數第一位置以與一使用者結合（engage）；以及一第二側，具有對應該等第一位置之複數第二位置或區域；其中，當一第一位置與使用者結合時，於該第二側上定位之對應之該第二位置會發射光線，並被該第一表面接收。

11. 如申請專利範圍第1至10項中任一項所述之觸控板，其中該接收裝置包括一組裝置以偵測於至少兩互異區域或點上所接收之光線，該偵測裝置用以決定每一區域或

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六、申請專利範圍

點所測得光線之一入射角。

12. 如申請專利範圍第11項所述之觸控板，其中該偵測裝置包括至少一偵測器，且每一區域或點上具有一組反射裝置或透鏡（len）裝置以偵測該區域或點測得之光線至一至少一偵測器。

13. 如申請專利範圍第1至12項中任一項所述之觸控板，其中該接收裝置包括一組裝置以偵測該第一表面之一預定點上兩互異方向射出之光線，以及包括一組裝置依據光線被偵測之該等方向以決定該預設點之位置。

14. 如申請專利範圍第13項所述之觸控板，其中該偵測裝置包括至少一偵測器與一組反射裝置或透鏡裝置，將該兩互異方向之發射光線導入該至少一偵測器。

15. 如申請專利範圍第11至14項中任一項所述之觸控板，包括至少兩偵測器，其中每一至少為單向偵測器，且具有複數偵測點或區域，配置該偵測器與反射/透鏡裝置，可於至少該一偵測器之互異點/區域上偵測來自該第一表面上兩互異點之光線。

16. 如申請專利範圍第15項所述之觸控板，其中還包括複數狹縫（slot）或細縫（aperture），位於該第一表面之該預設點與該等單向偵測器之間，該等單向偵測器之該等偵測點/區域基本上至少為等距，且兩相鄰狹縫之間距非為一偵測器之兩相鄰區域/點間距之倍數（multipla）。

17. 如申請專利範圍第11至16項中任一項所述之觸控

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六、申請專利範圍

板，其中至少一該偵測器為一CCD偵測器。

18. 如申請專利範圍第17項所述之觸控板，其中該CCD偵測器為一兩向偵測器，具有複數列之複數偵測點/區域，且其中每一偵測器包括至少一列該CCD。。

19. 如申請專利範圍第18項所述之觸控板，其中還包括一組裝置以偵測該觸控板周圍導入其他複數列之該CCD的光線。

20. 如申請專利範圍第11至19項中任一項所述之觸控板，其中配置一濾波器裝置或該反射/透鏡裝置以傳送僅含一預設波長間隔之光線。

21. 如申請專利範圍第1至20項中任一項所述之觸控板，其中該觸控板還包括一觸控筆（stylus）或筆從該觸控板之一點上發射光線，當該觸控筆或筆接觸亦/或於該第一表面經轉換後，將光線傳送至該該光傳送裝置。

22. 如申請專利範圍第1至21項中任一項所述之觸控板，其中還包括一組裝置以接收該觸控板外部之光線，與該第一表面之一平面傳送光線至該光傳送裝置，該決定裝置決定該觸控板外部光線之發射位置。

23. 如申請專利範圍第22項所述之觸控板，其中該等接收裝置包括至少兩透鏡裝置或鏡片裝置，用以將該觸控板外部光線沿該平面導入該光線傳送裝置。

24. 如申請專利範圍第23項所述之觸控板，其中該透鏡或鏡片裝置形成部分該光線傳送裝置。

25. 如申請專利範圍第23或24項所述之觸控板，其中

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六、申請專利範圍

包括一組裝置利用該傳送裝置至該決定裝置之方式將光線傳送至該光線傳送裝置。

26. 如申請專利範圍第1至25項中任一項所述之觸控板，還包括一觸控筆或筆，其包括：

一第一光傳送通道，係沿該觸控筆或筆之一預設軸；

一組提供光線進入並沿該傳送通道之裝置；

一組輸出來自該傳送通道之光線之裝置；

一接收通道，用以接收來自該傳送通道與被該筆或觸控筆外部反射之光線；以及

一組裝置用以將光線自該接收通道導向該觸控板之該接收裝置。

27. 如申請專利範圍第1至26項中任一項所述之觸控筆，其中該觸控筆具有一組光源提供裝置，以及該觸控筆之一點上之一組發射光源裝置。

28. 如申請專利範圍第27項所述之觸控筆，其中該觸控筆之端點具有彈性。

29. 如申請專利範圍第27或28項所述之觸控筆，其中該光源提供裝置為一光發射器。

30. 如申請專利範圍第27至29項中任一項所述之觸控筆，其中該光源提供裝置包括一組裝置以接收一組或多組周邊光發射器。

31. 如申請專利範圍第27至30項中任一項所述之觸控筆，其中還包括一組裝置以改變該發射光線之一強度（intensity）亦/或波長，該改變可由一使用者藉由一組

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六、申請專利範圍

控制裝置予以控制。

32. 如申請專利範圍第31項所述之觸控筆，其中該控制裝置包括該觸控筆之一區域，該區域為裸露且供該使用者施予向下壓力，該控制裝置會依裸露並被向下施壓之舉而改變該強度亦/或波長。

33. 一種觸控筆或筆，包括：

一第一光傳送通道，係沿該觸控筆或筆之一預設軸；

一組提供光線進入並沿該傳送通道之裝置；

一組輸出來自該傳送通道之光線之裝置；

一接收通道，用以接收來自該傳送通道與被該筆或觸控筆外部反射之光線；以及

一組用以輸出來自該接收通道之光線之裝置。

34. 一種操作觸控板的方法，包括下列步驟：

提供一組光傳送裝置，具有一第一表面用以接收光線；

於該第一表面接收光線；

將該接收之光線傳沿該第一表面送至該光傳送裝置之內部；

利用一第一與一第二裝置接收該傳送該傳送光線；

自該第一與該第二裝置輸出複數對應信號；以及

根據該等接收裝置之該等信號決定該第一表面上已接收之一位置。

35. 如申請專利範圍第34項所述之方法，其中還包括一顯示裝置或監視器，該監視器或顯示裝置藉由該光傳送

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六、申請專利範圍

裝置之該第一表面提供顯示資訊。

36. 如申請專利範圍第34或35項所述之方法，其中該光傳送裝置至少包括一平面光傳送元件，其表面具有一光傳送塗佈或材料層，其一上表面則形成該光傳送裝置之該第一表面。

37. 如申請專利範圍第36項所述之方法，其中該平面光傳送元件包括一光傳送顯示裝置或監視器。

38. 如申請專利範圍34至37項中任一項所述之方法，其中該觸控板還包括一彈性元件配置於該第一表面，以及一光射器以傳送光進入該彈性元件，該彈性元件具有一部份向該第一表面下壓，並使光線自該下壓部分導入。

39. 如申請專利範圍第38項所述之方法，其中該彈性元件具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上與該第一表面具有一距離，以及於一第二下壓位置上緊鄰該第一表面。

40. 如申請專利範圍第39項所述之方法，其中還包括一步驟，係於該等第二區域之間防止光線自該彈性元件傳送至該第一表面。

41. 如申請專利範圍第38項所述之方法，其中該觸控板還包括一組下壓裝置，具有一第一側，包含複數預設第一區域以朝該第一表面下壓；以及一第二側包含與該等預設第一區域相對應之複數第二區域，其於一第一無下壓位置上對該彈性元件無任何程度之下壓，以及於一第二下壓

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六、申請專利範圍

位置上下壓該彈性元件。

42. 如申請專利範圍第41項所述之方法，其中該下壓裝置包括至少一堅硬元件，該堅硬元件可根據該等下壓元件之一剩餘部分而旋轉，該堅硬元件於其第一側具有複數個該等第一區域，且於其第二側具有複數該等下壓元件。

43. 如申請專利範圍34至42項中任一項所述之方法，其中該觸控板還包括一元件，具有一第一側，該第一側具有預設的複數第一位置以與一使用者結合；以及一第二側，具有對應該等第一位置之複數第二位置或區域；其中，當一第一位置與使用者結合時，於該第二側上定位之對應之該第二位置會發射光線，並被該第一表面接收。

44. 如申請專利範圍第34至43項中任一項所述之方法，其中該偵測步驟係偵測於至少兩互異區域或點上所接收之光線，該偵測步驟決定每一區域或點所測得光線之一入射角。

45. 如申請專利範圍第44項所述之方法，其中該觸控板包括至少一偵測器，該方法包括一偵測步驟，於每一區域或點上具有一組反射裝置或透鏡（len）裝置以偵測該區域或點測得之光線至一至少一偵測器。

46. 如申請專利範圍34至45項中任一項所述之方法，其中該偵測與決定步驟係偵測該第一表面之一預定點上兩互異方向射出之光線，以及依據光線被偵測之該等方向以決定該預設點之位置。

47. 如申請專利範圍第46項所述之方法，其中該觸控

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六、申請專利範圍

板包括至少一偵測器與一組反射裝置或透鏡裝置，將該兩互異方向之發射光線導入該至少一偵測器。

48. 如申請專利範圍第44至47項中任一項所述之方法，其中該觸控板包括至少兩偵測器，其中每一至少為單向偵測器，且具有複數偵測點或區域，配置該偵測器與反射/透鏡裝置，可於至少該一偵測器之互異點/區域上偵測來自該第一表面上兩互異點之光線。

49. 如申請專利範圍第48項所述之方法，其步驟還包括提供複數狹縫或細縫，位於該第一表面之該預設點與該等單向偵測器之間，該等單向偵測器之該等偵測點/區域基本上至少為等距，且兩相鄰狹縫之間距非為一偵測器之兩相鄰區域/點間距之倍數。

50. 如申請專利範圍第44至49項中任一項所述之方法，其中該觸控板包括一兩向CCD偵測器，具有複數列之複數偵測點/區域，且其中該偵測步驟包括利用一或複數該等列之該等偵測點/元件以偵測經該傳送裝置傳送之光線。

51. 如申請專利範圍第50項所述之方法，其步驟還包括偵測該觸控板周圍導入其他複數列之該CCD的光線。

52. 如申請專利範圍第50或51項所述之方法，其步驟還包括傳送僅含一預設波長間隔之光線。

53. 如申請專利範圍34至52項中任一項所述之方法，其步驟還包括提供從一觸控筆（stylus）或筆一點上發射光線，當該觸控筆或筆接觸亦/或於該第一表面經轉換

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六、申請專利範圍

後，將光線傳送至該該光傳送裝置。

54. 如申請專利範圍34至53項中任一項所述之方法，其中還包括下列步驟：

接收該觸控板外部且至少與該第一表面平行之一平面上之光線；

傳送該光線進入該光傳送裝置；

該決定步驟包括決定該觸控板外部光線發射之一位置。

55. 如申請專利範圍第54項所述之方法，其中還包括提供少兩透鏡裝置或鏡片裝置，用以將該觸控板外部光線沿該平面導入該光線傳送裝置。

56. 如申請專利範圍第55項所述之方法，其中該提供該光傳送裝置與該透鏡或鏡片裝置之步驟包括構成該光傳送裝置與該透鏡或鏡片裝置成為一單一元件。

57. 如申請專利範圍第55或56項所述之方法，其中還包括下列步驟：利用該傳送裝置至該決定裝置之方式將光線傳送至該光線傳送裝置。

58. 如申請專利範圍第54項所述之方法，其中還包括轉化（translate）一觸控筆或筆之步驟，包括：

一第一光傳送通道，係沿該觸控筆或筆之一預設軸；

一組提供光線進入並沿該傳送通道之裝置；

一組輸出來自該傳送通道之光線之裝置；

一接收通道，用以接收來自該傳送通道與被該筆或觸控筆外部反射之光線；以及

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六、申請專利範圍

一組用以將光線自該接收通道導向該觸控板之該接收裝置之裝置；

一表面具有改變光反射之複數區域，該光線或該觸控筆將強度變化之光線導向該觸控板；

其中，該決定步驟包括決定來自光強度變化之資訊。

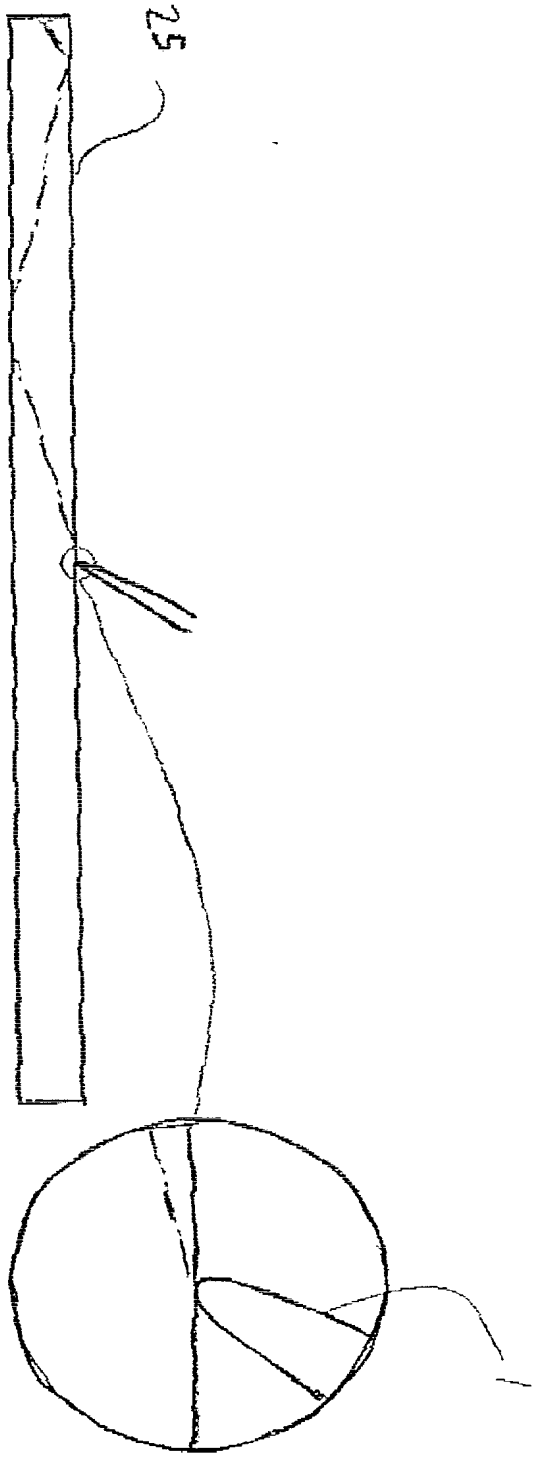
59. 如上述所有申請專利範圍第34至58項中任一項所述之方法，其中包括提供利用一觸控筆或筆於該第一表面上提供光線，還包括改變該發射光線之一強度（intensity）亦/或波長，該改變可由一使用者藉由一組控制裝置予以控制，且其中決定步驟包括偵測此改變。

60. 如申請專利範圍第59項所述之方法，其中該改變步驟包括該使用者下壓該觸控筆之一區域，該下壓動作促使該光強度亦/或波長發生變化。

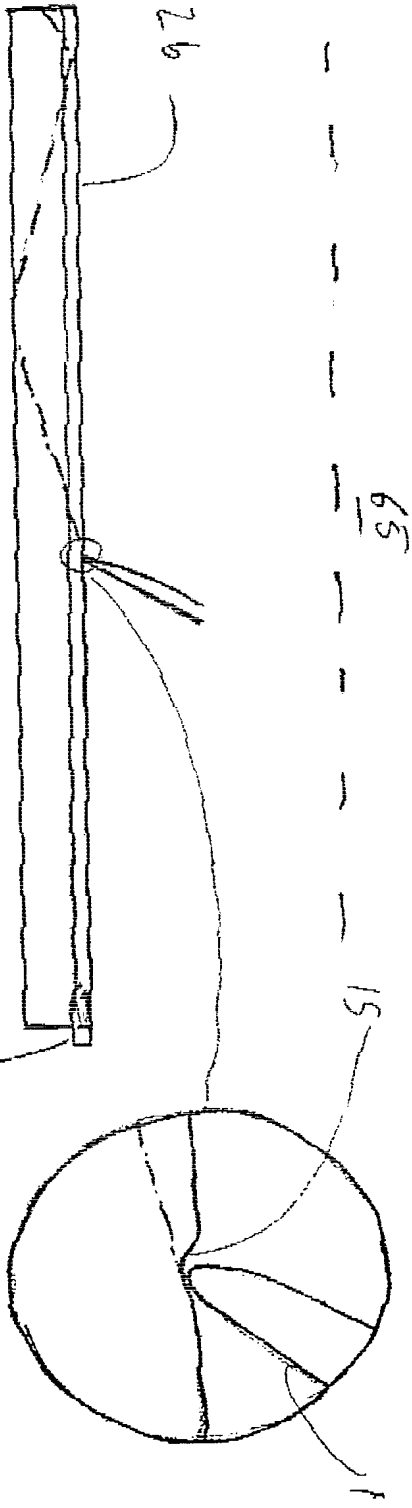
Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 473

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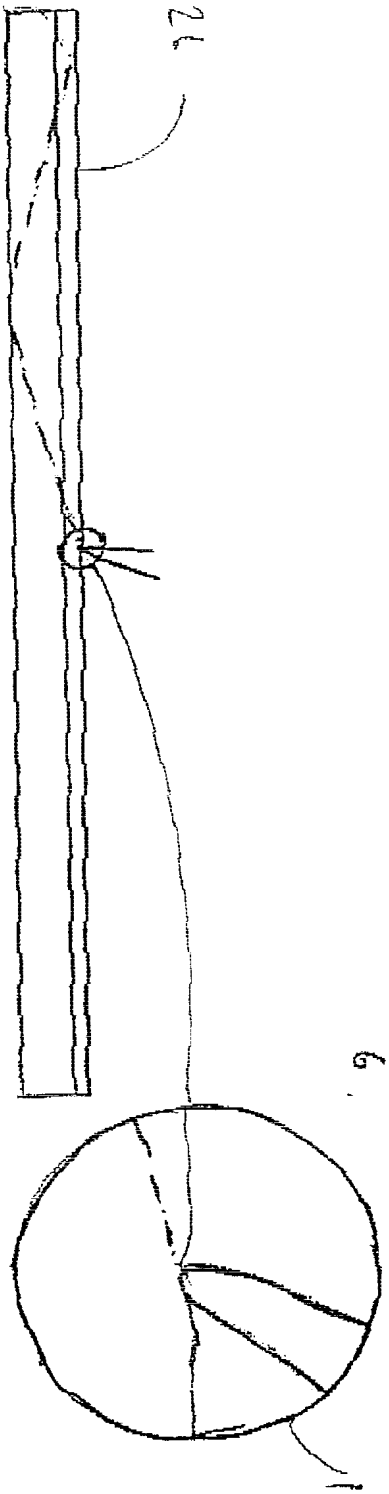
第 1 圖



第 2 圖



第 3 圖



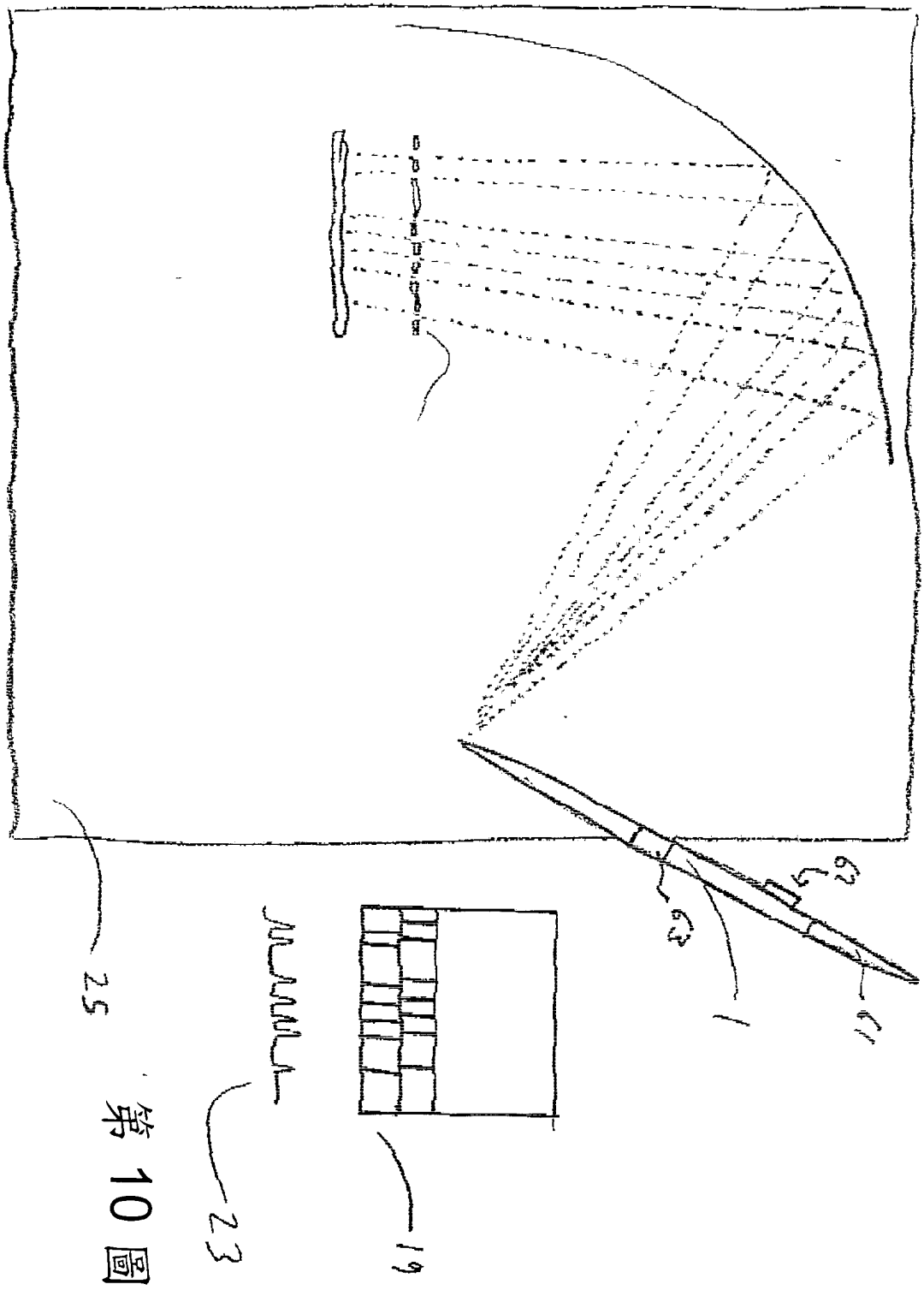
第 4 圖

第 5 圖

第 6 圖

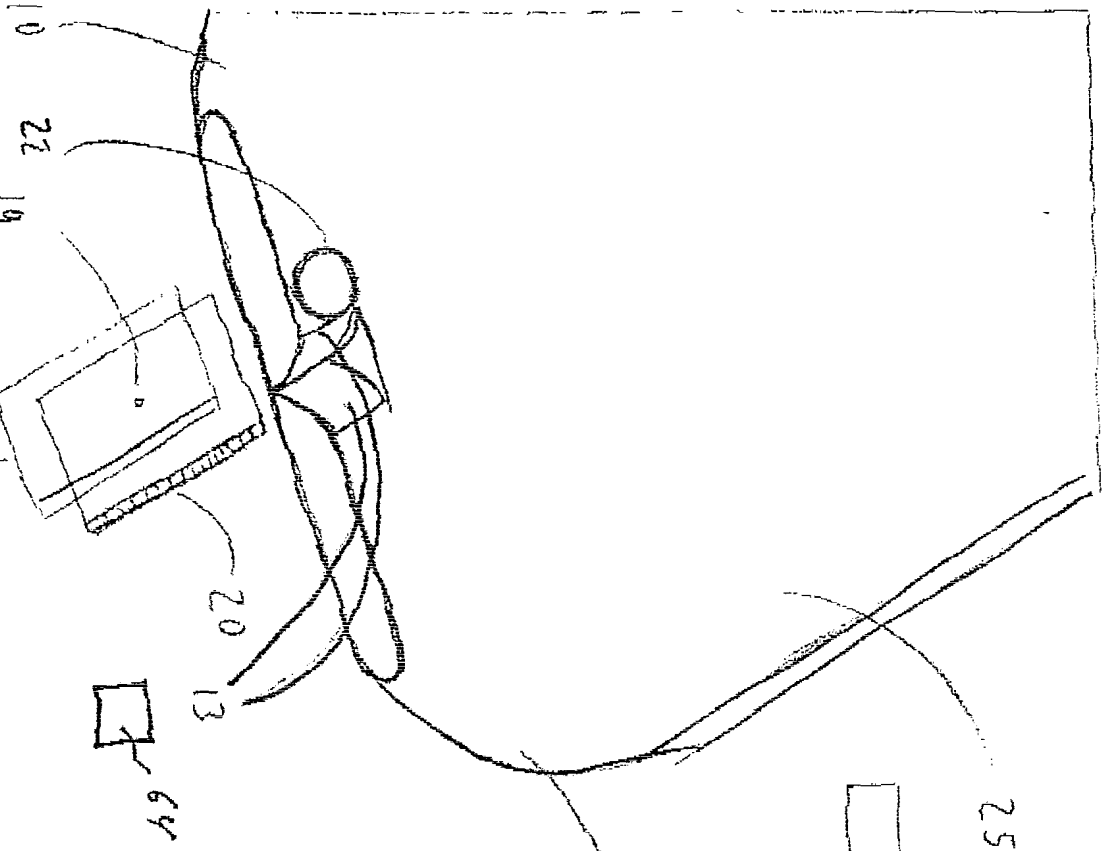
第 7 圖

第 8 圖

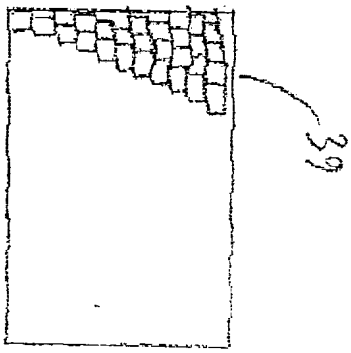


第 9 圖

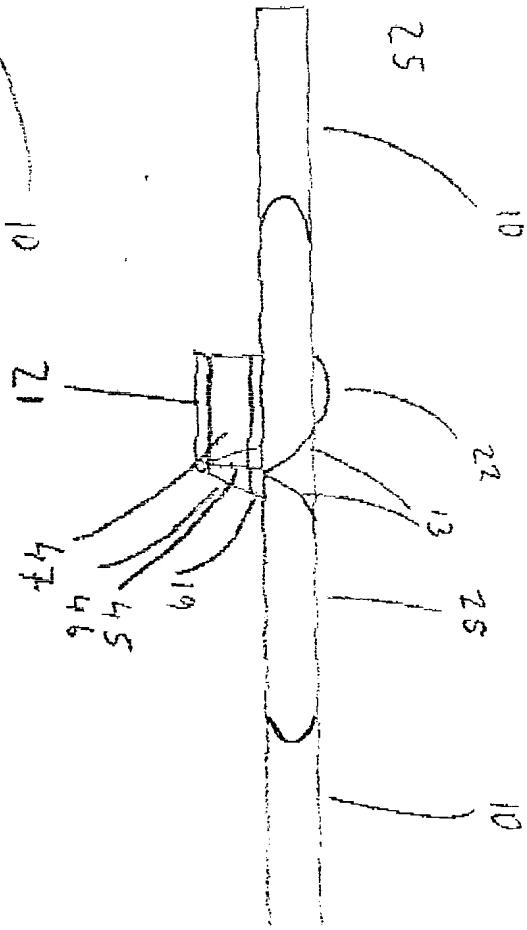
第 10 圖



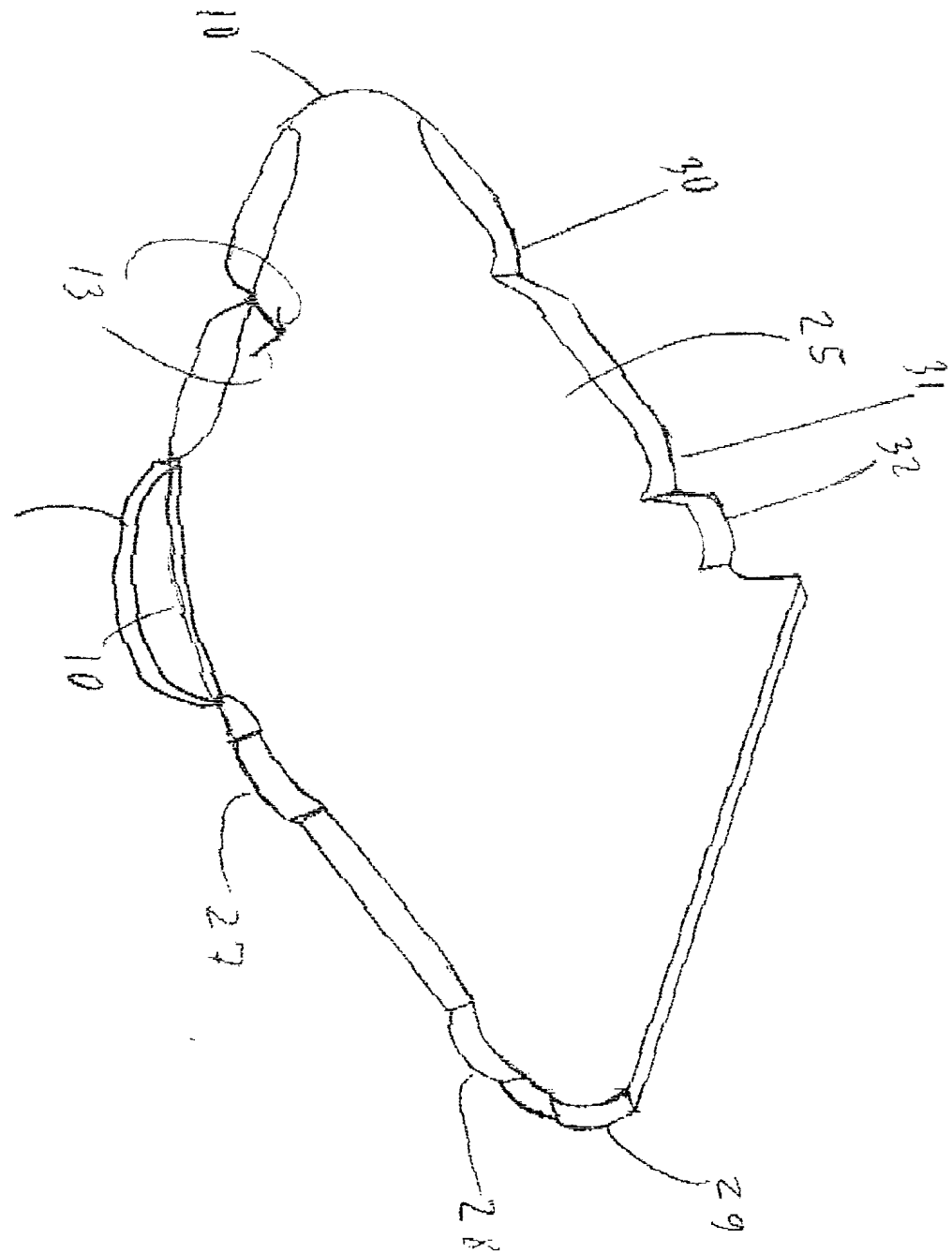
第 11 圖



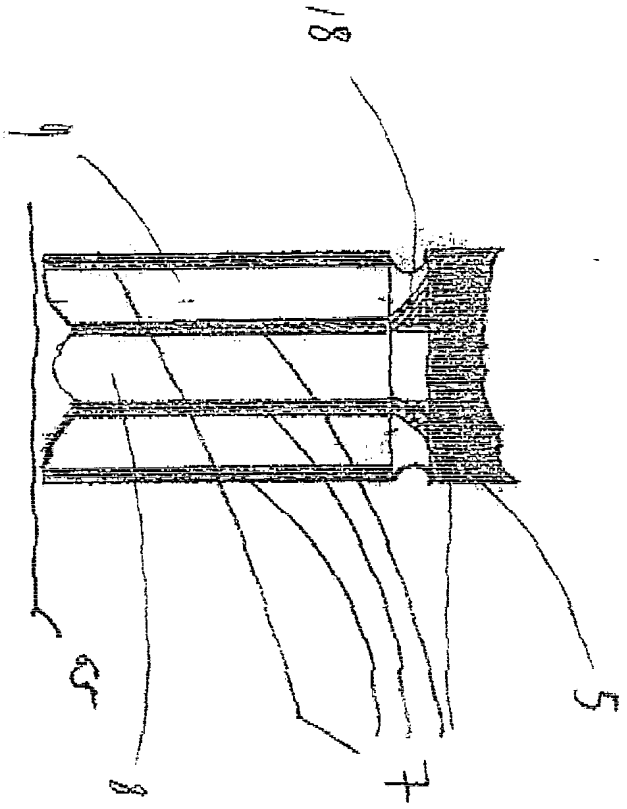
第 13 圖



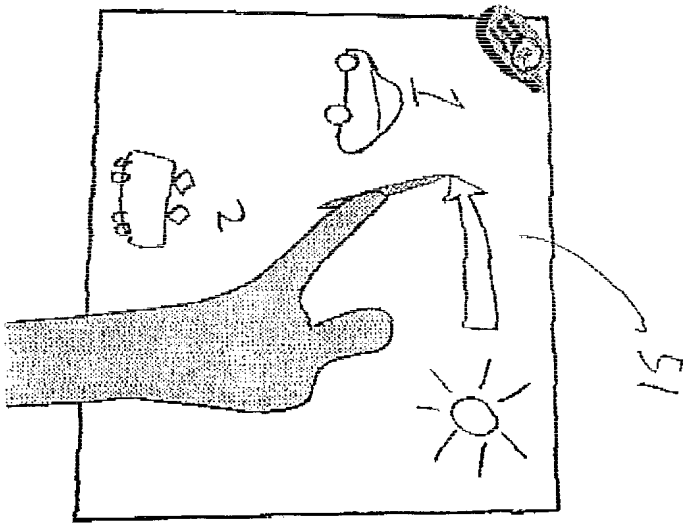
第 12 圖



第 14 圖



第 15 圖



第 16 圖

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Application No.	:	15/047,013
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Art Unit	:	2183
Docket No.	:	940131.442C4
Date	:	March 15, 2016

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

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

Commissioner for Patents:

In accordance with 37 C.F.R. 1.56 and 1.97 through 1.98, Applicant wishes to make known to the U.S. Patent and Trademark Office the references set forth on the attached Information Disclosure Statement. Copies of cited U.S. patents and published patent applications are not required and accordingly have not been provided. Copies of any other cited references are enclosed. As to any reference cited, Applicant does not admit that it is "prior art" under 35 U.S.C. §§ 101, 102 or 103. Although the aforesaid references are made known to the Patent and Trademark Office in compliance with Applicant's duty to disclose all information they are aware of which is believed relevant to the examination of the above-identified application, Applicant believes that their invention is patentable.

Please acknowledge receipt of this Information Disclosure Statement and kindly make the cited references of record in the above-identified application.

Applicant believes this Information Disclosure Statement has been timely filed, however, the Director is authorized to charge any fee due by way of this Information Disclosure Statement to our Deposit Account No. 19-1090.

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Respectfully submitted,

SEED Intellectual Property Law Group PLLC

/Shoko Leek/
Shoko I. Leek
Registration No. 43,746

SIL:dks

Enclosures:
Information Disclosure Statement
Cited References (3)

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/047,013

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	23 minus 20 =	* 3			OR	x 80 =	240
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 420 =	420
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2260

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

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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/047,013	02/18/2016	2183	2260	940131.442C4	23	4

CONFIRMATION NO. 1066

FILING RECEIPT

500
SEED INTELLECTUAL PROPERTY LAW GROUP PLLC
701 FIFTH AVE
SUITE 5400
SEATTLE, WA 98104

OC000000081120875

Date Mailed: 03/03/2016

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)

Yasuo Oda, Saitama, JAPAN;
Sadao Yamamoto, Saitama, JAPAN;
Yoshihisa Sugiyama, Saitama, JAPAN;

Applicant(s)

Wacom Co., Ltd., Saitama, JAPAN;

Power of Attorney: The patent practitioners associated with Customer Number 00500

Domestic Priority data as claimed by applicant

This application is a CON of 14/542,438 11/14/2014
which is a CON of 12/877,780 09/08/2010 PAT 8963889

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.)
JAPAN 2010-024858 02/05/2010

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

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: 03/02/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/047,013**

Projected Publication Date: 06/09/2016

Non-Publication Request: No

Early Publication Request: No

Title

POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Preliminary Class

712

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

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 484

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 486

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Yasuo Oda	Nonprovisional Application Number (if known):	
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Shoko Leek/	Date February 18, 2016
Name (Print/Typed) Shoko I. Leek	Practitioner Registration Number 43,746

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

☑ *Total of 1 forms are submitted.

Privacy Act Statement

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

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

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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
	Yasuo		Oda	

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

City	Saitama	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o Wacom Co., Ltd.
Address 2	2-510-1 Toyonodai, Kazo-shi
City	Saitama
State/Province	
Postal Code	349-1148
Country i	JP

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Sadao		Yamamoto	

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

City	Saitama	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o Wacom Co., Ltd.
Address 2	2-510-1 Toyonodai, Kazo-shi
City	Saitama
State/Province	
Postal Code	349-1148
Country i	JP

Inventor 3 Remove

Legal Name

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Yoshihisa		Sugiyama	

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

City	Saitama	Country of Residence i	JP

Mailing Address of Inventor:

Address 1	c/o Wacom Co., Ltd.		
Address 2	2-510-1 Toyonodai, Kazo-shi		
City	Saitama	**State/Province**	
Postal Code	349-1148	**Country** i	JP

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	00500		
Email Address	ShokoL.docketing@SeedIP.com	Add Email	Remove Email

Application Information:

Title of the Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD		
Attorney Docket Number	940131.442C4	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	15	**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 i

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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	00500		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	**Continuity Type**	**Prior Application Number**	**Filing or 371(c) Date (YYYY-MM-DD)**
	Continuation of	14542438	2014-11-14
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14542438	Continuation of	12877780	2010-09-08	8963889	2015-02-24

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

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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)
2010-024858	JP	2010-02-05	

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

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

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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	Wacom Co., Ltd.		
Mailing Address Information For Applicant:			
Address 1	2-510-1 Toyonodai, Kazo-shi		
Address 2			
City	Saitama	**State/Province**	
Country	JP	Postal Code	349-1148
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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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	/Shoko Leek/			Date (YYYY-MM-DD)	2016-02-18
First Name	Shoko I.	Last Name	Leek	Registration Number	43,746

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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	940131.442C4
	Application Number	
Title of Invention	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD	

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.

POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

[CROSS-REFERENCE TO RELATED APPLICATION]

The present application claims the benefit under 35 U.S.C. § 119(a) of Japanese Application No. 2010-024858, filed February 5, 2010, the entire content of which is incorporated herein by reference.

[Technical Field]

[0001] This invention relates to a pointer, a position detection apparatus and a position detection method, and more particularly to a pointer, a position detection apparatus and a position detection method of the electrostatic coupling type.

[Background Art]

[0002] A position detection apparatus, called a tablet, has been developed as one of pointing devices used for producing an image or illustration on a computer apparatus. Such a position detection apparatus typically includes a position detector substantially in the form of a flat plate, and a pointer in the form of a pen to be operated by a user on the position detector.

[0003] As such a position detection apparatus, for example, a position detection apparatus based on an electrostatic coupling method has been developed. The position detection apparatus of the electrostatic coupling type includes, as principal components thereof, a pointer including an integrated circuit (IC) and a position detector including a sensor section having a group of conductors arrayed in a predetermined pattern. A predetermined signal is transmitted from the pointer, which is placed on the sensor section, to the conductor group, and the position pointed to by the pointer is detected by specifying the reception position of the transmission signal by the position detector.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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[0004] A conventional position detection apparatus is described, for example, in Japanese Patent Laid-Open No. H8-50535.

[SUMMARY OF THE INVENTION]

[0005] In the position detection apparatus of the electrostatic coupling type, typically, a signal transmitted from the pointer to the sensor section is used to detect the position pointed to by the pointer. Therefore, such a position detection apparatus has a problem that, although it is possible to detect the position pointed to by the pointer, it cannot detect information other than the position information such as, for example, the pointer's pressure information (i.e., how much pressure is applied to the pointer tip by a surface of the sensor section) or pen down information, which indicates that the pointer is in contact with the position detector. Also, there is a problem that a plurality of different pointers, such as a pointer in the form of a pen and a finger as a pointer, cannot be detected at the same time.

[0006] According to one aspect, the present invention is directed to solving the problems described above. According to an aspect of the present invention, a position detection apparatus is provided, which adopts the electrostatic coupling method to detect, through use of codes for which a correlation matching operation process is carried out, not only position information representative of the position pointed to by a pointer but also information other than the position information such as, for example, pressure information, information of a rotational position where the pointer is rotated on a position detector around a pen tip (axis) thereof, or information regarding inclination of the pointer. Further, according to another aspect, the present invention makes it possible to detect information from a plurality of different pointers, such as position pointing information by a pen and a finger as a pointer, at the same time.

[0007] According to one aspect of the present invention, there is provided a position detection apparatus including a pointer having a transmission signal production section, which produces a signal based on two codes such that a

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pressure applied to the pointer is associated with a time difference between the two codes. The pointer transmits the signal produced by the transmission signal production section. The position detection apparatus further includes a sensor section having a plurality of first conductors disposed in a predetermined direction and a plurality of second conductors disposed in a direction crossing with the predetermined direction. The sensor section is configured to receive the signal transmitted from the pointer. The position detection apparatus further includes a correlation matching operation circuit configured to carry out a correlation matching operation between signals generated in conductors which form the plurality of first conductors and the plurality of second conductors and correlation calculation codes corresponding to the two codes. The position detection apparatus still further includes a position calculation circuit configured to detect a position on the sensor section pointed to by the pointer based on a result of the correlation matching operation calculated by the correlation matching operation circuit and based on at least one of the codes. The position detection apparatus also includes a pressure calculation circuit configured to detect the pressure applied to the pointer, which is associated with the time difference between the two codes, based on the result of the correlation matching operation calculated by the correlation matching operation circuit and based on the two codes. Further, in order to detect information other than the position information, such as the rotational position, where the pointer is rotated around a pen tip (axis) thereof on a position detector, or the inclination of the pointer, a plurality of electrode pieces divided electrically from each other are disposed around the central axis of the pointer on the pointer, and codes of different types are supplied respectively to the plurality of electrode pieces. Further, in order to detect a pointing operation by a finger simultaneously with a pointing operation by a pen, the position detector may further include a code production section and a changeover (switching) section for switching the conductors, which form the sensor section, between signal reception and signal transmission.

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[0008] It is to be noted that the two codes described above may have the same code pattern or may have code patterns different from each other. Where the same code pattern is used, the same correlation calculation code corresponding to the code pattern can be used.

[0009] According to another aspect of the invention, a pointer is provided, including an end portion (pen tip) for pointing to a position. The end portion projects from a housing. The pointer also includes a code production circuit configured to produce a first code and a second code having code patterns different from each other and to control, in response to a pressure applied to the end portion of the pointer, the production timings at which the two codes are to be produced, that is, a time difference between the codes. Alternatively, the code production circuit is configured to produce one code having a predetermined code pattern and to control, in response to a pressure applied to the end portion of the pointer, the timing for next production of the code relative to the first production of the code, that is, a time difference between the codes. The pointer may also include a transmission signal production section configured to transmit the codes produced by the code production circuit.

[0010] Various exemplary embodiments of the present invention are suited where an electrostatic coupling method is used to form a position detection apparatus. First and second codes having the same code pattern or having code patterns different from each other are transmitted from a pointer, with a time difference therebetween, and received by a position detector. Then, position detection of the pointer is carried out using the first code, while information other than the position information, such as pressure information or rotational position information of the pointer, is obtained based on the time difference between the two codes.

[0011] As described above, with exemplary embodiments of the present invention, the first code and the second code having code patterns that are the same as each other or different from each other are transmitted from the pointer

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and, upon signal reception, a correlation matching operation between the reception signal and correlation calculation codes that respectively correspond to the first and second codes is carried out. Accordingly, not only the pointing position of the pointer but also information other than the position information such as, for example, pressure information can be detected.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0012]

[FIG. 1] FIG. 1 is a perspective view of a position detection apparatus according to an embodiment of the present invention.

[FIG. 2] FIG. 2 is a view of a general configuration of a pointer according to an embodiment of the present invention.

[FIG. 3] FIGS. 3A and 3B are circuit block diagrams of a transmission code production section in the pointer.

[FIG. 4] FIG. 4 is a view of a general configuration of a position detector according to an embodiment of the present invention.

[FIG. 5] FIG. 5 is a view of a general configuration of a correlation matching section.

[FIG. 6] FIG. 6 is a view of a general configuration of a correlator.

[FIG. 7] FIGS. 7A-7C are views illustrating operation of the correlator.

[FIG. 8] FIG. 8 is a flow chart illustrating an operation procedure of the pointer.

[FIG. 9] FIG. 9 is a flow chart illustrating an operation procedure of the position detector.

[FIG. 10] FIGS. 10A-10C are views illustrating a principle of position detection and pressure detection of the pointer, where first and second codes are transmitted in a time-multiplexed state.

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[FIG. 11] FIG. 11 is a view of a general configuration of a pointer of modification 1.

[FIG. 12] FIGS. 12A and 12B are views of a general configuration of a pointer of modification 2.

[FIG. 13] FIG. 13A is a waveform diagram of a code, before PSK modulation, and FIG. 13B is a signal waveform diagram of the code after the PSK modulation, which forms a signal to be transmitted from a pointer of modification 3.

[FIG. 14] FIG. 14 is a view of a general configuration of a pointer of the modification 3.

[FIG. 15] FIG. 15 is a view of a general configuration of a reception system circuit group of a position detector of the modification 3.

[FIG. 16] FIG. 16A is a waveform diagram of a code, before FSK modulation, and FIG. 16B is a signal waveform diagram of the code after the FSK modulation, which forms a signal to be transmitted from a pointer of modification 4.

[FIG. 17] FIG. 17 is a view of a general configuration of a pointer of the modification 4.

[FIG. 18] FIG. 18 is a view of a general configuration of a reception system circuit group of a position detector of the modification 4.

[FIG. 19] FIG. 19 is a view illustrating rotation detection and inclination detection of a pointer of modification 5

[FIG. 20] FIG. 20 is a view of a general configuration of a pointer of the modification 5.

[FIG. 21] FIG. 21 is a view of a general configuration of a position detector of modification 6.

[FIG. 22] FIG. 22 is a view of a general configuration of a position detector of modification 7.

[FIG. 23] FIG. 23 is a view illustrating operation of the position detector of the modification 7.

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[DESCRIPTION OF EMBODIMENTS OF THE INVENTION]

[0013] An embodiment of a position detection apparatus of the present invention is described with reference to the drawings. However, the present invention is not limited to the following embodiment.

[0014] In the present embodiment, two codes having code patterns different from each other or two codes having the same code pattern are used to detect the position of a pointer and pressure of the pointer, that is, pressure applied to the pointer. If the code to be used is, for example, an 8-bit code, then one or a plurality of code patterns are used as selected from among "11110000," "11001100" and "10101010." Also, code patterns of "00101101," "11001100" and "10101010" can be used.

[0015] If those code patterns are used, then the code patterns can be identified by a correlation matching operation upon reception. As other codes, for example, spread codes including an M sequence, a gold code sequence or the like or orthogonal codes such as, for example, the Hadamard code or the Walsh code may be used. It is to be noted that, where an orthogonal code is used, the identification sensitivity of code patterns can be increased based on a correlation matching operation process upon reception.

[Configuration of the Position Detection Apparatus]

[0016] FIG. 1 shows a perspective view of the position detection apparatus of the present embodiment. It is to be noted that, in the present embodiment described below, a tablet is used as the position detection apparatus. The position detection apparatus 1 includes a pointer 2 having a shape of a pen, and a position detector 3 having a shape of a flat plate and being connected to an external apparatus such as a personal computer (PC) through an external apparatus connecting cable 4

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[0017] The pointer 2 is used on a scannable region 3a of the position detector 3. On the scannable region 3a, a pointed position (coordinate), pressure, and so forth of the pointer 2 can be detected by the position detector 3.

[0018] The position detector 3 detects the coordinate of a position pointed to by the pointer 2 and outputs the coordinate information to the external apparatus. Then, on a display screen (not shown) of the external apparatus, a pointer or the like is displayed at a position corresponding to the coordinate information inputted from the position detector 3.

[Configuration of the Pointer]

[0019] FIG. 2 shows a general configuration of the pointer 2 of the present embodiment. The pointer 2 includes a first electrode 20, a second electrode 21, a variable capacitor 22, an integrated circuit 23, a coil 24, a power production circuit 25, and a housing 129 which accommodates the above-mentioned components therein. The variable capacitor 22 is a capacitor that varies its capacitance value in response to a pressure applied thereto. The housing 129 is formed from a material having conductivity such as a metal.

[0020] The first electrode 20 has a shape of a rod and is disposed such that one end portion thereof projects from one end portion of the housing 129. Further, the projecting end portion of the first electrode 20 has conductivity and functions as a pen tip. In particular, the end portion projecting from the housing 129 functions as a pen tip of the pointer 2 and functions also as the first electrode 20. Meanwhile, the second electrode 21 is, in the present example, a substantially cylindrical electrode and is disposed in such a manner as to surround the first electrode 20. In particular, the second electrode 21 is disposed along an inner peripheral face of the housing 129 around the first electrode 20 having a shape of a rod. Further, codes (C1 and C2) outputted from the integrated circuit 23 are added together through resistors (R1 and R2) and then supplied to the first electrode 20 and the second electrode 21. Accordingly, the signals outputted from

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the integrated circuit 23, which respectively correspond to the two code patterns, are applied in a mutually added state to the first electrode 20 and the second electrode 21 so that signals are transmitted to the position detector 3 through the first electrode 20 and the second electrode 21.

[0021] The variable capacitor 22 disposed as a pressure detection element has a configuration that the capacitance thereof varies in response to a pressure (so-called "pen pressure") applied to the pen tip. In particular, the variable capacitor 22 is configured such that one of a pair of electrodes (not shown) which form the variable capacitor 22 is engaged with an end portion of the first electrode 20. Therefore, if the pointer 2 is brought into contact with the position detector 3 to press the first electrode 20 on the scannable region 3a, then also the one electrode of the variable capacitor 22 is pressed. Consequently, an electric characteristic between the paired electrodes of the variable capacitor 22 varies to change the capacitance of the capacitor. In other words, the capacitance variation amount of the variable capacitor 22 corresponds to the pressure. It is to be noted that a variable inductance coil configured such that the inductance thereof varies in response to the pressure or a variable resistor configured such that the resistance value thereof varies in response to the pressure may be used as the pressure detection element. Further, a resonance circuit including one of a variable capacitor, a variable inductance coil, and a variable resistor may be used. In short, it is only necessary for the pressure detection element to have a configuration such that pressure (pen pressure) applied to an end portion (pen tip) of the pointer 2 acts upon a production starting timing of a code signal outputted from a transmission code production section 28.

[0022] The transmission code production section 28 including a first code production section 26 and a second code production section 27 forms the integrated circuit 23. In the present embodiment, a first code C1 outputted from the first code production section 26 is used to carry out position detection while the

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first code C1 as well as a second code C2 outputted from the second code production section 27 are used to carry out pressure detection.

[0023] Output terminals of the integrated circuit 23 are connected, through resistors (R1 and R2), to the first electrode 20 and the second electrode 21, so as to output a transmission signal corresponding to the first code C1 and/or the second code C2 to the first electrode 20 and the second electrode 21 at a predetermined timing. It is assumed that, in the present embodiment, the first code C1 outputted from the first code production section 26 and the second code C2 outputted from the second code production section 27 have code patterns different from each other. However, the present invention is not limited to this configuration, and the same code pattern may be used to produce two codes by controlling the signal production starting timings of these codes, as hereinafter described.

[0024] The second code production section 27 is connected to the variable capacitor 22. Further, the second code production section 27 varies the signal production starting timing of the second code C2 based on a capacitance variation of the variable capacitor 22 according to the pen pressure. In particular, in the present embodiment, the time difference between the production timing of the first code C1 outputted from the first code production section 26 and the production timing of the second code C2 corresponds to the pressure applied to the pointer 2.

[0025] The integrated circuit 23 includes a control circuit (not shown) for controlling operation of the transmission code production section 28, and a clock signal and other signals necessary for the control are produced by the control circuit. It is to be noted that the integrated circuit 23 is driven by a voltage produced by the coil 24 and the power production circuit 25 hereinafter described.

[0026] The coil 24 receives an excitation signal signaled from an excitation coil 35 of a sensor section 30 hereinafter described provided in the position detector 3. Consequently, a high frequency signal is induced in the coil 24. The induced high frequency signal is inputted to the power production circuit 25. The

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power production circuit 25 has a rectification circuit not shown and rectifies the high frequency signal supplied from the coil 24 by means of the rectification circuit to convert the high frequency signal into a DC voltage. Then, the power production circuit 25 supplies the DC voltage obtained by the conversion, as driving power for the integrated circuit 23, to the integrated circuit 23.

[0027] It is to be noted that, while, in the present embodiment, the first code production section 26 and the second code production section 27 for producing the first code C1 and the second code C2, respectively, are provided in the integrated circuit 23, the present invention is not limited to this configuration. Another configuration may be used wherein, for example, a ROM (Read Only Memory) is provided in the integrated circuit 23 and the first code C1 and the second code C2 are stored in the ROM such that, when transmitting codes, the code patterns are read out from the ROM and transmitted. It is to be noted that, in this instance, a corresponding relationship between the capacitance variation amount ΔC of the variable capacitor 22 and the signal production starting timing of the first code C1 and the signal production starting timing of the second code C2 is prestored as a table in the ROM.

[0028] FIGS. 3A and 3B show examples of a circuit configuration of the transmission code production section 28 in the pointer 2 shown in FIG. 2. FIG. 3A shows an example of a circuit configuration of the transmission code production section 28 where the code patterns of the first code C1 and the second code C2 are different from each other. The variable capacitor 22, whose capacitance varies in response to the pressure applied to the first electrode 20, is connected at one terminal thereof to the ground. The variable capacitor 22 is connected at the other terminal thereof to the power production circuit 25 through a resistor 144 such that a predetermined voltage Vcc is supplied thereto.

[0029] A timing control circuit 141 carries out ON/OFF control of a switch 143 in a predetermined period t1. In particular, the switch 143 is turned ON once by the timing control circuit 141 to discharge the charge of the variable capacitor

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22 and is then turned OFF. Further, while turning the switch 143 OFF, the timing control circuit 141 instructs the first code production section 26 to produce a first code C1. When the switch 143 is OFF, the variable capacitor 22 is gradually charged through the resistor 144. Thereupon, the potential between the opposite terminals of the variable capacitor 22 gradually increases depending upon the capacitance value which varies in response to the pressure.

[0030] A delay setting circuit 142 carries out comparison between the potential of the variable capacitor 22 and a predetermined potential Vth in response to supply of a control signal from the timing control circuit 141. If the potential of the variable capacitor 22 reaches the predetermined potential Vth, then the delay setting circuit 142 instructs the second code production section 27 to produce a second code C2. By the configuration described above, the difference between the code production timing of the first code C1 from the first code production section 26 and the code production timing of the second code C2 from the second code production section 27, that is, the time difference between the first code C1 and the second code C2, varies based on the capacitance value which is varied in response to the pressure applied to the pen tip. Thus, the pressure can be detected by detecting the time difference.

[0031] FIG. 3B shows an example of a circuit configuration of the transmission code production section 28 where the same pattern is used for the first code C1 and the second code C2. In other words, a circuit configuration where a single code is used is shown. In this example, the first code production section 26 is used in place of the second code production section 27 shown in FIG. 3A, but the configuration of the other part is the same. Where the first code C1 and the second code C2 have the same code pattern as in the present example, the time difference between them varies in response to the pressure, and consequently, the pressure can be detected by detecting the time variation, also.

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[Configuration of the Position Detector]

[0032] FIG. 4 shows a general configuration of the position detector 3. The position detector 3 includes, as principal components thereof, a sensor section 30 for detecting a pointing position of the pointer 2, a selection circuit 40 for selecting a plurality of conductors which form the sensor section 30, and a position detection circuit 50. It is to be noted that, in FIG. 4, a flow of processing of a reception signal is indicated by a solid line arrow mark, and a flow of a control signal, a clock signal or the like is indicated by a broken line arrow mark. It is to be noted, however, that, in FIG. 4, broken line arrow marks indicative of flows of a control signal, a clock signal and so forth of a reception system circuit group 51 are omitted in order to simplify the description.

[0033] The sensor section 30 includes a first conductor group 32 including a plurality of first conductors 31 extending in an x direction (predetermined direction) in FIG. 4, a second conductor group 34 including a plurality of second conductors 33 extending in a direction crossing with the extension direction of the first conductors 31, that is, in a y direction in FIG. 4, and the excitation coil 35 provided on an outer periphery of the conductor groups. The plurality of first conductors 31 which form the first conductor group 32 are disposed in a predetermined spaced relationship from each other and in parallel to each other in the y direction in FIG. 4. Meanwhile, the plurality of second conductors 33 which form the second conductor group 34 are disposed in a predetermined spaced relationship from each other and in parallel to each other in the x direction in FIG. 4.

[0034] It is to be noted that the first conductors 31 and the second conductors 33 are formed, for example, from a transparent electrode film formed from an ITO (Indium Tin Oxide) film, a copper foil or the like. Further, the first conductor group 32 and the second conductor group 34 are laminated with a spacer, which is made of a resin material or the like or a glass substrate or the like (not shown) interposed therebetween. Further, the conductors of the first conductor group 32 and the second conductor group 34 are connected to the

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selection circuit 40. The excitation coil 35 is connected to a drive circuit 61 hereinafter described in the position detection circuit 50.

[0035] The number and the pitch of the first conductors 31 and the second conductors 33 are set suitably according to the size of the sensor section 30, required detection accuracy and so forth. Further, while, in the present embodiment, a linear conductor is illustrated as the first conductors 31 and the second conductors 33, the present invention is not limited to this configuration. For example, both of the first conductors 31 and the second conductors 33 may meander in directions crossing with the extension directions. Further, one of the first conductors 31 and the second conductors 33 may be formed as ring-shaped conductors and the other conductors may be formed as conductors which extend in radial directions from the center of the ring-shaped conductors.

[0036] The selection circuit 40 selects a predetermined conductor from within the first conductor group 32 and the second conductor group 34 in a predetermined order so as to select them in order. The conductor selection control by the selection circuit 40 is controlled by a control signal (broken line arrow mark in FIG. 4) outputted from a control section 63, which cooperates with a central processing unit 62 hereinafter described. It is to be noted that, in the present embodiment, the sensor section 30 at least has a configuration for receiving a predetermined signal transmitted from the pointer 2. Further, in the present embodiment, in order to time-divisionally operate the reception system circuit group 51, a configuration is provided for detecting the position (X coordinate and Y coordinate) pointed to by the pointer 2 by selecting a predetermined conductor from within each of the first conductor group 32 and the second conductor group 34 by means of the selection circuit 40. It is to be noted that, if a configuration which includes a plurality of reception system circuit groups 51 corresponding to the number of conductors which form the sensor section 30 is adopted, then the selection circuit 40 can be omitted.

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[0037] The position detection circuit 50 includes a reception system circuit group 51, an oscillator 60, a drive circuit 61, a central processing unit 62 (CPU), and a control section 63.

[0038] The oscillator 60 outputs an AC signal or a pulse signal of a predetermined frequency to the drive circuit 61. The drive circuit 61 converts the signal inputted thereto from the oscillator 60 into a current and outputs the current to the excitation coil 35.

[0039] The control section 63 cooperates with the central processing unit 62 to output control signals (broken line arrow marks in FIG. 4) to the components in the position detection circuit 50 and outputs a result of calculation of a position and pressure calculation section 58 hereinafter described in the reception system circuit group 51 to the external apparatus. Further, the central processing unit 62 includes a software program and controls operation of the control section 63.

[0040] The reception system circuit group 51 includes, as principal components thereof, a reception amplifier 52, an A/D (Analog to Digital) conversion circuit 53, a serial to parallel conversion section 54, a shift register 55, a correlation matching section 56, a memory 57, and a position and pressure calculation section 58 (detection section). The reception amplifier 52, A/D conversion circuit 53, serial to parallel conversion section 54, shift register 55, correlation matching section 56, memory 57, and position and pressure calculation section 58 are connected in this order from the selection circuit 40 side.

[0041] The reception amplifier 52 amplifies a reception signal inputted from a predetermined conductor selected by the selection circuit 40. Then, the reception amplifier 52 outputs the amplified reception signal to the A/D conversion circuit 53. The A/D conversion circuit 53 carries out analog to digital conversion of the amplified reception signal and outputs a digital signal obtained by the conversion to the serial to parallel conversion section 54.

[0042] The serial to parallel conversion section 54 is formed, for example, from a shift register of the serial-input parallel-output type and has a number of

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stages of flip-flops corresponding to the code length of a code to be used. Operation of the serial to parallel conversion section 54 is controlled by the control section 63 which cooperates with the central processing unit 62 including an execution program. It is to be noted that, for the flip-flops of the individual stages which form the serial to parallel conversion section 54, a flip-flop which can retain information of 1 bit may be used or a flip-flop which can retain information of multi bits (for example, 10 bits or the like) may be used.

[0043] The flip-flops of the stages which form the serial to parallel conversion section 54 successively shift a reception signal inputted thereto to the flip-flops at the succeeding stages. Further, an output terminal of each of the flip-flops is connected to an input terminal of a corresponding flip-flop in the shift register 55, hereinafter described which is also formed from multi-stage flip-flops. As a result, a number of output signals equal to the code length of a code to be used are outputted in parallel to the shift register 55.

[0044] The shift register 55 is a shift register of the parallel-input and output type and is formed from a number of flip-flops equal to the code length of a code to be used. It is to be noted that, for the flip-flops of the individual stages which form the shift register 55, a flip-flop which can retain information of 1 bit may be used or a flip-flop which can retain information of multi bits (for example, 10 bits or the like) may be used.

[0045] Operation of each of the flip-flops in the shift register 55 is controlled by the control section 63 which cooperates with the central processing unit 62. Further, each of the flip-flops which form the shift register 55 cyclically shift a signal inputted thereto to the flip-flops at the succeeding stages while also outputting the signal to corresponding integrators 56d in the correlation matching section 56.

[0046] It is to be noted that a register which functions as a buffer for temporarily retaining signals outputted from the serial to parallel conversion section 54 may be provided between the serial to parallel conversion section 54 and the shift register 55. In this instance, while reception signals retained in the shift

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register 55 are cyclically shifted to calculate a correlation value, signals necessary for next correlation value calculation can be temporarily retained in the register.

[0047] The correlation matching section 56 calculates a correlation value between a reception signal outputted from the shift register 55 and a code having a predetermined code pattern (the code is hereinafter referred to as a "correlation calculation code") and outputs a correlation value of the reception signal.

[0048] FIG. 5 shows a general configuration of the correlation matching section 56, where two codes having different code patterns from each other are transmitted from the pointer 2. The correlation matching section 56 includes two correlators (a first correlator 56a and a second correlator 56b).

[0049] The first correlator 56a calculates a correlation value using a correlation calculation code corresponding to a first code C1 outputted from the first code production section 26 of the pointer 2 (first correlation calculation code). In this case, for example, where a PN code which is a representative spread code is used, a correlation calculation code having the same code pattern as that of the first code C1 is used. Meanwhile, the second correlator 56b calculates a correlation value using a correlation calculation code corresponding to a second code C2 outputted from the second code production section 27 of the pointer 2 (second correlation calculation code).

[0050] It is to be noted that, where two codes transmitted from the pointer 2 have the same code pattern, the first correlator 56a and the second correlator 56b use the same correlation calculation code. In this instance, a single correlator can be used to carry out the signal processing. Furthermore, where two kinds of codes are used, it is possible to use a configuration which uses one of the codes in a calculation process of a position based on an output signal from the first conductor 31 (Y coordinate) while using the other code in a calculation process of a position based on an output signal from the second conductor 33 (X coordinate) in a position calculation process for determining a position (X coordinate and Y coordinate) pointed to by the pointer 2.

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[0051] FIG. 6 shows a general configuration of the first correlator 56a. It is to be noted that the configuration of the second correlator 56b is similar to the configuration of the first correlator 56a shown in FIG. 6 except that the correlation calculation code to be used is different. Therefore, description of the configuration of the second correlator 56b is omitted.

[0052] The first correlator 56a includes a correlation calculation code production section 56c, a number of integrators 56d corresponding to the code length of a correlation calculation code, and an adder 56e. It is to be noted that, in the present embodiment, each of the integrators 56d is connected to an output terminal of a corresponding flip-flop of the shift register 55. Further, in the example shown in FIG. 6, the code length of the correlation calculation code is 11. Therefore, in the example shown in FIG. 6, 11 integrators 56d (integrators I_1 to I_{11} in FIG. 6) are provided.

[0053] In the example shown in FIG. 6, an example wherein a PN code is used is illustrated, and a reception signal (PS_1 to PS_{11}) of a code length of 11 outputted from the shift register 55 is inputted to the integrators I_1 to I_{11}. Further, a correlation calculation code (PN_1 to PN_{11}) of a code length of 11 outputted from the correlation calculation code production section 56c is inputted to the integrators I_1 to I_{11}, respectively. The integrators I_1 to I_{11} integrate the signal PS_1 to PS_{11} outputted from the shift register 55 and the code PN_1 to PN_{11} outputted from the correlation calculation code production section 56c, respectively, and output results of the integration to the adder 56e.

[0054] The adder 56e adds the output signals from the integrators 56d and outputs the sum value as a correlation value. Thereupon, if a signal string pattern of the reception signal PS_1 to PS_{11} outputted from the shift register 55 and a code pattern of the code PN_1 to PN_{11} outputted from the correlation calculation code production section 56c coincide with each other, then signals of the same polarity are outputted from all of the integrators 56d and a maximum correlation value is outputted from the adder 56e. In any other case, since the polarities of signals

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outputted from the integrators 56d are different, a low value indicative of no correlation is outputted from the adder 56e.

[0055] It is to be noted that, where the code length of the reception signal retained in the shift register 55 is 11 as in the present example, in the first correlator 56a, the reception signal PS_1 to PS_{11} retained in the shift register 55 are cyclically shifted by 10 cycles to verify coincidence with the code pattern of the code PN_1 to PN_{11} outputted from the correlation calculation code production section 56c. However, the present invention is not limited to this configuration, and another configuration may be adopted wherein, in place of cyclically shifting the reception signal PS_1 to PS_{11} and supplying the cyclically shifted reception signal PS_1 to PS_{11} from the shift register 55 to the integrators 56d, the code pattern of the code PN_1 to PN_{11} outputted from the correlation calculation code production section 56c is cyclically shifted and then supplied to the integrators 56d.

[0056] FIGS. 7A-7C particularly illustrate the operation of the first correlator 56 described above and a calculation principle of a correlation characteristic. It is assumed that a reception signal outputted from the shift register 55 has a time difference corresponding, for example, to an 8-chip length (8τ) relative to the correlation calculation code (refer to FIGS. 7A and 7B).

[0057] In this instance, from the start of calculation of a correlation value until time 8τ (τ: unit time for code processing) corresponding to the 8-chip length, the code pattern of the reception signal outputted from the shift register 55 and the code pattern of the correlation calculation code outputted from the correlation calculation code production section 56c are different from each other. Therefore, a low value representative of no correlation is outputted from the first correlator 56a (refer to FIG. 7C). Then, when time 8τ elapses, both code patterns coincide with each other. Thereupon, signals of the same polarity are outputted from all of the integrators 56d as described hereinabove, and the correlation value exhibits the maximum value. Thereafter (after time 8τ has elapsed), since both code patterns become different from each other, the correlation value changes back to the low

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value. Therefore, if a correlation between the reception signal and the correlation calculation code is determined by the correlator, then a correlation characteristic is obtained wherein the correlation value between the two codes exhibits a peak (singular value) at a point of time when both code patterns satisfy a predetermined time relationship, as seen in FIG. 7C.

[0058] In the correlation matching section 56, for each conductor selected for signal detection, a correlation characteristic relative to the first code C1 for position detection is determined by the first correlator 56a and a correlation characteristic relative to the second code C2 for pressure detection is determined by the second correlator 56b, based on the calculation principle of a correlation characteristic (correlation value) described hereinabove. Then, the correlation characteristics are outputted to the memory 57. It is to be noted that, where the code patterns of the first code C1 for position detection and the second code C2 for pressure detection are set the same as each other, it is possible to use a single correlator to determine the correlation characteristics.

[0059] Further, the position and pressure calculation section 58 calculates a pointing position (coordinates) and pressure of the pointer 2 from the correlation characteristics calculated based on the signals generated in the conductors and stored in the memory 57. In particular, the position and pressure calculation section 58 detects a peak of a correlation value from the correlation characteristic relative to the first code C1 for position detection to carry out position detection of the pointer 2. In this case, the position detection circuit 50 identifies the pointer 2 which transmits a code pattern corresponding to a code pattern of a correlation calculation code used in the position detection circuit 50 and cooperates with the conductor selection control of the selection circuit 40 to determine the position (X coordinate and Y coordinate) pointed to by the identified pointer 2.

[0060] Further, in the present embodiment, the pointer 2 includes a configuration that the time difference between the first code C1 for position detection and the second code C2 for pressure detection varies in response to the

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pressure, as described hereinabove. In particular, in the present embodiment, the production timing of the second code C2 with respect to the production time of the first code C1 is controlled in response to the pressure, and the second code C2 is transmitted. Therefore, the peak position (time) of the correlation value obtained from the correlation characteristic relative to the second code C2 and the peak position (time) of the correlation value obtained from the correlation characteristic relative to the first code C1 are different according to the pressure. In the present embodiment, the pressure is determined based on the time difference between the peak positions of their respective correlation values. It is to be noted that the calculation principles of the position and the pressure of the pointer 2 are hereinafter described more particularly.

Operation of the Position Detection Apparatus

[0061] Now, operation of the position detection apparatus 1 of the present embodiment and the principles of position and pressure detection are described with reference to FIGS. 8 to 10. FIG. 8 is a flow chart illustrating operation of the pointer 2 of the present embodiment. FIG. 9 is a flow chart illustrating operation of the position detector 3. Further, FIGS. 10A-10C are views illustrating a transmission operation, a waveform of a reception signal, and a correlation characteristic upon operation of the position detection apparatus 1 of the present embodiment, respectively.

[0062] First, operation of the pointer 2 is described with reference to FIG. 8A and FIG. 10. First, the pointer 2 transmits a first code C1 for position detection from the first code production section 26 through the first electrode 20 and the second electrode 21 (step S1). Then, at a point of time at which a time period corresponding to the pressure elapses, the pointer 2 transmits a second code C2 for pressure detection from the second code production section 27 through the first electrode 20 and the second electrode 21 (step S2).

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[0063] Then, the pointer 2 determines whether or not the processing time after the start of transmission of the first code C1 (step S1) reaches a predetermined time period t1 sufficient to have transmitted a code pattern of the second code C2 (step S3). If the processing time after the start of transmission of the first code C1 does not reach the predetermined time period t1 sufficient to have transmitted the code pattern of the second code C2, that is, if the decision at step S3 is NO, then the pointer 2 waits until the predetermined time period t1 lapses. On the other hand, if the processing time after the start of transmission of the first code C1 exceeds the predetermined time period t1, that is, if the decision at step S3 is YES, then the processing returns to step S1.

[0064] In the pointer 2, a series of processes of transmitting a first code C1 and then, after a time period corresponding to the pressure elapses, transmitting a second code C2, as described hereinabove, are executed repetitively. A manner of this operation is illustrated in FIG. 10A. In this example, a first code C1 for determining a position pointed to by a pointer and a second code C2, whose transmission is started at a point of time at which a predetermined time period Td corresponding to the pressure elapses after the transmission starting time of the first code C1, are temporally multiplexed through the first electrode 20 and the second electrode 21 and transmitted from the pointer 2 as illustrated in FIG. 10A.

[0065] It is to be noted that, after the transmission of the second code C2 is completed, the transmission of the first code C1 (step S1) is started again after a predetermine time period (t2) has elapsed from the start of transmission of the first code C1.

[0066] It is to be noted that it is possible to make the code pattern of the first code C1 and the code pattern of the second code C2 the same as each other, as described hereinabove.

[0067] Now, operation of the position detector 3 is described with reference to FIGS. 9 and 10B and 10C. The position detector 3 carries out position and pressure detection of the pointer 2 in the following manner. First, the selection

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circuit 40 selects a predetermined conductor from within the conductor groups of the sensor section 30 (step S11). Then, the reception system circuit group 51 detects a reception signal (step S12). Then, the reception system circuit group 51 carries out amplification and analog to digital conversion of the reception signal. Then, the correlation matching section 56 is used to calculate a correlation value between a correlation calculation code corresponding to the first code C1 and the reception signal, and a correlation value between a correlation calculation code corresponding to the second code C2 and the reception signal, to determine correlation characteristics (first and second correlation characteristics), respectively, and stores the correlation characteristics in the memory 57 (step S13).

[0068] Then, in step S14, the position detector 3 determines whether or not the predetermined time period t2, required for the series of processes after the start of selection of a reception conductor until the detection of the pointing position and the pressure of the pointer 2, has elapsed from the selection process of a reception conductor (step S11). It is to be noted that the predetermined time period t2 is set to a time period longer than the predetermined time period t1 of the pointer 2, described hereinabove.

[0069] It is to be noted that, if the predetermined time period t2 has not elapsed after the selection process of a reception conductor (where the decision at step S14 is NO), then the position detector 3 waits until the predetermined time period t2 lapses.

[0070] When the predetermined time period t2 lapses, that is, when the decision at step S14 becomes YES, it is determined whether or not all reception conductors have been selected (step S15). If the decision at step S15 is NO, then the processing returns to the reception conductor selection at step S11. On the other hand, if the decision at step S15 is YES, then the position and pressure calculation section 58 in the reception system circuit group 51 calculates the position (coordinates) pointed to by the pointer 2 based on the first correlation

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characteristic stored in the memory 57, more particularly based on a peak of the correlation value. Further, pressure applied to the pointer 2, so-called pen pressure, is calculated based on the time difference between the first correlation characteristic and the second correlation characteristic, more particularly, the time difference between the two peaks of the correlation values (step S16).

[0071] Here, the principles of position and pressure detection of the pointer 2 at step S16 described above are described with reference to FIGS. 10B and 10C. Where the pointer 2 exists on the conductor selected at step S11 described hereinabove, within the predetermined time period t1 for position detection and pressure detection, a signal including the first code C1 and the second code C2 is transmitted from the pointer 2. In the selected reception conductor, a reception signal Sp1 corresponding to the transmission signal is generated (refer to FIG. 10B).

[0072] The reception signal Sp1 supplied to the correlation matching section 56 is inputted in parallel to the first correlator 56a and the second correlator 56b. The first correlator 56a uses the correlation calculation code corresponding to the first code C1 to calculate a correlation characteristic p1 between the correlation calculation code and the reception signal Sp1. It is to be noted that, in this example, a PN code is used as the first code C1. Accordingly, as the first correlation calculation code, a PN code which is the same as the first code C1 is used. From the first correlator 56a, a correlation value is outputted, which exhibits a maximum value (peak p1 in FIG. 10C) at a point of time at which the code patterns of the reception signal Sp1 and the correlation calculation code coincide with each other but exhibits a low correlation value at any other time period.

[0073] Meanwhile, the second correlator 56b uses the correlation calculation code corresponding to the second code C2 to calculate a correlation characteristic p2 between the correlation calculation code and the reception signal Sp1. Similarly as in the case of the first correlator 56a, since a PN code is used as the second code C2 in this example, a PN code which is the same as the second code

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C2 is used as the second correlation calculation code. From the second correlator 56b, a correlation value is outputted, which exhibits a maximum value (peak p2 in FIG. 10C) at a point of time at which the code patterns of the reception signal Sp1 and the correlation calculation code coincide with each other but exhibits a low correlation value at any other time period.

[0074] It is to be noted that, when a pointer 2 does not exist on the selected conductor, a peak of the correlation value does not appear. Further, the time difference between the peaks p1 and p2 of the two correlation values, that is, the time difference (ΔC in FIG. 10C), varies corresponding to the pressure. Accordingly, in the correlation characteristic illustrated in FIG. 10C, the position of the pointer 2 can be detected from the peak p1 or the peak p2 of the correlation value. Further, by detecting the time difference ΔC between the peaks p1 and p2 of the two correlation values, the pressure applied to the pointer 2 can be detected.

[0075] Then, in the present embodiment, the position and pressure calculation section 58 determines a peak level of the correlation value of the correlation characteristic p1 to determine whether or not a pointer 2 exists on the selected conductor. Further, the position and pressure calculation section 58 determines the time difference (ΔC) between the peak level of the correlation value of the correlation characteristic p1 and the peak level of the correlation value of the correlation characteristic p2 to determine the pressure applied to the pointer 2, that is, the pen pressure.

[0076] As described above, in the present embodiment, by transmitting first and second codes from the pointer 2, position detection of a pointer is carried out based on the first code, and information other than the position information such as, for example, pressure information is detected based on the time difference between the first code and the second code. It is to be noted that the first and second codes may be codes having code patterns different from each other or having the same code pattern as each other.

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[0077] When the same code pattern is used, the pointer 2 varies the signaling timing of one code with respect to the signaling timing of the other code in response to the pressure. Therefore, in this instance also, by carrying out the correlation matching operation process, two peaks appear in the correlation characteristic, and not only the position of the pointer 2 but also the pressure can be detected. It is to be noted that, where the code patterns of the two codes to be transmitted from the pointer 2 are the same as each other, since it is necessary to provide only one correlator, the configuration of the correlation matching section 56 is further simplified. Further, as the code, it is only necessary for a desired correlation matching operation result to be calculated by the correlation matching operation process, and for example, a PN code (spread code) can be applied.

[Modification 1]

[0078] While the embodiment described above is an example wherein two codes (first code C1 and second code C2) transmitted from the pointer 2 are used to determine the position and the pressure of the pointer 2, the present invention is not limited to this configuration. It is possible to use two codes transmitted from a pointer to detect not only the position of the pointer but also, for example, information regarding whether or not the pointer is contacting the sensor section (the information is hereinafter referred to as "pen down" information). In the description of modification 1, an example is described wherein two codes transmitted from a pointer are used to detect the position of the pointer, a state in which the pointer is positioned in the proximity of (but above) the sensor section (hovering state), and another state in which the pointer is in contact with the sensor section (pen down state).

[0079] First, a first example is described with reference to FIG. 2. In this first example, the configuration described hereinabove for pressure detection is applied. In particular, whether or not a pressure higher than a predetermined value is applied to a pointer is detected to determine whether the pointer is in a

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state wherein it is positioned in the proximity of the sensor section (hovering state) or another state wherein it is contacting the sensor section (pen down stage). Also in this first example, it is apparent that two codes transmitted from the pointer may have code patterns different from each other or the same as each other.

[0080] Now, a second example is described. FIG. 11 shows a general configuration of a pointer of this second example. It is to be noted that, in FIG. 11, like elements to those of the embodiment (FIG. 2) described hereinabove are denoted by like reference characters. Further, for the first code and the second code, for example, a PN code (spread code) is used.

[0081] The pointer 100 of this example includes a first electrode 20 having a shape of a rod, a switch 101 (first switch), an integrated circuit 102, a coil 24, a power production circuit 25, and a housing 129 which accommodates the components mentioned above. The configuration of the pointer 100 except the switch 101 and the integrated circuit 102 are similar to that of the first embodiment described hereinabove, and therefore, the configuration of only the switch 101 and the integrated circuit 102 is described.

[0082] The switch 101 is provided between the housing 129 and a changeover switch 103, hereinafter described, within the integrated circuit 102. Further, the switch 101 is engaged with the first electrode 20 and configured such that, when the first electrode 20 functioning as the pen tip is pressed on the scannable region 3a, then the switch 101 is placed into an ON state.

[0083] The integrated circuit 102 includes a transmission code production section 28 including a first code production section 26 and a second code production section 27, and a changeover switch 103 (second switch). It is to be noted that the transmission code production section 28 has a configuration similar to that of the embodiment described hereinabove.

[0084] The changeover switch 103 is connected at an input terminal thereof to output terminals of the first code production section 26 and the second code production section 27 and at an output terminal thereof to the first electrode 20.

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The changeover switch 103 selects which one of a first code C1 and a second code C2 should be transmitted. The changeover operation of the changeover switch 103 is controlled by a connection state (ON or OFF state) of the switch 101. In particular, when the switch 101 is in an OFF state (where the pointer 100 is in a hovering state wherein it is afloat above the sensor section), the changeover switch 103 is connected to the second code production section 27, but when the switch 101 is in an ON state (where the pointer 100 is placed in a pen down state wherein it is contacting the sensor section), the changeover switch 103 is connected to the first code production section 26.

[0085] In particular, when the pointer 100 is afloat above the sensor section, the second code C2 is transmitted from the pointer 100 to the sensor section. In this instance, the sensor section detects a peak of the correlation value from the reception signal corresponding to the second code C2, to thereby detect that the pointer 100 is in a hovering state and the position of the pointer 100 in the hovering state. On the other hand, when the pointer 100 contacts the sensor section, the first code C1 is transmitted from the pointer 100 to the sensor section. In this instance, the sensor section detects a peak of the correlation value from the reception signal corresponding to the first code C1 to carry out position detection. In this manner, by identifying the type (C1 or C2) of the code transmitted, it can be determined whether the pointer 100 is in a pen down state wherein it is contacting the sensor section or in a hovering state. This can be carried out, for example, by determining from which one of outputs of the first correlator and the second correlator of a correlation matching section in the reception system circuit group a peak of the correlation value is obtained.

[0086] It is to be noted that, also in this example, the first code production section 26 and the second code production section 27 are provided in the integrated circuit 102, but the present invention is not limited to this configuration. Another configuration may be used wherein, for example, a ROM is provided in the integrated circuit 102 and the first code C1 and the second code C2 are stored in

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the ROM such that, when transmitting a spread code, the codes are read out from the ROM and transmitted.

[Modification 2]

[0087] In the description of modification 2, examples of a configuration of a pointer are provided, which can detect operational information of a side switch of the pointer, in addition to the position and the pressure of the pointer, using a plurality of codes transmitted from the pointer.

[0088] FIGS. 12A and 12B show a general configuration of the pointers of this example. It is to be noted that, in FIGS. 12A and 12B, like elements to those of the embodiment described hereinabove (FIG. 2) are denoted by like reference characters.

[0089] The pointer 110 illustrated in FIG. 12A includes a first electrode 20 having a shape of a rod, a cylindrical second electrode 21, a variable capacitor 22, an integrated circuit 111, a coil 24, a power production circuit 25, and a housing 129 which accommodates the components mentioned above. Further, the pointer 110 includes an operation switch provided at a part of a side face of the housing 129, to be operated by a finger or the like, that is, a so-called side switch 113. The configuration of any other part of the pointer 110 than the integrated circuit 111 and the side switch 113 is similar to that of the embodiment described hereinabove, and therefore, the description of only the integrated circuit 111 and the side switch 113 is given.

[0090] The integrated circuit 111 includes a transmission code production section 115 including a first code production section 26 and a second code production section 27, a changeover switch 114, and an inverter circuit 128.

[0091] The first code production section 26 and the second code production section 27 have a configuration similar to that of the embodiment described hereinabove and produce and output a first code C1 and a second code C2, respectively. Further, as the codes to be produced, a spread code represented by

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a PN code can be applied. It is to be noted that, the position on the sensor section pointed to by the pointer 110 is detected based on the first code C1 produced by the first code production section 26 as described hereinabove. Meanwhile, detection of pressure applied to the pointer 110, that is, of so-called pen pressure, is carried out by detection of a capacitance variation of a capacitor caused by the first electrode 20 having a shape of a rod pressing the variable capacitor 22 in response to the pressure. In particular, as shown in FIGS. 3A and 3B, the production starting timing of the second code C2 which is produced by the second code production section 27 is varied in accordance with the capacitance of the variable capacitor 22. Accordingly, the pressure can be determined by detecting the time difference between the code production starting timings of the second code C2 and the first code C1 by means of the position detection circuit 50.

[0092] Meanwhile, the second code C2 produced by the second code production section 27 is supplied to the changeover switch 114 together with an output inverted signal obtained from the inverter circuit 128, to which the second code C2 is supplied. As the changeover switch 114 is controlled in response to an operation of the operation switch (side switch) 113, the second code C2 produced by the second code production section 27 is supplied to the second electrode 21 through the inverter circuit 128. It is to be noted that the inverter circuit 128 and the changeover switch 114 form a code inversion circuit 116.

[0093] According to this configuration, the interposition of the inverter circuit 128 is controlled, which carries out signal inversion of the second code C2 produced by the second code production section 27 in response to an operation of the operation switch (side switch) 113. The position detection circuit 50 can detect whether or not the operation switch (side switch) 113 is operated by detecting whether or not the second code C2 produced by the second code production section 27 is in a signal inverted state based on the processing of the correlation matching section 56. It is to be noted that the operation switch 113 is provided, for

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example, in order to implement a function of the right click button or the left click button of a mouse used in a personal computer.

[0094] In the configuration shown in FIG. 12A, the inverter circuit 128 is provided in the pointer 110, and a signal outputted from the inverter circuit 128 in response to an operation of the operation switch (side switch) 113 is supplied to the second electrode to detect presence or absence of an operation (activation) of the operation switch (side switch) 113. In contrast, in the configuration of a pointer 117 shown in FIG. 12B, the second electrode 21 is formed from a first electrode piece 21a and a second electrode piece 21b. Further, the pointer 117 includes a third code production section 29 in addition to the first code production section 26 and the second code production section 27. It is to be noted that, if a code pattern of a third code C3 produced by the third code production section 29 is made different from code patterns of the first code C1 and the second code C2 produced by the first code production section 26 and the second code production section 27, respectively, then the correlation matching section 56 which forms the position detection circuit 50 can differentiate the codes from one another.

[0095] The third code C3 produced by the third code production section 29 is supplied to the second electrode piece 21b through a switch 112, which is switched ON in response to an operation of the operation switch (side switch) 113. By detecting the third code C3 transmitted from the second electrode piece 21b by means of the position detection circuit 50, it can be detected whether or not the operation switch (side switch) 113 is operated. It is to be noted that the second code C2 produced by the second code production section 27 is supplied to the first electrode piece 21a and used for pressure detection. While this example has the configuration wherein the second electrode 21 is divided into two elements including the first electrode piece 21a and the second electrode piece 21b, the present invention is not limited to this configuration, and the second electrode 21 can be divided further finely. The second electrode 21 may be configured such that it is divided into a plurality of electrode pieces disposed substantially

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cylindrically such that the second code C2 is supplied to the odd-numbered ones of the electrode pieces while the third code C3 is supplied to the even-numbered ones of the electrode pieces. In this instance, a stabile electric coupling characteristic can be assured irrespective of the positional relationship between the sensor section and a peripheral face of the pointer.

[0096] It is to be noted that this example may also be configured such that, for example, a ROM is provided in the integrated circuit 111 and the first code C1, second code C2 and third code C3 are stored in advance in the ROM such that, when transmitting codes, the codes are read out from the ROM. Further, as described hereinabove with reference to FIGS. 3A and 3B, the codes including the first code C1, second code C2 and third code C3 may have code patterns different from one another or the same code pattern. However, where the codes have the same code pattern, a predetermined time difference is provided among the codes. Furthermore, while this example has the configuration that the codes are supplied to corresponding ones of the electrodes, it is also possible to supply the codes to the same electrode, for example, by using so-called resistance addition wherein the codes are supplied through resistors or the like.

[Modification 3]

[0097] While, in the description of the embodiment and the modifications 1 and 2 described above, codes themselves from the pointer 2 are transmitted directly to the position detector 3, the present invention is not limited to this configuration. Predetermined modulation may be applied to spread codes, and the modulated codes (transmission codes) may be transmitted from the pointer 2 to the position detector 3. In the description of modification 3, a spread code is used as the first and second codes and is PSK (Phase Shift Keying) modulated.

[0098] FIGS. 13A and 13B show waveforms of a spread code before and after PSK modulation. FIG. 13A shows a waveform of a spread code before PSK

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modulation and FIG. 13B shows a waveform of the spread code after PSK modulation.

[0099] In this example, a spread code is PSK modulated with a signal having a clock period that is 1/2 the code period of the spread code before modulation. It is to be noted that the ratio between the clock period used for modulation and the code period can be suitably adjusted depending on each application. In the PSK modulation of this example, the phase is reversed at a timing of transition of the level of the spread code before modulation (FIG. 13A) from High to Low or from Low to High, to produce a modulated signal (FIG. 13B).

[0100] FIG. 14 shows a general configuration of a pointer configured to carry out the PSK modulation described above. It is to be noted that, in FIG. 14, like elements to those of the embodiment described hereinabove (FIG. 2) are denoted by like reference characters. The pointer 120 includes a first electrode 20, a second electrode 21, a variable capacitor 22, an integrated circuit 121, a coil 24, a power production circuit 25, and a housing 129 which accommodates the components mentioned above. It is to be noted that the configuration of the pointer 120 other than the integrated circuit 121 is similar to that of the embodiment described hereinabove, and therefore, description is given here only of the integrated circuit 121.

[0101] The integrated circuit 121 includes a transmission code production section 122, which in turn includes a first code production section 26, a second code production section 27, and two PSK modulators 123 and 124. The PSK modulator 123 is connected to the output side of the first code production section 26 while the other PSK modulator 124 is connected to the output side of the second code production section 27. The first code production section 26 and the second code production section 27 have a configuration similar to that of the embodiment described hereinabove, and both of the PSK modulators 123 and 124 can be configured from a PSK modulator which is conventionally used in the communication technology field.

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[0102] It is to be noted that, while, in this example, the first code C1 and the second code C2 are produced in the transmission code production section 122 of the integrated circuit 121 and are PSK modulated, the present invention is not limited to this configuration. It is possible to use another configuration wherein, for example, a ROM is provided in the integrated circuit 121 and the first code C1 and the second code C2, which are PSK modulated in advance, are stored in the ROM such that, when transmitting spread codes, predetermined modulated spread codes are read out from the ROM and transmitted. It is to be noted that, in this instance, a corresponding relationship between capacitance variation amounts of the variable capacitor 22 and variation amounts of the phase of the PSK modulated second code C2 is stored in advance as a table in the ROM.

[0103] Further, since, in this example, a signal supplied to a conductor group is PSK modulated, upon detection of a reception signal, a circuit for demodulating the PSK modulated signal is required. FIG. 15 shows a configuration of the reception system circuit group in the position detector in this example. It is to be noted that, in FIG. 15, like elements to those of the embodiment (FIG. 4) described hereinabove are denoted by like reference characters.

[0104] The reception system circuit group 125 includes, as principal components thereof, a reception amplifier 52, an A/D conversion circuit 53, a PSK demodulator 126, a serial to parallel conversion section 54, a shift register 55, a correlation matching section 56, a memory 57, and a position and pressure calculation section 58. The reception amplifier 52, A/D conversion circuit 53, PSK demodulator 126, serial to parallel conversion section 54, shift register 55, correlation matching section 56, memory 57 and position and pressure calculation section 58 are connected in this order from the input side of a reception signal. In particular, in the reception system circuit group 125 of this example, the PSK demodulator 126 is provided between the A/D conversion circuit 53 and the serial to parallel conversion section 54. Except for this, the reception system circuit

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group 125 has a configuration similar to that of the embodiment described hereinabove. It is to be noted that the PSK demodulator 126 can be formed from a PSK demodulator which is conventionally used in the communication technology field.

[0105] If a spread code to be transmitted is PSK modulated as in this example, then since a clock signal of a period shorter than the code period of the spread code is used, the frequency of signal transitions upon rise and fall of spread codes detected by the reception system circuit group 125 can be increased, and errors in position and pressure detection can be reduced. Further, since a spread code is PSK modulated, the frequency range of the transmission signal can be increased and the noise tolerance can be improved.

[Modification 4]

[0106] In modification 4, a spread code is used as the first and second codes and is FSK (Frequency Shift Keying) modulated. Waveforms of a spread code before and after FSK modulation are shown in FIGS. 16A and 16B, respectively. FIG. 16A shows a waveform of the spread code before FSK modulation and FIG. 16B shows a waveform of the spread code after FSK modulation.

[0107] In the present example described below, a spread code is FSK modulated using signals having clock periods equal to 1/2 and 1/4 ,respectively, the code period of the spread code before modulation. In the FSK modulation of the present example, a High level state of a spread code before modulation (FIG. 16A) is associated with a signal having four times the frequency of that of the spread code before modulation, while a Low level state is associated with a signal having twice the frequency of the spread code before modulation, to thereby obtain a modulated signal (FIG. 16B). It is to be noted that the ratio between the clock period(s) used for modulation and the code period can be suitably adjusted depending on each application.

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[0108] FIG. 17 shows a general configuration of a pointer configured to carry out the FSK modulation described above. It is to be noted that, in FIG. 17, like elements to those of the embodiment described hereinabove (FIG. 2) are denoted by like reference characters. The pointer 130 includes a first electrode 20, a second electrode 21, a variable capacitor 22, an integrated circuit 131, a coil 24, a power production circuit 25, and a housing 129 which accommodates the components mentioned above. It is to be noted that the configuration of the pointer 130 other than the integrated circuit 131 is similar to that of the embodiment described hereinabove, and therefore, description is given here only of the integrated circuit 131.

[0109] The integrated circuit 131 includes a transmission code production section 132, which in turn includes a first code production section 26, a second code production section 27, and two FSK modulators 133 and 134. The FSK modulator 133 is connected to the output side of the first code production section 26 while the other FSK modulator 134 is connected to the output side of the second code production section 27. The first code production section 26 and the second code production section 27 have a configuration similar to that of the embodiment described hereinabove, and both of the FSK modulators 133 and 134 can be configured from an FSK modulator which is conventionally used in the communication technology field.

[0110] It is to be noted that, while, in this example, the first code C1 and the second code C2 are produced in the transmission code production section 132 of the integrated circuit 131 and are FSK modulated, the present invention is not limited to this configuration. It is possible to use another configuration wherein, for example, a ROM is provided in the integrated circuit 131 and the first code C1 and the second code C2, which are FSK modulated, are stored in the ROM such that, when transmitting spread codes, predetermined modulated spread codes are read out from the ROM and transmitted. It is to be noted that, in this instance, a corresponding relationship between capacitance variation amounts of the variable

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capacitor 22 and variation amounts of the phase of the FSK modulated second code C2 is stored in advance as a table in the ROM.

[0111] Further, since, in this example, a signal supplied to a conductor group is FSK modulated, upon detection of a reception signal, a circuit for demodulating the FSK modulated signal is required. FIG. 18 shows a configuration of the reception system circuit group in the position detector in this example. It is to be noted that, in FIG. 18, like elements to those of the embodiment (FIG. 4) described hereinabove are denoted by like reference characters.

[0112] The reception system circuit group 135 includes , as principal components thereof, a reception amplifier 52, an A/D conversion circuit 53, an FSK demodulator 136, a serial to parallel conversion section 54, a shift register 55, a correlation matching section 56, a memory 57, and a position and pressure calculation section 58. The reception amplifier 52, A/D conversion circuit 53, FSK demodulator 136, serial to parallel conversion section 54, shift register 55, correlation matching section 56, memory 57 and position and pressure calculation section 58 are connected in this order from the input side of a reception signal. In particular, in the reception system circuit group 135 of this example, the FSK demodulator 136 is provided between the A/D conversion circuit 53 and the serial to parallel conversion section 54. Except for this, the reception system circuit group 135 has a configuration similar to that of the embodiment described hereinabove. It is to be noted that the FSK demodulator 136 can be formed from an FSK demodulator which is conventionally used in the communication technology field.

[0113] If a spread code to be transmitted is FSK modulated as in this example, then since a clock signal of a period shorter than the code period of the spread code is used, the frequency of signal transitions upon rise and fall of spread codes detected by the reception system circuit group 135 can be increased, and errors in position and pressure detection can be reduced. Further,

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since a spread code is FSK modulated, the frequency range of the transmission signal can be increased and the noise tolerance can be improved.

[Modification 5]

[0114] In the modification 2 described with reference to FIGS. 12A and 12B, a configuration is described for assuring a stable electric coupling characteristic between the sensor section and the pointer, irrespective of the positional relationship between the sensor section and a peripheral face of the pointer. In modification 5, a configuration is described for detecting an operational state of a pointer with reference to FIG. 19. More particularly, a configuration is described for detecting the following three operational states.

(1) Detection of a rotational angle r around the pen tip of a pointer 146 as a reference axis.

(2) Detection of the inclination θ of the pointer 146, with its pen tip as a reference point, relative to a plane of the scannable region 3a (the plane formed by the sensor section 30 coupled to the position detection circuit 50).

(3) Detection of the rotational angle φ of the pointer 146 when the pointer 146 is projected to the plane of the scannable region 3a (or a plane parallel to that plane), where the pointer 146 is rotated with its pen tip as a reference point while maintaining the inclination θ, that is, where the pointer 146 is rotated in such a manner as to draw a cone with its pen tip as a reference point while maintaining the inclination θ.

[0115] It is to be noted that those elements which have already been described hereinabove are denoted by like reference characters and description of them is omitted. Further, as hereinafter described, information (r, θ, φ) is set with reference to a predetermined electrode piece disposed in the housing of the pointer 146.

[0116] It is assumed that, in FIG. 19, the pointer 146 itself is positioned at a predetermined rotational angle r around the center of rotation provided by the pen

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tip (axis), which forms the first electrode 20. Further, it is assumed that the pointer 146 points to a position with the inclination θ with respect to the plane of the scannable region 3a of the position detector 3, with its pen tip that forms the first electrode 20 as a reference point. Furthermore, it is assumed that, where the pointer 146 is rotated so as to draw a circle on the plane of the scannable region 3a with its pen tip as a reference point while maintaining the inclination θ, that is, where the pointer 146 is rotated such that a cone having the apex at the pen tip is formed by a locus of movement of the pointer 146, the pointer 146, when projected to the plane of the scannable region 3a (in FIG. 19, a plan parallel to the plane mentioned above), has a rotational angle φ.

[0117] Further, a plurality of reception conductors X1, X2, X3, Y1, Y2 and Y3 shown in FIG. 19 are schematically represented to detect the information (r, θ, φ) of the pointer 146. It is to be noted that the reception conductors X1, X2 and X3 correspond to the second conductors 33 which form the second conductor group 34. Meanwhile, the plurality of reception conductors Y1, Y2 and Y3 correspond to the first conductors 31 which form the first conductor group 32. In order to facilitate understanding, it is assumed that the pen tip of the pointer 146 is disposed at a crossing point of the reception conductors X2 and Y2 and the pointer 146 is inclined by the angle θ toward the reception conductor Y3 side along a direction perpendicular to the reception conductors Y1, Y2 and Y3, that is, along a direction in which the reception conductors X1, X2 and X3 extend.

[0118] In the embodiment shown in FIG. 20, a transmission signal production section 73 of an integrated circuit 72 accommodated in the pointer 146 includes a first code production section 26, a second code production section 27, a third code production section 29, a fourth code production section 65, and a fifth code production section 66, which produce and output a first code C1, a second code C2, a third code C3, a fourth code C4 and a fifth code C5, respectively. It is to be noted that a configuration that the codes have code patterns different from each other such that they can be identified from each other may be adopted or

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another configuration that the codes are produced with a predetermined time difference given therebetween so that they can be identified on the time axis may be adopted. It is to be noted that, where the codes are produced with a predetermined time difference given therebetween, the codes may be configured such that they have a plurality of code patterns or may be configured such that they have the same code pattern. In short, any configuration may be used as long as the codes can be identified from each other and detected on the side of the position detector 3. In this embodiment, it is assumed that the first code C1, second code C2, third code C3, fourth code C4 and fifth code C5 have code patterns different from one another.

[0119] A second electrode 211 is composed of a plurality of electrode pieces (211a, 211b, 211c and 211d) electrically divided from one another and disposed along a circumferential face of the inner side of the housing 129 in the proximity of the pen tip of the pointer 146. A signal of the third code C3 is supplied to the electrode piece 211a; a signal of the second code C2 is supplied to the electrode piece 211b; the fourth code C4 is supplied to the electrode piece 211c; and the fifth code C5 is supplied to the electrode piece 211d. Further, the signal of the first code C1 is supplied to the first electrode 20. When the variable capacitor 22 is pressed by pressure applied to the first electrode 20, the capacitance of the variable capacitor 22 varies, and as a result, the pressure can be detected as described hereinabove. In the present embodiment, the second electrode 211 is composed of a plurality of electrode pieces, and a plurality of codes having different code patterns from one another are respectively supplied to the plurality of electrode pieces. It is to be noted that it is possible to supply a plurality of codes having a time difference from each other and having the same code pattern to the plurality of electrode pieces.

[0120] Now, a detection principle of the information (r, θ, φ) is described. Further, in detecting each information, the arrangement position of the electrode

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piece 211a in the housing of the pointer 146 and a code supplied to the electrode piece 211a are described, as references to the information (r, θ, φ).

[0121] First, detection of the rotational angle r (rotational position r) is described. In order to facilitate understanding, it is assumed that the pointer 146 points to a crossing point between the reception conductor X2 and the reception conductor Y2 and the position is pointed to in the vertical direction with respect to the plane of the scannable region 3a. In other words, it is assumed that the inclination θ is 90 degrees. If, in this state, the pointer 146 is rotated along the circumferential face thereof around the pen tip, then the distance, for example, between the reception conductor Y2 and the electrode pieces 211a, 211b, 211c and 211d which form the second electrode 211 varies in response to the rotation of the pointer 146. Consequently, the detection signal level when each code is received through each electrode piece on the reception conductor Y2 varies. Accordingly, by detecting the variation of the signal level of each code, the rotational position r of the pointer 146 can be detected, with reference to the detection signal from the electrode piece 211a.

[0122] It is to be noted that, as a reception conductor used when the rotational angle r is detected, it is also possible to use the reception conductor X2 in place of the reception conductor Y2. Further, if the detection signal level of a plurality of codes detected by a plurality of reception conductors (for example, Y1, Y2 and Y3 or X1, X2 and X3) or all reception conductors (for example, X1, X2, X3, Y1, Y2 and Y3) is used, then the rotational position r can be determined more particularly.

[0123] Now, detection of the inclination θ of the pointer 146 with respect to the plane of the scannable region 3a with its pen tip as a reference point is described. It is assumed that the pointer 146 is inclined so as to exhibit an inclination θ along the extending direction of the reception conductor X2 in a state wherein the rotational position r is maintained as seen in FIG. 19. In this state, the detection signal level from the reception conductor Y3 is higher than the detection

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signal level from the reception conductor Y1. Accordingly, the inclination θ of the pointer 146 can be determined by comparing the detection signal levels from a plurality of reception conductors disposed in the proximity of the position pointed to by the pointer 146. It can be readily recognized that, where the pointer 146 is inclined so as to exhibit the inclination θ along the extending direction of the reception conductor Y2, the inclination of the pointer 146 can be detected based on a similar principle.

[0124] Further, the rotational angle φ of the pointer 146 obtained by projecting the position of the pointer 146, which is rotated while maintaining the inclination θ with its pen tip as a reference point, to the plane of the scannable region 3a can be detected by developing the detection principle of the inclination θ described above. In particular, the rotational angle φ of the pointer 146 can be detected by comparing the detection signal levels from a plurality of reception conductors, for example, the reception conductors Y1, Y2 and Y3 and/or the reception conductors X1, X2 and X3.

[0125] According to such a configuration as shown in FIG. 20, since the distances between the electrode pieces disposed in the housing of the pointer 146 and a predetermined reception conductor are different from each other, as a result, electric coupling relationships between the individual electrode pieces and the reception conductor differ from one another. Accordingly, by comparing the signal levels when the codes (C2, C3, C4 and C5) are detected with respect to a predetermined reception conductor with each other, the information (r, θ, φ) representative of a state of the pointer 146 can be detected.

[0126] It is to be noted that, while, in the description of the present embodiment, the detection principle of the information (r, θ, φ) is described using the second electrode 211 composed of four electrode pieces, the number of electrode pieces is not limited to this specific number. Further, as the first code C1 used for detection of the pointing position of the pointer 146, a code having the same code pattern as that of the other codes can be used, as described

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hereinabove. While, in this embodiment, the plurality of electrode pieces (211a, 211b, 211c and 211d) have a structure such that they are disposed in a circular pattern inside the housing 129 of the pointer 146, it is otherwise possible to use a structure such that they are disposed on an outer peripheral portion of the pointer 146, for example, near the pen tip.

[Modification 6]

[0127] In the position detector 3 of the embodiment shown in FIG. 4, a predetermined conductor is selected from within the first conductor group 32 and the second conductor group 34, but the present invention is not limited to this configuration. The selection circuit may be composed of two selection circuits, one of which is used as a selection circuit for selecting a predetermined conductor from within the first conductor group 32 while the other is used as a selection circuit for selecting a predetermined conductor from within the second conductor group 34. Also in this example, a spread code may be used as the first and second codes.

[0128] FIG. 21 shows a general configuration of a position detector of modification 6. It is to be noted that, in FIG. 21, like elements to those of the embodiment (FIG. 4) described hereinabove are denoted by like reference characters. Further, in FIG. 21, only components around a selection circuit 201 are shown to simplify the description.

[0129] The selection circuit 201 of the position detector 200 of this example is composed of a first selection circuit 202 for selecting a predetermined one of the first conductors 31 in a predetermined order from within the first conductor group 32, and a second selection circuit 203 for selecting a predetermined one of the second conductors 33 in a predetermined order from within the second conductor group 34. Further, the first selection circuit 202 and the second selection circuit 203 are connected to the reception system circuit group 51. It is to be noted that the configuration of the position detector 200 of the present example other than the selection circuit 201 is similar to that of the embodiment described hereinabove.

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[0130] In the position detector 200 of the present example, operation of the first selection circuit 202 for selecting a predetermined one of the first conductors 31 from within the first conductor group 32 and operation of the second selection circuit 203 for selecting a predetermined one of the second conductors 33 from within the second conductor group 34 are carried out at the same time. Therefore, in this example, an output signal of the first selection circuit 202 and an output signal of the second selection circuit 203 are inputted to the reception system circuit group 51. In the present example, correlation calculation codes respectively corresponding to the two spread codes C1 and C2 are used to calculate correlation values to carry out position detection and pressure detection of the pointer.

[0131] Further, in the configuration of the position detector 200 of the modification 6, the reception system circuit group for processing an output signal of the first selection circuit 202 may be provided separately from the reception system circuit group for processing an output signal of the second selection circuit 203. In this instance, both of the position detection and the pressure detection of the pointer may be carried out by both of the reception system circuit groups, or the position detection and the pressure detection of the pointer may be carried out by one of the reception system circuit groups while only the position detection of the pointer is carried out by the other reception system circuit group. In the former case, high speed detection can be achieved. On the other hand, where the latter is applied, the configuration becomes simpler. It is also possible to select an output signal of the first selection circuit 202 and an output signal of the second selection circuit 203 by means of a changeover (switching) circuit and supply the selected output signals time-divisionally to a common reception system circuit group to carry out the position detection and the pressure detection of the pointer.

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[Modification 7]

[0132] While, in the description of the embodiment and the modifications 1 to 6 described above, the position detection apparatus is a tablet, the present invention is not limited to this configuration. The position detection apparatus may have not only a function of a tablet but also a function of a touch panel wherein a user touches a screen of a position detector with a finger to carry out a predetermined operation. In the modification 7, the position detection apparatus having both functions of the tablet and the touch panel is described. In this example, a spread code is used as the first and second codes.

[0133] FIG. 22 shows a general configuration of a position detector of the position detection apparatus of the present example. The position detection apparatus of the present example uses, as the pointer thereof, one of those described in connection with the embodiment and the modifications 1 to 5. Therefore, description is given here only of the configuration of the position detector. It is to be noted that, in FIG. 22, like elements to those of the embodiment shown in FIG. 4 are denoted by like reference characters. Further, in FIG. 22, a flow of processes for a reception signal is indicated by solid line arrow marks, and flows of a control signal, a clock signal and so forth are indicated by broken line arrow marks. However, in FIG. 22, broken line arrow marks indicating flows of a control signal, a clock signal and so forth of the reception system circuit group 51 are omitted to simplify the description.

[0134] The position detector 210 of the present example includes, as principal components thereof, a sensor section 30 for detecting pointed positions of a plurality of different types of pointers, such as a pointer 147 having a shape of a pen, a plurality of fingers 148a and 148b and so forth as pointers, a selection circuit 220 for selecting and changing (switching) over a plurality of conductors which form the sensor section 30, and a position detection circuit 230. It is to be noted that, since the sensor section 30 has a configuration similar to that of the

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embodiment shown in FIG. 4, description of the configuration of the sensor section 30 is omitted.

[0135] The selection circuit 220 is composed of a first selection circuit 221 and a second selection circuit 222. The first selection circuit 221 is connected to a first conductor group 32 composed of a plurality of first conductors 31 disposed in parallel in a y direction in FIG. 22 and selects a predetermined one of the first conductors 31 in a predetermined order from within the first conductor group 32. Meanwhile, the second selection circuit 222 is connected to a second conductor group 34 composed of second conductors 33 disposed in parallel in an x direction in FIG. 22 and selects a predetermined one of the second conductors 33 in a predetermined order from within the second conductor group 34. It is to be noted that the changeover (switching) control of the first selection circuit 221 and the second selection circuit 222 is controlled by a control signal outputted from the control section 63 which cooperates with the central processing unit 62.

[0136] The position detection circuit 230 includes a reception system circuit group 51, an oscillator 60, a drive circuit 61, a central processing unit 62, a control section 63, a spread code production section 231 (code supplying section), a first changeover (switch) section 232, and a second changeover (switch) section 233. The position detection circuit 230 of the present example is configured such that it includes, in addition to the components of the position detection circuit 50 of the embodiment (FIG. 4) described hereinabove, the spread code production section 231, first changeover section 232 and second changeover section 233. The configuration of the other part of the position detection circuit 230 than the spread code production section 231, first changeover section 232 and second changeover section 233 is similar to that of the embodiment described hereinabove.

[0137] Where the position detector 210 is to operate as a touch panel which accepts an operation by a finger, the spread code production section 231 supplies a spread code to a predetermined one of the first conductors 31 of the first conductor group 32. It is to be noted that the spread code production section 231

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preferably produces a signal having a third spread code C3 different from a signal of the first code C1 or a signal of the second code C2 transmitted from the pointer 147 having a shape of a pen. However, the present invention is not limited to this configuration, and it is only necessary for the spread code production section 231 to produce a predetermined code, which enables recognition of multiple pen operations simultaneously, that is, recognition of the type of a pointer such as a finger or a pen. When the position detector 210 operates as a touch panel, at a position at which a finger of a user contacts the position detector 210, since a current is shunted to the ground, for example, through the finger, or a movement of the current between conductors crossing with each other occurs, the level of a reception signal obtained through the crossing point of the conductors at the touched position varies. Therefore, by detecting this level variation by means of the reception system circuit group 51, the touched position can be detected two-dimensionally.

[0138] The first changeover section 232 carries out changeover between a flow of signals when the position detector 210 is to operate as a tablet for accepting a pen operation, and a flow of signals when the position detector 210 is to operate as a touch panel which accepts an operation of a finger. In particular, when the position detector 210 is to operate as a tablet, since the first conductor group 32 acts as reception conductors, an output terminal of the first selection circuit 221 is connected to an input terminal of the second changeover section 233 through a switch SW2 of the first changeover section 232. At this time, a switch SW1 of the first changeover section 232 places the spread code production section 231 and the first selection circuit 221 into a mutually disconnected state. On the other hand, when the position detector 210 is to operate as a touch panel, since the first conductor group 32 acts as a transmission medium, the output terminal of the spread code production section 231 is connected to the first selection circuit 221 through the switch SW1 of the first changeover section 232. At this time, the switch SW2 of the first changeover section 232 places the first

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selection circuit 221 and the second changeover section 233 into a mutually disconnected state. It is to be noted that the changeover operation of the first changeover section 232 is controlled by a control signal (broken line arrow mark in FIG. 22) outputted from the control section 63 which cooperates with the central processing unit 62.

[0139] When the position detector 210 is to operate as a touch panel for accepting an operation of a finger, the second changeover section 233 connects the second selection circuit 222 and the reception amplifier 52 to each other in an interlocking relationship with the connection between the spread code production section 231 and the first selection circuit 221 through the first changeover section 232 under the control of the control section 63 which cooperates with the central processing unit 62. Where the first changeover section 232 and the second changeover section 233 are controlled in this manner, a transmission signal produced by the spread code production section 231 is successively supplied to the first conductors 31 which form the first conductor group 32 through the first selection circuit 221 while the second conductors 33 which form the second conductor group 34 are successively selected by the second selection circuit 222 and connected to the reception amplifier 52. By this configuration, an operation by a user can be detected two-dimensionally.

[0140] On the other hand, when the position detector 210 is to operate as a tablet for accepting an operation of a pen, the second changeover section 233 connects the first selection circuit 221 connected through the first changeover section 232 and the second selection circuit 222 alternately to the reception amplifier 52, under the control of the control section 63 which cooperates with the central processing unit 62. Since the first changeover section 232 and the second changeover section 233 are controlled in this manner, the pointed position by an operation of a pen can be detected two-dimensionally.

[0141] Next, an example of operation of a function as a touch panel and a function as a tablet of the position detector 210 of the present example is

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described briefly. In an example illustrated in FIG. 23, operation as a touch panel and operation as a tablet are switched after every predetermined interval of time. In particular, the first changeover section 232 and the second changeover section 233 are changed over in an interlocked relationship with each other after every predetermined period of time under the control of the control section 63, which cooperates with the central processing unit 62, to detect presence of pointers such as a finger and a pen or positions pointed to by the pointers. In the present example, a position detection operation (tablet function) of the pointer 147 having a shape of a pen and a detection operation (touch panel function) of the touched positions by the fingers 148a and 148b are repeated alternately after every predetermined period of time (in the example of FIG. 23, for example, 10 ms).

[0142] It is to be noted that the operation of the position detector 210 of the present example is not limited to the time divisional operation illustrated in the example of FIG. 23. For example, it is also possible to detect presence of a plurality of kinds of pointers represented by a finger and a pen on the sensor section 30 at the same time. In this instance, the position detector 210 operates in the following manner. It is to be noted that, in the following example of an operation, a transmission signal which includes a first spread code and a second spread code, which is different from the first spread code, is transmitted from a pen, and a transmission signal which includes a third spread code different from both the first and second spread codes allocated to the pen is produced by and outputted from the spread code production section 231 shown in FIG. 22.

[0143] First, the spread code production section 231 produces a transmission signal including the third spread code and repetitively supplies the transmission signal in a predetermined order to a plurality of first conductors 31, which form the first conductor group 32, through the switch SW1 of the first changeover section 232 and the first selection circuit 221. Thereupon, to the reception amplifier 52 which composes the reception system circuit group 51, the selected conductor is connected through the second selection circuit 222 and the

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second changeover section 233. It is to be noted that the second selection circuit 222 selects a predetermined conductor from among the plurality of second conductors 33, which form the second conductor group 3,4 by a selection operation in accordance with a predetermined order.

[0144] Then, the A/D conversion circuit 53 converts an analog signal outputted from the reception amplifier 52 into a digital signal whose one word is formed from a predetermined number of bits. Then, the serial to parallel conversion section 54 and the shift register 55 carry out serial to parallel conversion of the digital signal into a word having a word length corresponding to the code length of a spread code (C1, C2 and C3), and supplies the signal obtained by the conversion to the correlation matching section 56.

[0145] Then, the correlation matching section 56 carries out a correlation matching operation between the digital signal supplied thereto and individual correlation calculation codes. By this configuration, presence or absence of the first, second and third spread codes (C1, C2 and C3) is detected and also their signal levels are detected.

[0146] In particular, the operation described above is the same operation for detecting the detection operation of a touched position (touch panel function). Accordingly, the detection operation of the finger position in this operation state is such as described hereinabove. In this operation state, if the pen is operated, then by detecting a spread code of at least one of the first code C1 and the second code C2 transmitted from the pen by means of the correlation matching section 56, presence of the pen or the pointing position of the pen can be recognized. Then, by switching to the function of the position detector 210 as a tablet based on the recognition of the presence or absence of a pen operation, the pen position can be detected two-dimensionally.

[0147] On the other hand, if two kinds of pointers including a finger and a pen are detected at the same time by the position detection circuit 230, then by switching the function of the position detector 210 time-divisionally between the

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touch panel function and the tablet function as illustrated in FIG. 23, it is possible to create a state wherein operations of a finger and a pen appear to be detected at the same time. It is also possible to switch the function setting such that, where a pen and a finger are detected at the same time, the position detector enters the mode for detecting one of the pen and the finger (touch panel function or tablet function).

[0148] Further, in the present example, when the position detector 210 is to operate as a touch panel, a plurality of spread codes having phases different from each other may be supplied to corresponding ones of the plurality of first conductors 31 at the same time such that the plurality of spread codes are transmitted by phase multiplex transmission. For example, where the number of first conductors 31 is n, n spread codes having different phases from one another are produced from a spread code of one code pattern by the spread code production section 231 and are supplied in a corresponding relationship to the first conductors 31. Or, spread codes of n code patterns different from one another may be produced and supplied in a corresponding relationship to the n first conductors 31.

[0149] In this instance, the reception system circuit group 51 may adopt a configuration which includes correlation calculation codes corresponding to the spread codes produced by the spread code production section 231, and correlation matching operations with the individual received spread codes are carried out simultaneously. It is to be noted that, in this configuration, at least one of the first selection circuit 221 and the second selection circuit 222 which form the selection circuit 220 is not necessarily required.

[0150] Further, the position detector 210 of the present example includes a configuration for carrying out time-divisional switching between a touch panel function for detecting a finger as a pointer and a pen tablet function for detecting a pen as a different type of pointer. However, regardless of which function is performed by the position detector 210, the second conductors 33 which form the

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second conductor group 34 are always used for signal reception. Accordingly, as described hereinabove, where the reception system circuit group 51 includes a circuit configuration which can simultaneously detect a transmission signal supplied from the spread code production section 231 used to detect a finger as a pointer, and a transmission signal supplied from a pen as a pointer of a different type, when the finger position in the x direction is determined, the pen position in the x direction can also be determined simultaneously. Therefore, as a next process for determining the pen position, since the pen position in the x direction is acquired already, it is necessary to determine only the pen position in the y direction. Accordingly, since the position detector 210 of the present example has such a circuit configuration as described above, simultaneous detection of a pen and a finger by the sensor section 30 can be carried out at a high speed.

[0151] Furthermore, regarding detection of the presence or absence of an operation of the side switch 113 shown in FIG. 12 (modification 2), by providing a configuration for supplying an operational signal from the side switch 113 to the delay setting circuit 142 of FIG. 3 and switching the potential Vth, it can be detected that the side switch 113 is operated. For example, the potential Vth which is set by the delay setting circuit 142 in response to the fact that the side switch 113 is operated is switched, for example, to a high potential. If the potential Vth is set to the high potential, then even if the pressing force by the pointer is the same, a signal outputted from the delay setting circuit 12 is outputted after it is further delayed by a predetermined period of time. By this configuration, the production timing of a signal to be outputted from the second code production section with respect to a signal outputted from the first code production section is controlled in accordance with the operation of the side switch 113, and as a result, the presence or absence of an operation of the side switch 113 can be detected.

[0152] Further, while the pointer 2 shown in FIG. 2, the pointers 110 and 117 shown in FIGS. 12A and 12B, the pointer 120 shown in FIG. 14, the pointer 130 shown in FIG. 17 and so forth have a configuration that a signal outputted

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from the first code production section 26, second code production section 27 or third code production section 29 is supplied to a corresponding one of the first electrode 20 and the second electrode 21, the supplying configuration is not limited to this specific configuration. In particular, the signals can be added through resistors or the like and supplied to the first electrode 20 or the second electrode 21. According to this configuration, the signal supplying points to the first electrode 20 or the second electrode 21 can be reduced, and the configuration as a pointer can be simplified.

[0153] While, in the description of the embodiment and the modifications 1 to 7 described above, an excitation signal is received from an excitation coil of the sensor section to produce a driving voltage for the integrated circuit in the pointer, the present invention is not limited to this configuration, and a power supply such as, for example, a dry cell may be provided inside the pointer.

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CLAIMS

1. A pen-shaped position indicator configured to be capacitively coupled with a sensor surface to indicate a position on the sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body;

a first electrode extending from a distal end of the pen-shaped body and configured to be supplied with a first signal which, when detected by one or more conductors of the sensor surface indicates a position on the sensor surface; and

a second electrode provided near the distal end of the pen-shaped body, the second electrode surrounding a central axis of the pen-shaped body and configured to be supplied with a second signal to be detected by a plurality of conductors of the sensor surface;

wherein angular information of the pen-shaped position indicator is obtained based on a reference point indicated by the first signal from the first electrode and plural capacitive relationships, which are respectively formed between the second electrode and the plurality of conductors of the sensor surface.

2. The pen-shaped position indicator according to claim 1, wherein the angular information includes at least one of: i) a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and ii) a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface.

3. The pen-shaped position indicator according to claim 1, wherein the first electrode and the second electrode are respectively supplied with signals that are distinguishable from each other.

4. The pen-shaped position indicator according to claim 1, wherein the first electrode and the second electrode are respectively supplied with signals having a time difference with each other.

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5. The pen-shaped position indicator according to claim 4, wherein the first and second electrodes are time-divisionally supplied with the first and second signals, respectively.

6. The pen-shaped position indicator according to claim 1, which, in operation, controls selective supply of the second signal to the second electrode.

7. The pen-shaped position indicator according to claim 6, further comprising a switch configured to control selective supply of the second signal to the second electrode.

8. The pen-shaped position indicator according to claim 1, which, in operation, constantly supplies the first signal to the first electrode while selectively supplying the second signal to the second electrode.

9. The pen-shaped position indicator according to claim 1, further comprising:

a coil configured to receive an excitation signal; and

a power generation circuit configured to generate a drive voltage based on the excitation signal;

wherein the drive voltage is used to generate the first and second signals supplied to the first and second electrodes.

10. A pen-shaped position indicator configured to be capacitively coupled with a sensor surface to indicate a position on the sensor surface, the pen-shaped position indicator comprising:

a pen-shaped body;

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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a first electrode extending from a distal end of the pen-shaped body and configured to be supplied with a first signal which, when detected by one or more conductors of the sensor surface indicates a position on the sensor surface; and

a second electrode provided near the distal end of the pen-shaped body, the second electrode having a columnar shape that surrounds a central axis of the pen-shaped body and configured to be supplied with a second signal to be detected by a plurality of conductors of the sensor surface;

wherein plural capacitive relationships are respectively formed between the second electrode and the plurality of conductors of the sensor surface.

11. A detection circuit configured to detect angular information of a pen-shaped position indicator on a sensor surface, the circuit comprising:

reception circuitry which, in operation, receives:

a first signal transmitted from a first electrode extending from a distal end of the pen-shaped position indicator and received by the sensor surface, and

a second signal transmitted from a second electrode provided near the distal end of the pen-shaped position indicator and detected by a plurality of conductors of the sensor surface; and

detection circuitry which, in operation, detects:

a reference position indicated by the pen-shaped position indicator on the sensor surface based on the first signal, and

at least one of a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface, based on the reference position indicated by the first signal and based on plural capacitive relationships that are respectively formed between the second electrode of the pen-shaped position indicator and the plurality of conductors of the sensor surface.

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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12. The detection circuit according to claim 11, wherein the first signal and the second signal are distinguishable from each other.

13. The detection circuit according to claim 11, wherein the first signal and the second signal have a time difference with each other.

14. The detection circuit according to claim 13, wherein the first and second signals are time-divisionally transmitted from the first and second electrodes, respectively.

15. The detection circuit according to claim 11, wherein the reception circuitry intermittently receives the second signal.

16. The detection circuit according to claim 11, wherein the reception circuitry continuously receives the first signal.

17. The detection circuit according to claim 16, wherein the reception circuitry non-continuously receives the second signal.

18. A position detection device comprising:

(i) a sensor surface;

(ii) a receiver coupled to the sensor surface and configured to receive:

a first signal transmitted from a first electrode extending form a distal end of a pen-shaped position indicator and received by the sensor surface, and

a second signal transmitted from a second electrode provided near the distal end of the pen-shaped position indicator and detected by a plurality of conductors of the sensor surface; and

(iii) a detector coupled to the receiver and configured to detect:

Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
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a reference position indicated by the pen-shaped position indicator on the sensor surface based on the first signal, and

at least one of a tilt angle "θ" of an axis of the pen-shaped position indicator relative to the sensor surface, and a rotational angle "φ" of the pen-shaped position indicator about a normal to the sensor surface, based on the reference position indicated by the first signal and based on plural capacitive relationships that are respectively formed between the second electrode and the plurality of conductors of the sensor surface.

19. The position detection device according to claim 18, wherein the detector detects at least one of θ and φ based on comparison of levels of signals that are generated in the plurality of conductors.

20. The position detection device according to claim 18, wherein the first signal and the second signal are distinguishable from each other.

21. The position detection device according to claim 18, wherein the first signal and the second signal have a time difference with each other.

22. The position detection device according to claim 21, wherein the first and second signals are time-divisionally transmitted from the first and second electrodes, respectively.

23. The position detection device according to claim 18, further comprising:

(iv) a transmitter configured to transmit an excitation signal to power the pen-shaped position indicator to generate the first and second signals.

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ABSTRACT OF THE DISCLOSURE

A position detection apparatus of the electrostatic coupling type is provided, to detect not only a position of a pointer but also information other than the position information such as, for example, pointer pressure or side switch information. The pointer transmits two codes such that a pressure applied to a pen tip is associated with a time difference between the two codes. A position detector carries out a correlation matching operation between signals generated in reception conductors and correlation calculation codes corresponding to the two codes, to thereby detect a position on a sensor section pointed to by the pointer from a result of the correlation matching operation and based on at least one of the codes. The position detector further includes a pressure calculation circuit for detecting pressure applied to the pointer, which is associated with the time difference between the two codes, from the result of the correlation matching operation calculated by the correlation matching operation and based on the two codes.

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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	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

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

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

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

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LEGAL NAME OF INVENTOR

Inventor: Yasuo Oda Date (Optional): Nov. 7, 2014

Signature: Yasuo Oda

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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LEGAL NAME OF INVENTOR

Inventor: Yoshihisa Sugiyama Date (Optional): Nov. 06, 2014

Signature: Sugiyama Yoshihisa

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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

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- [ ] United States application or PCT international application number _____ filed on _____.

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LEGAL NAME OF INVENTOR

Inventor: Sadao Yamamoto Date (Optional): 6 Nov. 2014

Signature: Sadao Yamamoto

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Application Number	
Filing Date	February 18, 2016
First Named Inventor	Yasuo Oda
Title	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Art Unit	
Examiner Name	
Attorney Docket Number	940131.442C4

SIGNATURE of Applicant or Patent Practitioner

Signature	/Shoko Leek/	Date (Optional)	02/18/2016
Name	Shoko I. Leek	Registration Number	43,746
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

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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

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☑ 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: 00500

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☐ 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.)

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OR

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Wacom Co., Ltd.

☐ 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	Yuichi Ide	Date (Optional)	
Name	Yuichi Ide		
Title	Vice President Intellectual Property, Wacom Co., Ltd		

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.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
Docket No.	:	940131.442C4
Date	:	February 18, 2016

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

FEE DEFICIENCY AUTHORIZATION FORM

Commissioner for Patents:

Applicant hereby authorizes the Director to charge any deficiencies or credit any overpayment in fees due by way of the enclosed papers only to Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC

/Shoko Leek/
Shoko I. Leek
Registration No. 43,746

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

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Petitioner Shenzhen Qianfenyi Intelligent Technology Co., Ltd.
Exhibit 1002 Page 562

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Yasuo Oda et al.
Filed	:	February 18, 2016
For	:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD

Docket No.	:	940131.442C4
Date	:	February 18, 2016

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

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

Commissioner for Patents:

In accordance with 37 CFR 1.56 and 1.97 through 1.98, Applicant wishes to make known to the Patent and Trademark Office the references set forth on the attached Information Disclosure Statement. This application relies, under 35 U.S.C. § 120, on the earlier filing date of prior Application No. 14/542,438, filed November 14, 2014 which is a continuation of Application No. 12/877,780, filed September 8, 2010 now Patent No. 8,963,889 issued February 24, 2015. The references listed on the attached Information Disclosure Statement were submitted to and/or cited by the Patent and Trademark Office in this prior application and, therefore, are not required to be provided in this application. If the Examiner wishes, copies will be provided upon request. As to any reference supplied, Applicant does not admit that it is "prior art" under 35 U.S.C. §§ 101, 102 or 103. Although the aforesaid references are made known to the Patent and Trademark Office in compliance with Applicant's duty to disclose all information they are aware of which is believed relevant to the examination of the above-identified application, Applicant believes that their invention is patentable.

Please acknowledge receipt of this Information Disclosure Statement and kindly make the cited references of record in the above-identified application.

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Exhibit 1002 Page 563

Applicant believes this Information Disclosure Statement has been timely filed, however, the Director is authorized to charge any fee due by way of this Information Disclosure Statement to our Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC

/Shoko Leek/
Shoko I. Leek
Registration No. 43,746

SIL:cvj

Enclosure:
Information Disclosure Statement

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

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(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2016-02-18
First Named Inventor	Ysauo Oda
Art Unit	
Examiner Name	
Attorney Docket Number	940131.442C4

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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
	1	5128624	A	1992-07-07	Hoshino et al.	
	2	5138118	A	1992-08-11	Russell	
	3	5672852	A	1997-09-30	Fukuzaki et al.	
	4	6535206	B1	2003-03-18	Xu	
	5	6744426	B1	2004-06-01	Okamoto et al.	
	6	6930672	B1	2005-08-16	Kuribayashi	
	7	7474300	B2	2009-01-06	Katsurahira et al.	
	8	7570252	B2	2009-08-04	Fujiwara et al.	Corresponds to US 2004/0201580 A1 and JP 2004-310598 A

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

	9	7735024	B2	2010-06-08	Li et al.	
	10	8546706	B2	2013-10-01	Altman et al.	
	11	8604365	B2	2013-12-10	Altman et al.	
	12	5484251	A	1996-01-16	Sanda	
	13	5600105	A	1997-02-04	Fukuzaki et al.	
	14	6738050	B2	2004-05-18	Comiskey et al.	
	15	8154525	B2	2012-04-10	Katsurahira	Corresponds to US 2009/0065269 and CN 101387928
	16	8253702	B2	2012-08-28	Katsurahira et al.	Corresponds to CN 1617088

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	1	20010012002	A1	2001-08-09	Tosaya	

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	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

	2	20030095109	A1	2003-05-22	Sasaki et al.	
	3	20030214490	A1	2003-11-20	Cool	
	4	20040160429	A1	2004-08-19	Blake et al.	
	5	20040201580	A1	2004-10-14	Fujiwara et al.	Corresponds to US 7,570,252 B2 and JP 2004-310598 A
	6	20050128191	A1	2005-06-16	Katsurahira et al.	
	7	20060007164	A1	2006-01-12	Liu et al.	
	8	20070146351	A1	2007-06-28	Katsurahira et al.	
	9	20070227785	A1	2007-10-04	Katsurahira	
	10	20080042998	A1	2008-02-21	Orsley	
	11	20080149402	A1	2008-06-26	Vos	
	12	20080156546	A1	2008-07-03	Hauck	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

	13	20080238885	A1	2008-10-02	Zachut et al.	
	14	20080257613	A1	2008-10-23	Katsurahira	
	15	20090065268	A1	2009-03-12	Katsurahira	
	16	20090078476	A1	2009-03-26	Rimon et al.	
	17	20090078746	A1	2009-03-26	Karashima et al.	
	18	20090128249	A1	2009-05-21	Katta	
	19	20090139780	A1	2009-06-04	Katsurahira et al.	
	20	20090184940	A1	2009-07-23	Silk et al.	
	21	20090278794	A1	2009-11-12	McReynolds et al.	
	22	20100026639	A1	2010-02-04	Lee et al.	
	23	20100051356	A1	2010-03-04	Stern et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

	24	20100155153	A1	2010-06-24	Zachut	
	25	20100252335	A1	2010-10-07	Orsley	
	26	20050171714	A1	2005-08-04	Ely et al.	
	27	20040041799	A1	2004-03-04	Vincent et al.	
	28	20070180923	A1	2007-08-09	Liu et al.	
	29	20090114459	A1	2009-05-07	Fukushima et al.	
	30	20100321315	A1	2010-12-23	Oda et al.	
	31	20120050231	A1	2012-03-01	Westhues et al.	
	32	20030142073	A1	2003-07-31	Fukushima et al.	
	33	20090065269	A1	2009-03-12	Katsurahira	Corresponds to US 8,154,525 and CN 101387928

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

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	1 983 408	EP	A2	2008-10-22	WACOM CO., LTD.		
	2	8-50535	JP	A	1996-02-20	SHARP CORPORATION		
	3	8-234902	JP	A	1996-09-13	SYMBIOS LOGIC INC.		
	4	2004-310598	JP	A	2004-11-04	SHARP KK	Corresponds to US 7,570,252 B2 and US 2004/0201580 A1	
	5	1617088	CN	A	2005-05-18	WACOM CO LTD	Corresponds to US 8,253,702	
	6	101387928	CN	A	2009-03-18	WACOM CO LTD	Corresponds to US 8,154,525 and US 2009/0065269	
	7	200644402	TW		2006-12-16	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.		

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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]
	1	Extended European Search Report, dated July 14, 2014, for corresponding European Application No. 11150998.0 - 1959 / 2354909, 6 pages.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

	2	Office Action, dated July 22, 2014, for corresponding Israeli Application No. 208921, 4 pages.	
	3	Office Action, dated August 27, 2013, for corresponding Japanese Application No. 2010-024858, 3 pages.	
	4	Non-Final Office Action dated December 2, 2015, for corresponding U.S. Application No. 14/542,438, 30 pages.	
	5	Non-Final Office Action dated December 23, 2015, for corresponding U.S. Application No. 14/542,462, 26 pages.	
	6	Taiwanese Office Action dated January 27, 2016, for corresponding TW Application No. 104126246, 6 pages.	

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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.

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	Application Number	
	Filing Date	2016-02-18
	First Named Inventor	Ysauo Oda
	Art Unit	
	Examiner Name	
	Attorney Docket Number	940131.442C4

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	/Shoko Leek/	Date (YYYY-MM-DD)	2016-02-18
Name/Print	Shoko I. Leek	Registration Number	43,746

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 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.

FIG. 1

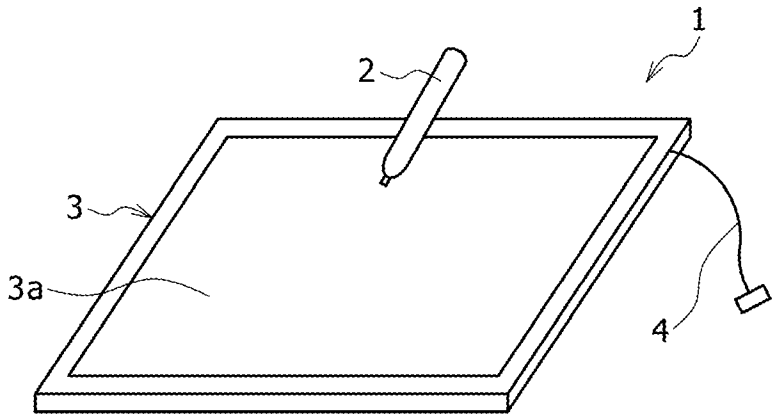

1
2
3
3a
4

FIG. 2

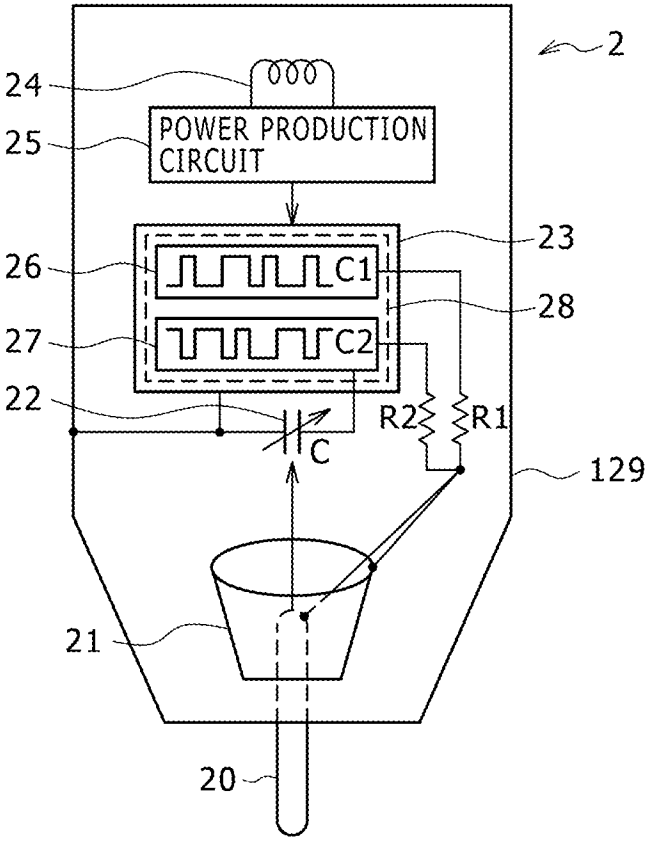

2
24
25
POWER PRODUCTION CIRCUIT
23
26
C1
28
27
C2
22
R2
R1
C
129
21
20

FIG. 3A

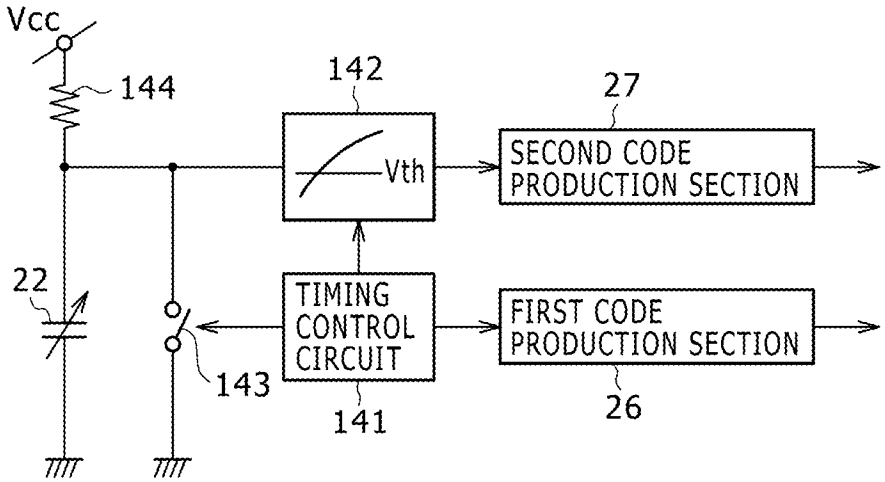
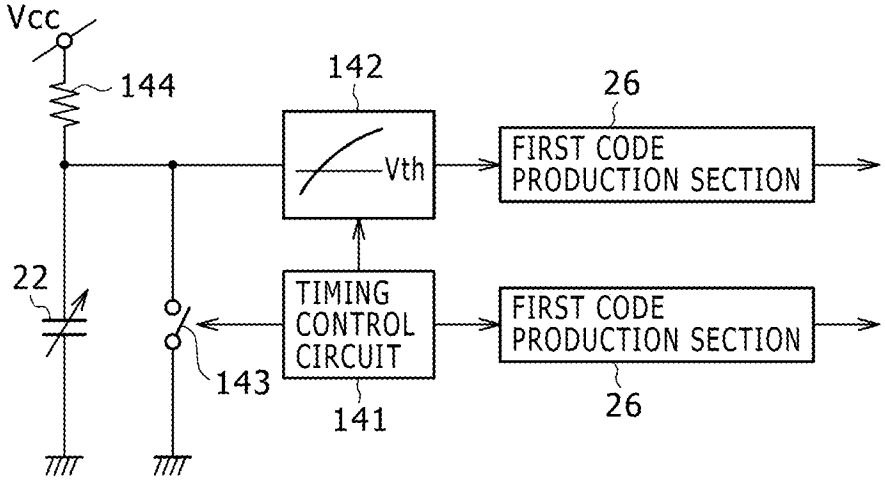

Vcc
144
142
27
Vth
SECOND CODE PRODUCTION SECTION
22
TIMING CONTROL CIRCUIT
FIRST CODE PRODUCTION SECTION
143
141
26

FIG. 3B


Vcc
144
142
26
Vth
FIRST CODE PRODUCTION SECTION
22
TIMING CONTROL CIRCUIT
FIRST CODE PRODUCTION SECTION
143
141
26

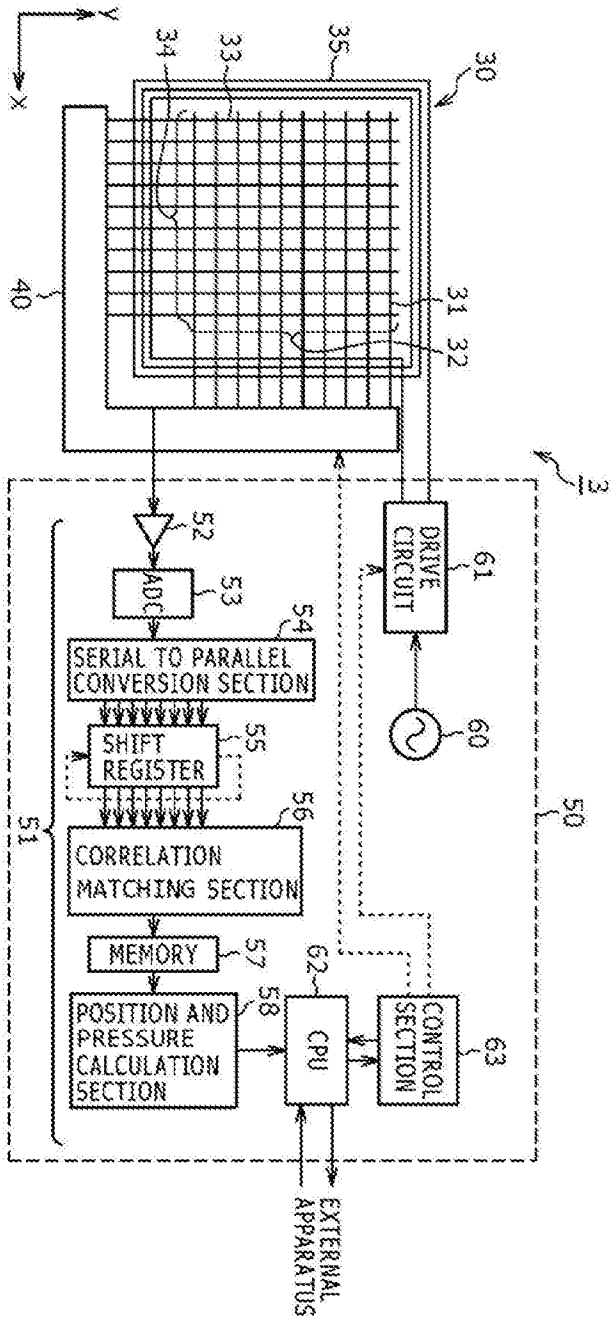

Y
X
34
33
35
30
40
31
32
3
52
ADC
53
54
SERIAL TO PARALLEL CONVERSION SECTION
SHIFT REGISTER
55
56
CORRELATION MATCHING SECTION
MEMORY
57
POSITION AND PRESSURE CALCULATION SECTION
58
CPU
62
CONTROL SECTION
63
DRIVE CIRCUIT
61
60
50
51
EXTERNAL APPARATUS

FIG. 4

FIG. 5

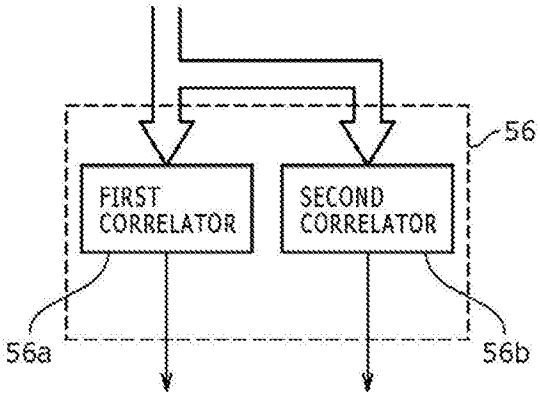

56
FIRST CORRELATOR
SECOND CORRELATOR
56a
56b

FIG. 6

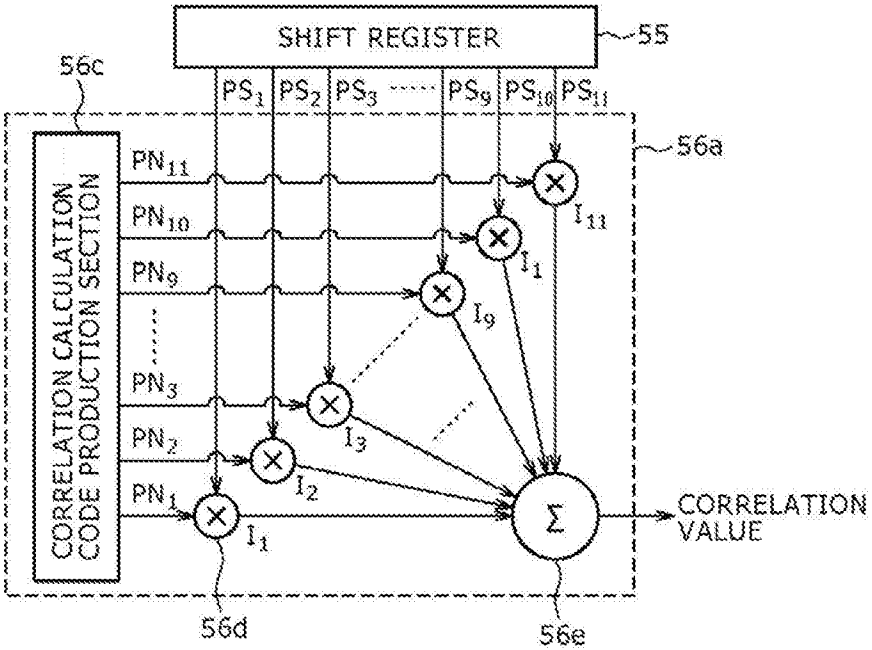

SHIFT REGISTER
55
56c
PS1 PS2 PS3 ····· PS9 PS10 PS11
56a
CORRELATION CALCULATION CODE PRODUCTION SECTION
PN11
PN10
PN9
PN3
PN2
PN1
I11
I1
I9
I3
I2
I1
Σ
CORRELATION VALUE
56d
56e

FIG. 7A

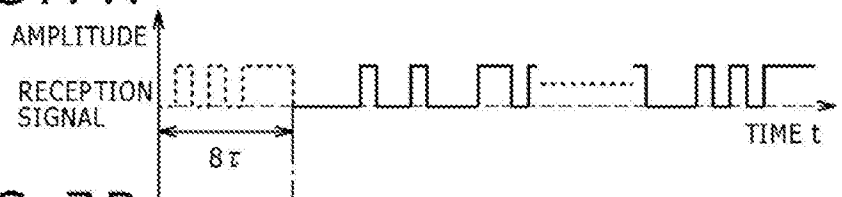


FIG. 7B

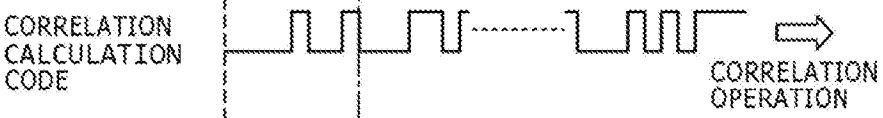


FIG. 7C

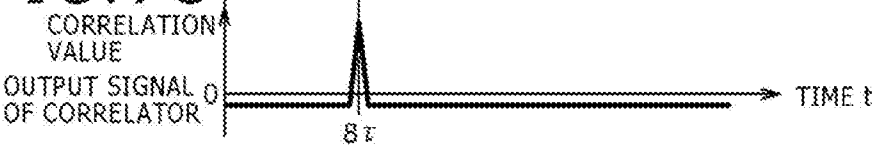


FIG. 8

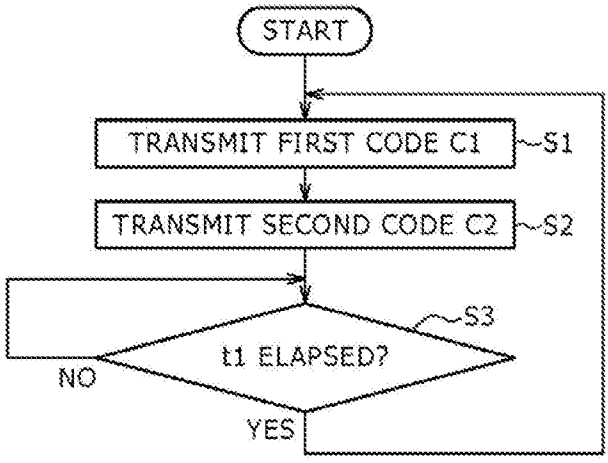


FIG. 9

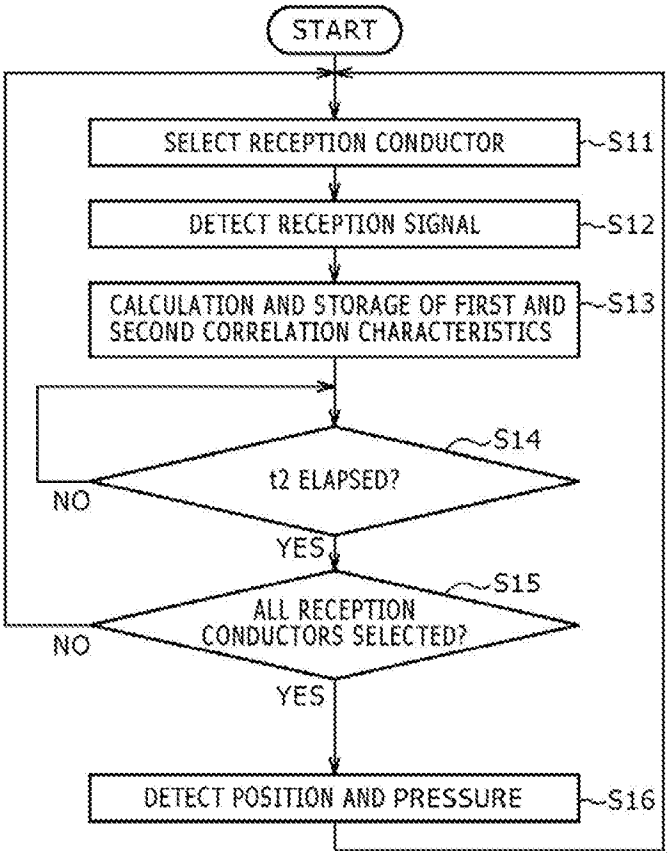

START
SELECT RECEPTION CONDUCTOR
S11
DETECT RECEPTION SIGNAL
S12
CALCULATION AND STORAGE OF FIRST AND SECOND CORRELATION CHARACTERISTICS
S13
S14
t2 ELAPSED?
NO
YES
S15
ALL RECEPTION CONDUCTORS SELECTED?
NO
YES
DETECT POSITION AND PRESSURE
S16

FIG.10A
TRANSMISSION SIGNAL

FIG.10B
RECEPTION SIGNAL

FIG.10C
CORRELATION CHARACTERISTIC

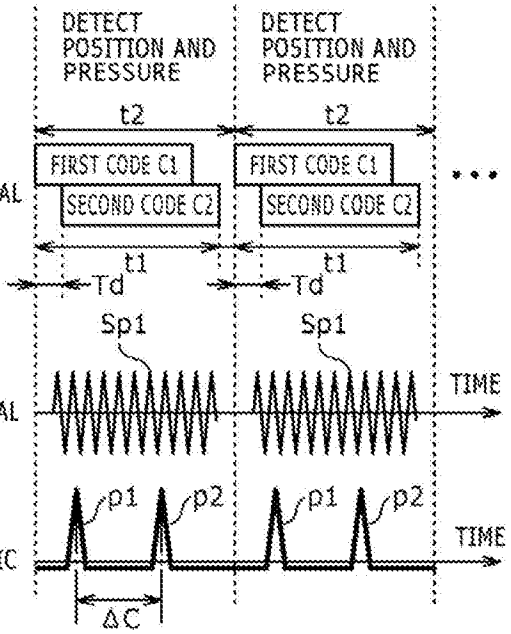


FIG.11

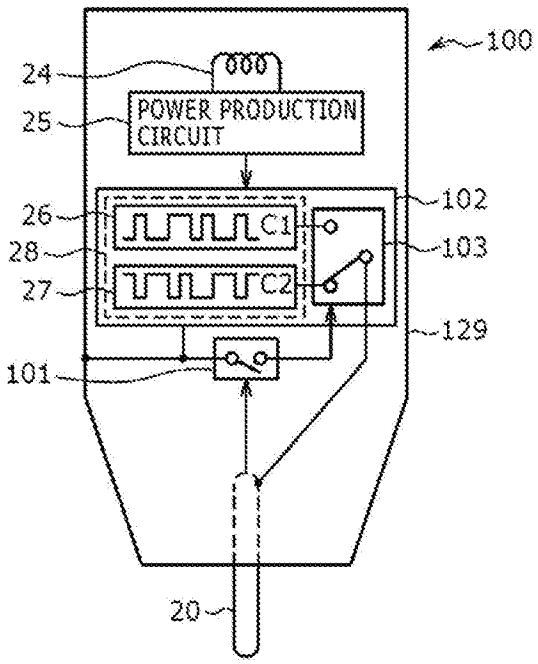


FIG. 12A

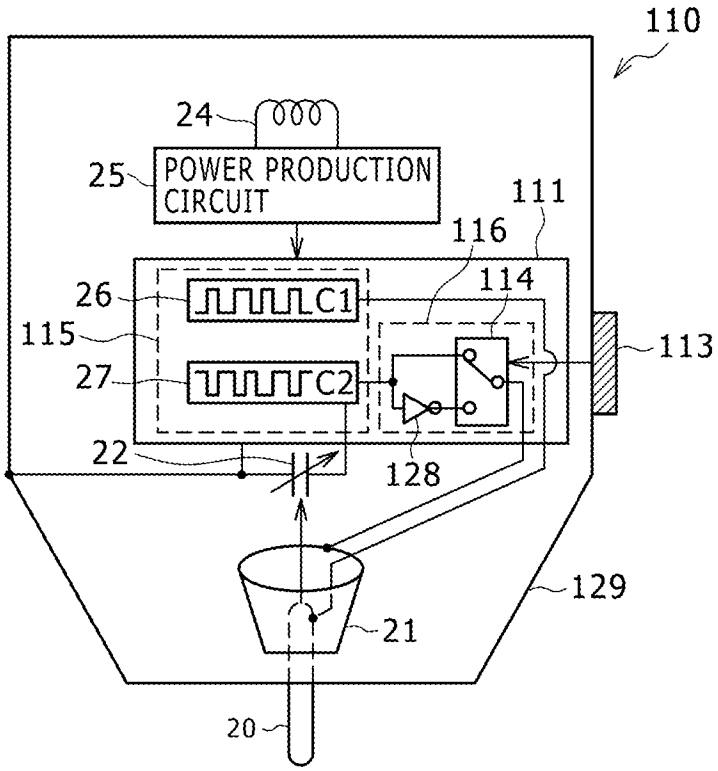


FIG. 12B

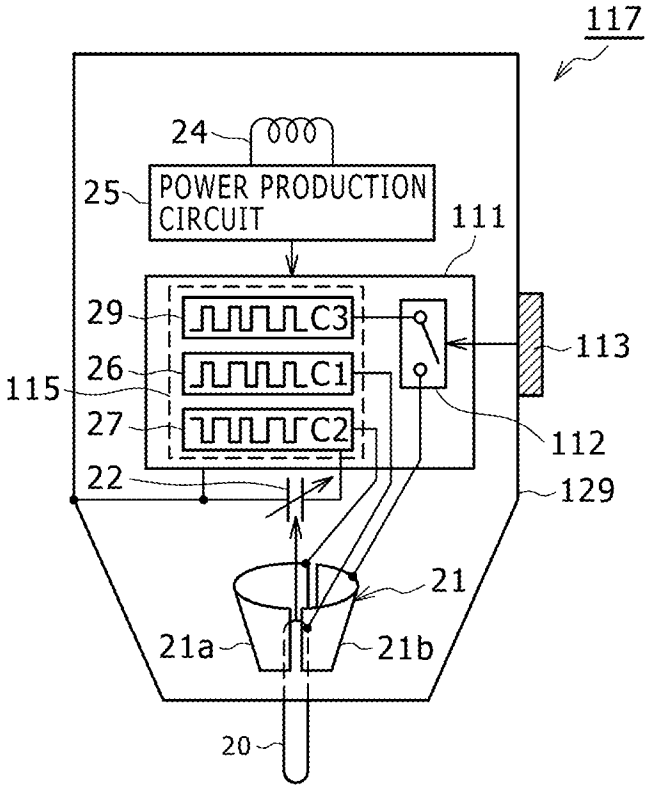


FIG. 13A
BEFORE PSK MODULATION

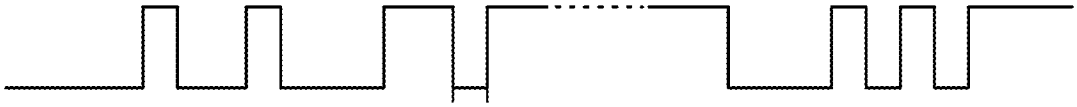


FIG. 13B
AFTER PSK MODULATION



FIG. 14

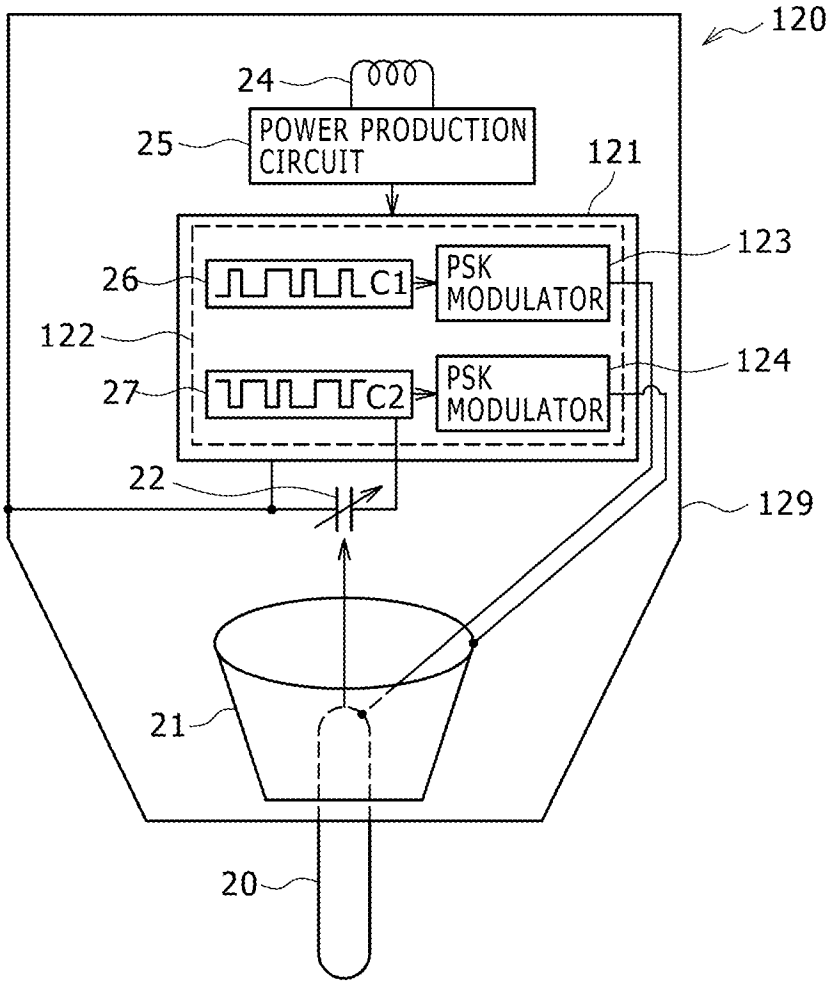


FIG. 15

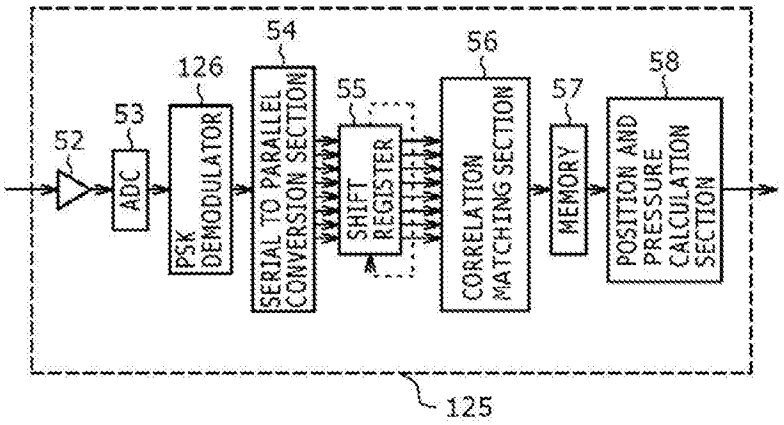


FIG. 16A
BEFORE FSK MODULATION

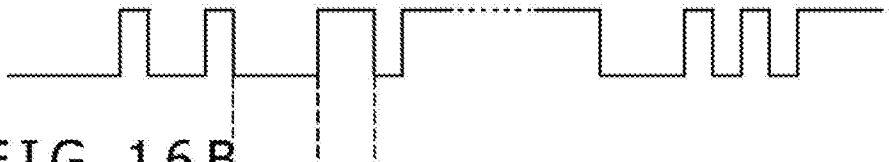


FIG. 16B
AFTER FSK MODULATION

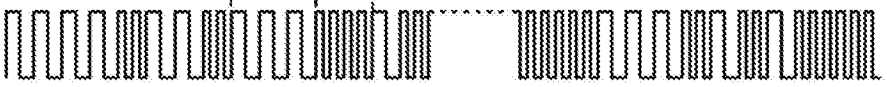


FIG.17

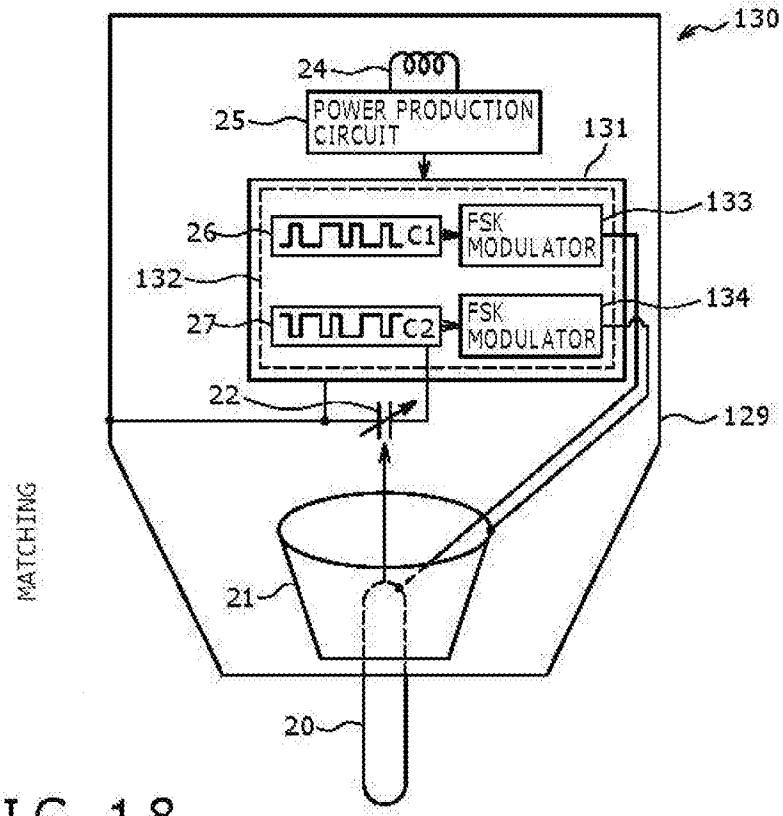

130
24
POWER PRODUCTION CIRCUIT
25
131
133
26
C1
FSK MODULATOR
132
134
27
C2
FSK MODULATOR
22
129
MATCHING
21
20

FIG.18

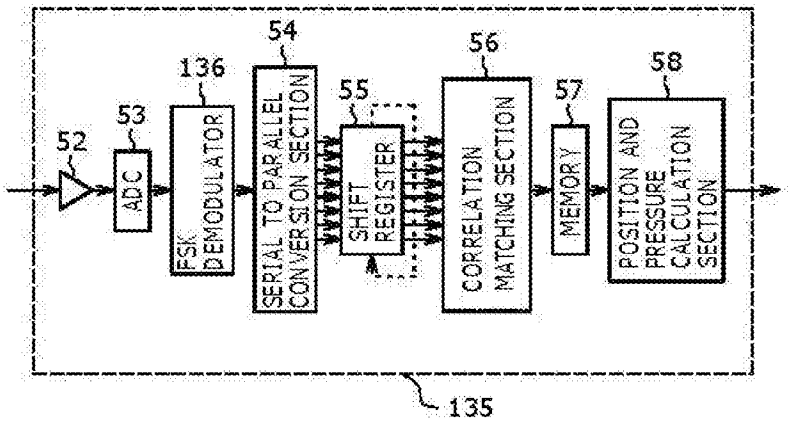

52
53
ADC
136
FSK DEMODULATOR
54
SERIAL TO PARALLEL CONVERSION SECTION
55
SHIFT REGISTER
56
CORRELATION MATCHING SECTION
57
MEMORY
58
POSITION AND PRESSURE CALCULATION SECTION
135

FIG. 19

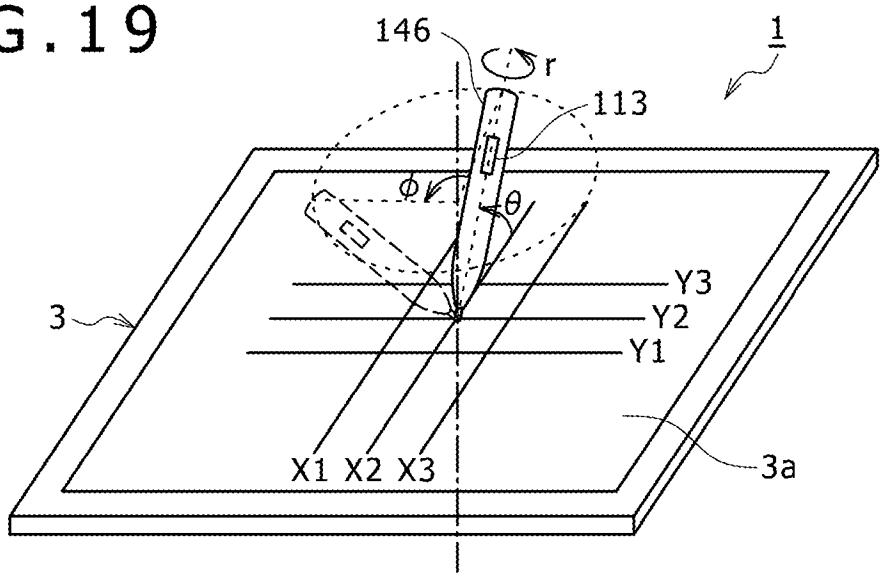

146
r
1
113
ϕ
θ
Y3
Y2
Y1
3
X1 X2 X3
3a

FIG. 20

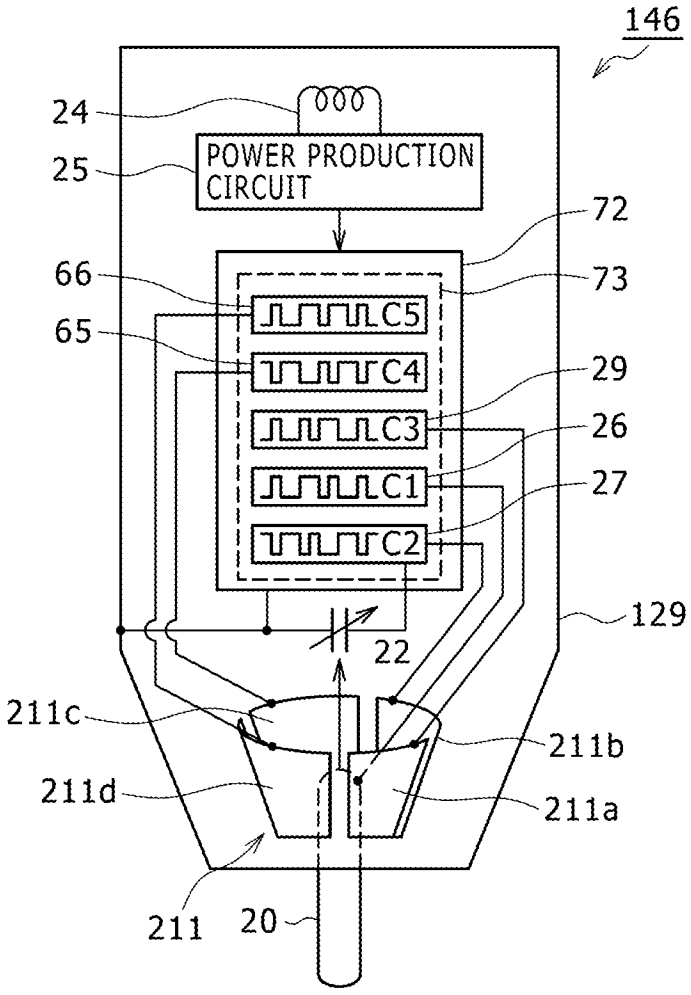
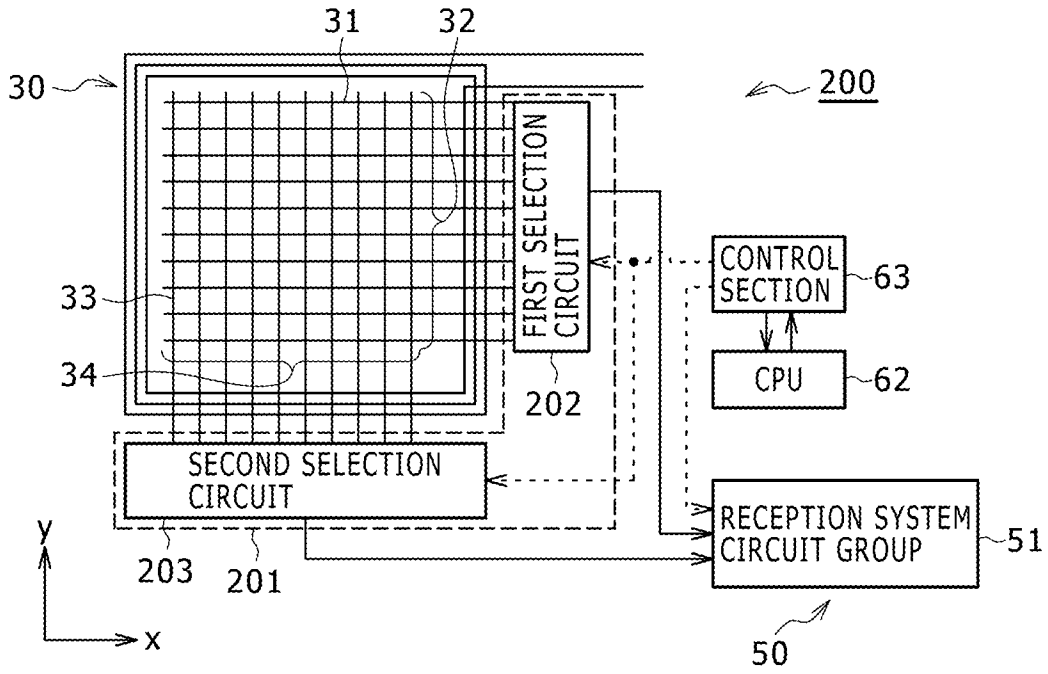

146
24
25
POWER PRODUCTION CIRCUIT
72
66
73
65
C5
C4
C3
C1
C2
29
26
27
129
22
211c
211b
211d
211a
211
20

FIG. 21


31
32
30
200
FIRST SELECTION CIRCUIT
CONTROL SECTION
63
33
34
CPU
62
202
SECOND SELECTION CIRCUIT
RECEPTION SYSTEM CIRCUIT GROUP
51
y
203
201
x
50

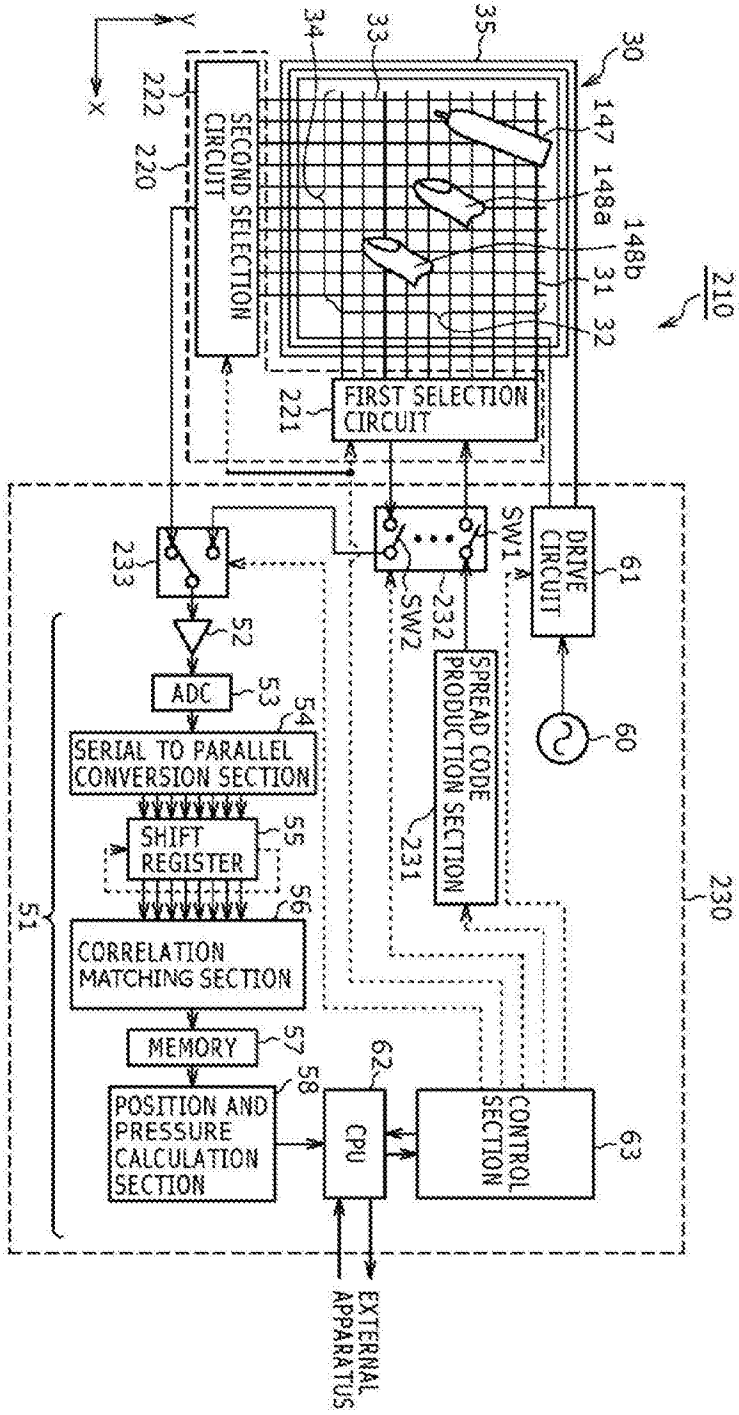
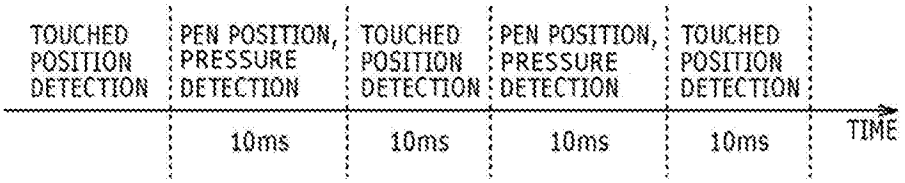

Y
X
222
220
SECOND SELECTION CIRCUIT
34
33
35
30
147
148a
148b
31
32
210
221
FIRST SELECTION CIRCUIT
233
SW1
SW2
232
DRIVE CIRCUIT
61
60
52
ADC
53
54
SERIAL TO PARALLEL CONVERSION SECTION
SHIFT REGISTER
55
56
SPREAD CODE PRODUCTION SECTION
231
230
51
CORRELATION MATCHING SECTION
MEMORY
57
58
62
POSITION AND PRESSURE CALCULATION SECTION
CPU
CONTROL SECTION
63
EXTERNAL APPARATUS

FIG. 22

FIG.23


TOUCHED POSITION DETECTION
PEN POSITION, PRESSURE DETECTION
TOUCHED POSITION DETECTION
PEN POSITION, PRESSURE DETECTION
TOUCHED POSITION DETECTION
10ms
10ms
10ms
10ms
TIME

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Filer:	Shoko I. Leek/Caitlin Johnson
Attorney Docket Number:	940131.442C4

Filed as Large Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Request for Prioritized Examination	1817	1	4000	4000
Pages:				
Claims:				
Claims in Excess of 20	1202	3	80	240
Independent claims in excess of 3	1201	1	420	420

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous-Filing:				
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**6400**

Electronic Acknowledgement Receipt

EFS ID:	24951060
Application Number:	15047013
International Application Number:	
Confirmation Number:	1066
Title of Invention:	POINTER, POSITION DETECTION APPARATUS AND POSITION DETECTION METHOD
First Named Inventor/Applicant Name:	Yasuo Oda
Customer Number:	500
Filer:	Shoko I. Leek/Caitlin Johnson
Filer Authorized By:	Shoko I. Leek
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Receipt Date:	18-FEB-2016
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Warnings:					
Information:					
2	Application Data Sheet	940131_442_C4_ADS.PDF	1823469 55f70c2b17768931ceac4554cc8ad3197d4b9730	no	9
Warnings:					
Information:					
3		940131_442_C4_Application.pdf	192516 ecbb705ff5fc852576d672d09d0ada9f0dea405e	yes	59

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	53
	Claims	54	58
	Abstract	59	59

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4	Oath or Declaration filed	940131_442_C4_Decs.pdf	2123346 7325529a07216f41304ece278bc93fa5f3eea99e	no	3
Warnings:					
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5	Power of Attorney	940131_442_C4_POA.PDF	335503 482f8a7c318427ad59766d91fbea3246d3394886	no	2
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6	Miscellaneous Incoming Letter	940131_442_C4_FDA.PDF	47144 85764a4d037f2e85f62e6f627921c8d9661a9171	no	1

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7	Transmittal Letter	940131_442_C4_IDS_Trans.pdf	51131 e3bb4b9e23d45c710b866b6585346435a95e6c81	no	2
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8	Information Disclosure Statement (IDS) Form (SB08)	940131_442_C4_IDS_Form.PDF	614518 2f23b44c8321a72dc6efb50db31ac829c31b3d32	no	9
Warnings:					
Information:					
9	Drawings-only black and white line drawings	940131_442_C4_Drawings.pdf	4327096 7c4f702464c5b210b2a922f28e5c7a58f8c3c4a6	no	15
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	43505 794a9c451f576114b1f4a580a4f746bd12e4467f	no	2
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