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P.O. Box 1450
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/724,001	12/23/2014	8917519	4041J-002077/US	5472

27572 7590 12/03/2014

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

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 228 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):

Yoshimasa Sano, Anjo-city, JAPAN;
DENSO CORPORATION, Kariya-city, JAPAN

FORM HDP-1449 (Based on Form PTO-1449) **PATENT AND TRADEMARK OFFICE** **INFORMATION DISCLOSURE CITATION** (Use several sheets if necessary) Sheet 1 of 1	ATTORNEY DOCKET NO.	APPLICATION NO.
	4041J-002077-US	13/724,001
	FIRST NAMED INVENTOR	
	Yoshimasa Sano	
	FILING DATE	GROUP
	12/21/2012	2846

U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
1.		2003/0174472 (corresponds to JP 2003-175780 below)	09/2003	Skofljanec et al.		

FOREIGN PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Country	Class/ Subclass	Translation Yes	No
1.		U-S53-055751	1978 Oct.	Japan			X
2.		U-S63-110090	07/1988	Japan			X
3.		2003-175780	06/2003	Japan		Machine & US '472	
4.		2006-110315	04/2006	Japan		Machine	
5.		2007-156553	06/2007	Japan		Machine	
6.		2008-301602	12/2008	Japan		Machine	

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)

Ref. Desig.	Examiner's Initials	
1.		

18663220.1

Examiner: /Keith DePew/	Date Considered: 11/18/2014

EXAMINER: Please initial if citation 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /KD/

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)

27572 7590 10/07/2014
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

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.
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US	5472

TITLE OF INVENTION: CIRCUIT BOARD FIXING DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	01/07/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
DEPEW, KEITH A	2835	361-756000

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 Harness, Dickey & Pierce, PLC
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: DENSO CORPORATION

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Kariya, Japan

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 08-0750 (enclose an extra copy of this form).

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

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

Authorized Signature _____ Date 11/13/2014
Typed or printed name Stanley M. Erjavac, Esq. Registration No. 38442

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	13724001
Filing Date:	21-Dec-2012
Title of Invention:	CIRCUIT BOARD FIXING DEVICE
First Named Inventor/Applicant Name:	Yoshimasa Sano
Filer:	Stanley Matthew Erjavac/Rose Faul
Attorney Docket Number:	4041J-002077/US

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	20689422
Application Number:	13724001
International Application Number:	
Confirmation Number:	5472
Title of Invention:	CIRCUIT BOARD FIXING DEVICE
First Named Inventor/Applicant Name:	Yoshimasa Sano
Customer Number:	27572
Filer:	Stanley Matthew Erjavac/Rose Faul
Filer Authorized By:	Stanley Matthew Erjavac
Attorney Docket Number:	4041J-002077/US
Receipt Date:	13-NOV-2014
Filing Date:	21-DEC-2012
Time Stamp:	15:23:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$960
RAM confirmation Number	1756
Deposit Account	080750
Authorized User	

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

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

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Issue_Fee_Transmittal.PDF	79954 66f6003f128d3bc91bac468e0e75f3d9d58ff3c7	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30588 b3efad579a1377c3e6c24734ea15163ea525c997	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	110542		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

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United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

27572 7590 10/07/2014

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

EXAMINER
DEPEW, KEITH A

ART UNIT	PAPER NUMBER
2835	

DATE MAILED: 10/07/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US	5472

TITLE OF INVENTION: CIRCUIT BOARD FIXING DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	01/07/2015

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

27572 7590 10/07/2014
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

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.
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US	5472

TITLE OF INVENTION: CIRCUIT BOARD FIXING DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	01/07/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
DEPEW, KEITH A	2835	361-756000

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

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

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

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

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

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

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

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

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

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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.
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US	5472

27572 7590 10/07/2014

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

EXAMINER	
DEPEW, KEITH A	

ART UNIT	PAPER NUMBER
2835	

DATE MAILED: 10/07/2014

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

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

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

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

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 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.

Notice of Allowability	Application No. 13/724,001	Applicant(s) SANO, YOSHIMASA	
	Examiner KEITH DE PEW	Art Unit 2846	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *12/21/2012*.
   ☐ 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 *1-6*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

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

   * Certified copies not received: _____.

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

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

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

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 12/21/2012, 6/6/2014
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 _____.

	/Keith DePew/

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

DETAILED ACTION

Priority

Receipt is acknowledged of certified copies of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statements (IDSs) submitted on 6/6/2014 and 12/21/2012 have been considered by the examiner.

EXAMINER'S AMENDMENT

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

Authorization for this examiner's amendment was given in a telephone interview with Michael Schmidt on 9/26/2014.

The application has been amended as follows:

Title: ~~Electronic~~ Circuit Board Fixing Device

Claim 1: (Currently Amended) An electronic device comprising: a circuit substrate provided with an electronic circuit;

a bottom case that is made of resin, has an opening portion at a top side, and receives and holds the circuit substrate; and

a top case that has an opening portion at a bottom side, and is attached to the bottom case from the top side of the bottom case, wherein

the circuit substrate has a plurality of slits penetrating through the circuit substrate,

the bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion, and

the bottom case is provided with a plurality of pin-shaped protrusion portions, each protrusion portion has a plurality of locking portions at a tip end portion, and each protrusion portion has a snib-shape and elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the

groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits from a top side of the circuit substrate.

Allowable Subject Matter

Claims 1-6 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claim 1, the pertinent prior art examined was not found to disclose, teach, or otherwise suggest, in a manner deemed obvious to one of ordinary skill in the art at the time of invention, all of the features and limitations imposed by an electronic device comprising: a circuit substrate provided with an electronic circuit;

a bottom case that is made of resin, has an opening portion at a top side, and receives and holds the circuit substrate; and

a top case that has an opening portion at a bottom side, and is attached to the bottom case from the top side of the bottom case, wherein

the circuit substrate has a plurality of slits penetrating through the circuit substrate,

the bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion, and

the bottom case is provided with a plurality of pin-shaped protrusion portions, each protrusion portion has a plurality of locking portions at a tip end portion, and each protrusion portion has a snib-shape and elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits from a top side of the circuit substrate.

While Ohno et al. (US Patent 6,034,876) discloses an electronic device having a circuit substrate with a bottom case having an opening on the top side, it fails to disclose the substrate having a plurality of slits and the bottom portion having a groove positioned such that the circuit substrate is slidably inserted into the groove. Where Guth et al. (US 6,285,556 B1) discloses a case with grooves to fit the circuit substrate, it also fails to disclose the slits in the circuit substrate. Further, neither reference discloses protrusions with locking portions which elastically bias the substrate toward the top side of the case after being inserted into the slits from a top side of the substrate, nor was the full set of features and limitations found to be disclosed, taught, or otherwise suggested in the prior art examined, either alone or in a combination deemed obvious to one of ordinary skill in the art at the time of invention.

Regarding claims 2-6, as depending from allowed claim 1, these claims are also deemed allowable.

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

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. This prior art is listed on attached form PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith DePew whose telephone number is (571)270-7725. The examiner can normally be reached on M-F 8a-5p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jinhee Lee can be reached on 571-272-1977. 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.

/Lisa Lea-Edmonds/
Primary Examiner, Art Unit 2846

/Keith DePew/
Examiner, Art Unit 2846

Notice of References Cited	Application/Control No. 13/724,001	Applicant(s)/Patent Under Reexamination SANO, YOSHIMASA	
	Examiner KEITH DE PEW	Art Unit 2846	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-4,002,953 A	01-1977	Tetlie, Per	361/756
*	B	US-4,668,873 A	05-1987	Ohba et al.	307/9.1
*	C	US-5,105,339 A	04-1992	Olsson et al.	361/752
*	D	US-5,400,215 A	03-1995	Chung, Pao-Lang	361/679.01
*	E	US-5,742,478 A	04-1998	Wu, Chih-Hsien	361/704
*	F	US-5,859,766 A	01-1999	Van Scyoc et al.	361/752
*	G	US-6,034,876 A	03-2000	Ohno et al.	361/752
*	H	US-6,285,556 B1	09-2001	Guth et al.	361/752
*	I	US-2003/0174472 A1	09-2003	Skofljanec et al.	361/736
*	J	US-6,628,523 B2	09-2003	Kobayashi et al.	361/736
*	K	US-2004/0257778 A1	12-2004	Lee, Kuo-Liang	361/752
*	L	US-6,864,573 B2	03-2005	Robertson et al.	257/718
*	M	US-7,075,784 B2	07-2006	Sullivan, Jason A.	361/679.47

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

Notice of References Cited	Application/Control No. 13/724,001	Applicant(s)/Patent Under Reexamination SANO, YOSHIMASA	
	Examiner KEITH DE PEW	Art Unit 2846	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2007/0211441 A1	09-2007	Wang, Mun En	361/752
*	B	US-7,522,427 B2	04-2009	Malmberg et al.	361/801
*	C	US-2009/0267465 A1	10-2009	CHENG, TA-YANG	312/223.2
*	D	US-2013/0058059 A1	03-2013	Min et al.	361/756
*	E	US-2013/0141831 A1	06-2013	Lee et al.	361/206
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

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

NON-PATENT DOCUMENTS

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

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

FORM HDP-1449 (Based on Form PTO-1449)

PATENT AND TRADEMARK OFFICE

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Sheet 1 of 1

ATTORNEY DOCKET NO.	SERIAL NO.
4041J-002077/US	To be assigned
APPLICANT	
Yoshimasa SANO	

FILING DATE	GROUP	CONFIRMATION NO.
12/21/2012		

U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date

FOREIGN PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Country	Class/ Subclass	Translation Yes	No
1.		2011-166048	8/2011	Japan		Abstract	
2.		2005-317692	11/2005	Japan		Abstract	

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)

Ref. Desig.	Examiner's Initials	

Examiner: /Keith DePew/ Date Considered: 09/18/2014

EXAMINER: Please initial if citation 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /KD/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	3518	361/752.ccls.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/25 12:13
S3	196	H05K5/0004.cpc.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/26 15:58
S4	59	H05K5/006.cpc.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/26 15:58
S5	60	H05K5/0039.cpc.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/26 16:10
S6	672	361/756.ccls.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/26 16:10
S7	2	((Yoshimasa) near2 (Sano)).INV.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 09:28
S8	19938	("DENSO CORPORATION").as.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 09:28
S9	11	(US-20070211441-$ or US-20040257778-$ or US-20090267465-$ or US-20130170160-$ or US-20130058059-$ or US-20130141831-$).did. or (US-6285556-$ or US-6034876-$ or US-7075784-$ or US-5859766-$ or US-4002953-$).did.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 09:52
S10	730	361/802.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 09:52
S11	276	361/741.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 09:53
S12	1171	361/736.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 09:53
S16	1381	361/801.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 10:54
S17	800	361/726.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 10:54
S18	486	361/732.ccls.	US-	ADJ	ON	2014/08/27

			PGPUB; USPAT			10:54
S19	1128	361/759.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/27 10:54
S20	730	361/802.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:15
S21	276	361/741.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:15
S22	1171	361/736.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:15
S23	800	361/726.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:15
S24	486	361/732.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:15
S25	1128	361/759.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:15
S26	623	S23 not (S24 or S25 or S20 or S21 or S22)	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/28 10:15
S27	1381	361/801.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:16
S28	670	S27 not (S24 or S25 or S20 or S21 or S22 or S23)	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/08/28 10:16
S29	71	206/707.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:31
S30	112	206/706.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:31
S31	600	211/41.17.ccls.	US-PGPUB; USPAT	ADJ	ON	2014/08/28 10:31
S32	1	"13724001"	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/09/18 14:39
S33	0	("2013/0170160").URPN.	USPAT	ADJ	ON	2014/09/18 14:44

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	0	361/576.ccls.	US-PGPUB; UPAD	ADJ	ON	2014/09/26 13:30
L7	84	361/756.ccls.	US-PGPUB; UPAD	ADJ	ON	2014/09/26 13:31

9/26/2014 1:33:16 PM

C:\ Users\ kdepew\ Documents\ EAST\ Workspaces\ 13-724001.wsp

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 5472

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/724,001	12/21/2012	361	2846	4041J-002077/US

APPLICANTS
DENSO CORPORATION, Kariya-city, JAPAN

INVENTORS
Yoshimasa Sano, Anjo-city, JAPAN;

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

**** FOREIGN APPLICATIONS ***************************
JAPAN 2011-287974 12/28/2011

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
01/22/2013

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged /KEITH A DEPEW/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		JAPAN	5	6	1

ADDRESS

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303
UNITED STATES

TITLE

ELECTRONIC DEVICE

FILING FEE RECEIVED		
1260	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

FORM HDP-1449 (Based on Form PTO-1449)

PATENT AND TRADEMARK OFFICE

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Sheet 1 of 1

ATTORNEY DOCKET NO.	APPLICATION NO.
4041J-002077-US	13/724,001
FIRST NAMED INVENTOR	
Yoshimasa Sano	
FILING DATE	GROUP
12/21/2012	2846

U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
1.		2003/0174472 (corresponds to JP 2003-175780 below)	09/2003	Skofljanec et al.		

FOREIGN PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Country	Class/ Subclass	Translation Yes	No
1.		U-S53-055751	1978	Japan			X
2.		U-S63-110090	07/1988	Japan			X
3.		2003-175780	06/2003	Japan		Machine & US '472	
4.		2006-110315	04/2006	Japan		Machine	
5.		2007-156553	06/2007	Japan		Machine	
6.		2008-301602	12/2008	Japan		Machine	

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)

Ref. Desig.	Examiner's Initials	
1.		

18663220.1

Examiner:	/Keith DePew/	Date Considered:	09/18/2014

EXAMINER: Please initial if citation 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /KD/

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13724001	SANO, YOSHIMASA
	Examiner	Art Unit
	KEITH DEPEW	2846

CPC- SEARCHED		
Symbol	Date	Examiner
H05K5/0004, H05K5/006, H05K5/0039	8/26/2014	/KD/

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
361	752, 756, 801, 802, 741, 736, 726, 732, 759,	8/28/2014	/KD/
206	706, 707	8/28/2014	/KD/
211	41.17	8/28/2014	/KD/

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor search performed	8/27/2014	/KD/
Assingee search performed	8/27/2014	/KD/
Consult with Primary Bui, Hung	9/18/2014	/KD/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
361	756	9/26/2014	/KD/

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13724001	SANO, YOSHIMASA
	Examiner	**Art Unit**
	KEITH DEPEW	2846

CPC						
Symbol					**Type**	**Version**
H05K		5	/	0221	F	2013-01-01
H05K		5	/	0013	I	2013-01-01
H05K		7	/	1417	I	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

/KEITH DEPEW/ Examiner.Art Unit 2846 (Assistant Examiner)	09/26/2014 (Date)	**Total Claims Allowed:** 6	
/LISA LEA EDMONDS/ Primary Examiner.Art Unit 2846 (Primary Examiner)	09/26/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1A and 1B

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13724001	SANO, YOSHIMASA
	Examiner	**Art Unit**
	KEITH DEPEW	2846

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
361	756	H	0	5	K	5 / 00 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
361	801	802	752		
206	706	707			

/KEITH DEPEW/ Examiner.Art Unit 2846	09/26/2014	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	6	
/LISA LEA EDMONDS/ Primary Examiner.Art Unit 2846	09/26/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1A and 1B

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13724001	SANO, YOSHIMASA
	Examiner	**Art Unit**
	KEITH DEPEW	2846

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1														
	2														
	3														
	4														
	5														
	6														

/KEITH DEPEW/ Examiner.Art Unit 2846 (Assistant Examiner)	09/26/2014 (Date)	**Total Claims Allowed:** 6	
/LISA LEA EDMONDS/ Primary Examiner.Art Unit 2846 (Primary Examiner)	09/26/2014 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1A and 1B

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US	5472

27572 7590 09/23/2014

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

EXAMINER	
DEPEW, KEITH A	

ART UNIT	PAPER NUMBER
2846	

NOTIFICATION DATE	DELIVERY MODE
09/23/2014	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):

troydocketing@hdp.com

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United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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In re Application of
Yoshimasa Sano
Application No.: 13/724,001
Filed: 21 December 2012
Attorney Docket No.: 4041J-002077/US
For: ELECTRONIC DEVICE

: DECISION ON REQUEST TO
: PARTICIPATE IN THE PATENT
: PROSECUTION HIGHWAY
: PROGRAM AND PETITION
: TO MAKE SPECIAL UNDER
: 37 CFR 1.102(a)

This is a corrected decision on the request to participate in the Patent Prosecution Highway (PPH) program and the petition under 37 CFR 1.102(a), filed 06 June 2014, to make the above-identified application special.

The request and petition are **GRANTED**.

DISCUSSION

A grantable request to participate in the PPH pilot program and petition to make special require:

1. The U.S. application for which participation in the Global/IP5 PPH pilot program is requested must have the same earliest date, whether this is the priority date or filing date, as that of a corresponding national or regional application filed with another Global/IP5 PPH participating office or a corresponding PCT international application for which one of the Global/IP5 PPH participating offices was the International Searching Authority (ISA) or the International Preliminary Examining Authority (IPEA).

2. Applicant must:
    a. Ensure all the claims in the U.S. application must sufficiently correspond or be amended to sufficiently correspond to the allowable/patentable claim(s) in the corresponding Office of Earlier Examination (OEE) application and
    b. Submit a claims correspondence table in English;

3. Examination of the U.S. application has not begun;

4. Applicant must submit:
    a. Documentation of prior office action:
        i. a copy of the office action(s) just prior to the "Decision to Grant a Patent" from each of the Global/IP5 PPH participating office application(s) containing the allowable/patentable claim(s) or
        ii. if the allowable/patentable claims(s) are from a "Notification of Reasons for Refusal" then the Notification of Reasons for Refusal or
        iii. if the Global/IP5 PPH participating office application is a first action allowance then no office action from the Global/IP5 PPH participating office is necessary should be indicated on the request/petition form or
        iv. the latest work product in the international phase of the OEE PCT application;
    b. An English language translation of the Global/IP5 PPH participating office action or work product from (4)(a)(i)-(ii) or (iv) above;

5. Applicant must submit:
    a. An IDS listing the documents cited by the Global/IP5 PPH participating office examiner in the Global/IP5 PPH participating office action or work product (unless already submitted in this application)
    b. Copies of the documents except U.S. patents or U.S. patent application publications (unless already submitted in this application);

The request to participate in the PPH pilot program and petition comply with the above requirements. Accordingly, the above-identified application has been accorded "special" status.

Telephone inquiries concerning this decision should be directed to April M. Wise at (571) 272-1642.

All other inquiries concerning the examination or status of the application is accessible in the PAIR system at http://www.uspto.gov/ebc.index.html.

This application will be forwarded to the examiner for action on the merits commensurate with this decision once this application's formality reviews have been completed.

/dab/
David Bucci
Petitions Examiner
Office of Petitions

Office of Petitions: Routing Sheet

Application No. 13/724,001

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application.

- [X] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

Office of Petitions: Decision Count Sheet

Mailing Month: 9

Application No.: 13724001

13724001

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: WISE, APRIL M.

Count (1) - Palm Credit 13/724,001

Decision: GRANT

FINANCE WORK NEEDED ☐ Select Check Box for YES

GRANT

Decision Type: 652 - Petition to make special-PPH

652

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED ☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED ☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: *9/19/2014*

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	13/724,001
Confirmation No.:	5472
Filing Date:	12/21/2012
Applicant:	Yoshimasa Sano
Group Art Unit:	2846
Examiner:	Keith A. Depew
Title:	ELECTRONIC DEVICE
Attorney Docket:	4041J-002077-US

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

PRELIMINARY AMENDMENT

Sir:

In support of the Request for Participation in the Patent Prosecution Highway (PPH) Program between the JPO and the USPTO, please amend the above referenced patent application as follows.

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

Remarks begin on page 5 of this paper.

AMENDMENTS TO THE CLAIMS

Please amend Claim 1 as follows.

LISTING OF CLAIMS

1. (currently amended) An electronic device comprising:

a circuit substrate provided with an electronic circuit;

a bottom case that is made of resin, has an opening portion at a top side, and receives and holds the circuit substrate; and

a top case that has an opening portion at a bottom side, and is attached to the bottom case from the top side of the bottom case, wherein

the circuit substrate has a plurality of slits penetrating through the circuit substrate,

the bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion, and

the bottom case is provided with a plurality of pin-shaped protrusion portions, each protrusion portion has a plurality of locking portions at a tip end portion, and each protrusion portion has a snib-shape and elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits.

2. (original) The electronic device according to claim 1, wherein

a bottom end portion of the top case includes a plurality of leg portions for attaching the electronic device to a subject, and

the top case is positioned to cover the bottom case.

3. (original)The electronic device according to claim 1, wherein

the protrusion portion is provided to protrude toward one of the top side and the bottom side of the bottom case.

4. (original) The electronic device according to claim 1, further comprising

a plurality of guide portions provided in the top case such that an inside surface of each guide portion is U-shaped, wherein:

the protrusion portion is provided to protrude toward the top side of the bottom case, and

the locking portions are respectively guided along the guide portions and bent to a direction opposite to a protruding direction of the protrusion portions to head for the slits, and are respectively inserted into the slits, when the top case is assembled to the bottom case.

5. (original) The electronic device according to claim 1, further comprising

a plurality of guide portions provided such that a bottom surface of each guide portion declines from a base part of the guide portion to an inner side surface of the guide portion, wherein

the protrusion portion is provided in the bottom case such that the tip end portion is positioned at a direct top side of the slit and heads for a bottom side of the bottom case, and the locking portions are respectively inserted into the slits of the circuit substrate due to the protrusion portions pressed toward the bottom side of the bottom case along the guide portions, when the top case is assembled to the bottom case.

6. (original) The electronic device according to claim 1, wherein

the circuit substrate is provided with an acceleration sensor or a gyro sensor.

REMARKS

Claims 1-6 remain pending in the present application. Claim 1 has been amended. Basis for the amendments can be found throughout the specification, claims and drawings as originally filed.

Claims 1-6 correspond to the allowed Claims 1-6 from the Japanese priority as detailed in the Claims Correspondence Table in the Request included with this Amendment.

CONCLUSION

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: June 6, 2014

By: _____
Michael J. Schmidt, Reg. No. 34,007

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

MJS/pmg

18663214.1

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	13/724,001
Confirmation No.:	5472
Filing Date:	12/21/2012
First Named Inventor:	Yoshimasa Sano
Group Art Unit:	2846
Examiner:	Keith A. Depew
Title:	ELECTRONIC DEVICE
Attorney Docket:	4041J-002077-US

Director of the United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner:

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant hereby submits an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS, AND OTHER INFORMATION

The patents, publications and other information requested to be considered by the Office (except unpublished U.S. patent applications) are listed on Form 1449 attached hereto.

II. COPIES

A. ☒ Submitted herewith is a legible copy of (i) each foreign patent; (ii) each publication or that portion which caused it to be listed, other than U.S. patents and U.S. patent application publications unless required by the Office; (iii) each unpublished U.S. application listed below in Section IV (i.e., including the specification, claims, and any drawing of the application, or that portion of the application which caused it to be listed, including any claims directed to that portion), except for such applications filed on or after June 30, 2003, pursuant to the Waiver of the Copy Requirement in 37 C.F.R. 1.98 (OG Notice dated

October 19, 2004); and (iv) all other information or that portion which caused it to be listed.

B. ☐ Any patents, publications or other information which are listed on Form 1449 or on the copies of PTO-892, but which are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Serial Number	U.S. Filing Date

C. ☐ This is a PCT application in the entry of the National Phase in the United States. A copy of the International Search Report is attached for the Examiner's information. The documents listed on the International Search report are listed on the attached Form 1449 for consideration by the Examiner and for listing on any patent resulting from this application. If the International Search report was from the US, EPO, or JPO search authorities, copies of these references should have been supplied to the USPTO under the trilateral agreement and are believed to be in the file of the above-identified application. (MPEP 1893.03(g).)

III. CONCISE EXPLANATION OF THE RELEVANCE (check at least one box)

A. ☒ Except as may be indicated below in (B), all of the patents, publications or other information are in the English language (concise explanation not required).

B. ☒ A concise explanation of the relevance of each patent, publication or other information listed that is not in the English language is as follows (see 37 C.F.R. § 1.98(a)(3)):

1. ☐ See the attached foreign patent office communication from a counterpart foreign application:

2. ☒ English machine translations are provided for JP 2003-175780, JP2006-110315, JP 2007-156553 and JP 2008-301602.

3. ☐ Other:

C. ☐ The following additional information is provided for the Examiner's consideration.

IV. CROSS REFERENCE TO RELATED APPLICATION(S)

A. ☐ The Examiner is advised that the following co-pending application(s) contain(s) subject matter that may be related to the present application. By bringing this(these) application(s) to the Examiner's attention, Applicant(s) does (do) not waive the confidentiality provisions of 35 U.S.C. § 122.

Serial No.	Filing Date	Inventor(s)

V. THIS IDS IS BEING FILED UNDER

A. ☒ **37 C.F.R. § 1.97(b):** (check only one box)

1. ☐ within three months of the filing date of a national application other than a continued prosecution application under § 1.53(d) (37 C.F.R. § 1.97(b)(1)). No fee or certification is required.

2. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or certification is required.

3. ☒ before the mailing of a first Office Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or certification is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the certification under 37 C.F.R. § 1.97(e) below; or, if no certification has been made, charge our deposit account a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

4. ☐ before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No fee or certification is required.

B. ☐ **37 C.F.R. § 1.97(c):** (check only one box)

before the mailing date of either any Final Office Action under 37 C.F.R. § 1.113, a Notice of Allowance under 37 C.F.R. § 1.311, or an action that otherwise closes prosecution.

1. ☐ No certification; therefore, a fee in the amount of $180.00 is required by 37 C.F.R. § 1.17(p).

2. ☐ See the certification below. No fee is required.

C. ☐ **37 C.F.R. § 1.97(d):**

after the mailing date of either a Final Office Action under 37 C.F.R. § 1.113, a Notice of Allowance under 37 C.F.R. § 1.311, or an action that otherwise closes prosecution, yet on or before payment of the issue fee.

1. ☐ See the certification below. A fee in the amount of $180.00 is required by 37 C.F.R. § 1.17(p).

VI. CERTIFICATION UNDER 37 C.F.R. § 1.97(e): (check only one box)

The undersigned hereby certifies that:

A. ☐ each item of information contained in this IDS 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 IDS (See 37 C.F.R. § 1.97(e)(1)). See further statement under 37 C.F.R. 1.704(d) below in section VII, if applicable; or

B. ☐ no item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS (See 37 C.F.R. § 1.97(e)(2)).

C. ☐ some of the items of information were first cited in a communication from a foreign patent office. As to this information, the undersigned hereby certifies that each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby certifies that no item of this remaining information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS.

VII. STATEMENT UNDER 37 C.F.R. 1.704(d)

The undersigned hereby states that:

☐ each item of information contained in this IDS was first cited in any communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this IDS.

VIII. PAYMENT OF FEES (check only one box, if applicable)

A. ☐ A check in the amount of $180.00 is enclosed for the above-identified fee.

B. ☐ Please charge Deposit Account No. 08-0750 in the amount of $180.00 for the above-identified fee. A duplicate copy of this paper is attached.

Please charge any additional fees or credit any overpayment pursuant to 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 08-0750.

The above references are being cited only in the interest of candor and without any admission that they constitute statutory prior art, contain matter which anticipates the invention, or which would render the same obvious, either singly or in combination, to a person of ordinary skill in the art. Furthermore, this Information Disclosure Statement shall not be construed as a representation that a search has been made.

If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule (with a petition if necessary) and charge the appropriate fee to Deposit Account No. 08-0750.

Respectfully submitted,

By: _____
Michael J. Schmidt
Reg. No. 34,007

Dated: June 6, 2014

Harness, Dickey & Pierce, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

MJS/pmg

18663218.1

FORM HDP-1449 (Based on Form PTO-1449)

PATENT AND TRADEMARK OFFICE

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Sheet 1 of 1

ATTORNEY DOCKET NO.	APPLICATION NO.
4041J-002077-US	13/724,001
FIRST NAMED INVENTOR	
Yoshimasa Sano	
FILING DATE	GROUP
12/21/2012	2846

U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
1.		2003/0174472 (corresponds to JP 2003-175780 below)	09/2003	Skofljanec et al.		

FOREIGN PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Country	Class/ Subclass	Translation Yes	No
1.		U-S53-055751	1978	Japan			X
2.		U-S63-110090	07/1988	Japan			X
3.		2003-175780	06/2003	Japan		Machine & US '472	
4.		2006-110315	04/2006	Japan		Machine	
5.		2007-156553	06/2007	Japan		Machine	
6.		2008-301602	12/2008	Japan		Machine	

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)

Ref. Desig.	Examiner's Initials	
1.		

18663220.1

Examiner:	Date Considered:

EXAMINER: Please initial if citation 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.

JP-U-S53-055751

This document relates to a part attaching apparatus.

収入印紙 3,000円

実用新案登録願(12)

(3,000円)

昭和 51.10.15 年 月 日

特許庁長官 片山石郎 殿

1. 考案の名称

部品取付装置（ブヒントリツケソウチ）

2. 考案者

神奈川県横浜市磯子区新磯子町33番地（ヨコハマシイソゴクシンイソゴチョウ）

東京芝浦電気株式会社音響工場内（トウキョウシバウラデンキオンキョウコウジョウナイ）

高野正男（タカノマサオ）

特許庁 51.10.16 出願第二課 長島

3. 実用新案登録出願人

住所 神奈川県川崎市幸区堀川町72番地

名称 (307) 東京芝浦電気株式会社

代表者 ~~玉置敬三~~ 岩田式夫 4字訂正

4. 代理人

住所 東京都港区芝西久保桜川町2番地 第17森ビル

〒105 電話 03 (502) 3181 (大代表)

氏名 (5847) 弁理士 鈴江武 (ほか2名)

方式審査

51 138499

53-55751

明　　細　　書

1.考案の名称

部品取付装置

2.実用新案登録請求の範囲

被取付用部品を挟持する弾性を有した取付接片と、この取付接片と対応して設けられ合体時に該取付接片と係合する押え接片とを具備してなることを特徴とする部品取付装置。

3.考案の詳細な説明

この考案はプリント板やフレーム等の部品を螺子を用いることなく取付けるのに好適する部品取付装置に関する。

一般に普及用の小形ラジオ受信機等においてはその筐体にプリント板等の部品を取付けるのに可及的に螺子を用いないで取付けることが作業性やコストの面から強く要請されている。しかしながらそれだからといつてその取付けがおろそかになされてよいということではなく、落下等の強い衝撃を受けた場合等においても部品が外れるようなことがなく確実に取付状態を維

53-15751

持しなければならないことは勿論である。

そこでこの考案は以上のような点に鑑みてなされたもので、強い衝撃を受けた場合においても確実に取付状態を維持し得、しかも螺子を用いないで済ませることのできる極めて良好な部品取付装置を提供することを目的としている。

以下図面を参照してこの考案の一実施例につき詳細に説明する。

すなわち第1図において11，12はそれぞれ小形ラジオ受信機等のキャビネットフロントおよびキャビネットバックである。そしてこのキャビネットバック12内において底部から起立せしめる如く一体または別体に所定の間隔をおいて弾性を有する一対の取付板片13，14を設けると共に、その内側に適数個の支柱15を設ける。ここで一対の取付板片13，14は支柱15の高さより若干高い位置に互いに内側に向いた鍵状部131，141が形成されると共に、該鍵状部131，141から延長された先端部132，142を有している。而してか

かる構成のキャビネットバック１２には図示の如く所定の回路部品群１６１を搭載したプリント板１６が支柱１５上に載置される如く、且つ弾性を有した一対の取付接片１３，１４の鍔状部１３１，１４１で挟持される如く螺子を一切用いることなしに取付けされる。ところで強い衝撃を受けない状態においてはプリント板１６は確実にキャビネットバック１２内に取付けされているので、このままでキャビネットフロント１４を合体せしめて実用に供せるが、若しこのままで落下等により強い衝撃を受けたとすると、一対の取付接片１３，１４が図示の如く互いに外側（矢印Ｂ）方向に開いてしまうようなことがあるために、プリント板１６が図示破線の如く外れてしまうといつた不所望な事故を招くおそれがある。

ところでこのようなことを考慮してプリント板１６の外れを防止するために、通常は取付接片１３，１４の断面積を可及的に大きくとつて強度を増すかあるいは挟持部を大きくするよう

なことか考えられる。またキャビネットフロント11側から直接プリント板16上の部品群161を押えるようなことも考えられる。しかしながら取付接片の幅を広げることができないこともあり、よしんばできたとしても接片を強くすることは組立てを困難にすると共に、保守等のサービス性を悪くする。またキャビネットフロント11側から直接押えるようにするとデリケートな回路部品に損傷を与えたり、押え部材の場所がなかつたり且つそれが長すぎるなどの問題があつて必しも有効な解決策ではない。

そこでこの考案においては図示の如くキャビネットフロント11内に、キャビネットバック12の一対の取付接片13，14と対応する位置に一対の押え接片17，18を設けて矢印A方向から合体させたときに取付接片13，14の各先端部132，142と当接せしめる如く外側から押えるようにし、強い衝撃を受けた場合に取付接片13，14が矢印B方向に開かないようにしたもので、これでもつて上述のよう

な問題を生じることなくプリント板16の取付状態を確実に維持し得るようにした点に特徴を有している。

第2図は以上における取付接片13または14と押え接片17または18との係合状態の他の例を示すもので、先ずaは単なる当接でなく弾性的な係合状態としたものであり、bは互いに若干の余裕をもたせたものである。またcは押え接片17'または18'を中空の支柱としてこの中に取付接片13または14の先端部131または141を嵌合せしめたものであつて、左右前後に押えることかできる。さらにd，eは左右前後に押える場合の正面と側面の形状態を示したもので、fは二つのプリント板16，16'を挟持する二つの取付接片13，13''を一つの押え接片17''で同時に押えるようにしたものである。

第3図もまた他の実施例を示すもので、先ずaは別体の板ばね等の押え接片27，28を用いたもので、bは別体のL状押え接点38をプ

リント板36と取付接片33との間に掛けるようにしたものである。またcはプリント板46を挟持する取付接片43と対向させて補助接片45を設け、この間に押え接片47を挿入するようにしたものである。

従つて以上詳述したようにこの考案によれば、強い衝撃を受けた場合においても確実に取付状態を維持し得、しかも螺子を用いないで済ませることのできる極めて良好な部品取付装置を提供することができる。

なお以上の実施例はプリント板を取付ける場合について説明したが、これに限らずフレーム等であつてもよく、この考案の要旨を逸脱しない範囲で種々の変形を実施することが可能である。

4.図面の簡単な説明

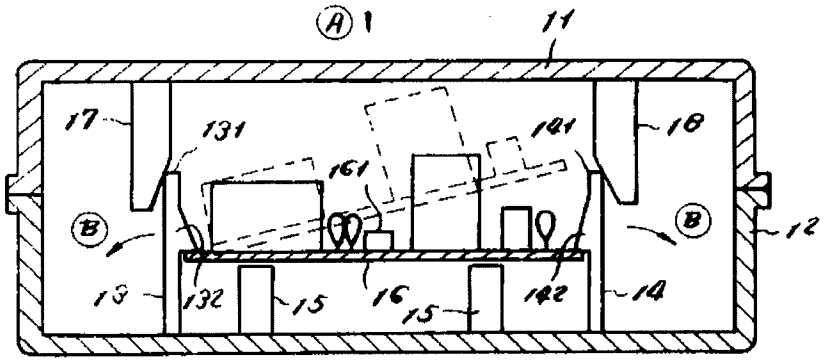
第1図はこの考案に係る部品取付装置の一実施例を示す断面図、第2図、第3図は同じく他の実施例を示す要部の切欠き図である。

11…キヤビネツトフロント、12…キヤビ

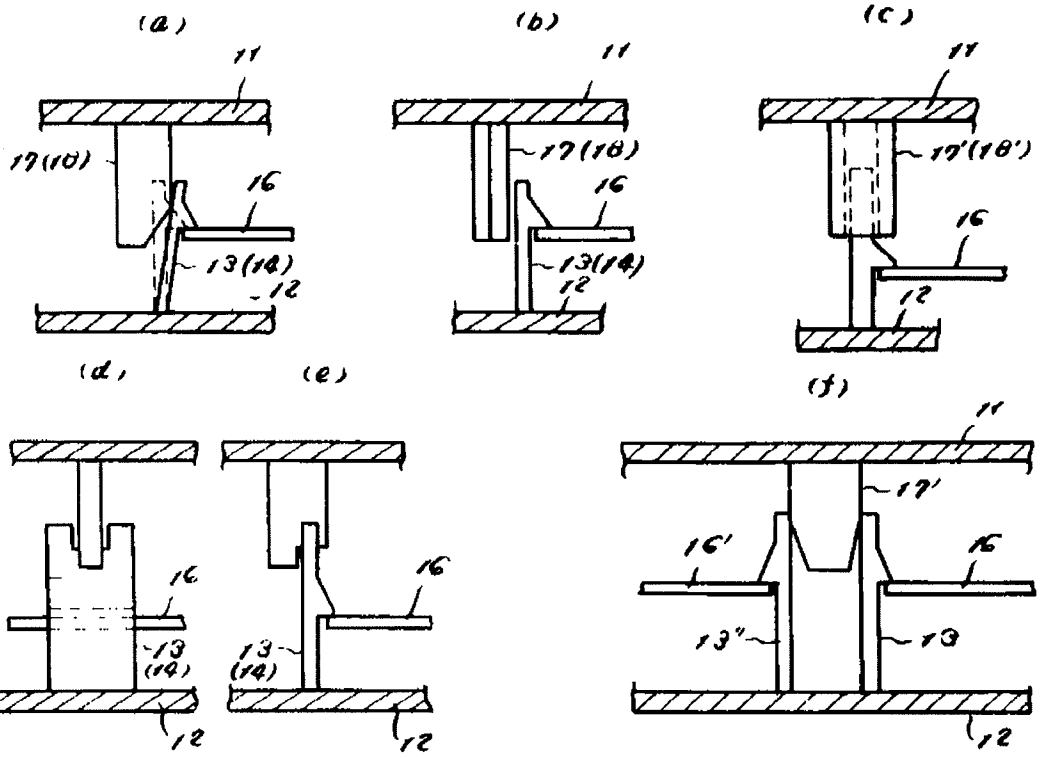
ネットパック、13，14…取付接片、15…支柱、16…プリント板、17，18…押え接片。

出願人代理人　弁理士　鈴　江　武　彦

第1図



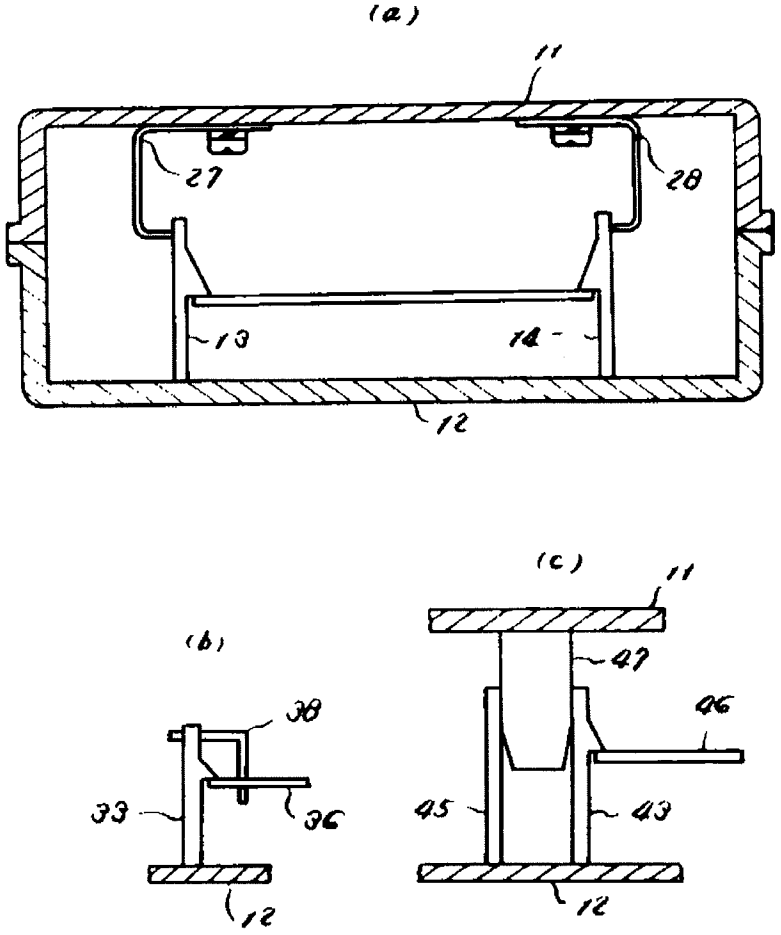
第2図



3776316 3
765518 (1/2)

出願人 東京芝浦電気株式会社
代理人 鈴江武彦

第 3 図



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765518 (2/2)

出願人 東京芝浦電気株式会社
代理人 鈴 江 武 彦

5. 添付書類の目録

(1)	委任状	1通
(2)	明細書	1通
(3)	図面	1通
(4)	願書副本	1通

同時提出の実用新案登録願(1)に添付の委任状を援用する。

6. 前記以外の考案者、実用新案登録出願人又は代理人

代理人

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53-55751

JP-U-S63-110090

This document relates to a member mounting structure.

⑲日本国特許庁（JP）　⑪実用新案出願公開

⑫公開実用新案公報（U）　昭63－110090

⑤1Int.Cl.⁴	識別記号	庁内整理番号	④3公開　昭和63年(1988)7月15日
H 05 K 7/14		E－7373－5F	

審査請求　未請求　（全　頁）

⑤4考案の名称　部材取り付け構造

⑵1実　願　昭62－2142

⑵2出　願　昭62(1987)1月9日

⑦2考案者　中村　修二　大阪府寝屋川市日新町2番1号　オンキヨー株式会社内

⑦1出願人　オンキヨー株式会社　大阪府寝屋川市日新町2番1号

明　細　書

1．考案の名称

部材取り付け構造

2．実用新案登録請求の範囲

本体部材（１）から突出した係止用突起（２）の先端の鈎状部（2a）を相手部材（３）に穿設した係合穴（４）に係合させて該相手部材（３）を本体部材（１）に固定するとともに、前記係止用突起（２）の近傍で鈎状部（2a）の反対方向の本体部材（１）の部位に、取付け状態での本体部材（１）と相手部材（３）との間隔Lよりも長寸法となるように突設した、係止用突起（２）の方向に湾曲する舌状片（５）を前記本体（１）部材と相手部材（３）とで挟んで長さ方向に圧縮してより強く湾曲した状態とし、該湾曲部を前記係止用突起（２）に当接させたことを特徴とする部材取り付け構造。

3．考案の詳細な説明

［産業上の利用分野］

この考案は、例えば、増幅器等電子機器の本体

内にプリント基板のような部材を取り付けるための取付け部の構造に関する。

［従来の技術］

従来における部材取り付け構造の代表的な構造は、例えば部材としてプリント基板の取付け構造を例として説明すると、第３図に示す如く、増幅器本体21から突出した係止用突起22の鈎状先端部22a をプリント基板23に穿設した係合穴24に引っ掛けるようにして係止させ、該プリント基板23を本体21に固定している。

尚、本体21には突起25を設けて、プリント基板24に当接させ、取付け状態でガタ付が生じないように配慮されている。

［解決しようとする問題点］

この様な構造を有する従来のプリント基板取付け構造は、輸送などでプリント基板23が振動すると、係止用突起22が外れやすく、製品不良となる欠点があった。

［問題点を解決するための手段］

上記した従来例の有する欠点を解決するための

本考案に係る部材取り付け構造を実施例を示す第１図～第２図を用いて説明すると、本考案は、本体部材１から突出した係止用突起２の先端の鈎状部2aを相手部材３に穿設した係合穴４に係止させて該相手部材３を本体部材１に固定するとともに、前記係止用突起２の近傍で鈎状部2aの反対側の本体部材１の部位に、取付け状態での本体部材１と相手部材３との間隔Ｌよりも長寸法となるように突設した、係止用突起２の方向に湾曲する舌状片５を本体部材１と相手部材３とで挟んで長さ方向に圧縮してより強く湾曲した状態とし、該湾曲部を前記係止用突起２に当接させたことを特徴とする部材取り付け構造である。

［作　用］

そして、此の様な構成の部材取り付け構造では、第２図のように相手部材を取り付けた状態では、舌状片５は前記機器の本体部材１と相手部材３とに挟まれて長さ方向に圧迫され、より強く湾曲した状態となり、該湾曲部が前記係止用突起２に鈎状部2aの反対方向から当接して係止用突起２が矢

印の方向に撓むことを制止するので、いかなる場合にも係止用突起２が係合穴４から外れることはない。

［実施例］

第１図及び第２図は本考案の実施例の本体と相手部材が離れている状態、及び固定された状態の断面を示す。

図中、１は例えば、増幅器の筐体の一部位の如き本体側を構成する本体部材で、該本体部材１のプリント基板などの相手部材３を取り付ける位置に、先端が鈎状部2aとなっている係止用突起２と、該係止用突起２の近傍で鈎状部2aの裏面側の本体部材１の部位に係止用突起２の方向に湾曲する舌状片５とが突設されている。

この舌状片５は、取付け状態での本体部材１と相手部材３との間隔Ｌよりも長寸法となるように形成される。

又、本体部材１には、相手部材３に当接して取付け状態でガタ付が生じないように突起６が設けられている。

相手部材３には、前記係止用突起２の鈎状部2aが係合する係合穴４が穿設されて、係止用突起２の先端部が挿通され、鈎状部2aが係合穴４に引っ掛かって本体部材１に相手部材３が固定される。この時舌状片５は、本体部材１と相手部材３との間隔、即ち第２図に於けるＬ寸法より幾らか長く形成されているので、本体部材１と相手部材３とで挟まれて長さ方向に圧縮されてより強く湾曲した状態となり、その先端部が相手部材３の裏面に当接するとともに湾曲部は前記係止用突起２に鈎状部2aの裏面方向から当接して係止用突起２が矢印の方向に撓むことを制止する。

尚、上記、舌状片５長さの、係止用突起２の鈎状部2aの内側までの長さＬに対する割合は、舌状片５と係止用突起２との間隔及び前記した本体部材１と相手部材３との間隔Ｌに依存するが、相手部材３を取り付けた状態で舌状片５の湾曲部が係止用突起２に当接するように設定される。

以上、上記した実施例の変型として、舌状片５の剛性を大きくしておき、この剛性によって相手

部材３を係止用突起２の鈎状部2aの内側に押付け、突起６を省略することもできる。

また突起６を設けた場合でも、舌状片５の剛性を大きくすることにより、突起６の寸法公差を大きくしても取付け後の相手部材３がガタ着くことはない。

［効　果］

以上に述べた本考案に係る部材取り付け構造は従来構造と比較して、相手部材が取り付けられた状態では、舌状片の湾曲部が係止用突起に当接して、該係止用突起が鈎状部の反対側に撓もうとするのを制止するので、鈎状部が相手部材の係合穴から外れることはなく、例えば、プリント基板が離脱して器材の組立後に製品不良が発生することを絶無とすることが出来る効果を有するものである。

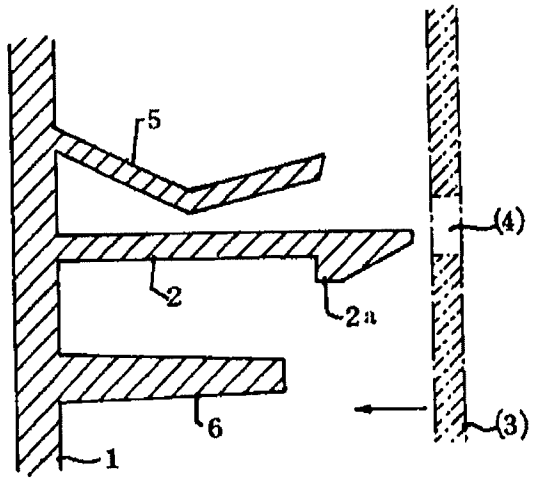
４．図面の簡単な説明

第１図は本考案に係る部材取り付け構造の断面図、第２図は取付け状態の断面図、第３図は従来例の取付け状態の断面図である。

１は本体部材、２は係止用突起、３は相手部材、４は係合穴、５は舌状片である。

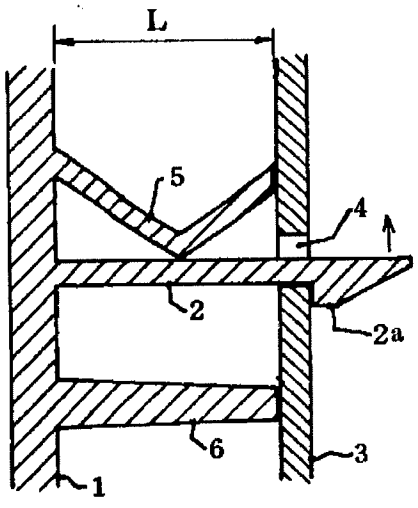
実用新案登録出願人　オンキヨー株式会社

第 1 図

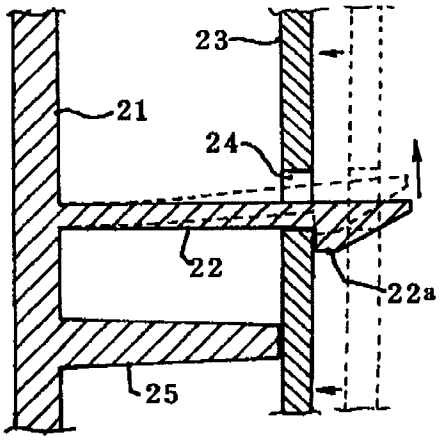


1‥本体部材
2‥係止用突起
3‥相手部材
4‥係合穴
5‥舌状片

第 2 図



第 3 図



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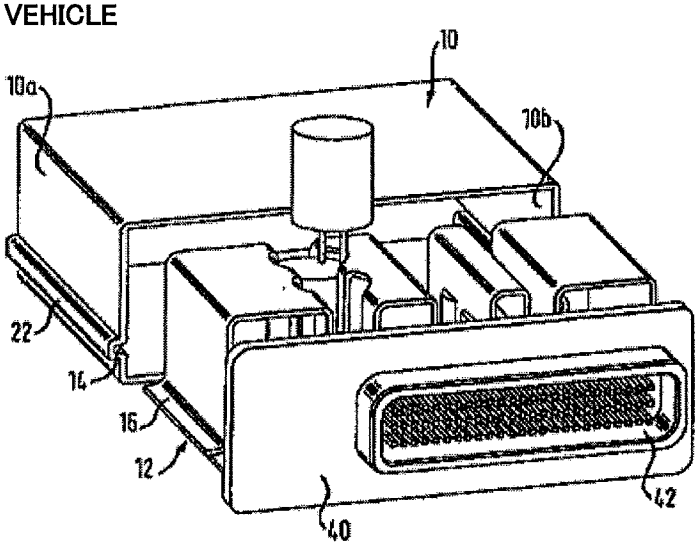
2003-175780 (JP2003175780A) 2003/06/24 2002-276664 (JP2002276664A) 2002/09/24
TRW AUTOMOTIVE ELECTRON & COMP [SKOFLJANEC ROBERT]
B60R 16/02;H05K 7/14

HOUSING FOR ELECTRONIC CONTROL DEVICE OF VEHICLE

[57]ABSTRACT:

PROBLEM TO BE SOLVED: To provide a housing which satisfies requirements for transmission of acceleration and secure grounding with simple and inexpensive structure.SOLUTION: This housing has a metal shell (10), and the shell has an upper wall and a bottom wall in parallel, both side walls (10a and 10b) connecting the upper wall to the bottom wall, and an open front face. A shape-imparted carrier structure (12) has a pair of both lateral edges (16). An inner groove (14) extending in parallel with the bottom wall of the shell with an interval is provided on the both side walls of the shell. The shell structure is stored in the shell, and its lateral edges fit in the groove of the side wall.COPYRIGHT: (C)2003,JPO



(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（Ａ）**　(11)特許出願公開番号
特開2003－175780
（P2003－175780A）
(43)公開日　平成15年６月24日(2003.6.24)

(51)Int.Cl.⁷	識別記号	ＦＩ	ﾃｰﾏｺｰﾄﾞ(参考)
Ｂ６０Ｒ　16/02	６１０	Ｂ６０Ｒ　16/02	６１０Ａ　５Ｅ３４８
Ｈ０５Ｋ　7/14		Ｈ０５Ｋ　7/14	Ｅ

審査請求　有　　請求項の数11　ＯＬ　（全５頁）

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(22)出願日　平成14年９月24日(2002.9.24)

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(32)優先日　平成13年９月24日(2001.9.24)
(33)優先権主張国　ドイツ（ＤＥ）

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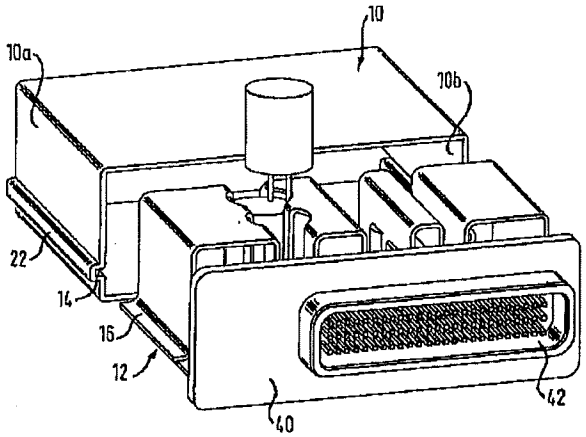
最終頁に続く

(54)【発明の名称】　車輌の電子式制御装置用のハウジング

(57)【要約】
【課題】　加速度の伝達及び確実な接地接続の要件を簡単で安価な構造で満たすハウジングを提供する。
【解決手段】　ハウジングは、金属製シェル（１０）を有しており、シェルは、平行な上壁及び底壁と、上壁と底壁とを相互連結する両側壁（１０ａ、１０ｂ）、と、開放した前面とを有する。賦形キャリヤ構造（１２）は、一対の両横縁部（１６）を有する。シェルの両側壁には、シェルの底壁と平行に延び且つ間隔が隔てられた内部溝（１４）が設けられている。キャリヤ構造はシェル内に収容され、その横縁部が側壁の溝に嵌着する。



【特許請求の範囲】
【請求項１】　車輛の電子式制御装置用のハウジングにおいて、
平行な上壁及び底壁と、これらの上壁と底壁とを相互連結する両側に設けられた側壁と、開口した前面とを有する金属製のシェルを備え、
さらに、両側に設けられた一対の横縁部を有する所定形状のキャリヤ構造体を備え、
前記側壁の各々は、前記底壁と平行に且つ間隔が隔てられて延びる内部溝を有しており、
前記キャリヤ構造体は、前記シェル内に収容され、前記横縁部が前記内部溝に嵌入することを特徴とする、ハウジング。
【請求項２】　請求項１に記載のハウジングにおいて、
さらに、金属製のベースプレートを備え、
前記シェルが、前記ベースプレートに取り付けられることを特徴とする、ハウジング。
【請求項３】　請求項２に記載のハウジングにおいて、
前記内部溝は、外方に突出した壁部分によって形成されており、
前記ベースプレートに取り付けられており且つ前記突出壁部分と係合するファスナ部材が、設けられていることを特徴とする、ハウジング。
【請求項４】　請求項３に記載のハウジングにおいて、
前記突出壁部分は、前記ベースプレートによって支持された支持部材上に当接し、前記ファスナ部材と前記支持部材との間にクランプされていることを特徴とする、ハウジング。
【請求項５】　請求項４に記載のハウジングにおいて、
前記ファスナ部材は、前記突出壁部分に押し付けられていることを特徴とする、ハウジング。
【請求項６】　請求項１に記載のハウジングにおいて、
前記キャリヤ構造体は、プリント回路基板を備え、
前記横縁部は、前記プリント回路基板の横縁部であることを特徴とする、ハウジング。
【請求項７】　請求項１に記載のハウジングにおいて、
前記キャリヤ構造体は、折り曲げられたシートメタル部材と、当該シートメタル部材に取り付けられたプリント回路基板とを備え、
前記横縁部は前記シートメタル部材に設けられていることを特徴とする、ハウジング。
【請求項８】　請求項１に記載のハウジングにおいて、
前記突出壁部分を、前記キャリヤ構造体の前記横縁部に二つの両側から押し付け、その間に電気的接地接続を形成することを特徴とする、ハウジング。
【請求項９】　請求項７に記載のハウジングにおいて、
前記シートメタル部材は、前記シェルの前記底壁に当接する複数の第１壁部分と、該第１壁部分と平行であり且つ間隔が隔てられた複数の第２壁部分とを有しており、
前記プリント回路基板は、前記第２壁部分に取り付けられていることを特徴とする、ハウジング。
【請求項１０】　請求項７に記載のハウジングにおいて、
前記シートメタル部材は、前記制御装置の複数の電子部品を支持できるように、前記プリント回路基板上に直立させた複数の壁部を有していることを特徴とする、ハウジング。
【請求項１１】　請求項１に記載のハウジングにおいて、
前記シェルの前記開口した前面は、プラグソケットを支持する前プレートによって閉鎖されることを特徴とする、ハウジング。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、車輛の電子式制御装置用ハウジングに関する。
【０００２】
【従来の技術】車輛の電子式制御装置は、高い熱応力及び機械的応力を被る。従って、これらに耐える十分な抵抗を備えたハウジングが必要とされる。ベルトテンショナやエアバッグ等の車輛の安全装置の作動に役立つ加速度センサを含む制御装置のハウジングについて特に高い要求がなされる。このような制御装置では、ハウジングを自動車のボディにしっかりと取り付け、発生した加速度を加速度センサに伝達できなければならない。更に、制御装置の電子部品を確実に機能するため、一方では、ハウジングと自動車のボディとの間に、他方では、ハウジングと電子式制御装置との間に良好な接地接続がなければならない。
【０００３】これらの要件は、従来のハウジングでは、重量があり且つ嵩張る金属製構造で満たされた。
【０００４】
【発明が解決しようとする課題】本発明は、加速度の伝達及び確実な接地接続の要件（又は必要条件）を簡単で安価な構造で満たすハウジングを提供する。
【０００５】
【課題を解決するための手段】具体的には、本発明のハウジングは、平行な上壁及び底壁と、これらの上壁と底壁とを相互連結する対向する両側の側壁と、開口又は開放した前面とを有する金属製のシェル（外殻状部）を備えている。所定の形状が付与された（賦形された）キャリヤ構造体（支持構造体）が、一対の両横縁部を有している。シェルの両側にある側壁は、内部溝を有している。内部溝は、シェルの底壁と平行に延びており、シェルの底壁から間隔をあけて設けられている。キャリヤ構造体はシェル内に収容され、キャリヤ構造体の横縁部が、シェルの側壁の内部溝に嵌入又は嵌合（あるいは嵌着）する。好ましい実施例では、シェルの底壁は金属製ベースプレートに取り付けられている。内部溝は、外方に突出した突出壁部分によって形成されている。ファス

ナ部材（締結部材又は留め部材）が設けられており、ファスナ部材は、ベースプレートに取り付けられており、前記突出壁部分と係合する。好ましくは、二つの両側から、突出壁部分をキャリヤ構造体の横縁部に押し付け、シェルに固定的に取り付けると同時に電気的な接地接続（アース接続）を確実にする。横縁部は、制御装置の電子部品が取り付けられるプリント回路基板の横縁部であってもよいし、プリント回路基板が取り付けられる折り曲げられた（又は、折畳まれた、あるいは、折り重なれた）シートメタル（金属の薄板）部材の横縁部であってもよい。

【０００６】本発明のハウジングは、幾つかの自動工程で組み立てられるほんの数個の容易に且つ安価に製造される部品で形成できる。本明細書のこの他の特徴及び利点は、幾つかの実施例の以下の説明から、及び参照がなされる添付図面からわかるであろう。

【０００７】

【発明の実施の形態】車輛の電子制御装置用の図１に示すハウジングは、ほぼ平行６面体の金属製のハウジングシェル（シェル状のハウジング、又はハウジング）１０と、制御装置の電子部品用のキャリヤ構造体１２とを備えている。ハウジングシェル１０は、開口した（又は、開放した）前面を持つカップ状であり、開口した（又は、開放した）前面を通してキャリヤ構造体１２を挿入できる。ハウジングシェル１０は、平行な上壁及び底壁と、これらの上壁及び底壁を相互連結する一対の側壁１０ａ、１０ｂとを有する。側壁１０ａ、１０ｂには平行な溝１４が設けられており、キャリヤ構造１２の二つの対応する横縁部１６がこれらの溝１４と係合する。溝１４は、側壁１０ａ、１０ｂの外方に突出した壁部分２２によって形成されている。好ましくは、ハウジングシェル１０はアルミニウム製であり、フロープレス法（ｆｌｏｗ　ｐｒｅｓｓｉｎｇ）によって形成される。

【０００８】ハウジングシェル１０はベースプレート１８に着座し、これに取り付けられる。側壁１０ａ、１０ｂと対応するベースプレート１８の縁部には、直立支持部材２０が設けられており、これらの支持部材２０にハウジングシェル１０の突出壁部分２２が当接する。

【０００９】直立ファスナエレメント（直立した締結部材）２４が、支持部材２０と平行に、また、ベースプレート１８の対応する縁部に沿って設けられている。これらの直立ファスナエレメント２４は、ハウジングシェル１０の外方に突出した壁部分２２の周囲と係合する。

【００１０】図２及び図３に示す実施例では、プリント回路基板２８が、溝１４に滑り込ませてある（又は、摺動して入れ込んでいる）。プリント回路基板２８をシェル１０の溝１４に取り付けるため、ファスナエレメント２４を支持部材２０に対してかしめ、それによって、ハウジングシェル１０の壁部分２２を挟んで締めつけ、プリント回路基板２８の対応する縁部領域をクランプ（又は、クランプして固定）する。この状態を図６の拡大図に示す。溝１４に挿入されたプリント回路基板２８の縁部領域を挟んで締め付けることにより、プリント回路基板とハウジングシェルとの間で電気的接地接続がなされると同時に機械的安定性が提供される。

【００１１】図２に示す実施例では、制御装置の電子部品はプリント回路基板２８上に取り付けられている。これらの電子部品の一つは、プリント回路基板及びハウジングシェル１０を介してベースプレート１８にしっかりと連結された加速度センサとすることができる。ベースプレート１８は、ハウジングを自動車のボディに固定（例えば、アンカ止め）するための取り付け開口部１９を有する。

【００１２】図４による実施例では、プリント回路基板２８は、金属製のキャリヤプレート（金属製の支持板）３０に取り付けられている。キャリヤプレート３０の断面は、蛇行形状の（又は、曲がりくねった）輪郭（プロファイル）を有している。キャリヤプレート３０は複数の支持面を有しており、一部の支持面は、プリント回路基板に当たっている。また、別の支持面は、プリント回路基板から間隔が隔てられた状態となっており、ハウジングシェル１０の底面に当接した状態となっている。図２の実施例とは異なり、溝１４と係合するのはプリント回路基板２８の縁部領域ではなく、キャリヤプレート３０の縁部領域となっている。キャリヤプレート３０の縁部領域は、図３及び図６を参照して説明したのと同じ方法で、溝１４取り付けられ、接触する。金属製のキャリヤプレート３０とプリント回路基板２８との間の導電性接続部は、図４の取り付け箇所３２ａ等の複数の取り付け箇所で重複して行われる。

【００１３】図４に示す実施例の変形例として、又は追加で、図５に示すように、機械的支持構造体３４を、プリント回路基板２８のうちハウジングシェル１０の底面に向いた側とは反対側に取り付ける。機械的支持構造体３４は概ね蛇行形状であり、複数の直立した支持壁３６を直角に曲げ、そこで制御装置の複数の電子部品を支持できる。例えば、図７は、プリント回路基板２８に取り付けられており且つ支持構造体３４の支持壁３６によって支持された多数のコンデンサーを示す。

【００１４】ハウジングシェル１０の開放（又は開口）した前面は、プラグソケット４２を支持する前プレート（フロントプレート）４０によって閉鎖される。前プレート４０は、キャリヤ構造体１２に取り付けられる。前プレート４０をキャリヤ構造体１２に取り付けるため、角度の付いたタブ（アングルタブ）４４、４６がキャリヤ構造体１２に設けられており、これらに前プレート４０の内面が当接する。

【００１５】全ての実施例に共通していることは、比較的容易に且つ安価に製造されるハウジング部品を使用するけれども機械的に堅固な構造が得られるということで

ある。従って、ハウジングは、プリント回路基板に取り付けられる加速度センサを使用する車輌の安全装置の作動装置等の制御装置にも適している。このような用途で必要とされる、外ハウジングとプリント回路基板との間の電気的接地接続もまた確保される。

【図面の簡単な説明】

【図１】図１は、金属製シェルと、このシェルに滑り込ませることができる（又は、摺動させることができる）電子部品用の内部のキャリヤ構造体とを含むハウジングの分解斜視図である。

【図２】図２は、プリント回路基板を所定位置に滑り込ませた（又は摺動した）状態にある、ベースプレート上に着座させたハウジングシェルの斜視図である。

【図３】図３は、図２の拡大詳細図である。

【図４】図４は、他の実施態様に係るハウジングの断面図である。

【図５】図５は、キャリヤ構造体及びプリント回路基板の断面図である。

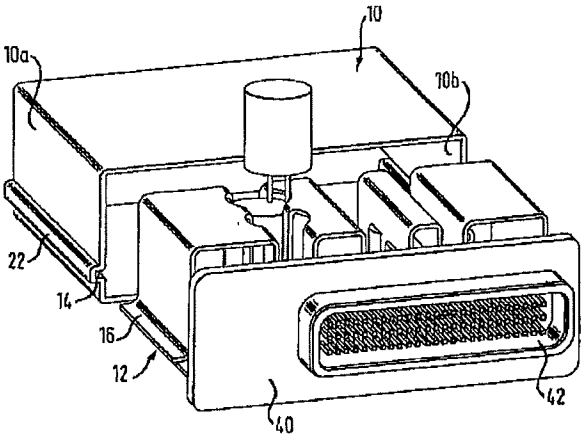
【図６】図６は、図２の拡大詳細図である。

【図７】図７は、電子部品及びプリント回路基板が取り付けられたキャリヤ構造体の部分斜視図である。

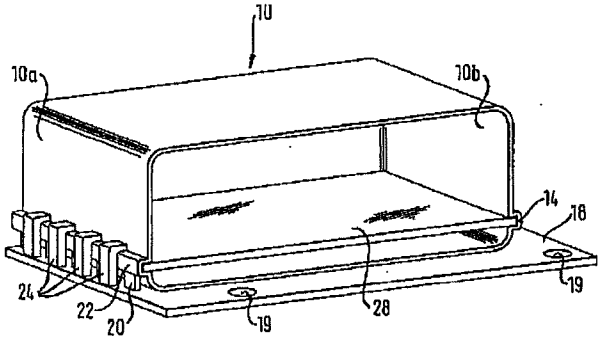
【符号の説明】

１０　ハウジングシェル
１２　キャリヤ構造（賦形キャリヤ構造）
１０ａ、１０ｂ　側壁
１４　溝
１６　横縁部
１８　ベースプレート
２０　直立支持部材
２２　壁部分
２４　直立ファスナエレメント
２８　プリント回路基板

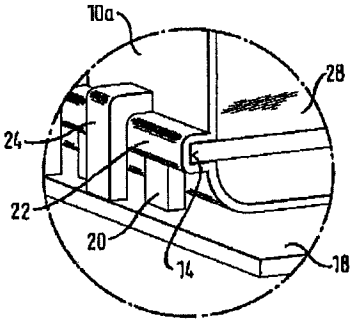
【図１】



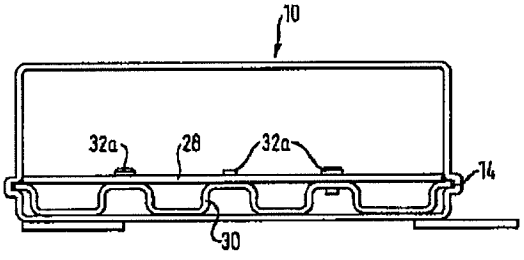
【図２】



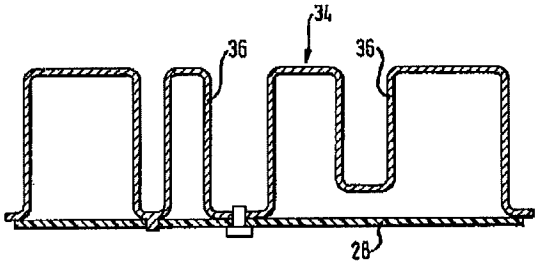
【図３】



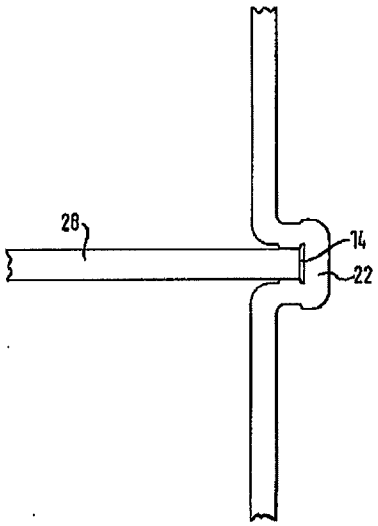
【図４】



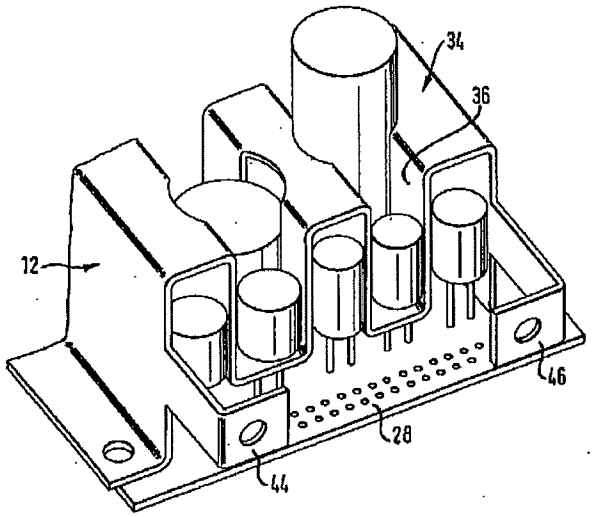
【図５】



【図６】



【図７】



フロントページの続き

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Ｆターム(参考)　5E348 AA02 AA05 AA07 AA14 AA31
CC02 CC06 CC09 DG01 EE02
EE17 EE27 EE29 EF04 EF32
EF38 EF41 FF01

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]In a housing for electronic control devices of a car,
Have metal shell characterized by comprising the following, have a carrier structure of prescribed shape which has further the pair of end lap part provided by both sides, and each of the aforementioned side wall, A housing which it has an inner groove which an interval is separated and is extended in parallel with the aforementioned bottom wall, and the aforementioned carrier structure is accommodated in the aforementioned shell, and is characterized by the aforementioned end lap part inserting in the aforementioned inner groove.
A parallel upper wall and a bottom wall.
A side wall provided by both sides which link these upper walls and bottom walls.
A front face which carried out the opening.

[Claim 2]A housing which is provided with further metal base plates in the housing according to claim 1, and is characterized by attaching the aforementioned shell to the aforementioned base plate.
[Claim 3]A housing, wherein a fastener component which the aforementioned inner groove is formed in the housing according to claim 2 of a wall part projected to a method of outside, and is attached to the aforementioned base plate, and engages with the aforementioned projecting wall portion is provided.
[Claim 4]A housing, wherein it abuts on a support component supported with the aforementioned base plate and the aforementioned projecting wall portion is clamped between the aforementioned fastener component and the aforementioned support component in the housing according to claim 3.

[Claim 5]A housing, wherein the aforementioned fastener component is pressed to the aforementioned projecting wall portion in the housing according to claim 4.
[Claim 6]A housing which the aforementioned carrier structure is provided with a printed circuit board in the housing according to claim 1, and is characterized by the aforementioned end lap part being an end lap part of the aforementioned printed circuit board.
[Claim 7]In the housing according to claim 1,
A housing which is provided with the following and characterized by the aforementioned end lap part being provided by the aforementioned sheet metal component.
A sheet metal component by which the aforementioned carrier structure was bent.
A printed circuit board attached to the sheet metal component concerned.

[Claim 8]A housing which presses the aforementioned projecting wall portion to the aforementioned end lap part of the aforementioned carrier structure from two both sides in the housing according to claim 1, and is characterized by forming electrical ground connection between them.
[Claim 9]In the housing according to claim 7, the aforementioned sheet metal component, A housing

which has two or more 1st wall parts to which the aforementioned bottom wall of the aforementioned shell is abutted, and two or more 2nd wall parts from which it is parallel to this 1st wall part, and an interval was separated, and is characterized by attaching the aforementioned printed circuit board to said 2nd wall part.
[Claim 10]A housing, wherein the aforementioned sheet metal component has two or more walls uprighted on the aforementioned printed circuit board in the housing according to claim 7 so that two or more electronic parts of the aforementioned control device can be supported.
[Claim 11]A housing, wherein a front face, as for, the aforementioned shell carried out [aforementioned] the opening is closed in the housing according to claim 1 with a front plate which supports a plug socket.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]The present invention relates to the electronic housing for control devices of a car.
[0002]
[Description of the Prior Art]The electronic control device of a car wears high heat stress and mechanical stress. Therefore, the housing provided with sufficient resistance which bears these is needed. A high demand is especially made about the housing of the control device containing the acceleration sensor which is useful for the operation of the safeguard of cars, such as a belt tensioner and an air bag. In such a control device, a housing must be firmly attached to the body of an automobile and the generated acceleration must be able to be transmited to an acceleration sensor. In order to function the electronic parts of a control device reliably, on the other hand, there must be ground connection good between a housing and an electronic control device between a housing and the body of an automobile.
[0003]These requirements were satisfied by the conventional housing with the metal structure where there is weight and it is bulky.
[0004]
[Problem to be solved by the invention]The present invention provides the housing which satisfies transmission of acceleration, and the requirements for positive ground connection (or necessary condition) by easy and inexpensive structure.
[0005]
[Means for solving problem]Specifically, the housing of the present invention is provided with the metal shell (coat shaped part) which has a side wall, and the opening or the front face opened wide of the both sides which link a parallel upper wall and bottom walls, and these upper walls and bottom walls, and which oppose. The carrier (size enlargement was carried out) structure (supporting structure body) to which predetermined form was given has both the pair of end lap part. The side wall in the both sides of shell has an inner groove. The inner groove is extended to the bottom wall of shell, and parallel, from the bottom wall of shell, opens an interval and is provided. A carrier structure is accommodated in shell, and the end lap part of a carrier structure inserts or fits into the inner groove of the side wall of shell (or attachment). The bottom wall of shell is attached to metal base plates in the preferable working example. The inner groove is formed of the projecting wall portion projected to the method of outside. The fastener component (a fastening member or a stop component) is provided, the fastener component is attached to the base plate, and it engages with the aforementioned projecting wall portion. Electric ground connection (ground connection) is reliably carried out at the same time it presses a projecting wall portion to the end lap part of a carrier structure and attaches it to shell fixed from two both sides preferably. An end lap part may be an end lap part of a printed circuit board to which the electronic parts of a control device are

attached, and may be an end lap part of the bent sheet metal (or it was folded up or was able to lie one upon another) (sheet metal) component to which a printed circuit board is attached.
[0006]The housing of the present invention can be formed with the parts of mere some which assemble and shine by some automatic steps manufactured easily and inexpensive. Probably, the description of the following of some working examples and the accompanying drawing in which reference is made show the other characteristics and advantages of this Description.
[0007]
[Mode for carrying out the invention]A housing shown in Fig.1 for electronic controls of a car is provided with the following.
Housing shell (a shell-like housing or a housing) 10 of metal of parallel 6 face piece substantially.
The carrier structure 12 for electronic parts of a control device.
The housing shell 10 is cup shape with the front face (or it opened wide) which carried out the opening, and can insert the carrier structure 12 through the front face (or it opened wide) which carried out the opening. The housing shell 10 is provided with the following.
A parallel upper wall and a bottom wall.
The pair of side walls 10a and 10b which link these upper walls and bottom walls.
The slot 14 parallel to the side walls 10a and 10b is provided, and the two corresponding end lap parts 16 of the carrier structure 12 engage with these slots 14. The slot 14 is formed of the wall part 22 projected to the way outside the side walls 10a and 10b. Preferably, the housing shell 10 is a product made from aluminum, and is formed by the flow pressing method (flow pressing).
[0008]The housing shell 10 sits down to the base plate 18, and is attached to this. The erected bearing member 20 is provided by the edge of the side walls 10a and 10b and the corresponding base plate 18, and the projecting wall portion 22 of the housing shell 10 abuts these support components 20.
[0009]The erection fastener element (upright fastening member) 24 is provided in parallel with the support component 20 along the edge where the base plate 18 corresponds. These erection fastener elements 24 engage with the circumference of the wall part 22 projected to the way outside the housing shell 10.
[0010]The printed circuit board 28 makes it have slid into the slot 14 in the working example shown in Fig.2 and Fig.3 (or it slides).In order to attach the printed circuit board 28 to the slot 14 of the shell 10, caulk the fastener element 24 to the support component 20, and by it, It binds tight on both sides of the wall part 22 of the housing shell 10, and the edge area where the printed circuit board 28 corresponds is clamped (or clamping fixing). This state is shown in the enlarged drawing of Fig.6. By binding tight across the edge area of the printed circuit board 28 inserted in the slot 14, while electrical ground connection is made between a printed circuit board and housing shell, mechanical stability is provided.
[0011]In the working example shown in Fig.2, the electronic parts of the control device are attached on the printed circuit board 28. One of the electronic parts of these can be used as the acceleration sensor firmly connected with the base plate 18 via a printed circuit board and the housing shell 10. The base plate 18 has the mounting opening part 19 for fixing a housing to the body of an automobile (for example, anchor stop).
[0012]The printed circuit board 28 is attached to the metal carrier plate (metal support plate) 30 in the working example by Fig.4. The section of the carrier plate 30 has an outline (or it wound) (profile) of meandering shape. The carrier plate 30 has two or more back faces, and some back faces have been equivalent to the printed circuit board. Another back face is in the state where the interval was separated from the printed circuit board, and is in the state where the bottom surface of the housing shell 10 was abutted. Unlike the working example of Fig.2, engaging with the slot 14 is an edge area of the carrier plate 30 instead of the edge area of the printed circuit board 28. The edge area of the carrier plate 30 is the same method as having described with reference to Fig.3 and Fig.6, is attached slot 14 and contacts.The conductive connection part between the metal carrier

plate 30 and the printed circuit board 28 overlaps in two or more mounting parts, such as the mounting part 32a of Fig.4, and is performed.

[0013]By the addition as a modification of the working example shown in Fig.4, as shown in Fig.5, the mechanical supporting structure body 34 is attached to an opposite side with the side which turned to the bottom surface of the housing shell 10 among the printed circuit boards 28.The mechanical supporting structure body 34 is meandering shape in general, bends two or more upright supporting walls 36 right-angled, and can support two or more electronic parts of a control device there. For example, Fig.7 shows the many capacitor which is attached to the printed circuit board 28, and was supported with the supporting wall 36 of the supporting structure body 34.

[0014]The front face which the housing shell 10 opened (or opening) is closed by the front plate (front plate) 40 which supports the plug socket 42. The front plate 40 is attached to the carrier structure 12. In order to attach the front plate 40 to the carrier structure 12, the tabs (angle tab) 44 and 46 to which the angle was attached are provided by the carrier structure 12, and the inner surface of the front plate 40 abuts these.

[0015]Although the housing part article manufactured comparatively easily and inexpensive is used, I hear that a strong structure is acquired mechanically and it is sometimes common in all the working examples. Therefore, the housing also fits control devices, such as a starting device etc. of the safeguard of the car which uses the acceleration sensor attached to a printed circuit board. The electrical ground connection between the outer housing and the printed circuit board which are needed for such a use is also secured.

[Translation done.]

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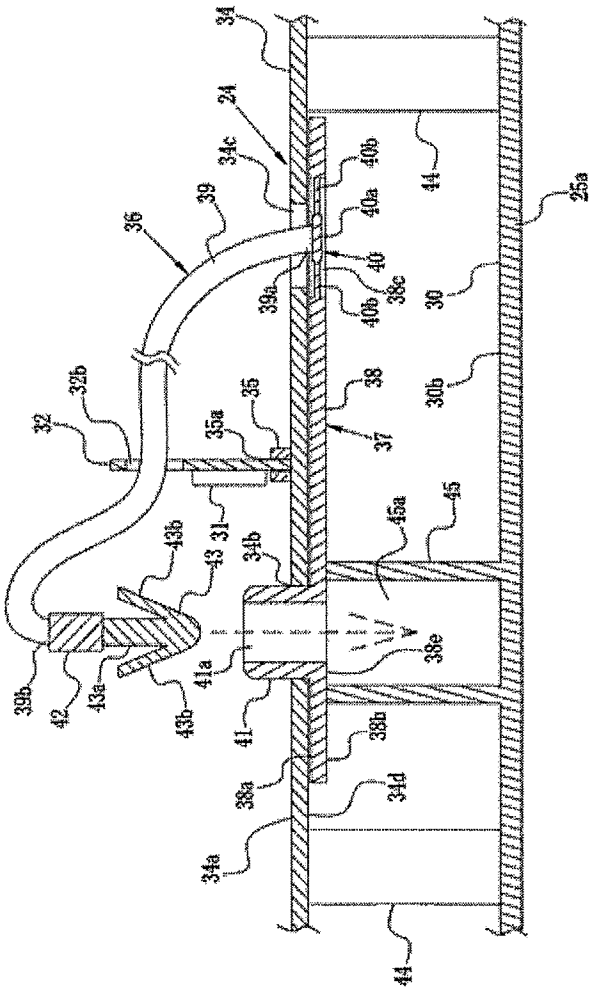
OLYMPIA KK [FUJII NOBUO]
A63F 5/04 (2006.01);A63F 5/04 (2006.01)

ELECTRONIC CIRCUIT BOARD

[57]ABSTRACT:
PROBLEM TO BE SOLVED: To prevent a fraudulentness of removing a storage medium from an electronic circuit board.SOLUTION: A base member 37 is provided with a projection 41, and a through hole 41a is formed in the projection 41. The base end 39a of a string 39 is fixed to a fixing part 40 integrated with the base member 37. The tip 39b of the string 39 is provided with a locking member 43. With the projection 41 pressed in from the back 34d side of the board body 34 to a first hole 34b of the board body 34, the base member 37 is fitted to the board body 34. The locking member 43 is drawn out through a second hole 34c from the back 34d side of the board body 34 to the packaging surface 34a side, inserted in the through hole 32a and passed through the projection 41 to be engaged with an edge 38e, thereby unseparably connecting the tip 39b side of the string 39 to the base member 37.COPYRIGHT: (C) 2006,JPO&NCIPI



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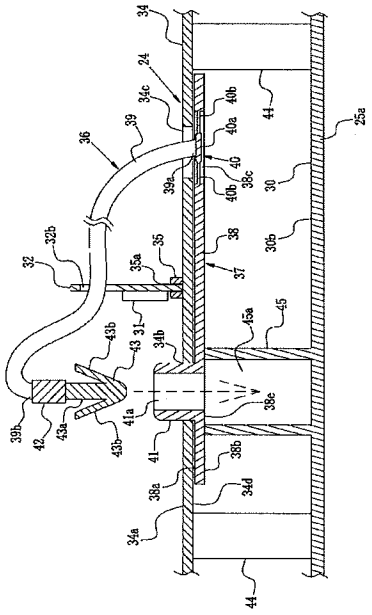
(54)【発明の名称】電子回路基板

(57)【要約】
【課題】　記憶媒体を電子回路基板から不正に取り外すといった行為を防止する。
【解決手段】　ベース部材３７に突起４１を設け、この突起４１に貫通孔４１ａを形成する。ベース部材３７に一体に成形されている固着部４０に、紐３９の基端３９ａを固着する。紐３９の先端３９ｂに係止部材４３を設ける。突起４１を基板本体３４の裏面３４ｄ側から基板本体３４の第１孔３４ｂに圧入してベース部材３７を基板本体３４に取り付ける。係止部材４３が第２孔３４ｃを通して第１基板３４の裏面３４ｄ側から実装面３４ａ側に引き出され、貫通孔３２ａに挿通されてから突起４１内を通過した後に縁３８ｅに係合することで紐３９の先端３９ｂ側がベース部材３７に分離不能に連結される。
【選択図】　図７



【特許請求の範囲】
【請求項１】
表面側に第１コネクタが設けられた第１基板と、遊技用のプログラムが記憶されている記憶媒体を有しており、前記第１コネクタと対になっている第２コネクタを前記第１コネクタに差し込むことにより前記第１基板から起立した状態で前記第１基板に連結された第２基板とを備えた電子回路基板において、
紐または帯状の挿通部材の根元を固着したベース部材を前記第１基板の裏面側に重なるように取り付け、前記挿通部材をその先端側から前記第２基板に形成した貫通孔に挿通し、この貫通孔から引き出した前記挿通部材の先端側を前記ベース部材に分離不能に連結したことを特徴とする電子回路基板。
【請求項２】
表面側に第１コネクタが設けられた第１基板と、遊技用のプログラムが記憶されている記憶媒体を有しており、前記第１コネクタと対になっている第２コネクタを前記第１コネクタに差し込むことにより前記第１基板から起立した状態で前記第１基板に連結された第２基板とを備えた電子回路基板において、
前記電子回路基板は、前記第２基板が前記第１コネクタから引き抜かれることを防ぐ引き抜き阻止部材を含み、この引き抜き阻止部材は、前記第１基板の裏面側に重なるように前記第１基板に取り付けられるベース部材と、このベース部材に根元側が固着された紐または帯状の挿通部材とを有し、前記挿通部材はその先端側から前記第２基板に形成した貫通孔に挿通され、前記貫通孔から引き出された先端側が前記ベース部材に分離不能に連結されていることを特徴とする電子回路基板。
【請求項３】
前記ベース部材を貫通する開口を有する筒状部が前記ベース部材に一体に設けられ、前記挿通部材の先端にフックが一体に設けられ、前記第１基板に形成された第１孔に前記筒状部を前記第１基板の裏面側から圧入することによって前記ベース部材が前記第１基板に取り付けられ、前記フックが前記第１基板に形成された第２孔を通して前記第１基板の裏面側から表面側に引き出され、前記貫通孔に挿通されてから前記筒状部内に挿通された際に前記ベース部材または前記筒状部内に設けられた係止部に係合することで前記挿通部材の先端側が前記ベース部材に分離不能に連結されることを特徴とする請求項１または２記載の電子回路基板。
【請求項４】
前記第１基板の一端縁を部分的に包み込むように屈曲した屈曲部が前記ベース部材に一体に設けられ、前記屈曲部を活用して前記第１基板の一端縁を包み込むことによって前記ベース部材が前記第１基板に取り付けられることを特徴とする請求項１または２記載の電子回路基板。
【請求項５】
前記挿通部材はその根元が前記第１基板の表面側に露呈した前記屈曲部に固着されることを特徴とする請求項４記載の電子回路基板。
【請求項６】
前記第１基板の一端縁を部分的に包み込むように屈曲した屈曲部と、前記ベース部材を貫通する開口を有する筒状部とが前記ベース部材に一体に設けられ、前記ベース部材と前記屈曲部とで前記第１基板の一端縁を包み込み、且つ前記筒状部を前記第１基板に形成された第１孔に圧入することによって前記ベース部材が前記第１基板に取り付けられ、前記挿通部材の先端に一体に設けられたフックが前記貫通孔に挿通されてから前記筒状部内に挿通された際に前記ベース部材または前記筒状部内に設けられた係止部に係合することで前記挿通部材の先端側が前記ベース部材に分離不能に連結されることを特徴とする請求項１または２記載の電子回路基板。
【請求項７】
前記第１基板の一端縁を部分的に包み込むように屈曲した屈曲部と、前記ベース部材を貫通する開口を有する筒状部とが前記ベース部材に一体に設けられ、前記ベース部材と前

記屈曲部とで前記第１基板の一端縁を包み込み、且つ前記筒状部を前記第１基板に形成された第１孔に圧入することによって前記ベース部材が前記第１基板に取り付けられ、前記挿通部材はその根元が前記第１基板の表面側に露呈した前記屈曲部に固着されるとともに先端に一体に設けられたフックが前記貫通孔に挿通されてから前記筒状部内に挿通された際に前記ベース部材または前記筒状部内に設けられた係止部に係合することで前記挿通部材の先端側が前記ベース部材に分離不能に連結されることを特徴とする請求項１または２記載の電子回路基板。

【請求項８】

前記屈曲部は、板状の前記ベース部材の一端から前記第１基板の厚みと同程度の高さで立ち上がる立ち上がり部と、この立ち上がり部から前記ベース部材の他端側に向けて延設された折り返し部とからなり、前記ベース部材と前記立ち上がり部と前記折り返し部とで前記第１基板の一端縁を包み込むことを特徴とする請求項４ないし７のいずれか１つに記載の電子回路基板。

【請求項９】

前記屈曲部は、板状の前記ベース部材の一端から前記第１基板の厚みと同程度の高さで立ち上がる立ち上がり部と、この立ち上がり部から前記ベース部材の他端側に向けて延設された折り返し部とからなり、前記ベース部材と前記立ち上がり部と前記折り返し部とで前記第１基板の一端縁を包み込み、

前記筒状部は、前記立ち上がり部と同じ方向に突出していることを特徴とする請求項６または７記載の電子回路基板。

【請求項１０】

前記係止部に係合した前記フックを取り囲む筒状の収容部が前記ベース部材に一体成形されていることを特徴とする請求項３、６、７、９のいずれか１つに記載の電子回路基板。

【請求項１１】

前記係止部に係合した前記フックが、前記第１及び第２基板を収納するケースの内面に一体成形された筒状の収容部で覆われることを特徴とする請求項３、６、７、９のいずれか１つに記載の電子回路基板。

【請求項１２】

前記挿通部材の根元が脆弱な連結部材を介して前記ベース部材に連結されていることを特徴とする請求項１ないし１１のいずれか１つに記載の電子回路基板。

【発明の詳細な説明】

【技術分野】

【０００１】

本発明は、遊技用のプログラムが記憶されている記憶媒体を備えた電子回路基板に関するものである。

【背景技術】

【０００２】

パチンコ店などの遊技場に設置して使用されるパチンコ機やスロットマシン等の遊技機は、パチンコ球やメダル等の遊技媒体に一定の価値が与えられて、ゲームを行って獲得した遊技媒体を種々の景品に交換することができる。遊技機には、その筐体内部に、遊技媒体の供給に基づいて作動させるランプ装置や音声発生装置などの様々な駆動装置及びこれら駆動装置を制御する制御回路装置を備えており、遊技者が遊技を行う際にこれらを適宜作動させることによって遊技を興趣に溢れたものとしている。また、近年では、図柄を変動表示させるリール表示装置または液晶画像表示装置等の図柄可変表示装置を内蔵し、所定条件を満たしたときに識別情報を変動させた後に停止表示させるように図柄可変表示装置を作動させるものが主流となっている。これらの装置は制御回路装置によって制御されている。

【０００３】

最近の遊技機の内部に配設されている制御回路装置は、基板上に設けられたＣＰＵ（ｃｅｎｔｒａｌ　ｐｒｏｃｅｓｓｉｎｇ　ｕｎｉｔ）が、制御プログラムに従って電子制御を行うものが一般的である。制御プログラムは、ＲＯＭ（ｒｅａｄ　ｏｎｌｙ　ｍｅｍｏｒｙ）として機能するＩＣチップなどの記憶媒体にデータとして記憶されており、ＣＰＵは、遊技状態に応じて記憶媒体から制御プログラムのデータを逐次読み出して実行することによって制御を行っている。

【０００４】

ところで、記憶媒体を制御回路装置に組み込む方式として、記憶媒体を記憶媒体専用基板に取り付けて、この記憶媒体専用基板に設けられている端子を制御回路装置の基板本体上に設けられている接続コネクタに差し込むといった方式が知られている。この方式を用いることにより記憶媒体を制御回路装置の適正な箇所に容易且つ正確に組み込むことができ、記憶媒体の組み込み作業の効率を高めることができる。また、記憶媒体専用基板の端子と基板本体の接続コネクタとの接続を解除する場合、記憶媒体専用基板を基板本体から引き抜くことにより記憶媒体を制御回路装置から容易に取り外すことができる。よって、旧型の遊技機を新型の遊技機に切り替える場合、記憶媒体専用基板のみを交換することでコスト削減やリサイクルを行うことができる。また、制御回路装置のメンテナンスなどを行う場合、記憶媒体を制御回路装置から取り外す際の作業効率が向上し、これによりメンテナンスにかかる時間を短くすることができる。

【０００５】

また、記憶媒体専用基板を基板本体から容易に取り外すことができないように、記憶媒体専用基板及び基板本体には、これら２つの基板を繋ぐようにして封印シールが貼付されている。記憶媒体専用基板を基板本体から無理矢理取り外すと、封印シールの残骸が記憶媒体専用基板や基板本体に残されるので、記憶媒体が不正に交換された場合には、それを容易に発見することができる。

【特許文献１】特開２００３－２３６０３８号

【発明の開示】

【発明が解決しようとする課題】

【０００６】

しかしながら、上述したような方法で記憶媒体専用基板が基板本体に取り付けられている場合、記憶媒体が記憶媒体専用基板ごと容易に取り外され、不正な記憶媒体が搭載された記憶媒体専用基板を基板本体に取り付けられてしまう虞があった。上述したように封印シールを用いたとしても、近年では封印シールは簡単に複製することができるため、例えば、貼付されている封印シールを引きちぎるような力を加えながら記憶媒体専用基板を基板本体から無理矢理取り外して、封印シールの残骸を記憶媒体専用基板や基板本体に付着させたままの状態にしておいても、不正な記憶媒体が搭載された記憶媒体専用基板を基板本体に取り付けた後に、複製した封印シールを記憶媒体専用基板や基板本体に付着した封印シールの残骸に覆い被せるように貼付することにより、記憶媒体専用基板を基板本体から取り外した痕跡を隠すことができる。また、封印シールを貼付しておいても、痕跡を残すことなく封印シールを丁寧に剥がして記憶媒体専用基板を基板本体から取り外し、不正な記憶媒体が搭載された記憶媒体専用基板を基板本体に取り付けた後に、再びその封印シールを貼付することで、記憶媒体専用基板を基板本体から取り外した痕跡を残さないようにすることもできる。これにより不正に記憶媒体専用基板が取り外されたとしても、それを発見することができなくなってしまうといった問題が生じる。

【０００７】

また、記憶媒体専用基板や基板本体をリサイクルする場合、封印シールが用いられていると、封印シールを剥がした際に封印シールの糊が記憶媒体専用基板や基板本体の表面に付着して記憶媒体専用基板や基板本体を再使用することができなくなってしまうため、リサイクル性が悪いといった問題があった。

【０００８】

本発明は、上記課題を解決するためになされたものであり、遊技用のプログラムが記憶

されている記憶媒体を電子回路基板から不正に取り外すことを防止することができ、また、リサイクル性を良好にすることができる電子回路基板を提供することを目的とする。

【課題を解決するための手段】

【０００９】

本発明は上記目的を達成するために、表面側に第１コネクタが設けられた第１基板と、遊技用のプログラムが記憶されている記憶媒体を有しており、前記第１コネクタと対になっている第２コネクタを前記第１コネクタに差し込むことにより前記第１基板から起立した状態で前記第１基板に連結された第２基板とを備えた電子回路基板において、紐または帯状の挿通部材の根元を固着したベース部材を前記第１基板の裏面側に重なるように取り付け、前記挿通部材をその先端側から前記第２基板に形成した貫通孔に挿通し、この貫通孔から引き出した前記挿通部材の先端側を前記ベース部材に分離不能に連結したことを特徴としている。

【００１０】

本発明は上記目的を達成するために、表面側に第１コネクタが設けられた第１基板と、遊技用のプログラムが記憶されている記憶媒体を有しており、前記第１コネクタと対になっている第２コネクタを前記第１コネクタに差し込むことにより前記第１基板から起立した状態で前記第１基板に連結された第２基板とを備えた電子回路基板において、前記電子回路基板は、前記第２基板が前記第１コネクタから引き抜かれることを防ぐ引き抜き阻止部材を含み、この引き抜き阻止部材は、前記第１基板の裏面側に重なるように前記第１基板に取り付けられるベース部材と、このベース部材に根元側が固着された紐または帯状の挿通部材とを有し、前記挿通部材はその先端側から前記第２基板に形成した貫通孔に挿通され、前記貫通孔から引き出された先端側が前記ベース部材に分離不能に連結されていることを特徴としている。

【００１１】

また、前記ベース部材を貫通する開口を有する筒状部が前記ベース部材に一体に設けられ、前記挿通部材の先端にフックが一体に設けられ、前記第１基板に形成された第１孔に前記筒状部を前記第１基板の裏面側から圧入することによって前記ベース部材が前記第１基板に取り付けられ、前記フックが前記第１基板に形成された第２孔を通して前記第１基板の裏面側から表面側に引き出され、前記貫通孔に挿通されてから前記筒状部内に挿通された際に前記ベース部材または前記筒状部内に設けられた係止部に係合することで前記挿通部材の先端側が前記ベース部材に分離不能に連結されることが好ましい。

【００１２】

また、前記第１基板の一端縁を部分的に包み込むように屈曲した屈曲部が前記ベース部材に一体に設けられ、前記屈曲部を活用して前記第１基板の一端縁を包み込むことによって前記ベース部材が前記第１基板に取り付けられることが好ましい。

【００１３】

また、前記挿通部材はその根元が前記第１基板の表面側に露呈した前記屈曲部に固着されることが好ましい。

【００１４】

また、前記第１基板の一端縁を部分的に包み込むように屈曲した屈曲部と、前記ベース部材を貫通する開口を有する筒状部とが前記ベース部材に一体に設けられ、前記ベース部材と前記屈曲部とで前記第１基板の一端縁を包み込み、且つ前記筒状部を前記第１基板に形成された第１孔に圧入することによって前記ベース部材が前記第１基板に取り付けられ、前記挿通部材の先端に一体に設けられたフックが前記貫通孔に挿通されてから前記筒状部内に挿通された際に前記ベース部材または前記筒状部内に設けられた係止部に係合することで前記挿通部材の先端側が前記ベース部材に分離不能に連結されることが好ましい。

【００１５】

また、前記第１基板の一端縁を部分的に包み込むように屈曲した屈曲部と、前記ベース部材を貫通する開口を有する筒状部とが前記ベース部材に一体に設けられ、前記ベース部材と前記屈曲部とで前記第１基板の一端縁を包み込み、且つ前記筒状部を前記第１基板に

形成された第１孔に圧入することによって前記ベース部材が前記第１基板に取り付けられ、前記挿通部材はその根元が前記第１基板の表面側に露呈した前記屈曲部に固着されるとともに先端に一体に設けられたフックが前記貫通孔に挿通されてから前記筒状部内に挿通された際に前記ベース部材または前記筒状部内に設けられた係止部に係合することで前記挿通部材の先端側が前記ベース部材に分離不能に連結されることが好ましい。

【００１６】

また、前記屈曲部は、板状の前記ベース部材の一端から前記第１基板の厚みと同程度の高さで立ち上がる立ち上がり部と、この立ち上がり部から前記ベース部材の他端側に向けて延設された折り返し部とからなり、前記ベース部材と前記立ち上がり部と前記折り返し部とで前記第１基板の一端縁を包み込むことが好ましい。

【００１７】

また、前記屈曲部は、板状の前記ベース部材の一端から前記第１基板の厚みと同程度の高さで立ち上がる立ち上がり部と、この立ち上がり部から前記ベース部材の他端側に向けて延設された折り返し部とからなり、前記ベース部材と前記立ち上がり部と前記折り返し部とで前記第１基板の一端縁を包み込み、前記筒状部は、前記立ち上がり部と同じ方向に突出していることが好ましい。

【００１８】

また、前記係止部に係合した前記フックを取り囲む筒状の収容部が前記ベース部材に一体成形されていることが好ましい。

【００１９】

また、前記係止部に係合した前記フックが、前記第１及び第２基板を収納するケースの内面に一体成形された筒状の収容部で覆われることが好ましい。

【００２０】

前記挿通部材の根元が脆弱な連結部材を介して前記ベース部材に連結されていることが好ましい。

【発明の効果】

【００２１】

本発明の電子回路基板によれば、紐または帯状の挿通部材の根元を固着したベース部材を第１基板の裏面側に重なるように取り付け、挿通部材をその先端側から第２基板に形成した貫通孔に挿通し、この貫通孔から引き出した挿通部材の先端側をベース部材に分離不能に連結したので、第２基板が前記第１コネクタから引き抜かれることを防止することができる。また、第２基板を第１コネクタから引き抜く際に、挿通部材、あるいは挿通部材とベース部材との固着部分が破壊されるので、その破壊された痕跡を視認することより第２基板が第１コネクタから引き抜かれたことを容易且つ確実に認識することができる。これにより電子回路基板から第２基板が不正に取り外れたか否かを判別することができる。また、接着剤を用いずに第２基板が第１コネクタから引き抜かれることを防止するようにしたので、第１基板及び第２基板のリサイクル性を良好にすることができる。

【００２２】

電子回路基板は、第２基板が第１コネクタから引き抜かれることを防ぐ引き抜き阻止部材を含み、この引き抜き阻止部材は、第１基板の裏面側に重なるように第１基板に取り付けられたベース部材と、このベース部材に根元側が固着された紐または帯状の挿通部材とを有し、挿通部材はその先端側から第２基板に形成した貫通孔に挿通され、貫通孔から引き出された先端側がベース部材に分離不能に連結されているので、第２基板が第１コネクタから引き抜かれることを防止することができる。また、第２基板を第１コネクタから引き抜く際に、挿通部材、あるいは挿通部材とベース部材との固着部分が破壊されるので、その破壊された痕跡を視認することより第２基板が第１コネクタから引き抜かれたことを容易且つ確実に認識することができる。これにより電子回路基板から第２基板が不正に取り外れたか否かを判別することができる。また、接着剤を用いずに第２基板が第１コネクタから引き抜かれることを防止するようにしたので、第１基板及び第２基板のリサイクル性を良好にすることができる。

【００２３】
また、ベース部材を貫通する開口を有する筒状部がベース部材に一体に設けられ、挿通部材の先端にフックが一体に設けられ、第１基板に形成された第１孔に筒状部を第１基板の裏面側から圧入することによってベース部材が第１基板に取り付けられ、フックが第１基板に形成された第２孔を通して第１基板の裏面側から表面側に引き出され、貫通孔に挿通されてから筒状部内に挿通された際にベース部材または筒状部内に設けられた係止部に係合することで挿通部材の先端側が前ベース部材に分離不能に連結されるので、ベース部材を第１基板に容易且つ正確に取り付けることが可能となる。また、挿通部材の先端側を容易にベース部材に連結させることができる。

【００２４】
また、第１基板の一端縁を部分的に包み込むように屈曲した屈曲部がベース部材に一体に設けられ、屈曲部を活用して第１基板の一端縁を包み込むことによってベース部材が第１基板に取り付けられるようにしたので、ベース部材を第１基板に容易に取り付けることができる。

【００２５】
また、挿通部材はその根元が第１基板の表面側に露呈した屈曲部に固着されるので、挿通部材の根元が視認し易くなり、第２基板を第１コネクタから引き抜くにあたって挿通部材とベース部材との固着部分が破壊された際には、その破壊された痕跡を容易且つ確実に視認することができる。

【００２６】
また、第１基板の一端縁を部分的に包み込むように屈曲した屈曲部と、ベース部材を貫通する開口を有する筒状部とがベース部材に一体に設けられ、ベース部材と屈曲部とで第１基板の一端縁を包み込み、且つ筒状部を第１基板に形成された第１孔に圧入することによってベース部材が第１基板に取り付けられ、挿通部材の先端に一体に設けられたフックが貫通孔に挿通されてから筒状部内に挿通された際にベース部材または筒状部内に設けられた係止部に係合することで挿通部材の先端側がベース部材に分離不能に連結されるようにしたので、ベース部材を第１基板に容易且つ確実に取り付けることができる。また、挿通部材の先端側を容易にベース部材に連結させることができる。

【００２７】
また、第１基板の一端縁を部分的に包み込むように屈曲した屈曲部と、ベース部材を貫通する開口を有する筒状部とがベース部材に一体に設けられ、ベース部材と屈曲部とで第１基板の一端縁を包み込み、且つ筒状部を第１基板に形成された第１孔に圧入することによってベース部材が第１基板に取り付けられ、挿通部材はその根元が第１基板の表面側に露呈した屈曲部に固着されるとともに先端に一体に設けられたフックが貫通孔に挿通されてから筒状部内に挿通された際にベース部材または筒状部内に設けられた係止部に係合することで挿通部材の先端側がベース部材に分離不能に連結されるようにしたので、挿通部材の根元が視認し易くなり、第２基板を第１コネクタから引き抜くにあたって挿通部材とベース部材との固着部分が破壊された際には、その破壊された痕跡を容易且つ確実に視認することができる。また、挿通部材の先端側を容易にベース部材に連結されることができる。

【００２８】
また、屈曲部は、板状のベース部材の一端から第１基板の厚みと同程度の高さで立ち上がる立ち上がり部と、この立ち上がり部からベース部材の他端側に向けて延設された折り返し部とからなり、ベース部材と立ち上がり部と折り返し部とで第１基板の一端縁を包み込むようにしたので、ベース部材を第１基板に容易に取り付けることができる。

【００２９】
また、屈曲部は、板状の前記ベース部材の一端から第１基板の厚みと同程度の高さで立ち上がる立ち上がり部と、この立ち上がり部からベース部材の他端側に向けて延設された折り返し部とからなり、ベース部材と立ち上がり部と折り返し部とで第１基板の一端縁を包み込み、筒状部は、立ち上がり部と同じ方向に突出しているので、筒状部を第１孔に容

易に圧入することができ、且つベース部材を第１基板に容易に取り付けることができる。
【００３０】
また、係止部に係合したフックを取り囲む筒状の収容部がベース部材に一体成形されているので、係止部に係合しているフックに触れることができなくなり、これによりフックを破壊したり、あるいはフックに細工を施すなどして係合状態を解除し、不正に第２基板をコネクタから引き抜くといった行為を防止することができる。
【００３１】
また、係止部に係合したフックが、第１及び第２基板を収納するケースの内面に一体成形された筒状の収容部で覆われるので、係止部に係合しているフックに触れることができなくなる。つまり、フックを破壊したり、あるいはフックに細工を施すなどして係合状態を解除することができなくなり、これにより不正に第２基板を第１コネクタから引き抜くといった行為を防止することができる。
【００３２】
また、挿通部材の根元が脆弱な連結部材を介してベース部材に連結されているので、挿通部材を引っ張って連結部材を破壊することで、第２基板を第１コネクタから引き抜くことが可能となり、連結部材に破壊された痕跡があるか否かを視認することにより第２基板が第１コネクタから引き抜かれた否かを容易に判別することができる。
【発明を実施するための最良の形態】
【００３３】
以下、本発明における第１の実施形態について図面を参照しながら説明する。図１に示すように、スロットマシン１０は、筐体１１の前面扉１２に４個の表示窓１３が設けられており、各々の表示窓１３の奥に位置するように第１リール１４ａ、第２リール１４ｂ、第３リール１４ｃ及びサブリール１５が回転自在に組み込まれている。周知のように、第１～第３リール１４ａ～１４ｃの外周には複数種類の当選絵柄を含む所定絵柄が一定ピッチで配列され、リールが停止した状態では表示窓１３を通して１リールにつき３個の絵柄が観察可能になる。これにより、各リール毎に表示された絵柄を一個ずつ組み合わせてなる直線状の入賞有効ラインが例えば横３本斜め２本の合計５本が設定される。
【００３４】
前面扉１２は、上扉１２ａと下扉１２ｂとから構成されている。上扉１２ａ及び下扉１２ｂはそれぞれヒンジ１６により取り付けられ、それぞれ図中矢印Ｍの方向に回動させることができるようになっている。
【００３５】
下扉１２ｂの上部にはゲームの開始時に操作される１枚ベットボタン、ＭＡＸベットボタン、ペイアウトボタンなどの各種の操作ボタンの他に、メダルを投入するためのメダル投入口１７が設けられている。なお、これらの操作ボタンの機能はいずれも周知であるので、その詳細については省略する。また、これら操作ボタンの下部には、メダルベットが行われた後に操作される押下式スタートレバー１８や、押下式スタートレバー１８の押下操作により回転し始めるリールの動作を停止させるための第１～第３ストップボタン１９ａ～１９ｃが設けられている。さらに、下扉１２ｂの下部には、メダル受け皿２０が設けられており、このメダル受け皿２０には、ゲームで入賞状態となるときに得られる配当メダルが払い出し口２１から払い出される。
【００３６】
図２に示すように、上扉１２ａを開くと、筐体１１内部には、主制御部であるメイン基板（電子回路基板）２４が配設されている。筐体１１の背面側の内壁にはメイン基板収納ケース２５が組み付けられており、メイン基板２４はメイン基板収納ケース２５に収納されている。また、筐体１１内部にはリールユニット２６が配設されており、このリールユニット２６は、支持枠２７に取り付けられ、支持枠２７は筐体１１の内壁に着脱自在に取り付けられている。
【００３７】
図３に示すように、メイン基板収納ケース２５は、大きく分けてケース本体２５ａと蓋

２５ｂとから構成されている。蓋２５ｂはケース本体２５ａにヒンジ２９により取り付けられ、回動可能な状態になっている。ケース本体２５ａには基板収納用凹部３０が形成されている。基板収納用凹部３０は、四方を囲む側部３０ａと底部（内面）３０ｂとから構成されており、メイン基板２４が収納可能な大きさに形成されている。

【００３８】

メイン基板２４は、スロットマシン１０の遊技動作プログラムを記憶したＲＯＭ（記憶媒体）３１が実装されている記憶媒体専用基板（第２基板）３２と、記憶媒体専用基板３２やＣＰＵ（Ｃｅｎｔｒａｌ　Ｐｒｏｃｅｓｓｉｎｇ　Ｕｎｉｔ）３３などの各種回路部品が実装される基板本体（第１基板）３４とから構成されている。なお、ＣＰＵ３３は、ＲＯＭ３１に記憶されている情報を適宜読み出して、その情報に基づいてスロットマシン１０の作動を制御するものである。

【００３９】

基板収納用凹部３０の所定箇所に設置されたメイン基板２４は、蓋２５ｂを閉じることによってケース本体２５ａ内に封入される。また、蓋２５ｂは図示しないかしめ部材等のロック装置によってケース本体２５ａに封印固定されている。なお、ケース本体２５ａ及び蓋２５ｂはいずれも透光性を有するＡＢＳ樹脂（アクリロニトリルーブタジエンースチレン樹脂）などの合成樹脂で成形される。

【００４０】

図４に示すように、基板本体３４の記憶媒体専用基板３２やＣＰＵ３３などの各種回路部品が実装される実装面（表面）３４ａには、長細い略直方形状の接続コネクタ（第１コネクタ）３５が設けられている。接続コネクタ３５には差込口３５ａが形成されている。記憶媒体専用基板３２には接続コネクタ３５と対になっている端子（第２コネクタ）３２ａが設けられている。端子３２ａは複数のピンからなり、端子３２ａを差込口３５ａのピン穴（不図示）に差し込むことにより記憶媒体専用基板３２が基板本体３４から起立した状態で基板本体３４に連結される。これにより記憶媒体専用基板３２と基板本体３４とが電気的に接続される。なお、上述した「起立した状態」とは、広義的に、基板本体３４と記憶媒体専用基板３２との間に隙間ができるように記憶媒体専用基板３２が基板本体３４に連結された状態のことをも示す。また、端子３２と接続コネクタ３５とによって電気的に接続された記憶媒体専用基板３２の起立状態を保持する保持部材を記憶媒体専用基板３２または基板本体３４の少なくともいずれか一方に設けても良い。

【００４１】

記憶媒体専用基板３２には、貫通孔３２ｂが形成されている。基板本体３４には、接続コネクタ３５を間に挟む位置に、円形の第１孔３４ｂ、第２孔３４ｃが形成されている。なお、貫通孔３２ｂ、第２孔３４ｃは、後述する紐３９、コネクタ４２、及び係止部材４３が挿通可能な大きさに形成されており、第１孔３４ｂは、後述する突起４１が圧入可能な大きさに形成されている。また、貫通孔３２ｂ、第１孔３４ｂ、第２孔３４ｃは、実装される各種回路部品のレイアウトの妨げにならないような位置に形成されている。

【００４２】

引き抜き阻止部材３６は、記憶媒体専用基板３２が基板本体３４の接続コネクタ３５から引き抜かれることを防止するためのものである。引き抜き阻止部材３６はプラスチック製であり、ベース部材３７と紐（挿通部材）３９とから構成されている。ベース部材３７は、板状に形成されたベース部材本体３８と、このベース部材本体３８と一体化しており、紐３９の基端（根元）３９ａが固着される固着部４０とから構成されている。

【００４３】

ベース部材３７は、ベース部材本体３８の上面３８ａが基板本体３４の裏面３４ｄ（図５参照）に対面するように、基板本体３４に重ねて取り付けられる。メイン基板２４が基板収納用凹部３０に収容されると、基板本体３４の裏面３４ｄが基板収納用凹部３０の底部３０ｂに対面するので、ベース部材３７を基板本体３４の裏面３４ｄに重ねて取り付けることによりベース部材３７を不正に取り外したり細工を施したりするなどといったような行為を防止することができる。なお、ベース部材３７は、裏面３４ｄに取り付けられた

際に実装面３４ａ側から見て基板本体３４の縁から食み出さないような大きさに形成されている。

【００４４】

上面３８ａには、角がとれた略円筒状の突起（筒状部）４１が一体成形されている。突起４１は、ベース部材３７を基板本体３４の裏面３４ｄに取り付ける際に第１孔３４ｂの位置に対応するように形成されている。また、突起４１の外径は第１孔３４ｂの直径よりも僅かに大きく形成されている。そして、第１孔３４ｂに突起４１が押し入れられると圧着されてその状態を保持する。突起４１の軸心方向の中心部にはベース部材３７を貫通する円形の貫通孔（開口）４１ａが形成されている。

【００４５】

上面３８ａには、ベース部材３７を基板本体３４の裏面３４ｄに取り付ける際に第２孔３４ｃの位置に対応するように貫通孔３８ｃが形成されている。貫通孔３８ｃには固着部４０が設けられている。この固着部４０は第２孔３４ｃを通して実装面３４ａ側に露呈される。

【００４６】

固着部４０は、紐３９の基端３９ａが固着される固着部本体４０ａと、４本のリブ（連結部材）４０ｂとから構成されている。固着部本体４０ａは円盤状に形成されており、貫通孔３８ｃの中心部に配置されている。リブ４０ｂは外力が加えられると破損し易い細い棒状に形成されている。リブ４０ｂは、固着部本体４０ａの側周面４０ｃから貫通孔３８ｃの内周壁面３８ｄかけて放射状に形成されており、固着部本体４０ａとベース部材本体３８とを連結している。このように構成されているリブ４０ｂは、記憶媒体専用基板３２を接続コネクタ３５から引き抜く際に破壊される。なお、リブ４０ｂの大きさ、硬度、本数などは適宜に決めれば良い。また、リブ４０ｂの代わりに固着部本体４０ａと同心円状に形成された薄いシート状のものでベース部材本体３８と連結するようにしても良く、紐３９の基端３９ａが脆弱な連結部材を介してベース部材本体３８に連結されていれば良い。

【００４７】

固着部本体４０ａの上面４０ｄには、紐３９の基端３９ａが固着されている。この固着方法は、工業用接着剤、熱溶着などの周知の方法で行えば良く、適宜に決定すれば良い。なお、本実施形態では紐３９を用いるが、紐３９の代わりに帯状に形成された挿通部材を用いても良く、可撓性を有する挿通部材を適宜に用いれば良い。

【００４８】

紐３９の先端３９ｂには円筒状のコネクタ４２を介して係止部材（フック）４３が設けられている。図５に示すように、係止部材４３はプラスチック製であり、碇状に形成されている。係止部材４３は軸４３ａと係止片４３ｂとからなり、円柱状の軸４３ａの先端の両側に、その軸心方向に向かって弾性変形する一対の係止片４３ｂが形成されている。

【００４９】

軸４３ａの外径は、貫通孔４１ａの直径αよりも小さく設定されており、係止片４３ｂは、係止部材４３を貫通孔４１ａに挿通可能にする挿通可能位置と、係止部材４３を貫通孔４１ａに挿通し、ベース部材３７の下面３８ｂ側に係止部材４３を露呈させた場合、挿通方向と反対方向に脱不可状態となるように貫通孔４１ａの下面３８ｂ側の縁（係止部）３８ｅに係合する係合可能位置との間で弾性変形するように構成されている。第１孔３４ｂに突起４１を基板本体３４の裏面３４ｄ側から圧入することによってベース部材３７が基板本体３４に取り付けられ、係止部材４３が第２孔３４ｃを通して基板本体３４の裏面３４ｄ側から実装面３４ａ側に引き出され、貫通孔３２ｂに挿通されてから貫通孔４１ａを通して突起４１内を通過した後にベース部材３７の縁３８ｅに係合することで紐３９の先端３９ｂ側がベース部材３７に分離不能に連結される。なお、紐３９の太さ及びコネクタ４２の外径は、貫通孔４１ａの直径αよりも小さく設定されており、これによりコネクタ４２及び紐３９を係止突起４３とともに貫通孔４１ａに挿通させることができる。

【００５０】

本実施形態では、紐３９の先端３９ｂにコネクタ４２を介して係止部材４３を設けたが、係止部材４３が紐３９の他端に強固に固着されていれば良く、例えば、係止部材４３を紐３９の先端３９ｂに熱溶着しても良い。このように紐３９の先端３９ｂに係止部材４３を設ける方法は適宜に決定すれば良い。

【００５１】

図６に示すように、ケース本体２５ａにおける基板収納用凹部３０の底部３０ｂには支柱４４が立設されている。メイン基板２４を基板収納用凹部３０に収納する際、基板本体３４は、支柱４４の上面４４ａに載置され、工業用接着剤やビスなどで固定される。底部３０ｂには係止部材４３が収容される収容部４５が一体成形されている。

【００５２】

収容部４５は、底部３０ｂから上方に向かって突出するように略円筒形状に形成されている。収容部４５には上方に向けて開口された穴部４５ａが形成されている。収容部４５の高さＹは、支柱４４の高さＨよりもベース部材３７の厚みｔ分だけ低く設定されて、収容部４５はベース部材３７が載置されることで支持機能も有する。収容部４５は、貫通孔４１ａの位置に対応するような位置に形成されており、基板本体３４が支柱４４に固定された際には貫通孔４１ａが穴部４５ａに連通するように構成されている。これにより、貫通孔４１ａを通過した係止部材４３が収容部４５で覆われる。係止部材４３が収容部４５で覆われると、係止部材４３は接触不可状態となる。

【００５３】

次に、上記構成による作用について説明する。メイン基板２４をメイン基板収納ケース２５に収納する場合、先ず、図５に示すように、基板本体３４の裏面３４ｄとベース部材３７の上面３８ａとが対面し、且つ突起４１が第１孔３４ｂに対応するようにベース部材３７を基板本体３４の裏面３４ｄ側に配置する。

【００５４】

次に、突起４１を裏面３４ｄ側から第１孔３４ｂに圧入するとともに、裏面３４ｄ側から係止部材４３を第２孔３４ｃに挿通させ、実装面３４ａ側に引き出す。突起４１を第１孔３４ｂに圧入することにより、図６に示すように、ベース部材３７が基板本体３４に取り付けられる。このようにしてベース部材３７を基板本体３４に取り付けた後、記憶媒体専用基板３２の端子３２ａを基板本体３４の接続コネクタ３５に差し込む。そして、貫通孔４１ａが収容部４５の穴部４５ａに連通するように位置決めを行いながら基板本体３４を支柱４４に固定する。

【００５５】

次に、図７に示すように、係止部材４３を記憶媒体専用基板３２の貫通孔３２ｂに挿通させる。係止部材４３を貫通孔３２ｂに挿通させた後、係止部材４３を貫通孔４１ａに対向するように配置して、係止部材４３を貫通孔４１ａに挿入する。

【００５６】

係止部材４３を貫通孔４１ａに挿入すると、係止片４３ｂが貫通孔４１ａの内周壁面に当接し、係止片４３ｂが係合可能位置から挿通可能位置に弾性変形する。係止部材４３が貫通孔４１ａを通過し、ベース部材３７の下面３８ｂ側に露呈されると、係止片４３ｂが自身の弾性復元力によって挿通可能位置から係合可能位置に戻される。このとき、図８に示すように、係止片４３ｂが、挿入方向と反対方向に脱不可状態に縁３８ｅに係合する。これにより紐３９の先端３９ｂ側がベース部材３７に分離不能に連結された状態となる。

【００５７】

また、係止部材４３は収容部４５に収容されて接触不可状態となるので、係止部材４３が破壊されたり、係止部材４３に細工が施されたりする虞がなくなる。さらに、収容部４５が縁３８ｅを支持するので、係止部材４３を貫通孔４１ａに挿入する際には、第１孔３４ｂに圧入されている突起４１を脱落させることなく係止部材４３を貫通孔４１ａにスムーズに挿入することができる。

【００５８】

このようにしてメイン基板２４をケース本体２５ａに収納した後、蓋２５ｂを閉めてロ

ックする。以上のような過程を経て、メイン基板２４はメイン基板収納ケース２５に収納される。

【００５９】

記憶媒体専用基板３２を基板本体３４から取り外す場合、先ず、メイン基板収納ケース２５の蓋２５ｂをロックを解除して開放する。そして、紐３９の第２孔３４ｃから露呈されている部分、あるいは記憶媒体専用基板３２を摘んで紐３９を引っ張る。このようにして紐３９を引っ張ることによりリブ４０ｂが破壊される。これにより記憶媒体専用基板３２を接続コネクタ３５から引き抜くことが可能となる。このとき貫通孔３８ｃにはリブ４０ｂの残骸が残るので、この残骸を視認することにより記憶媒体専用基板３２が基板本体３４から取り外されたことを容易且つ確実に知ることができる。これにより、記憶媒体専用基板３２を基板本体３４から不正に取り外すといった行為を防止することができる。

【００６０】

なお、記憶媒体専用基板３２を基板本体３４から取り外す場合、紐３９や記憶媒体専用基板３２を引っ張らずに、紐３９を切断しても良い。紐３９を切断することにより、紐３９には切断された痕跡が残るので、この痕跡を視認することにより記憶媒体専用基板３２が基板本体３４から取り外されたことを知ることができる。

【００６１】

また、接着剤を使わずに、引き抜き阻止部材３６によって記憶媒体専用基板３２が接続コネクタ３５から引き抜かれることを防止しているので、記憶媒体専用基板３２及び基板本体３４のリサイクル性を良好にすることができる。

【００６２】

上記実施形態では、係止部材４３の係止片４３ｂが縁３８ｅに係合するようにしたが、これに限ることなく、突起４１内に溝（係止部）を形成し、係止部材４３が貫通孔４１ａに挿通された際に、その溝に係止片４３ｂを係合させるようにしても良い。

【００６３】

上記実施形態では、収容部４５を基板収納用凹部３０の底部３０ｂに一体成形したが、図９に示すように、ベース部材３７の下面３８ｂと略円筒状の収容部３８ｆとを一体成形し、この収容部３８ｆに係止部材４３を収容するようにしても良い。このように収容部４５は、メイン基板２４がスロットマシン１０に取り付けられた際に、係止部材４３が接触不可状態になるように構成されていれば良く、設置箇所やその形態は適宜変更可能である。

【００６４】

上記実施形態では、突起４１を第１孔３４ｂに圧入することによりベース部材３７を基板本体３４に取り付けるようにしたが、図１０に示すように、第１孔３４ｂに対応するようにベース部材３７に貫通孔３８ｇを形成するようにしても良く、ベース部材３７を基板本体３４に取り付ける場合には、上面３８ａを基板本体３４の裏面３４ｄに対面させるように配置し、貫通孔３８ｇを第１孔３４ｂの位置に、貫通孔３８ｃを第２孔３４ｃの位置に合わせながらベース部材３７を基板本体３４の裏面３４ｄに工業用接着剤やビスなどで固定すれば良い。そして、係止部材４３を第２孔３４ｃ、貫通孔３２ｂに挿通させた後、係止部材４３と貫通孔３８ｇとを第１孔３４ｂを介して対向するように配置して、係止部材４３を貫通孔３８ｇに挿通させる。これにより、上記実施形態と同様に、係止部材４３が縁３８ｅに係合して、係止部材４３が挿通方向と反対方向に脱不可状態となり、紐３９の先端３９ｂ側がベース部材３７に分離不能に連結される。

【００６５】

上記実施形態では、突起４１に貫通孔４１ａを形成したが、これに限ることなく、図１１に示すように、有底筒状の突起４６を形成しても良い。突起４６には穴部４６ａが形成されており、この穴部４６ａの内周壁面４６ｂには係止片４３ｂが嵌合される溝（係止部）４６ｃが形成されている。係止部材４３を穴部４６ａに挿入することにより、係止部材４３の係止片４３ｂが溝４６ｃに挿入方向と反対方向に脱不可状態に係止する。これにより紐３９の先端３９ｂ側がベース部材３７に分離不能に連結される。

【００６６】
上記実施形態では、紐３９の先端３９ｂに係止部材４３を、突起４１に係止部材４３が挿通される貫通孔４１ａを形成したが、図１２に示すように、ベース部材３７に係止突起４７、紐３９の先端３９ｂに有底筒状の嵌合部材４８を設けても良い。係止突起４７は上述した係止部材４３と同様の構成になっており、軸４７ａと係止片４７ｂとから構成されている。嵌合部材４８は上述した突起４１と同様の構成になっており、穴部４８ａが形成されている。穴部４８ａの内周壁面４８ｂには溝４８ｃが形成されている。ベース部材３７を基板本体３４に取り付けるにあたって、係止突起４７を第１孔３４ｂに挿通させる。係止突起４７と穴部４８ａとを第１孔３４ｂを通して対向するように配置した後、係止突起４７を穴部４８ａに挿入することにより、係止突起４７の係止片４７ｂが溝４８ｃに挿入方向と反対方向に脱不可状態に係止する。これにより紐３９の先端３９ｂ側がベース部材３７に分離不能に連結される。

【００６７】
上記実施形態では、紐３９の先端３９ｂを第２孔３４ｃ、貫通孔３２ｂの順に挿通させてから、係止部材４３を貫通孔４１ａに挿通させることにより紐３９の先端３９ｂ側がベース部材３７に分離不能に連結されるようにしたが、例えば、記憶媒体専用基板３２の上部に切り欠きを形成しておき、紐３９を基板本体３４の縁から前記切り欠きを経由させて、係止部材４３を貫通孔４１ａに挿通させるようにしても良い。この場合、係止部材４３が縁３８ｅに係合した際に、紐３９が弛まないように紐３９の長さを予め調整しておく。これにより、上記実施形態と同様の効果を持たせることができる。

【００６８】
なお、上記実施形態では、本発明がメイン基板２４に適用されている例を挙げて説明したが、これに限ることなく、スピーカやランプの作動を制御するサブ基板について適用することも可能である。スロットマシン１０では、電子抽選で当選していても第１～第３ストップボタン１９ａ～１９ｃの押下順序が正しくないと入賞条件を満たさないという制御があり、サブ基板に搭載されているＲＯＭが不正に取り外されて改変されると、第１～第３ストップボタン１９ａ～１９ｃの押下順序がスピーカやランプなどによって不正に報知され、それに従って第１～第３ストップボタン１９ａ～１９ｃが押下されることにより不正にメダルが獲得されてしまう虞がある。したがって、サブ基板に本発明を適用することにより、サブ基板からＲＯＭを取り外すといった不正行為を防止することができる。

【００６９】
次に、第２の実施形態について図１３及び図１４を参照しながら説明する。以下、上述した第１の実施形態と重複する部材については同一の符号を付し、説明を省略する。図１３及び図１４に示すように、メイン基板５０は、記憶媒体専用基板３２と基板本体（第１基板）５１とから構成されている。基板本体５１の実装面（表面）５１ａには記憶媒体専用基板３２やＣＰＵ３３などの各種回路部品が実装されている。また、実装面５１ａには差込口３５ａが形成された接続コネクタ３５が設けられており、この接続コネクタ３５に記憶媒体専用基板３２の端子３２ａが差し込むことにより記憶媒体専用基板３２が基板本体５１から起立した状態で基板本体５１に連結され、記憶媒体専用基板３２と基板本体５１とが電気的に接続される。

【００７０】
基板本体５１には第１孔５１ｂが形成されている。第１孔５１ｂは、突起５５が圧入可能な大きさに形成されている。また、第１孔５１ｂは、実装される各種回路部品のレイアウトの妨げにならないような位置に形成されている。

【００７１】
引き抜き阻止部材５２は、記憶媒体専用基板３２が基板本体５１の接続コネクタ３５から引き抜かれることを防止するためのものである。引き抜き阻止部材５２はプラスチック製であり、ベース部材５３及び紐３９から構成されている。

【００７２】
ベース部材５３は長細い薄板状に成形されている。ベース部材５３の一端には基板本体

５１の一端縁を部分的に包み込むように屈曲した屈曲部５４が一体に成形されている。屈曲部５４は、ベース部材５３の一端から基板本体５１の厚みと同程度の高さで立ち上がる立ち上がり部５４ａと、この立ち上がり部５４ａからベース部材の他端側に向けてベース部材５３の上面５３ａと略平行となるように延設された折り返し部５４ｂとからなる。また、上面５３ａには、立ち上がり部５４ａと同じ方向に突出している略円筒形状の突起（筒状部）５５が一体成形されている。突起５５は、第１孔５１ｂに対応するように形成されている。第１孔５１ｂに突起５５が押し入れられると圧着されてその状態を保持する。突起５５の軸心方向の中心部にはベース部材５３を貫通する貫通孔５５ａが形成されている。

【００７３】

ベース部材５３を基板本体５１に取り付ける場合、上面５３ａが基板本体５１の裏面５１ｃに対面するように、ベース部材５３を基板本体５１の裏面５１ｃ側に配置し、ベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込み、且つ突起５５を第１孔５１ｂに圧入することによってベース部材５３が基板本体５１に取り付けられる。

【００７４】

折り返し部５４ｂの延設方向先端部から立ち上がる傾斜面５４ｃが形成されている。この傾斜面５４ｃは、ベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込んだ際に実装面５１ａに対して折り返し部５４ｂの先端部を中心にベース部材５３の他端側に向かって略４５度傾斜するように形成されている。これにより実装面５１ａ側から見た際に傾斜面５４ｃが容易に視認可能となる。なお、傾斜面５４ｃは、実装面５１ａ側から見た際に視認可能となるように形成されていれば良く、傾斜角度は適宜に設定すれば良い。

【００７５】

傾斜面５４ｃには貫通孔５４ｄが形成されている。この貫通孔５４ｄには固着部４０が設けられており、この固着部４０は、ベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込んだ際に実装面５１ａ上に露呈される。なお、折り返し部５４ｂには傾斜面５４ｃの上端から立ち上がり部５４ａに向かって傾斜する面５４ｅが設けられており、この面５４ｅには貫通孔５４ｄと連通している開口５４ｆが形成されている。この開口５４ｆによって、メイン基板収納ケース２５の側面から固着部４０を覗き見る点検をする際の視認容易性を高められる。

【００７６】

固着部４０、ベース部材５３、及び屈曲部５４はプラスチック製であり、これらは一体成形されている。固着部４０は、貫通孔５４ｄの中心に位置させる固着部本体４０ａと、この固着部本体４０ａを支持する細い棒状の複数のリブ４０ｂとから構成されている。リブ４０ｂは、固着部本体４０ａの側周面４０ｃから貫通孔５４ｄの内周壁面５４ｇにかけて放射状に形成されており、固着部本体４０ａと屈曲部５４とが一体となるように連結している。

【００７７】

固着部本体４０ａの上面４０ｄには先端３９ｂに係止部材４３が一体成形されている紐３９の基端３９ａが固着されている。紐３９の先端３９ｂにはコネクタ４２を介して係止部材４３が設けられている。係止部材４３は軸４３ａと一対の弾性変形自在な係止片４３ｂとから構成されている。上述したようにベース部材５３が基板本体５１の裏面５１ｃ側に重なるように取り付けられ、係止部材４３が貫通孔３２ｂに挿通されてから貫通孔５５ａを通して突起５５内を通過した後にベース部材５３の縁（係止部）５３ｃに係合することで紐３９の先端３９ｂ側が前述した通過させる方向と逆方向に戻すことができなくなりベース部材５３に分離不能に連結される。

【００７８】

基板収納用凹部３０の底部３０ｂには係止部材４３を接触不能に収容する筒状の収容部４５が一体成形されている。収容部４５には穴部４５ａが形成されている。収容部４５は

、引き抜き阻止部材５２が取り付けられた基板本体５１をメイン基板収納ケース２５内に収納した際に貫通孔５５ａの位置に対応するような位置に形成されており、基板本体５１が支柱４４にネジ（不図示）を介して固定された際に貫通孔４１ａが穴部４５ａに連通するように構成されている。なお、本実施形態では、底部３０ｂに収容部４５を設けたが、これに限ることなく、図９で示したようにベース部材５３の下面５３ｂ側に係止部材４３を接触不能に収容する収容部を一体成形しても良い。

【００７９】

次に、上記構成による作用について説明する。メイン基板５０をメイン基板収納ケース２５（図３参照）に収納する場合、先ず、基板本体５１の裏面５１ｃとベース部材５３の上面５３ａとが対面し、且つ突起５５を第１孔５１ｂに対応させるとともに屈曲部５４が基板本体の端縁に位置するようにベース部材５３を基板本体５１の裏面５１ｃ側に配置する。

【００８０】

次に、突起５５を裏面５１ｃ側から第１孔５１ｂに圧入した後、屈曲部５４を摘んでベース部材５３の上面５３ａが基板本体５１の裏面５１ｃから離反していくようにベース部材５３を撓らせ、この撓りを解除しながらベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込む。これによりベース部材５３が基板本体５１に着脱自在に取り付けられる。また、屈曲部５４に設けられた固着部４０が実装面５１ａ上に露呈される。このようにして固着部４０が実装面５１ａ上に露呈されると、リブ４０ｂが破壊された際に、その破壊された痕跡を容易に確認することができる。なお、立ち上がり部５４ａの少なくとも一部を薄くし、屈曲部５４を撓ませ易くすることで、ベース部材５３を基板本体に取り付け易くすることができる。

【００８１】

ベース部材５３を基板本体５１に取り付ける前または取り付けた後において、記憶媒体専用基板３２の端子３２ａを基板本体５１の接続コネクタ３５に差し込む。そして、貫通孔５５ａが収容部４５の穴部４５ａに連通するように位置決めを行いながら基板本体５１を支柱４４に載置してネジで固定する。

【００８２】

次に、係止部材４３を記憶媒体専用基板３２の貫通孔３２ｂに挿通させる。係止部材４３を貫通孔３２ｂに挿通させた後、係止部材４３を貫通孔５５ａに対向するように配置して、係止部材４３を貫通孔５５ａに挿入する。

【００８３】

係止部材４３を貫通孔５５ａに挿入すると、係止片４３ｂが貫通孔５５ａの内周壁面に当接し、係止片４３ｂが係合可能位置から挿通可能位置に弾性変形する。係止部材４３が貫通孔５５ａを通過すると、係止片４３ｂが縁５３ｃに係合する。これにより紐３９の先端３９ｂ側が前述した通過させる方向と逆方向に戻すことができなくなりベース部材５３に分離不能に連結された状態となる。

【００８４】

また、係止部材４３は収容部４５に収容されて接触不可状態となるので、係止部材４３が破壊されたり、係止部材４３に細工が施されたりする虞がなくなる。さらに、収容部４５が縁５３ｃを支持するので、係止部材４３を貫通孔５５ａに挿入する際には、第１孔５１ｂに圧入されている突起５５を脱落させることなく係止部材４３を貫通孔５５ａにスムーズに挿入することができる。

【００８５】

このようにしてメイン基板２４をケース本体２５ａに収納した後、蓋２５ｂを閉めてロックする。以上のような過程を経て、メイン基板２４はメイン基板収納ケース２５に収納される。

【００８６】

記憶媒体専用基板３２を基板本体３４から取り外す場合、先ず、メイン基板収納ケース２５の蓋２５ｂをロックを解除して開放する。そして、紐３９の基端３９ａを摘んで引っ

張るか、あるいは記憶媒体専用基板３２を摘んで紐３９を引っ張る。このようにして紐３９を引っ張ることによりリブ４０ｂが破壊される。これにより記憶媒体専用基板３２を接続コネクタ３５から引き抜くことが可能となる。このとき貫通孔５４ｄにはリブ４０ｂの残骸が残るので、この残骸を視認することにより記憶媒体専用基板３２が基板本体５１から取り外されたことを容易且つ確実に知ることができる。また、固着部４０が実装面５１ａ上に露呈されているので、リブ４０ｂの残骸を容易に確認することができる。

【００８７】

上記実施形態では、係止部材４３の係止片４３ｂが縁５３ｃに係合するようにしたが、これに限ることなく、突起５５内に溝（係止部）を形成し、係止部材４３が貫通孔５５ａに挿通された際に、その溝に係止片４３ｂを係合させるようにしても良い。

【００８８】

上記実施形態では、突起５５を裏面５１ｃ側から第１孔５１ｂに圧入し、ベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込むことによってベース部材５３を基板本体５１に取り付けるようにしたが、突起５５のみを用いてベース部材５３を基板本体５１に取り付けることも可能である。また、突起５５を用いずにベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込むことによってベース部材５３を基板本体５１に取り付けることも可能である。

【００８９】

上記実施形態では、ベース部材５３と立ち上がり部５４ａと折り返し部５４ｂとで基板本体５１の一端縁を包み込むとしたが、ベース部材５３と折り返し部５４ｂとで基板本体５１を挟持するようにしても良い。

【図面の簡単な説明】

【００９０】

【図１】本発明のスロットマシンの外観を示す斜視図である。

【図２】上扉を開放した状態を示す斜視図である。

【図３】メイン基板をメイン基板収納ケースに収納した状態を示す斜視図である。

【図４】メイン基板及び引き抜き阻止部材を示す斜視図である。

【図５】基板本体及び引き抜き阻止部材の要部を示す断面図である。

【図６】メイン基板、引き抜き阻止部材及び基板収納用凹部の底部の構成を示す断面図である。

【図７】基板本体が支柱に固定されたときのメイン基板、引き抜き阻止部材及び基板収納用凹部の底部を示す断面図である。

【図８】紐の先端側をベース部材に分離不能に連結したときのメイン基板、引き抜き阻止部材及び基板収納用凹部の底部を示す断面図である。

【図９】ベース部材に収容部が一体成形された態様を示す断面図である。

【図１０】基板本体及び引き抜き阻止部材を示す断面図である。

【図１１】基板本体及び引き抜き阻止部材を示す断面図である。

【図１２】基板本体及び引き抜き阻止部材を示す断面図である。

【図１３】メイン基板及び引き抜き阻止部材を示す斜視図である。

【図１４】基板本体が支柱に固定されたときのメイン基板、引き抜き阻止部材及び基板収納用凹部の底部を示す断面図である。

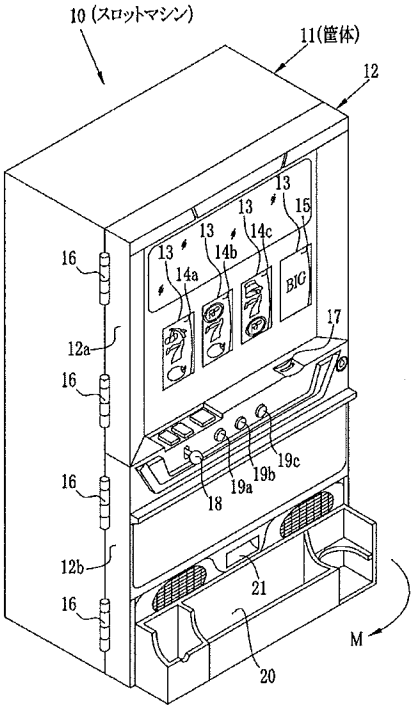
【符号の説明】

【００９１】

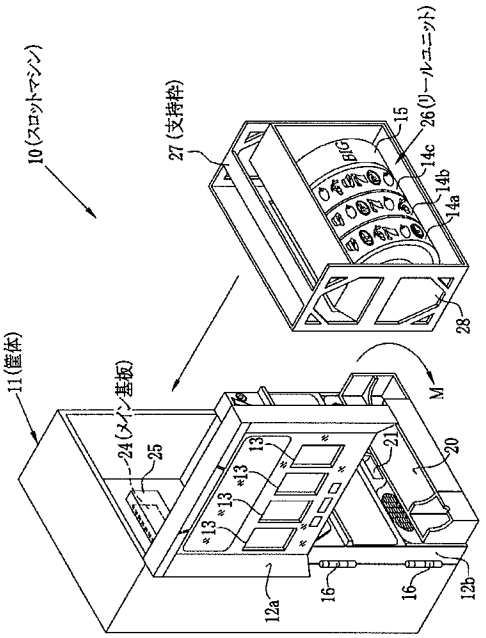
１０　スロットマシン
２４、５０　メイン基板（電子回路基板）
３０ａ　底部（内面）
３１　ＲＯＭ（記憶媒体）
３２　記憶媒体専用基板（第２基板）
３２ａ　端子（第２コネクタ）
３２ｂ　貫通孔

３４、５１　基板本体（第１基板）
３４ａ、５１ａ　実装面（表面）
３４ｂ、５１ｂ　第１孔
３４ｃ　第２孔
３４ｄ、５１ｃ　裏面
３５　接続コネクタ（第１コネクタ）
３６　引き抜き阻止部材
３７、５３　ベース部材
３８ｅ、５３ｃ　縁（係止部）
３９　紐（挿通部材）
３９ａ　基端（根元）
３９ｂ　先端
４０　固着部
４０ａ　固着部本体
４０ｂ　リブ（連結部材）
４１、４６、５５　突起（筒状部）
４３　係止部材（フック）
４５、３８ｆ　収容部
４６ｃ　溝（係止部）
５４　屈曲部
５４ａ　立ち上がり部
５４ｂ　折り返し部

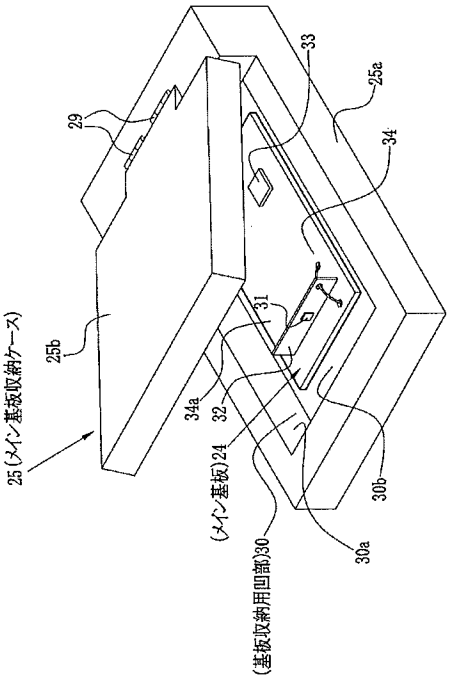
【図１】



【図２】



【図３】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34a
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(基板収納用凹部)30
30a
30b

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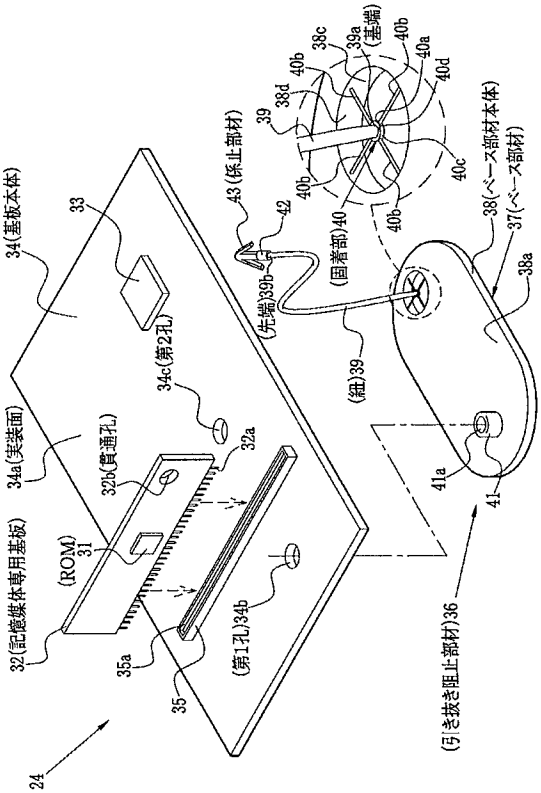
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38d
38c
39a
(基端)
40b
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40d
40c
42
(固着部)40
(先端)39b
(紐)39
38(ベース部材本体)
37(ベース部材)
38a
34c(第2孔)
32a
34a(実装面)
32b(貫通孔)
(ROM)
31
32(記憶媒体専用基板)
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(第1孔)34b
41a
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(引き抜き阻止部材)36
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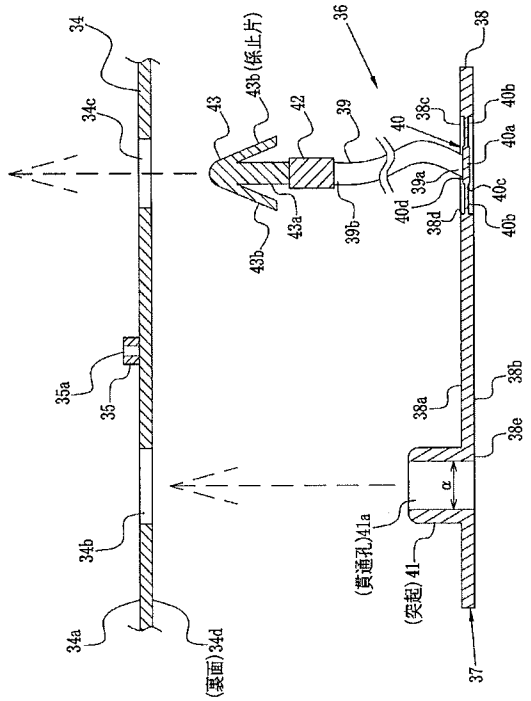
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43a
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35a
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(裏面)34d
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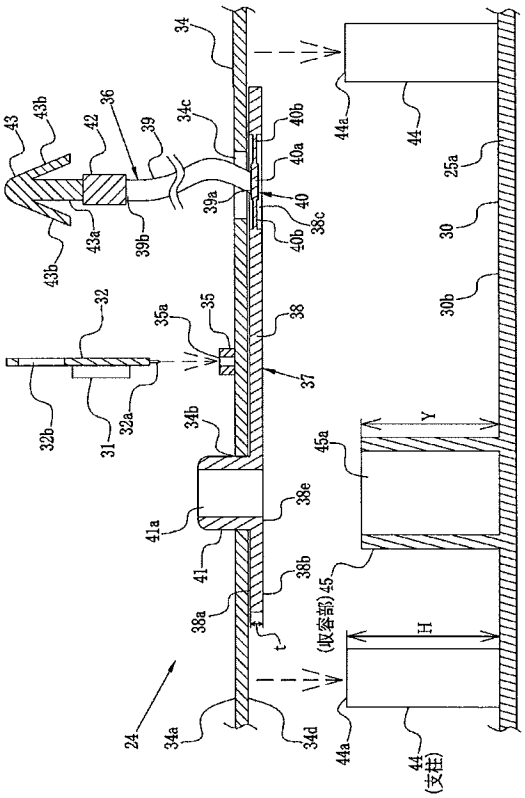
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30b
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35a
35
38
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32b
32a
31
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(収容部)45
H
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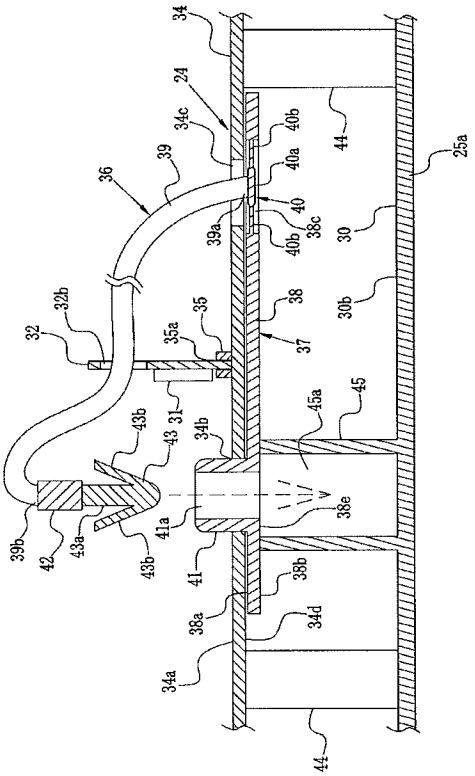
34a
34d
44a
44
(支柱)

【図７】



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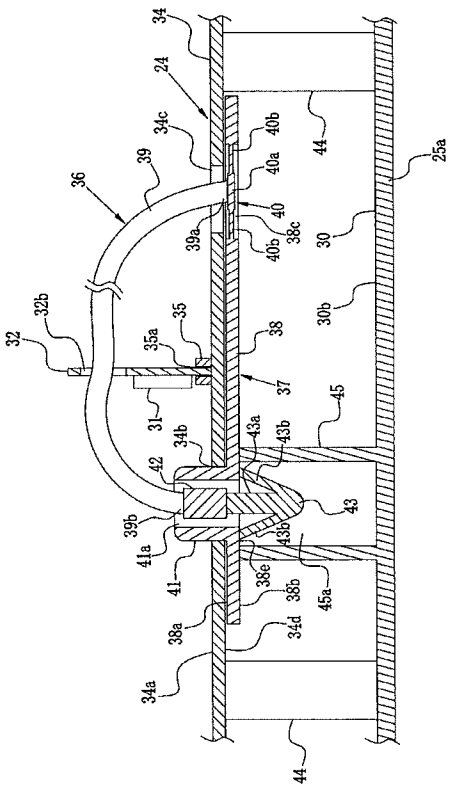

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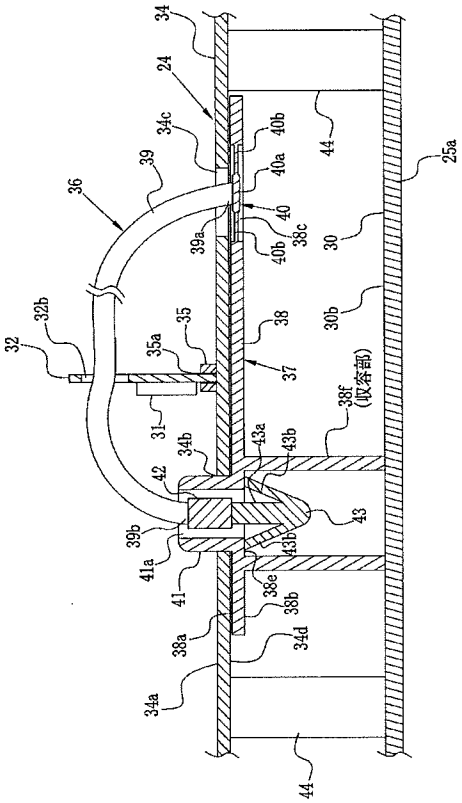

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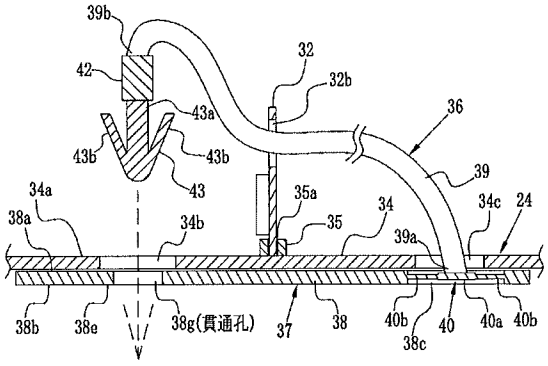

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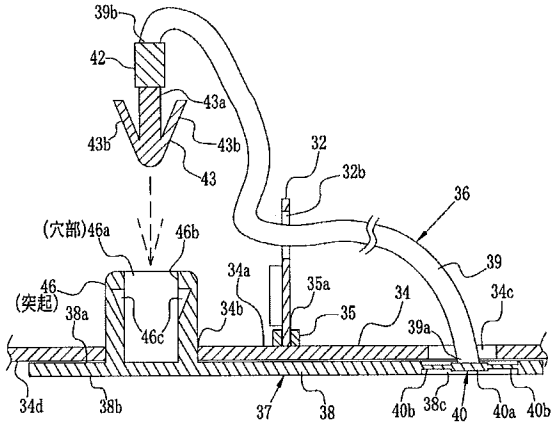

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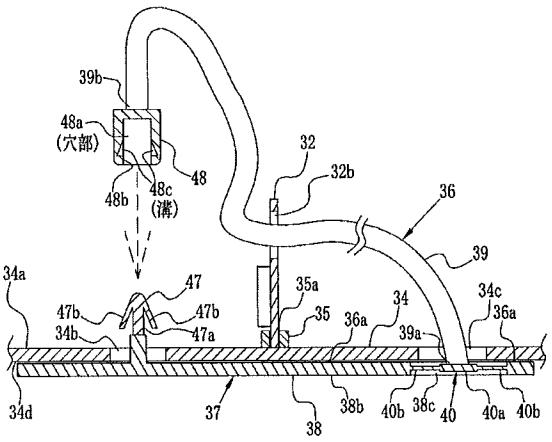

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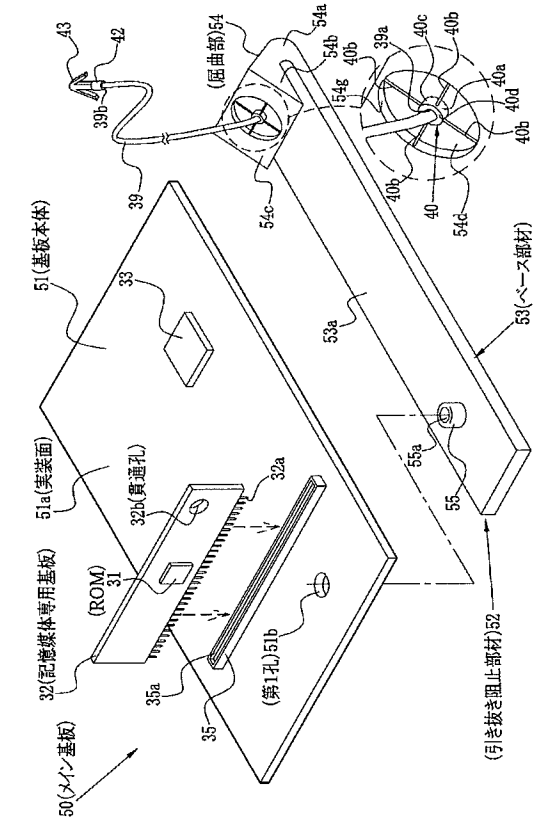

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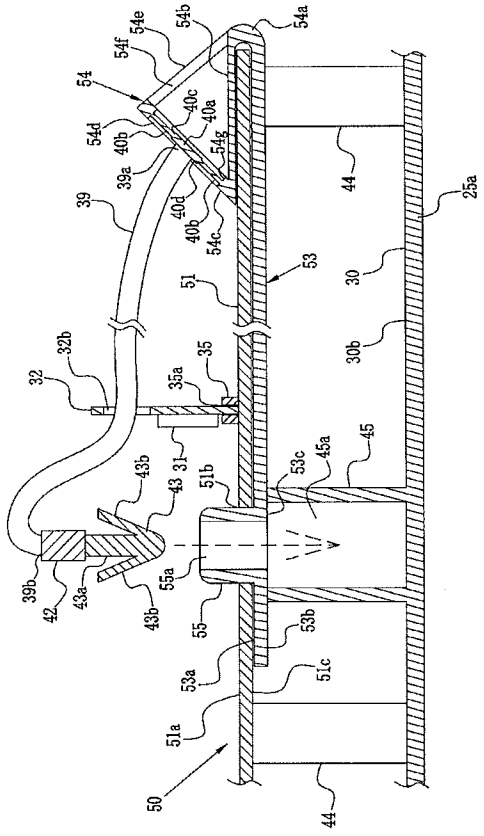

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]
It has the 1st substrate by which the 1st connector was provided at the surface side, and the storage medium with which a program for games is memorized, In an electronic circuit board provided with the 2nd substrate connected with said 1st substrate in the state where it stood up from said 1st substrate by inserting in said 1st connector said 1st connector and the 2nd connector that is pairs,
A base member which fixed a root of a string or a strip-like insertion component is attached so that it may lap with the back surface side of said 1st substrate, An electronic circuit board connecting with separation impossible the tip side of the aforementioned insertion component which was inserted in a through-hole which formed the aforementioned insertion component in said 2nd substrate from that tip side, and was pulled out from this through-hole at the aforementioned base member.
[Claim 2]
It has the 1st substrate by which the 1st connector was provided at the surface side, and the storage medium with which a program for games is memorized, In an electronic circuit board provided with the 2nd substrate connected with said 1st substrate in the state where it stood up from said 1st substrate by inserting in said 1st connector said 1st connector and the 2nd connector that is pairs,
An electronic circuit board which it has the following, and the aforementioned insertion component is inserted in a through-hole formed in said 2nd substrate from the tip side, and is characterized by connecting with separation impossible the tip side pulled out from the aforementioned through-hole at the aforementioned base member.
A base member attached to said 1st substrate so that this drawing inhibition component may lap that said 2nd substrate is drawn out from said 1st connector as for the aforementioned electronic circuit board with the back surface side of said 1st substrate including a drawing inhibition component to prevent.
A string with which the root side was fixed to this base member, or a strip-like insertion component.

[Claim 3]
A tubed part which has an opening which penetrates the aforementioned base member is integrally provided by the aforementioned base member, A hook is integrally provided at a tip of the aforementioned insertion component, and the aforementioned base member is attached to said 1st substrate by pressing the aforementioned tubed part fit in the 1st hole formed in said 1st substrate from the back surface side of said 1st substrate, The aforementioned hook is pulled out from the back surface side of said 1st substrate through the 2nd hole formed in said 1st substrate at the surface side, The electronic circuit board according to claim 1 or 2, wherein the tip side of the aforementioned insertion component is connected with separation impossible at the aforementioned

base member by engaging with a locking part provided in the aforementioned base member or the aforementioned tubed part when it was inserted in in the aforementioned tubed part, after being inserted in the aforementioned through-hole.
[Claim 4]
A flection bent so that an one end rim of said 1st substrate might be wrapped in partially is integrally provided by the aforementioned base member, The electronic circuit board according to claim 1 or 2, wherein the aforementioned base member is attached to said 1st substrate by utilizing the aforementioned flection and wrapping in an one end rim of said 1st substrate.
[Claim 5]
The electronic circuit board according to claim 4, wherein the aforementioned insertion component is fixed to the aforementioned flection which the root exposed to the surface side of said 1st substrate.
[Claim 6]
A tubed part characterized by comprising the following is integrally provided by the aforementioned base member, An one end rim of said 1st substrate is wrapped in the aforementioned base member and the aforementioned flection, And the aforementioned base member is attached to said 1st substrate by pressing the aforementioned tubed part fit in the 1st hole formed in said 1st substrate, That the tip side of the aforementioned insertion component is connected with separation impossible at the aforementioned base member by engaging with a locking part provided in the aforementioned base member or the aforementioned tubed part when it was inserted in in the aforementioned tubed part, after a hook integrally provided at a tip of the aforementioned insertion component was inserted in the aforementioned through-hole. The electronic circuit board according to claim 1 or 2 by which it is characterized.
A flection bent so that an one end rim of said 1st substrate might be wrapped in partially.
An opening which penetrates the aforementioned base member.

[Claim 7]
A tubed part characterized by comprising the following is integrally provided by the aforementioned base member, An one end rim of said 1st substrate is wrapped in the aforementioned base member and the aforementioned flection, And the aforementioned base member is attached to said 1st substrate by pressing the aforementioned tubed part fit in the 1st hole formed in said 1st substrate, While the root is fixed to the aforementioned flection exposed to the surface side of said 1st substrate, the aforementioned insertion component. That the tip side of the aforementioned insertion component is connected with separation impossible at the aforementioned base member by engaging with a locking part provided in the aforementioned base member or the aforementioned tubed part when it was inserted in in the aforementioned tubed part, after a hook integrally provided at a tip was inserted in the aforementioned through-hole. The electronic circuit board according to claim 1 or 2 by which it is characterized.
A flection bent so that an one end rim of said 1st substrate might be wrapped in partially.
An opening which penetrates the aforementioned base member.

[Claim 8]
An electronic circuit board of any one description of the Claims 4-7 which is provided with the following and characterized by wrapping an one end rim of said 1st substrate in the aforementioned base member, the aforementioned rising portion, and the aforementioned clinch part.
A rising portion which rises from an end of the aforementioned base member with the aforementioned plate-like flection in height comparable as thickness of said 1st substrate.
A clinch part installed towards the other end side of the aforementioned base member from this rising portion.

[Claim 9]
A rising portion which rises from an end of the aforementioned base member with the aforementioned plate-like flection in height comparable as thickness of said 1st substrate, It consists of a clinch part installed towards the other end side of the aforementioned base member from this rising portion, and an one end rim of said 1st substrate is wrapped in the aforementioned base member, the aforementioned rising portion, and the aforementioned clinch part,
The electronic circuit board according to claim 6 or 7 having projected the aforementioned tubed part in the same direction as the aforementioned rising portion.
[Claim 10]
An electronic circuit board of any one description of the Claims 3, 6, 7 and 9, wherein a cylindrical accommodation part which encloses the aforementioned hook which engaged with the aforementioned locking part is formed integrally by the aforementioned base member.
[Claim 11]
An electronic circuit board of any one description of the Claims 3, 6, 7 and 9, wherein the aforementioned hook which engaged with the aforementioned locking part is covered by a cylindrical accommodation part formed integrally by inner surface of a case which stores said 1st and 2nd substrates.
[Claim 12]
An electronic circuit board of any one description of the Claims 1-11, wherein a root of the aforementioned insertion component is connected with the aforementioned base member via a vulnerable connecting member.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
The present invention relates to the electronic circuit board provided with the storage medium with which the program for games is memorized.
[Background of the Invention]
[0002]
Fixed value is given to game media, such as a pachinko ball and a medal, and game machines used installing in amusement centers, such as a pachinko parlor, such as a pachinko machine and a slot machine, can exchange for various premiums the game medium which gained by performing a game. A game machine is equipped with a control circuit device which controls various driving devices and these driving devices, such as a lamp device operated inside the housing based on supply of a game medium, and a speech generation device.
When a game person performed a game, it should be full of interest in a game by operating these suitably.
What operates a pattern variable display so that a deactivate indication may be carried out after fluctuating identification information, when pattern variable displays to which fluctuation displaying of the pattern is carried out, such as a reel display or a liquid crystal image display device, are built in in recent years and a prescribed condition is fulfilled is in use. These pieces of equipment is controlled by the control circuit device.
[0003]
The control circuit device currently arranged inside the latest game machine has that common to which CPU (central processing unit) provided on the substrate performs electronic control according to a control program. A control program is memorized by storage media, such as an IC chip which functions as a ROM (read only memory), as data.
CPU is controlling by beginning to read data of a control program one by one, and performing it from a storage medium, according to a game position.

[0004]
By the way, as a system which builds a storage medium into a control circuit device, a storage medium is attached to a storage-medium dedicated substrate, and the system of inserting the terminal currently provided by this storage-medium dedicated substrate in the connection connector currently provided on the substrate body of a control circuit device is known. By using this system, a storage medium can be built into the proper part of a control circuit device easily and correctly, and the efficiency of the inclusion work of a storage medium can be raised. When releasing connection between the terminal of a storage-medium dedicated substrate, and the connection connector of a substrate body, a storage medium can be easily removed from a control

circuit device by drawing out a storage-medium dedicated substrate from a substrate body. Therefore, when switching an old type game machine to a new style game machine, cost reduction and recycling can be performed by exchanging only a storage-medium dedicated substrate. When performing the maintenance of a control circuit device, etc., the working efficiency at the time of removing a storage medium from a control circuit device can improve, and time which a maintenance takes by this can be shortened.

[0005]

As these two substrates are connected with a storage-medium dedicated substrate and a substrate body, the sealing layer is stuck on them, so that a storage-medium dedicated substrate cannot be easily removed from a substrate body. Since the wreckage of a sealing layer will be left behind to a storage-medium dedicated substrate and a substrate body if a storage-medium dedicated substrate is forcibly removed from a substrate body, when unauthorizedly exchanged in a storage medium, it can be discovered easily.

[Patent document 1] JP,2003-236038,A

[Description of the Invention]

[Problem to be solved by the invention]

[0006]

However, when the storage-medium dedicated substrate was attached to the substrate body by a method which was mentioned above, the storage medium was removed easily the whole storage-medium dedicated substrate, and there was a possibility that the storage-medium dedicated substrate on which the unauthorized storage medium was mounted may be attached by the substrate body. Since a sealing layer can be easily reproduced in recent years even if it uses a sealing layer, as mentioned above, For example, even if it changes into the state which removes a storage-medium dedicated substrate from a substrate body forcibly, and made the wreckage of the sealing layer freely adhere to a storage-medium dedicated substrate or a substrate body, applying power which tears off the sealing layer stuck, After attaching to a substrate body the storage-medium dedicated substrate on which the unauthorized storage medium was mounted, the trace of having removed the storage-medium dedicated substrate from the substrate body can be hidden by sticking so that the reproduced sealing layer may be covered and put on the wreckage of the sealing layer adhering to a storage-medium dedicated substrate or a substrate body. Even if it sticks the sealing layer, without leaving a trace, remove a sealing layer carefully and a storage-medium dedicated substrate is removed from a substrate body, After attaching to a substrate body the storage-medium dedicated substrate on which the unauthorized storage medium was mounted, it can avoid leaving the trace of having removed the storage-medium dedicated substrate from the substrate body, by sticking the sealing layer again. Even if a storage-medium dedicated substrate is removed unauthorizedly by this, the problem of it becoming impossible to discover it arises.

[0007]

If the sealing layer is used when it recycles a storage-medium dedicated substrate and a substrate body, Since the paste of a sealing layer adhered to the surface of a storage-medium dedicated substrate or a substrate body and it became impossible to carry out the reuse of a storage-medium dedicated substrate or the substrate body when a sealing layer is removed, there was a problem that recycling efficiency was bad.

[0008]

The present invention is made in order to solve an aforementioned problem, and it is a thing. The purpose is to provide an electronic circuit board which can prevent removing unauthorizedly a storage medium with which ** is memorized from an electronic circuit board, and can make recycling efficiency good.

[Means for solving problem]

[0009]

The 1st substrate by which the 1st connector was provided to achieve the above objects at the surface side as for the present invention, In the electronic circuit board provided with the 2nd substrate connected with the 1st above-mentioned substrate in the state where it stood up from the 1st above-mentioned substrate by having the storage medium with which the program for games is memorized, and inserting in the 1st above-mentioned connector the 1st above-mentioned connector and the 2nd connector that is pairs, The base member which fixed the root of the string or the strip-like insertion component is attached so that it may lap with the back surface side of the 1st above-mentioned substrate, It inserts in the through-hole which formed the aforementioned insertion component in the 2nd above-mentioned substrate from that tip side, and is characterized by connecting with separation impossible the tip side of the aforementioned insertion component pulled out from this through-hole at the aforementioned base member.

[0010]

The 1st substrate by which the 1st connector was provided to achieve the above objects at the surface side as for the present invention, In the electronic circuit board provided with the 2nd substrate connected with the 1st above-mentioned substrate in the state where it stood up from the 1st above-mentioned substrate by having the storage medium with which the program for games is memorized, and inserting in the 1st above-mentioned connector the 1st above-mentioned connector and the 2nd connector that is pairs, The aforementioned electronic circuit board that the 2nd above-mentioned substrate is drawn out from the 1st above-mentioned connector including the drawing inhibition component to prevent this drawing inhibition component, The base member attached to the 1st above-mentioned substrate so that it may lap with the back surface side of the 1st above-mentioned substrate, It has the string with which the root side was fixed to this base member, or a strip-like insertion component, the aforementioned insertion component is inserted in the through-hole formed in the 2nd above-mentioned substrate from that tip side, and it is characterized by connecting with separation impossible the tip side pulled out from the aforementioned through-hole at the aforementioned base member.

[0011]

The tubed part which has an opening which penetrates the aforementioned base member is integrally provided by the aforementioned base member, A hook is integrally provided at the tip of the aforementioned insertion component, and the aforementioned base member is attached to the 1st above-mentioned substrate by pressing the aforementioned tubed part fit in the 1st hole formed in the 1st above-mentioned substrate from the back surface side of the 1st above-mentioned substrate, The aforementioned hook is pulled out from the back surface side of the 1st above-mentioned substrate through the 2nd hole formed in the 1st above-mentioned substrate at the surface side, After being inserted in the aforementioned through-hole, when it is inserted in in the aforementioned tubed part, it is preferable that the tip side of the aforementioned insertion component is connected with the aforementioned base member at separation impossible by engaging with the locking part provided in the aforementioned base member or the aforementioned tubed part.

[0012]

It is preferable that the aforementioned base member is attached to the 1st above-mentioned substrate by the bent flection being integrally provided by the aforementioned base member so that the one end rim of the 1st above-mentioned substrate may be wrapped in partially, and utilizing the aforementioned flection, and wrapping in the one end rim of the 1st above-mentioned substrate.

[0013]

As for the aforementioned insertion component, it is preferable that the root is fixed to the aforementioned flection exposed to the surface side of the 1st above-mentioned substrate.

[0014]

The flection bent so that the one end rim of the 1st above-mentioned substrate might be wrapped in partially, The tubed part which has an opening which penetrates the aforementioned base member

is integrally provided by the aforementioned base member, The one end rim of the 1st above-mentioned substrate is wrapped in the aforementioned base member and the aforementioned flection, And the aforementioned base member is attached to the 1st above-mentioned substrate by pressing the aforementioned tubed part fit in the 1st hole formed in the 1st above-mentioned substrate, After the hook integrally provided at the tip of the aforementioned insertion component is inserted in the aforementioned through-hole, when it is inserted in in the aforementioned tubed part, it is preferable that the tip side of the aforementioned insertion component is connected with separation impossible at the aforementioned base member by engaging with the locking part provided in the aforementioned base member or the aforementioned tubed part.

[0015]

The flection bent so that the one end rim of the 1st above-mentioned substrate might be wrapped in partially, The tubed part which has an opening which penetrates the aforementioned base member is integrally provided by the aforementioned base member, The one end rim of the 1st above-mentioned substrate is wrapped in the aforementioned base member and the aforementioned flection, And the aforementioned base member is attached to the 1st above-mentioned substrate by pressing the aforementioned tubed part fit in the 1st hole formed in the 1st above-mentioned substrate, While the root is fixed to the aforementioned flection exposed to the surface side of the 1st above-mentioned substrate, the aforementioned insertion component. After the hook integrally provided at the tip is inserted in the aforementioned through-hole, when it is inserted in in the aforementioned tubed part, it is preferable that the tip side of the aforementioned insertion component is connected with separation impossible at the aforementioned base member by engaging with the locking part provided in the aforementioned base member or the aforementioned tubed part.

[0016]

The rising portion which rises from the end of the aforementioned base member with the aforementioned plate-like flection in height comparable as the thickness of the 1st above-mentioned substrate, It is preferable to consist of a clinch part installed towards the other end side of the aforementioned base member from this rising portion, and to wrap the one end rim of the 1st above-mentioned substrate in the aforementioned base member, the aforementioned rising portion, and the aforementioned clinch part.

[0017]

The rising portion which rises from the end of the aforementioned base member with the aforementioned plate-like flection in height comparable as the thickness of the 1st above-mentioned substrate, It consists of a clinch part installed towards the other end side of the aforementioned base member from this rising portion, the one end rim of the 1st above-mentioned substrate is wrapped in the aforementioned base member, the aforementioned rising portion, and the aforementioned clinch part, and, as for the aforementioned tubed part, it is preferable to have projected in the same direction as the aforementioned rising portion.

[0018]

It is preferable that the cylindrical accommodation part which encloses the aforementioned hook which engaged with the aforementioned locking part is formed integrally by the aforementioned base member.

[0019]

It is preferable that the aforementioned hook which engaged with the aforementioned locking part is covered by the cylindrical accommodation part formed integrally by the inner surface of the case which stores the 1st and 2nd above-mentioned substrates.

[0020]

It is preferable that the root of the aforementioned insertion component is connected with the aforementioned base member via a vulnerable connecting member.

[Effect of the Invention]

[0021]
According to the electronic circuit board of the present invention, the base member which fixed the root of the string or the strip-like insertion component is attached so that it may lap with the back surface side of the 1st substrate, It inserts in the through-hole which formed the insertion component in the 2nd substrate from that tip side, and since the tip side of the insertion component pulled out from this through-hole was connected with the base member at separation impossible, the 2nd substrate can be prevented from being drawn out from the 1st above-mentioned connector. Since the fixed section of an insertion component or an insertion component, and a base member is destroyed when drawing out the 2nd substrate from the 1st connector, it can recognize easily and reliably that the 2nd substrate was drawn out from the 1st connector from recognizing the destroyed trace visually. Thereby, it can be distinguished from an electronic circuit board whether the 2nd substrate took unauthorizedly and separated. Since the 2nd substrate was prevented from being drawn out from the 1st connector, without using adhesives, recycling efficiency of the 1st substrate and the 2nd substrate can be made good.
[0022]
An electronic circuit board that the 2nd substrate is drawn out from the 1st connector including the drawing inhibition component to prevent this drawing inhibition component, The base member attached to the 1st substrate so that it might lap with the back surface side of the 1st substrate, Since the tip side which it has the string with which the root side was fixed to this base member, or a strip-like insertion component, and the insertion component was inserted in the through-hole formed in the 2nd substrate from that tip side, and was pulled out from the through-hole is connected with the base member at separation impossible, The 2nd substrate can be prevented from being drawn out from the 1st connector. Since the fixed section of an insertion component or an insertion component, and a base member is destroyed when drawing out the 2nd substrate from the 1st connector, it can recognize easily and reliably that the 2nd substrate was drawn out from the 1st connector from recognizing the destroyed trace visually. Thereby, it can be distinguished from an electronic circuit board whether the 2nd substrate took unauthorizedly and separated. Since the 2nd substrate was prevented from being drawn out from the 1st connector, without using adhesives, recycling efficiency of the 1st substrate and the 2nd substrate can be made good.
[0023]
The tubed part which has an opening which penetrates a base member is integrally provided by the base member, A hook is integrally provided at the tip of an insertion component, and a base member is attached to the 1st substrate by pressing a tubed part fit in the 1st hole formed in the 1st substrate from the back surface side of the 1st substrate, A hook is pulled out from the back surface side of the 1st substrate through the 2nd hole formed in the 1st substrate at the surface side, Since the tip side of an insertion component is connected with a front base member at separation impossible by engaging with the locking part provided in the base member or the tubed part when it is inserted in in a tubed part, after being inserted in a through-hole, it becomes possible to attach a base member to the 1st substrate easily and correctly. The tip side of an insertion component can be made to connect with a base member easily.
[0024]
Since the base member was attached to the 1st substrate by the flection bent so that the one end rim of the 1st substrate might be wrapped in partially being integrally provided by the base member, utilizing a flection, and wrapping in the one end rim of the 1st substrate, a base member can be easily attached to the 1st substrate.
[0025]
Since an insertion component is fixed to the flection which the root exposed to the surface side of the 1st substrate, It becomes easy to recognize the root of an insertion component visually, and when the fixed section of an insertion component and a base member is destroyed in drawing out the 2nd substrate from the 1st connector, the destroyed trace can be recognized visually easily and

reliably.
[0026]
The flection bent so that the one end rim of the 1st substrate might be wrapped in partially, The tubed part which has an opening which penetrates a base member is integrally provided by the base member, Wrap the one end rim of the 1st substrate in a base member and a flection, and a base member is attached to the 1st substrate by pressing a tubed part fit in the 1st hole formed in the 1st substrate, Since the tip side of an insertion component was connected with separation impossible at the base member by engaging with the locking part provided in the base member or the tubed part when it was inserted in in a tubed part, after the hook integrally provided at the tip of an insertion component was inserted in the through-hole, A base member can be attached to the 1st substrate easily and reliably. The tip side of an insertion component can be made to connect with a base member easily.
[0027]
The flection bent so that the one end rim of the 1st substrate might be wrapped in partially, The tubed part which has an opening which penetrates a base member is integrally provided by the base member, Wrap the one end rim of the 1st substrate in a base member and a flection, and a base member is attached to the 1st substrate by pressing a tubed part fit in the 1st hole formed in the 1st substrate, While the root is fixed to the flection exposed to the surface side of the 1st substrate, an insertion component. Since the tip side of an insertion component was connected with separation impossible at the base member by engaging with the locking part provided in the base member or the tubed part when it was inserted in in a tubed part, after the hook integrally provided at the tip was inserted in the through-hole, It becomes easy to recognize the root of an insertion component visually, and when the fixed section of an insertion component and a base member is destroyed in drawing out the 2nd substrate from the 1st connector, the destroyed trace can be recognized visually easily and reliably. The tip side of an insertion component can be easily connected with a base member.
[0028]
The rising portion which rises from the end of a base member with a plate-like flection in height comparable as the thickness of the 1st substrate, Since it consists of a clinch part installed towards the other end side of a base member from this rising portion and the one end rim of the 1st substrate was wrapped in the base member, the rising portion, and the clinch part, a base member can be easily attached to the 1st substrate.
[0029]
The rising portion which rises from the end of the aforementioned base member with a plate-like flection in height comparable as the thickness of the 1st substrate, Consist of a clinch part installed towards the other end side of a base member from this rising portion, wrap the one end rim of the 1st substrate in a base member, a rising portion, and a clinch part, and a tubed part, Since it has projected in the same direction as a rising portion, a tubed part can be easily pressed fit in the 1st hole, and a base member can be easily attached to the 1st substrate.
[0030]
Since the cylindrical accommodation part which encloses the hook which engaged with the locking part is formed integrally by the base member, It becomes impossible to touch on the hook which is engaging with the locking part, and a hook can be destroyed by this, or an engagement state can be released by manipulating at a hook, and a Ta line sake can be prevented when as drawing out the 2nd substrate from a connector unauthorizedly.
[0031]
Since the hook which engaged with the locking part is covered by the cylindrical accommodation part formed integrally by the inner surface of the case which stores the 1st and 2nd substrates, it becomes impossible to touch on the hook which is engaging with the locking part. That is, it becomes impossible to destroy a hook or to release an engagement state by manipulating at a hook,

and a Ta line sake can be prevented when as this draws out the 2nd substrate from the 1st connector unauthorizedly.

[0032]

Since the root of the insertion component is connected with the base member via the vulnerable connecting member, By pulling an insertion component and destroying a connecting member, it becomes possible to draw out the 2nd substrate from the 1st connector, and the 2nd substrate can distinguish easily whether it is the no drawn out from the 1st connector by recognizing visually whether there is any trace destroyed by the connecting member.

[Best Mode of Carrying Out the Invention]

[0033]

Hereafter, it describes, referring to Drawings for the first embodiment in the present invention. As shown in Fig.1, the 1st reel 14a, the 2nd reel 14b, the 3rd reel 14c, and the sub reel 15 are rotatably incorporated so that the four display windows 13 may be provided by the front door 12 of the housing 11 and the slot machine 10 may be placed in the inner part of each display window 13. The predetermined pattern which contains two or more kinds of success-in-an-election patterns in the periphery of the 1st - the 3rd reel 14a-14c is arranged at constant pitch as everyone knows, and after the reel has stopped, three patterns per one reel become observable through the display window 13. A total of five of two three horizontal slant are set up for the winning-a-prize effective line of the linear shape which combines by this the pattern displayed for every reel a piece every.

[0034]

The front door 12 comprises the upper door 12a and the lower door 12b. The upper door 12a and the lower door 12b can be attached by the hinge 16, respectively, and can be rotated now in the direction of the arrow M in a figure, respectively.

[0035]

The medal slot 17 for throwing into the upper part of the lower door 12b the medal other than various kinds of manual operation buttons, such as an one-sheet bed button, a MAX bed button, and a payout button, operated at the time of the start of a game is provided. Since each function of these manual operation buttons is well-known, it omits about the details. The 1st - the 3rd stop button 19a-19c for making the lower part of these manual operation buttons suspend operation of the reel which it begins to rotate by depression operation of the depression type start lever 18 operated after a medal bed is performed, and the depression type start lever 18 are provided. The medal receiving tray 20 is provided by the lower part of the lower door 12b, and the dividend medal obtained when it will be in a winning-a-prize state in a game pays out this medal receiving tray 20, and it pays it out of the mouth 21.

[0036]

If the upper door 12a is opened as shown in Fig.2, the main substrate (electronic circuit board) 24 which is a main control part is arranged by housing 11 inside. The main substrate storage case 25 is attached to the wall of the back side of the housing 11, and the main substrate 24 is stored by the main substrate storage case 25. The reel unit 26 is arranged by housing 11 inside, this reel unit 26 is attached to the housing 27, and the housing 27 is attached to the wall of the housing 11 freely attachable/detachable.

[0037]

As shown in Fig.3, the main substrate storage case 25 is divided largely, and comprises the case body 25a and the lid 25b. The lid 25b is attached to the case body 25a by the hinge 29, and is in the rotatable state. The concave part 30 for substrate storage is formed in the case body 25a. The concave part 30 for substrate storage comprises the side part 30a and the bottom part (inner surface) 30b surrounding the four quarters, and is formed in the size which can store the main substrate 24.

[0038]

The storage-medium dedicated substrate (the 2nd substrate) 32 in which ROM(storage medium) 31

the main substrate 24 remembered the game action program of the slot machine 10 to be is mounted, It comprises the substrate body (the 1st substrate) 34 in which several kinds of circuit components, such as the storage-medium dedicated substrate 32 and CPU(Central Processing Unit) 33, are mounted. CPU33 begins to read suitably the information memorized by ROM31, and controls the operation of the slot machine 10 based on the information.

[0039]

The main substrate 24 installed in the prescribed spot of the concave part 30 for substrate storage is enclosed in the case body 25a by closing the lid 25b. Seal fixing of the lid 25b is carried out by locking devices, such as a caulking material which is not illustrated, at the case body 25a. The case body 25a and the lid 25b are molded with synthetic resins, such as ABS plastics (acrylonitrile-butadiene-styrene resin) which all have translucency.

[0040]

As shown in Fig.4, the connection connector (the 1st connector) 35 of slender approximately direct rectangular shape is provided by the component side (surface) 34a where several kinds of circuit components, such as the storage-medium dedicated substrate 32 of the substrate body 34 and CPU33, are mounted. The entry 35a is formed in the connection connector 35. The terminal (the 2nd connector) 32a which is the connection connector 35 and a pair is provided by the storage-medium dedicated substrate 32. The terminal 32a consists of two or more pins, and by inserting the terminal 32a in pin hole (not shown) of the entry 35a, after the storage-medium dedicated substrate 32 has stood up from the substrate body 34, it is connected with the substrate body 34. Thereby, the storage-medium dedicated substrate 32 and the substrate body 34 are electrically connected. The "state where it stood up" mentioned above also shows the thing in the state where the storage-medium dedicated substrate 32 was connected with the substrate body 34 in broad sense so that a gap might be made between the substrate body 34 and the storage-medium dedicated substrate 32. The attachment component holding the standing state of the storage-medium dedicated substrate 32 electrically connected by the terminal 32 and the connection connector 35 may be provided to any 1 side, even if there are few storage-medium dedicated substrates 32 or substrate bodies 34.

[0041]

The through-hole 32b is formed in the storage-medium dedicated substrate 32. The 1st circular hole 34b and the 2nd hole 34c are formed in the position which inserts the connection connector 35 into the substrate body 34 in between. The through-hole 32b and the 2nd hole 34c are formed in the size which can insert in the string 39, the connector 42, and the locking member 43 which are mentioned later, and the 1st hole 34b is formed in the size which can press fit the projection 41 mentioned later. The through-hole 32b, the 1st hole 34b, and the 2nd hole 34c are formed in a position which does not become the hindrance of the layout of several kinds of circuit component mounted.

[0042]

The drawing inhibition component 36 is to prevent the storage-medium dedicated substrate 32 from being drawn out from the connection connector 35 of the substrate body 34. The drawing inhibition component 36 is a product made from a plastic, and comprises the base member 37 and the string (insertion component) 39. It is uniting with the base member main part 38 formed in plate-like form and this base member main part 38, and the base member 37 comprises the fixation part 40 to which the string's 39 end face (root) 39a is fixed.

[0043]

The base member 37 is attached to the substrate body 34 in piles so that the upper surface 38a of the base member main part 38 may meet 34 d (refer to Fig.5) of back surfaces of the substrate body 34. Since 34 d of back surfaces of the substrate body 34 will meet the bottom part 30b of the concave part 30 for substrate storage if the main substrate 24 is accommodated in the concave part 30 for substrate storage, Acts like, such as removing the base member 37 unauthorizedly or

manipulating, can be prevented by attaching the base member 37 to 34 d of back surfaces of the substrate body 34 in piles. When the base member 37 is attached to 34 d of back surfaces, it is formed in a size which is seen from the component-side 34a side and from which it does not protrude from the edge of the substrate body 34.

[0044]

The polished approximately cylindrical projection (tubed part) 41 is formed integrally by the upper surface 38a. The projection 41 is formed so that it may correspond to the position of the 1st hole 34b, when attaching the base member 37 to 34 d of back surfaces of the substrate body 34. The outer diameter of the projection 41 is formed largely more slightly than the diameter of the 1st hole 34b. And if the projection 41 is pushed on the 1st hole 34b, it will be stuck by pressure, and the state is held. The circular through-hole (opening) 41a which penetrates the base member 37 is formed in the central part of the axial center direction of the projection 41.

[0045]

The through-hole 38c is formed in the upper surface 38a so that it may correspond to the position of the 2nd hole 34c, when attaching the base member 37 to 34 d of back surfaces of the substrate body 34. The fixation part 40 is provided by the through-hole 38c. This fixation part 40 is exposed through the 2nd hole 34c at the component-side 34a side.

[0046]

The fixation part 40 comprises the fixation part main part 40a to which the string's 39 end face 39a is fixed, and the four ribs (connecting member) 40b. The fixation part main part 40a is formed disc-like, and is arranged in the central part of the through-hole 38c. The rib 40b is formed in brittle thin rod form if external force is applied. It is radiately formed from the side periphery surface 40c of the fixation part main part 40a, 38d of internal peripheral wall surfaces of the through-hole 38c applying the rib 40b, and it has connected the fixation part main part 40a and the base member main part 38. The rib 40b constituted in this way is destroyed when drawing out the storage-medium dedicated substrate 32 from the connection connector 35. What is necessary is just to decide the size of the rib 40b, hardness, a number, etc. suitably. It was formed in the fixation part main part 40a and concentric circle shape instead of the rib 40b, and may be made to connect a thin sheet shaped with the base member main part 38, and the string's 39 end face 39a should just be connected with the base member main part 38 via the vulnerable connecting member.

[0047]

The string's 39 end face 39a is fixed to 40d of upper surfaces of the fixation part main part 40a. What is necessary is for what is necessary to be just to perform this fixation method by the method of well-known of industrial use adhesives, hot welding, etc., and just to determine it suitably. The insertion component formed in strip-like fashion instead of the string 39 may be used, and what is necessary is just to use suitably the insertion component which has flexibility, although the string 39 is used in this embodiment.

[0048]

At the string's 39 tip 39b, the locking member (hook) 43 is provided via the cylindrical connector 42. As shown in Fig.5, the locking member 43 is a product made from a plastic, and is formed in the shape of an anchor. The locking member 43 consists of the axis 43a and the locking piece 43b, and the pair of locking piece 43b which carries out elastic deformation to the both sides at the cylindrical tip of the axis 43a toward the axial center direction is formed.

[0049]

The outer diameter of the axis 43a is set up smaller than the diameter alpha of the through-hole 41a, and the locking piece 43b, The position which enables insertion of the locking member 43 to the through-hole 41a and which can be inserted in, and the locking member 43 are inserted in the through-hole 41a, When the locking member 43 is made to expose to the lower surface 38b side of the base member 37, it is constituted so that elastic deformation may be carried out between the positions which engage with the edge (locking part) 38e by the side of the lower surface 38b of the

through-hole 41a so that it may be in a deimpossible state in an insert direction and a counter direction and which can be engaged. The base member 37 is attached to the substrate body 34 by pressing the projection 41 fit in the 1st hole 34b from the back surface 34d side of the substrate body 34, The locking member 43 is pulled out from the back surface 34d side of the substrate body 34 through the 2nd hole 34c at the component-side 34a side, After being inserted in the through-hole 32b and passing through the inside of the projection 41 through the through-hole 41a, the string's 39 tip 39b side is connected with the base member 37 by engaging with the edge 38e of the base member 37 at separation impossible. The string's 39 thickness and the outer diameter of the connector 42 are set up smaller than the diameter alpha of the through-hole 41a, and, thereby, can make the connector 42 and the string 39 insert in the through-hole 41a with the lock projection 43.

[0050]

According to this embodiment, although the locking member 43 was provided via the connector 42 at the string's 39 tip 39b, the locking member 43 should just be firmly fixed to the string's 39 other end, for example, hot welding of the locking member 43 may be carried out at the string's 39 tip 39b. Thus, what is necessary is just to determine suitably the method of providing the locking member 43 at the string's 39 tip 39b.

[0051]

The support 44 is set up by the bottom part 30b of the concave part 30 for substrate storage in the case body 25a as shown in Fig.6. When storing the main substrate 24 to the concave part 30 for substrate storage, the substrate body 34 is placed on the upper surface 44a of the support 44, and is fixed on industrial use adhesives, a screw, etc. The accommodation part 45 in which the locking member 43 is accommodated is formed integrally by the bottom part 30b.

[0052]

The accommodation part 45 is formed in the shape of a cylindrical shape so that it may project toward the upper part from the bottom part 30b. The hole 45a by which the opening was carried out towards the upper part is formed in the accommodation part 45. Height Y of the accommodation part 45 is low set up rather than height H of the support 44 only for thickness t minutes of the base member 37, and the accommodation part 45 also has a supporting function by the base member 37 being placed. The accommodation part 45 is formed in a position which is equivalent to the position of the through-hole 41a, and it is constituted so that the through-hole 41a may communicate the hole 45a, when the substrate body 34 is fixed to the support 44. Thereby, the locking member 43 which passed the through-hole 41a is covered by the accommodation part 45. If the locking member 43 is covered by the accommodation part 45, the locking member 43 will be in a contact impossible state.

[0053]

Next, it describes about the operation by the above-mentioned composition. First, 34 d of back surfaces of the substrate body 34 and the upper surface 38a of the base member 37 meet, and when storing the main substrate 24 to the main substrate storage case 25, as shown in Fig.5, the base member 37 is arranged to the back surface 34d side of the substrate body 34 so that the projection 41 may correspond to the 1st hole 34b.

[0054]

Next, while pressing the projection 41 fit in the 1st hole 34b from the back surface 34d side, the locking member 43 is made to insert in the 2nd hole 34c from the back surface 34d side, and it pulls out to the component-side 34a side. By pressing the projection 41 fit in the 1st hole 34b, as shown in Fig.6, the base member 37 is attached to the substrate body 34. Thus, after attaching the base member 37 to the substrate body 34, the terminal 32a of the storage-medium dedicated substrate 32 is inserted in the connection connector 35 of the substrate body 34. And the substrate body 34 is fixed to the support 44, positioning so that the through-hole 41a may communicate the hole 45a of the accommodation part 45.

[0055]

Next, the locking member 43 is made to insert in the through-hole 32b of the storage-medium dedicated substrate 32, as shown in Fig.7. After making the locking member 43 insert in the through-hole 32b, the locking member 43 is arranged so that it may oppose to the through-hole 41a, and the locking member 43 is inserted in the through-hole 41a.

[0056]

If the locking member 43 is inserted in the through-hole 41a, the locking piece 43b will abut the internal peripheral wall surface of the through-hole 41a, and the locking piece 43b will carry out elastic deformation to the position which can be inserted in from the position which can be engaged. If the locking member 43 passes the through-hole 41a and is exposed at the lower surface 38b side of the base member 37, the locking piece 43b will be returned to the position which can be engaged by own elastic restoring force from the position which can be inserted in. At this time, as shown in Fig.8, the locking piece 43b engages with a deimpossible state on the edge 38e at the path of insertion and a counter direction. Thereby, the string's 39 tip 39b side will be in the state where it connected with separation impossible at the base member 37.

[0057]

Since the locking member 43 will be accommodated in the accommodation part 45 and will be in a contact impossible state, a possibility of it that the locking member 43 may be destroyed or workmanship may be given to the locking member 43 is lost. Since the accommodation part 45 supports the edge 38e, when inserting the locking member 43 in the through-hole 41a, the locking member 43 can be smoothly inserted in the through-hole 41a, without omitting the projection 41 currently pressed fit in the 1st hole 34b.

[0058]

Thus, after storing the main substrate 24 to the case body 25a, the lid 25b is closed and locked. The main substrate 24 is stored by the main substrate storage case 25 through the above processes.

[0059]

When removing the storage-medium dedicated substrate 32 from the substrate body 34, first, a lock is released and the lid 25b of the main substrate storage case 25 is opened. And the portion exposed from the string's 39 2nd hole 34c or the storage-medium dedicated substrate 32 is gathered, and the string 39 is pulled. Thus, the rib 40b is destroyed by pulling the string 39. It enables this to draw out the storage-medium dedicated substrate 32 from the connection connector 35. Since the wreckage of the rib 40b remains in the through-hole 38c at this time, it can know easily and reliably that the storage-medium dedicated substrate 32 was removed from the substrate body 34 by recognizing this wreckage visually. Thereby, a Ta line sake can be prevented when as removing the storage-medium dedicated substrate 32 from the substrate body 34 unauthorizedly.

[0060]

When removing the storage-medium dedicated substrate 32 from the substrate body 34, the string 39 may be cut without pulling the string 39 and the storage-medium dedicated substrate 32. Since the cut trace remains in the string 39 by cutting the string 39, it can know that the storage-medium dedicated substrate 32 was removed from the substrate body 34 by recognizing this trace visually.

[0061]

Since the storage-medium dedicated substrate 32 is prevented from being drawn out by the drawing inhibition component 36 from the connection connector 35, without using adhesives, recycling efficiency of the storage-medium dedicated substrate 32 and the substrate body 34 can be made good.

[0062]

When a slot (locking part) is formed in the projection 41 and the locking member 43 is inserted in the through-hole 41a, without restricting to this, it may be made to make the slot carry out engagement of the locking piece 43b in the above-mentioned embodiment, although it was made for the locking piece 43b of the locking member 43 to engage with the edge 38e.

[0063]

Although the accommodation part 45 was formed integrally at the bottom part 30b of the concave part 30 for substrate storage, the lower surface 38b of the base member 37 and the approximately cylindrical accommodation part 38f are formed integrally, and it may be made to accommodate the locking member 43 in this accommodation part 38f in the above-mentioned embodiment, as shown in Fig.9. Thus, when the main substrate 24 is attached to the slot machine 10, the accommodation part 45 should just be constituted so that the locking member 43 may be in a contact impossible state, and can change an installation place and its form suitably.

[0064]

Although the base member 37 was attached to the substrate body 34 by pressing the projection 41 fit in the 1st hole 34b in the above-mentioned embodiment, As shown in Fig.10, in making it form 38 g of through-holes in the base member 37 so that it may correspond to the 1st hole 34b and attaching the base member 37 to the substrate body 34, What is necessary is to arrange so that the upper surface 38a may be made to meet 34 d of back surfaces of the substrate body 34, and just to fix the base member 37 to 34 d of back surfaces of the substrate body 34 on industrial use adhesives, a screw, etc., doubling 38 g of through-holes with the position of the 1st hole 34b, and doubling the through-hole 38c with the position of the 2nd hole 34c. And after making the locking member 43 insert in the 2nd hole 34c and the through-hole 32b, the locking member 43 and 38 g of through-holes are arranged so that it may oppose via the 1st hole 34b, and the locking member 43 is made to insert in 38 g of through-holes. By this, the locking member 43 will engage with the edge 38e, the locking member 43 will be in a deimpossible state like the above-mentioned embodiment, in an insert direction and a counter direction, and the string's 39 tip 39b side is connected with separation impossible at the base member 37.

[0065]

According to the above-mentioned embodiment, although the through-hole 41a was formed in the projection 41, as shown in Fig.11, the cylinder-like-object-with-base-like projection 46 may be formed, without restricting to this. The hole 46a is formed in the projection 46, and the slot (locking part) 46c where fitting of the locking piece 43b is carried out is formed in the internal peripheral wall surface 46b of this hole 46a. By inserting the locking member 43 in the hole 46a, it locks to a deimpossible state in the path of insertion and a counter direction at the locking piece 43b fang furrow 46c of the locking member 43. Thereby, the string's 39 tip 39b side is connected with the base member 37 at separation impossible.

[0066]

Although the through-hole 41a by which the locking member 43 is inserted in the projection 41 in the locking member 43 was formed at the string's 39 tip 39b in the above-mentioned embodiment, as shown in Fig.12, the cylinder-like-object-with-base-like fitting member 48 may be provided at the tip 39b of the lock projection 47 and the string 39 to the base member 37. The lock projection 47 has the same composition as the locking member 43 mentioned above, and comprises the axis 47a and the locking piece 47b. The fitting member 48 has the same composition as the projection 41 mentioned above, and the hole 48a is formed. The slot 48c is formed in the internal peripheral wall surface 48b of the hole 48a. In attaching the base member 37 to the substrate body 34, the lock projection 47 is made to insert in the 1st hole 34b. After arranging the lock projection 47 and the hole 48a so that it may oppose through the 1st hole 34b, it locks to a deimpossible state by inserting the lock projection 47 in the hole 48a in the path of insertion and a counter direction at the locking piece 47b fang furrow 48c of the lock projection 47. Thereby, the string's 39 tip 39b side is connected with the base member 37 at separation impossible.

[0067]

In the above-mentioned embodiment, after making the string's 39 tip 39b insert in in order of the 2nd hole 34c and the through-hole 32b, the string's 39 tip 39b side was connected with the base member 37 at separation impossible by making the locking member 43 insert in the through-hole 41a, but. For example, form notching in the upper part of the storage-medium dedicated substrate

32, the string 39 is made to go via the aforementioned notching from the edge of the substrate body 34, and it may be made to make the locking member 43 insert in the through-hole 41a. In this case, when the locking member 43 engages with the edge 38e, the string's 39 length is previously adjusted so that the string 39 may not slacken. Thereby, the same effect as the above-mentioned embodiment can be given.

[0068]

Although the present invention gave and described the example applied to the main substrate 24 in the above-mentioned embodiment, it is also possible to apply to the sub substrate which controls the operation of a loudspeaker or a lamp, without restricting to this. There is control of not fulfilling a prize condition by the slot machine 10 unless the 1st - a depression order of the 3rd stop button 19a-19c are right, even if it has won in the electronic lottery, If ROM currently mounted on the sub substrate is removed unauthorizedly and changed, The 1st - a depression order of the 3rd stop button 19a-19c are unauthorizedly reported by a loudspeaker, lamp, etc., and there is a possibility that a medal may be won unauthorizedly, by pushing the 1st - the 3rd stop button 19a-19c according to it. Therefore, the malfeasance of removing ROM from a sub substrate can be prevented by applying the present invention to a sub substrate.

[0069]

Next, it describes, referring to Fig.13 and Fig.14 for a second embodiment.The code same about the component which overlaps with the first embodiment mentioned above hereafter is attached, and a description is omitted. As shown in Fig.13 and Fig.14, the main substrate 50 comprises the storage-medium dedicated substrate 32 and the substrate body (the 1st substrate) 51.Several kinds of circuit components, such as the storage-medium dedicated substrate 32 and CPU33, are mounted in the component side (surface) 51a of the substrate body 51. The connection connector 35 by which the entry 35a was formed in the component side 51a is provided, When the terminal 32a of the storage-medium dedicated substrate 32 inserts in this connection connector 35, the storage-medium dedicated substrate 32 is connected with the substrate body 51 in the state where it stood up from the substrate body 51, and the storage-medium dedicated substrate 32 and the substrate body 51 are electrically connected.

[0070]

The 1st hole 51b is formed in the substrate body 51. The 1st hole 51b is formed in the size which the projection 55 can press fit. The 1st hole 51b is formed in a position which does not become the hindrance of the layout of several kinds of circuit component mounted.

[0071]

The drawing inhibition component 52 is to prevent the storage-medium dedicated substrate 32 from being drawn out from the connection connector 35 of the substrate body 51. The drawing inhibition component 52 is a product made from a plastic, and comprises the base member 53 and the string 39.

[0072]

The base member 53 is molded into slender thin plate state. The flection 54 bent so that the one end rim of the substrate body 51 might be wrapped in partially is integrally molded into the end of the base member 53. The flection 54 consists of the rising portion 54a which rises from one end of the base member 53 in height comparable as the thickness of the substrate body 51, and the clinch part 54b installed so that it might become substantially parallel from this rising portion 54a with the upper surface 53a of the base member 53 towards the other end side of a base member. The projection (tubed part) 55 of the shape of a cylindrical shape projected in the same direction as the rising portion 54a is formed integrally by the upper surface 53a. The projection 55 is formed so that it may correspond to the 1st hole 51b. If the projection 55 is pushed on the 1st hole 51b, it will be stuck by pressure, and the state is held. The through-hole 55a which penetrates the base member 53 is formed in the central part of the axial center direction of the projection 55.

[0073]

When attaching the base member 53 to the substrate body 51, so that the upper surface 53a may meet the back surface 51c of the substrate body 51. The base member 53 is attached to the substrate body 51 by arranging the base member 53 to the back surface 51c side of the substrate body 51, and wrapping the one end rim of the substrate body 51 in the base member 53, the rising portion 54a, and the clinch part 54b, and pressing the projection 55 fit in the 1st hole 51b.

[0074]

The inclined plane 54c which rises from the installation direction point of the clinch part 54b is formed. This inclined plane 54c is formed so that a substantially 45 degree inclination may be carried out toward the other end side of the base member 53 to the component side 51a a center [the point of the clinch part 54b], when the one end rim of the substrate body 51 is wrapped in the base member 53, the rising portion 54a, and the clinch part 54b. When this sees from the component-side 51a side, visual recognition of the inclined plane 54c is attained easily. The inclined plane 54c should just be formed so that visual recognition may become possible, when it sees from the component-side 51a side, and it should just set up the angle of gradient suitably.

[0075]

54 d of through-holes are formed in the inclined plane 54c. The fixation part 40 is provided by 54d of this through-hole, and when this fixation part 40 wraps the one end rim of the substrate body 51 in the base member 53, the rising portion 54a, and the clinch part 54b, it is exposed on the component side 51a. The surface 54e which inclines toward the rising portion 54a from the upper end of the inclined plane 54c is provided by the clinch part 54b, and 54 d of through-holes and 54 f of openings which communicate are formed in this surface 54e. The visual recognition ease at the time of carrying out the check which tries to look into the fixation part 40 through the side surface of the main substrate storage case 25 by 54 f of this opening is improved.

[0076]

The fixation part 40, the base member 53, and the flection 54 are the products made from a plastic, and these are formed integrally. The fixation part 40 comprises the fixation part main part 40a made to be placed at the center of 54 d of through-holes, and two or more thin cylindrical ribs 40b which support this fixation part main part 40a. It is radiately formed from the side periphery surface 40c of the fixation part main part 40a, applying the rib 40b to 54 g of internal peripheral wall surfaces of 54 d of through-holes, and it is connected so that the fixation part main part 40a and the flection 54 may be united.

[0077]

The end face 39a of the string 39 with which the locking member 43 is formed integrally at the tip 39b is fixed to 40d of upper surfaces of the fixation part main part 40a. At the string's 39 tip 39b, the locking member 43 is provided via the connector 42. The locking member 43 comprises the axis 43a and the locking piece 43b in which pair of elastic deformation is free. It is attached so that the base member 53 may lap with the back surface 51c side of the substrate body 51, as mentioned above, After the locking member 43 is inserted in the through-hole 32b, it lets the through-hole 55a pass. After passing through the inside of the projection 55, it becomes impossible to return to the direction and opposite direction which the string's 39 tip 39b side mentioned above by engaging with the edge (locking part) 53c of the base member 53 and to pass, and connects with the base member 53 at separation impossible.

[0078]

The cylindrical accommodation part 45 which accommodates the locking member 43 in contact impossible is formed integrally by the bottom part 30b of the concave part 30 for substrate storage. The hole 45a is formed in the accommodation part 45. The accommodation part 45 is formed in a position which is equivalent to the position of the through-hole 55a when the substrate body 51 in which the drawing inhibition component 52 was attached is stored in the main substrate storage case 25, It is constituted so that the through-hole 41a may communicate the hole 45a, when the substrate body 51 is fixed to the support 44 via screw (not shown). In this embodiment, although the

accommodation part 45 was provided at the bottom part 30b, the accommodation part which accommodates the locking member 43 in the lower surface 53b side of the base member 53 at contact impossible as Fig.9 showed may be formed integrally, without restricting to this.

[0079]

Next, it describes about the operation by the above-mentioned composition. When the main substrate 50 is stored to the main substrate storage case 25 (refer to Fig.3), First, while the back surface 51c of the substrate body 51 and the upper surface 53a of the base member 53 meet and making the projection 55 correspond to the 1st hole 51b, the base member 53 is arranged to the back surface 51c side of the substrate body 51 so that the flection 54 may be placed at the end rim of a substrate body.

[0080]

The base member 53 so that the flection 54 may be gathered and the upper surface 53a of the base member 53 may separate the back surface 51c of the substrate body 51, after pressing the projection 55 fit in the 1st hole 51b from the back surface 51c side Next, ******, The one end rim of the substrate body 51 is wrapped in the base member 53, the rising portion 54a, and the clinch part 54b, releasing this ****. Thereby, the base member 53 is attached to the substrate body 51 freely attachable/detachable. The fixation part 40 provided by the flection 54 is exposed on the component side 51a. Thus, when the fixation part 40 was exposed on the component side 51a and the rib 40b is destroyed, the destroyed trace can be checked easily. The base member 53 can be made easy to attach to a substrate body by carrying out that make thin at least one copy of the rising portion 54a, and it is easy to sag the flection 54.

[0081]

Before attaching the base member 53 to the substrate body 51, or after attaching, the terminal 32a of the storage-medium dedicated substrate 32 is inserted in the connection connector 35 of the substrate body 51. And positioning so that the through-hole 55a may communicate the hole 45a of the accommodation part 45, the substrate body 51 is placed on the support 44, and it fixes with a screw.

[0082]

Next, the locking member 43 is made to insert in the through-hole 32b of the storage-medium dedicated substrate 32. After making the locking member 43 insert in the through-hole 32b, the locking member 43 is arranged so that it may oppose to the through-hole 55a, and the locking member 43 is inserted in the through-hole 55a.

[0083]

If the locking member 43 is inserted in the through-hole 55a, the locking piece 43b will abut the internal peripheral wall surface of the through-hole 55a, and the locking piece 43b will carry out elastic deformation to the position which can be inserted in from the position which can be engaged. If the locking member 43 passes the through-hole 55a, the locking piece 43b will engage with the edge 53c. It will be in the state where it becomes impossible to have returned to the direction and opposite direction which the string's 39 tip 39b side mentioned above by this and to pass, and connected with the base member 53 at separation impossible.

[0084]

Since the locking member 43 will be accommodated in the accommodation part 45 and will be in a contact impossible state, a possibility of it that the locking member 43 may be destroyed or workmanship may be given to the locking member 43 is lost. Since the accommodation part 45 supports the edge 53c, when inserting the locking member 43 in the through-hole 55a, the locking member 43 can be smoothly inserted in the through-hole 55a, without omitting the projection 55 currently pressed fit in the 1st hole 51b.

[0085]

Thus, after storing the main substrate 24 to the case body 25a, the lid 25b is closed and locked. The main substrate 24 is stored by the main substrate storage case 25 through the above processes.

[0086]
When removing the storage-medium dedicated substrate 32 from the substrate body 34, first, a lock is released and the lid 25b of the main substrate storage case 25 is opened. And the string's 39 end face 39a is gathered and pulled, or the storage-medium dedicated substrate 32 is gathered and the string 39 is pulled. Thus, the rib 40b is destroyed by pulling the string 39. It enables this to draw out the storage-medium dedicated substrate 32 from the connection connector 35. Since the wreckage of the rib 40b remains in 54d of through-holes at this time, it can know easily and reliably that the storage-medium dedicated substrate 32 was removed from the substrate body 51 by recognizing this wreckage visually. Since the fixation part 40 is exposed on the component side 51a, the wreckage of the rib 40b can be checked easily.
[0087]
When a slot (locking part) is formed in the projection 55 and the locking member 43 is inserted in the through-hole 55a, without restricting to this, it may be made to make the slot carry out engagement of the locking piece 43b in the above-mentioned embodiment, although it was made for the locking piece 43b of the locking member 43 to engage with the edge 53c.
[0088]
Although the projection 55 is pressed fit in the 1st hole 51b from the back surface 51c side and the base member 53 was attached to the substrate body 51 in the above-mentioned embodiment by wrapping the one end rim of the substrate body 51 in the base member 53, the rising portion 54a, and the clinch part 54b, It is also possible to attach the base member 53 to the substrate body 51 only using the projection 55. It is also possible by wrapping the one end rim of the substrate body 51 in the base member 53, the rising portion 54a, and the clinch part 54b, without using the projection 55 to attach the base member 53 to the substrate body 51.
[0089]
Although it presupposed that the one end rim of the substrate body 51 is wrapped in the base member 53, the rising portion 54a, and the clinch part 54b in the above-mentioned embodiment, it may be made to pinch the substrate body 51 in the base member 53 and the clinch part 54b.
[Brief Description of the Drawings]
[0090]
[Drawing 1]It is a perspective view showing the appearance of the slot machine of the present invention.
[Drawing 2]It is a perspective view showing the state where the upper door was opened wide.
[Drawing 3]It is a perspective view showing the state where the main substrate was stored to the main substrate storage case.
[Drawing 4]It is a perspective view showing a main substrate and a drawing inhibition component.
[Drawing 5]It is a cross sectional view showing the essential part of a substrate body and a drawing inhibition component.
[Drawing 6]It is a cross sectional view showing the composition of the bottom part of a main substrate, a drawing inhibition component, and the concave part for substrate storage.
[Drawing 7]It is a cross sectional view showing the bottom part of a main substrate when a substrate body is fixed to a support, a drawing inhibition component, and the concave part for substrate storage.
[Drawing 8]It is a cross sectional view showing the bottom part of a main substrate when a string's tip side is connected with separation impossible at a base member, a drawing inhibition component, and the concave part for substrate storage.
[Drawing 9]It is a cross sectional view showing the mode in which the accommodation part was formed integrally by the base member.
[Drawing 10]It is a cross sectional view showing a substrate body and a drawing inhibition component.
[Drawing 11]It is a cross sectional view showing a substrate body and a drawing inhibition

component.
[Drawing 12]It is a cross sectional view showing a substrate body and a drawing inhibition component.
[Drawing 13]It is a perspective view showing a main substrate and a drawing inhibition component.
[Drawing 14]It is a cross sectional view showing the bottom part of a main substrate when a substrate body is fixed to a support, a drawing inhibition component, and the concave part for substrate storage.
[Explanations of letters or numerals]
[0091]
10 Slot machine
24, 50 main substrates (electronic circuit board)
30a Bottom part (inner surface)
31 ROM (storage medium)
32 Storage-medium dedicated substrate (the 2nd substrate)
32a Terminal (the 2nd connector)
32b Through-hole
34 and 51 Substrate body (the 1st substrate)
34a and 51a Component side (surface)
34b and 51b The 1st hole
34c The 2nd hole
34d and 51c Back surface
35 Connection connector (the 1st connector)
36 Drawing inhibition component
37, 53 base members
38e and 53c Edge (locking part)
39 String (insertion component)
39a End face (root)
39b Tip
40 Fixation part
40a Fixation part main part
40b Rib (connecting member)
41, 46, and 55 Projection (tubed part)
43 Locking member (hook)
45 or 38 f Accommodation part
46c Slot (locking part)
54 Flection
54a Rising portion
54b Clinch part

[Translation done.]

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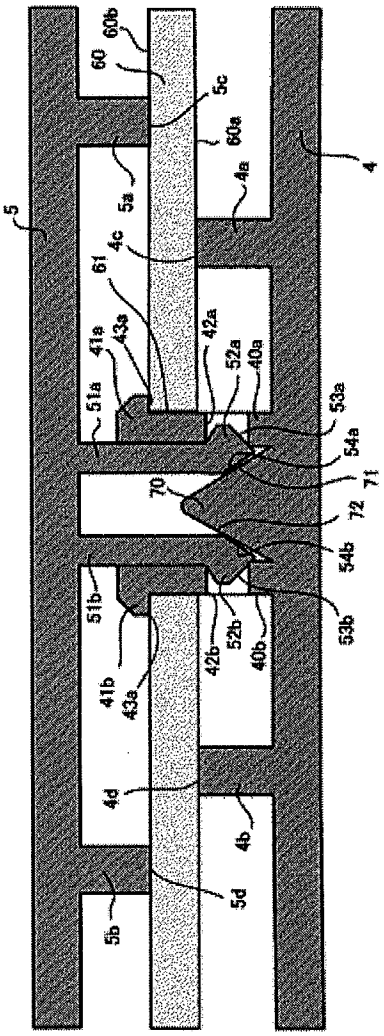
TOSHIBA CORP [SHIGENOBU NAOYA]
G06F 1/16 (2006.01);G06F 1/16 (2006.01)

FIXED STRUCTURE

[57]ABSTRACT:
PROBLEM TO BE SOLVED: To provide a fixed structure of a casing suitable for assembly when two cases are coupled together and for costs.SOLUTION: First engagement protrusions 40a, 40b have respective engagement pawls 41a, 41b. The engagement protrusions 40a, 40b have respective engagement holes 42a, 42b. Second engagement protrusions 51a, 51b have respective engagement pawls 52a, 52b. A circuit board 60 is provided with a through hole 61. The engagement pawls 41a, 51b are engaged in the through hole 61. When an upper case 5 is pushed in, inclined faces 54a, 54b are made to abut against the inclined faces 71, 72 of an engagement piece 70. As the upper case 5 is further pushed in, the inclined faces 54a, 54b are pushed by the inclined faces 71, 72 toward the first engagement protrusions 40a, 40b, and the engagement pawls 52a, 52b enter the engagement holes 42a, 42b, whereby the first engagement protrusions 40a, 40b are engaged with the second engagement protrusions 51a, 51b.



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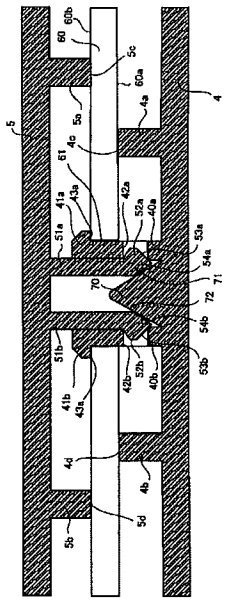
(54)【発明の名称】固定構造

(57)【要約】
【課題】　本発明は、２つのケースを結合する際の組み立て製およびコストの点で好適な筐体の固定構造を提供することを目的とする。
【解決手段】　第１の係合突起４０ａ，４０ｂは係合爪４１ａ，４１ｂを有し、係合突起４０ａ，４０ｂは係合孔４２ａ，４２ｂを持つ。第２の係合突起５１ａ，５１ｂは係合爪５２ａ，５２ｂを持つ。回路基板６０には貫通口６１が設けられている。貫通口６１に係合爪４１ａ，５１ｂが係合される。上ケース５を押し込むと傾斜面５４ａ，５４ｂは係止片７０の傾斜面７１，７２に当接する。上ケース５をさらに押し込むと、傾斜面５４ａ，５４ｂが傾斜面７１，７２により第１の係合突起４０ａ，４０ｂ方向に押され係合爪５２ａ，５２ｂは係合孔４２ａ，４２ｂに入り込み第１の係合突起４０ａ，４０ｂと第２の係合突起５１ａ，５１ｂとが係合される。
【選択図】　図４



【特許請求の範囲】
【請求項１】
それぞれ開口部が設けられるとともに互いに離間して設けられた一対の第１の係合突起が設けられた第１の部材と、
前記第１の部材と対向するとともに、一対の第２の係合突起が設けられた第２の部材と、
貫通口を有した第３の部材と、を有し、
前記一対の第1の係合突起は、前記貫通口に貫通して前記貫通口の縁部に係合され、前記一対の第２の係合突起は前記一対の第１の係合突起の間に挿入されるとともに、前記一対の第１の係合突起の開口部に係合されることで前記第３の部材を前記第1の部材と第２の部材との間に固定することを特徴とする固定構造。
【請求項２】
前記一対の係合突起の間には、前記第１のケースと一体形成された係止片が設けられ、前記一対の第２の係合突起が前記一対の第１の係合突起の前記開口部に係合された状態において、前記係止片は前記一対の第２の係合突起の間に位置することを特徴とする請求項１記載の固定構造。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、ノート型コンピュータ等の電子機器にかかり、特に３つの部材の固定構造に関する。
【背景技術】
【０００２】
一般に、ノート型コンピュータ所謂、ノートブック型パーソナルコンピュータ（以下、コンピュータと称する）は、本体と、この本体に回動可能に結合された表示部とを有している。通常、本体筐体や表示部筐体は２つのケースを結合することで筐体が形成されている。たとえば、表示部筐体は表示パネルが搭載される表示部ケースとこの表示部ケースに結合される表示マスクとを有している。表示マスクと表示部ケースとの結合は、表示マスクに設けられたラッチを表示部ケースに結合したのち、表示部ケースと表示マスクとをねじ固定することで表示部筐体を形成している（特許文献１参照）。
【特許文献１】特開２００４－２８０３３１号公報（段落番号００３９，００４９、図６、８参照）
【発明の開示】
【発明が解決しようとする課題】
【０００３】
特許文献１に記載の従来の方法では、表示マスクと表示部ケースとをねじを介して強固に結合することは可能であるが、ラッチ結合工程の外にねじ止め作業を要し、さらには表示部筐体を本体筐体に閉じた際に生じる衝撃吸収のための緩衝材（ゴム等）をねじの上に貼り付けたりする作業を要するために、組み立て製、コストの面で好ましくない。
そこで本発明は、２つのケースを結合する際の組み立て製およびコストの点で好適な筐体の固定構造を提供することを目的とする。
【課題を解決するための手段】
【０００４】
上記目的を達成するために本発明の固定構造は、それぞれ開口部が設けられるとともに互いに離間して設けられた一対の第１の係合突起が設けられた第１の部材と、第１の部材と対向するとともに、一対の第２の係合突起が設けられた第２の部材と、貫通口を有した第３の部材と、を有し、一対の第1の係合突起は、貫通口に貫通して貫通口の縁部に係合され、一対の第２の係合突起は一対の第１の係合突起の間に挿入されるとともに、一対の第１の係合突起の開口部に係合されることで第３の部材を第1の部材と第２の部材との間に固定することを特徴とする。

【発明の効果】
【０００５】
本発明によれば、２つのケースを結合する際の組み立て製およびコストの点で好適な筐体の固定構造を提供することが可能である。
【発明を実施するための最良の形態】
【０００６】
以下、図面を参照して本発明の実施形態について詳細に説明する。図１は、電子機器の斜視図である。
【０００７】
ノート型コンピュータ（電子機器）１は本体筐体２と、この本体筐体２に結合される表示部筐体３とを有している。本体筐体２は下ケース（第１の部材）４と、この下ケース４に結合される上ケース（第２の部材）５とを有している。上ケース５の上面６の全部にはパームレスト７が設けられている。上面６にはキーボード載置部８が設けられており、このキーボード載置部８にはキーボード９が着脱自在に搭載されている。パームレスト７の略中央にはポインティングデバイス１６が設けられている。
【０００８】
表示部筐体３は表示部ケース１０を有しており、この表示部ケース１０には表示マスク１１が結合されている。表示部ケース１０と表示マスク１１とで形成される表示部筐体内には表示パネル（ＬＣＤ）１３が内蔵されている。表示マスク１１はＬＣＤ１３の表示面を露出するための開口部１２が設けられている。
【０００９】
本体筐体２の後部には表示部筐体３を結合するための凹状に形成された一対の結合部１４ａ，１４ｂが設けられている。表示部筐体３は結合部１４ａ，１４ｂに結合される一対の脚部１５ａ，１５ｂを有している。結合部１４ａ，１４ｂと脚部１５ａ，１５ｂとは図示しないヒンジ装置により結合されることで表示部筐体３は本体筐体２に対して回動可能となる。
【００１０】
図２は、上ケースと下ケースと回路基板を示す分解斜視図である。本体筐体２内部には回路基板（第３の部材）６０が内蔵されている。下ケース４の内面からは台座４ａ、４ｂが突出して形成されている。台座４ａ，４ｂは下ケース４と一体形成されている。下ケース４の内面にはさらに一対の第１の係合突起４０ａ，４０ｂが下ケース４と一体形成されている。これら第１の係合突起４０ａ，４０ｂの先端には係合爪４１ａ，４１ｂが設けられている。さらに係合突起４０ａ，４０ｂには係合孔４２ａ，４２ｂが設けられている。一対の係合突起４０ａ，４０ｂの間には係止片７０が下ケースと一体形成されている。係止片７０は三角形上に形成されており、傾斜面７１，７２を有している。
【００１１】
回路基板６０には一対の係合突起４０ａ，４０ｂが貫通可能な大きさの貫通口６１が設けられている。
【００１２】
上ケース５の内面には台座５ａ，５ｂが突出して形成されている。台座５ａ，５ｂは上ケース５と一体形成されている。上ケース５の内面にはさらに一対の第２の係合突起５１ａ，５１ｂが上ケース５と一体形成されている。これら第２の係合突起５１ａ，５１ｂの先端には係合爪５２ａ，５２ｂが設けられている。
【００１３】
図３は、回路基板を実装した状態の下ケースに上ケースを結合する前の状態を示す断面図である。図４は、上ケースと下ケースと回路基板とを結合した状態を示す断面図である。
【００１４】
まず、図３に示すように、下ケース４に回路基板６０を実装する。回路基板の貫通口６１に一対の第１の係合突起４０ａ，４０ｂを貫通させるように実装する。このとき回路基

板６０の下面６０ａが下ケース４より突出している台座４ａ，４ｂの上面４ｃ，４ｄに当接するまで、回路基板６０の貫通口６１に第１の係合突起４０ａ，４０ｂを挿入する。図示はしないが台座は回路基板の大きさに合わせて適宜配置すれば良く、２つに限らず、剛性、仕様に合わせ必要な数だけ配置すればよい。

【００１５】

回路基板６０を台座４ａ，４ｂに当接するまで実装すると、回路基板６０の貫通口の縁部に一対の第１の係合突起４０ａ，４０ｂの係合爪４１ａ，５１ｂが係合される。係合爪４１ａ，４１ｂには係合部４３ａ，４３ｂが設けられており、この係合部４３ａ，４３ｂが貫通口６１の縁部に係合されることで回路基板６０が下ケース４に確実に実装されることになる。この貫通口６０と一対の第１の係合突起４０ａ，４０ｂの係合構造を回路基板６０の大きさにあわせ４角、中央付近等適宜適用すれば、従来のよう回路基板をねじにより固定するという工程は不要になるため、コスト、組み立て性が良好になる。

【００１６】

次に、下ケース４に回路基板６０が実装された後に上ケース５を下ケース４に結合する方法について説明する。上ケース５の一対の第２の係合突起５１ａ，５１ｂの係合爪５２ａ，５２ｂは、一対の第２の係合突起５１ａ，５１ｂの外方に向かって傾斜している傾斜面５３ａ，５３ｂと、一対の第２の係合突起５１ａ，５１ｂの内方に向かって傾斜している傾斜面５４ａ，５４ｂを有している。傾斜面５３ａ，５３ｂと傾斜面５４ａ，５４ｂとでそれぞれ構成される先端５５ａ，５５ｂの間隔は一対の第１の係合突起４０ａ４０ｂの間隔よりも狭くなっている。そのために傾斜面５３ａ，５３ｂが第１の係合突起４０ａ，４０ｂの互いに対向する側に入り込んでいく。上ケース５を押し込んでいくと傾斜面５３ａ，５３ｂが第１の係合突起４０ａ，４０ｂに互いに近づく方向に弾性変形するその状態でさらに上ケース５を下ケース４方向に押し込む。

【００１７】

図４に示すように、上ケース５を押し込むと第２の係合突起５１ａ，５１ｂの傾斜面５４ａ，５４ｂは係止片７０の傾斜面７１，７２に当接する。上ケース５がさらに押し込まれると、傾斜面５４ａ，５４ｂが係止片７０の傾斜面７１，７２により第１の係合突起４０ａ，４０ｂ方向に押されるようになる。そのため第２の係合突起５１ａ，５１ｂの係合爪５２ａ，５２ｂは第１の係合突起４０ａ，４０ｂの係合孔４２ａ，４２ｂに入り込み第１の係合突起４０ａ，４０ｂと第２の係合突起５１ａ，５１ｂとが係合される。さらに第２の係合突起の間には係止片７０が存在するために用意に第１の係合突起４０ａ，４０ｂと第２の係合突起５１ａ，５１ｂとの係合が解除されるようなことは無い。また、上ケース５内面に設けられている台座５ａ，５ｂは回路基板６０の上面６０ｂに当接される。このような構成により回路基板６０は上ケース５および下ケース４との間に確実に固定される。

【００１８】

以上説明したような構成により、上ケースと下ケースとの結合および上ケースと下ケースとその間に位置する回路基板の係合を容易に結合することができる。

【００１９】

また、本実施の形態においては上ケース、下ケース、回路基板の結合について説明したが、回路基板の変わりに他の構成部品、たとえばヒンジデバイス等でも良く、また、上ケースと下ケースだけの結合に適用しても良い。また、上ケースあるいは下ケースの内面に部品を取り付けるような場合に上ケースあるいは下ケースと構成部品および構成部品を上ケースあるいは下ケースに取り付けるための別部品を結合させるようにしても良い。この場合は別部品に上ケースあるいは下ケースに第１の係合突起を設け、別部品に第２の係合突起を儲け、構成部品に貫通口を設けることで、本実施の携帯と同様に容易に結合することができる。

【００２０】

以上説明したように、２つあるいは３つの部品の結合において極力ねじを使用することなく容易に互いを結合することが可能である。

【図面の簡単な説明】

【００２１】

【図１】電子機器の斜視図。

【図２】上ケースと下ケースと回路基板を示す分解斜視図。

【図３】回路基板を実装した状態の下ケースに上ケースを結合する前の状態を示す断面図。

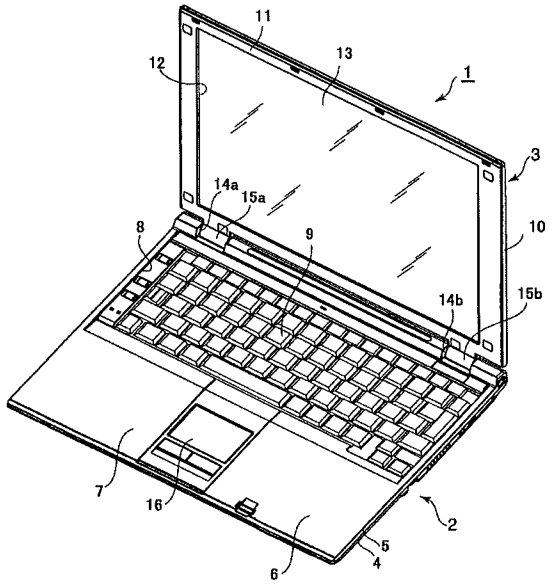
【図４】上ケースと下ケースと回路基板とを結合した状態を示す断面図。

【符号の説明】

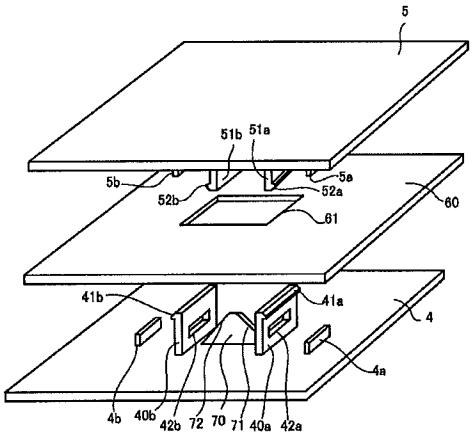
【００２２】

１…ノート型コンピュータ（電子機器）、２…本体筐体、３…表示部筐体、４…下ケース（第１の部材）、５…上ケース（第２の部材）、４ａ，４ｂ、５ａ，５ｂ…台座、６…上面、７…パームレスト、８…キーボード載置部、９…キーボード、１０…表示部ケース、１１…表示マスク、１３…表示パネル（ＬＣＤ）、一対の第１の係合突起４０ａ，４０ｂ、４１ａ，４１ｂ…係合爪、４２ａ，４２ｂ…係合孔、４３ａ，４３ｂ…係合部、５１ａ，５１ｂ…一対の第２の係合突起、５２ａ，５２ｂ…係合爪、５３ａ，５３ｂ、５４ａ，５４ｂ…傾斜面、５５ａ，５５ｂ…先端、６０…回路基板（第３の部材）、６１…貫通口、７０…係止片、７１，７２…傾斜面

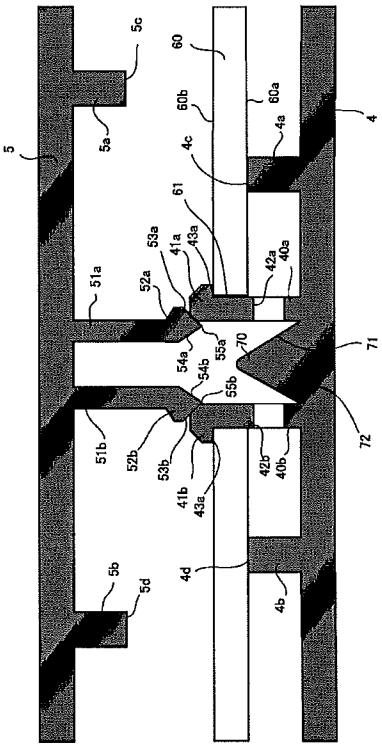
【図１】



【図２】



【図３】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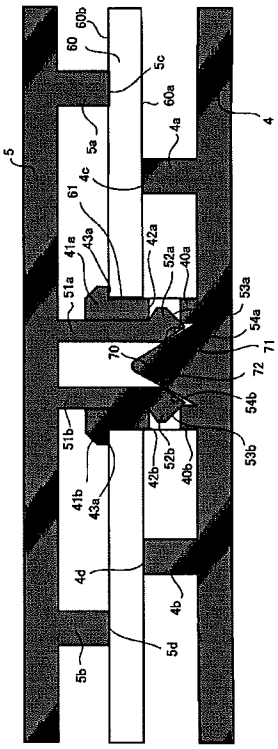
60
60b
60a
4a
4
5
5a
4c
61
53a
41a
43a
42a
40a
51a
52a
54a
54b
55a
70
71
55b
72
51b
52b
53b
41b
43a
42b
40b
4d
4b
5b
5d

【図４】


60b
60
5c
60a
4a
4
5
5a
4c
61
41a
43a
42a
52a
40a
51a
53a
54a
71
70
72
54b
51b
53b
41b
43a
42b
52b
40b
4d
4b
5d
5b

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]
A first component by which pair of first engagement protrusion that separated mutually and was provided was provided while an opening was provided, respectively,
A second component by which pair of second engagement protrusion was provided while opposing with said first component,
It has the 3rd component with a penetrating port,
While penetrating to the aforementioned penetrating port, carrying out engagement of said pair of first engagement protrusion to an edge of the aforementioned penetrating port and inserting said pair of second engagement protrusion between said pair of first engagement protrusion, Fixing structure fixing said 3rd component between said first component and a second component by engagement being carried out to an opening of said pair of first engagement protrusion.
[Claim 2]
In the state where said first case and a locking piece integrally formed were provided between said pair of engagement protrusion, and engagement of said pair of second engagement protrusion was carried out to the aforementioned opening of said pair of first engagement protrusion, The fixing structure according to claim 1, wherein the aforementioned locking piece is placed between said pair of second engagement protrusion.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
The present invention starts electronic devices, such as a notebook computer, and relates to the fixing structure of three components especially.
[Background of the Invention]
[0002]
Generally, notebook computer **** and a notebook type personal computer (a computer is called hereafter) have a main part and the display part combined with this main part rotatable. Usually, the housing is formed because body casing and a display part housing combine two cases. For example, the display part housing has a display mask combined with the display part case where a display panel is mounted, and this display part case. The combination with a display mask and a display part case forms the display part housing by fixing a display part case and a display mask with screws, after combining with a display part case the latch provided by the display mask (see Patent Document 1).
[Patent document 1] JP,2004-280331,A (the paragraph numbers 0039 and 0049, Fig.6, eight references)
[Description of the Invention]
[Problem to be solved by the invention]
[0003]
Although it is possible to combine a display mask and a display part case with a Patent document 1 firmly via a screw by the conventional method of a description, In order to require screw clamp work out of a latch joint process and to require the work which sticks on a screw the shock absorbing material (rubber etc.) for the impact absorption produced when a display part housing is further closed to body casing, it is not preferable in respect of the product made from an assembly, and cost.
Then, an object of the present invention is to provide the product made from an assembly at the time of combining two cases, and the fixing structure of a housing preferable in respect of cost.
[Means for solving problem]
[0004]
To achieve the above objects, the fixing structure of the present invention, While opposing with the first component by which the pair of first engagement protrusion that separated mutually and was provided was provided while the opening was provided, respectively, and a first component, Have the second component by which pair of second engagement protrusion was provided, and the 3rd component with a penetrating port, and pair of first engagement protrusion, While penetrating to a penetrating port, carrying out engagement to the edge of a penetrating port and inserting pair of second engagement protrusion between pair of first engagement protrusion, the 3rd component is

fixed between a first component and second component by engagement being carried out to the opening of pair of first engagement protrusion.

[Effect of the Invention]

[0005]

According to the present invention, it is possible to provide the product made from an assembly at the time of combining two cases and the fixing structure of a housing preferable in respect of cost.

[Best Mode of Carrying Out the Invention]

[0006]

Hereafter, with reference to Drawings, it describes in detail about the embodiment of the present invention. Fig.1 is a perspective view of an electronic device.

[0007]

The notebook computer (electronic device) 1 has the body casing 2 and the display part housing 3 combined with this body casing 2. The body casing 2 has the lower case (first component) 4 and the upper case (second component) 5 combined with this lower case 4. The palm rest 7 is provided by all of the upper surfaces 6 of the upper case 5. The keyboard placing part 8 is provided by the upper surface 6, and the keyboard 9 is mounted on this keyboard placing part 8 freely attachable/detachable. The pointing device 16 is provided by the approximately center of the palm rest 7.

[0008]

The display part housing 3 has the display part case 10, and the display mask 11 is combined with this display part case 10. The display panel (LCD) 13 is built in in the display part housing formed with the display part case 10 and the display mask 11. The opening 12 for the display mask 11 to expose the display surface of LCD13 is provided.

[0009]

The pair of bond parts 14a and 14b formed in the concave for combining the display part housing 3 with the rear part of the body casing 2 are provided. The display part housing 3 has the pair of legs 15a and 15b combined with the bond parts 14a and 14b. The display part housing 3 becomes rotatable to the body casing 2 by the bond parts 14a and 14b and the legs 15a and 15b being combined by the hinge device which is not illustrated.

[0010]

Fig.2 is an exploded perspective view showing an upper case, a lower case, and a circuit board. The circuit board (the 3rd component) 60 is built in body casing 2 inside. From the inner surface of the lower case 4, the bases 4a and 4b project and are formed. The bases 4a and 4b are integrally formed with the lower case 4. The pair of first engagement protrusion 40a and 40b is further integrally formed by the inner surface of the lower case 4 with the lower case 4. At the tip of these 1st engagement protrusion 40a and 40b, the engaging pawls 41a and 41b are provided. Furthermore, the engagement holes 42a and 42b are provided by the engagement protrusion 40a and 40b. Between the pair of engagement protrusion 40a and 40b, the locking piece 70 is integrally formed with the lower case. The locking piece 70 is formed on the triangle and has the inclined planes 71 and 72.

[0011]

The penetrating port 61 of the size which can penetrate the pair of engagement protrusion 40a and 40b is provided by the circuit board 60.

[0012]

The bases 5a and 5b are projected and formed in the inner surface of the upper case 5. The bases 5a and 5b are integrally formed with the upper case 5. The pair of second engagement protrusion 51a and 51b is further integrally formed by the inner surface of the upper case 5 with the upper case 5. At the tip of these 2nd engagement protrusion 51a and 51b, the engaging pawls 52a and 52b are provided.

[0013]

Fig.3 is a cross sectional view showing the state before combining an upper case with the lower case in the state where the circuit board was mounted. Fig.4 is a cross sectional view showing the state where the upper case, the lower case, and the circuit board were combined.

[0014]

First, as shown in Fig.3, the circuit board 60 is mounted in the lower case 4. It mounts so that the penetrating port 61 of a circuit board may be made to penetrate the pair of first engagement protrusion 40a and 40b. The first engagement protrusion 40a and 40b is inserted in the penetrating port 61 of the circuit board 60 until it abuts the upper surfaces 4c and 4d of the bases 4a and 4b which the lower surface 60a of the circuit board 60 has projected from the lower case 4 at this time. Although a graphic display is not carried out, what is necessary is just to arrange a base suitably in accordance with the size of a circuit board, and it is doubled not only with two but with rigidity and specification, and should arrange only a required number.

[0015]

If the circuit board 60 is mounted until it abuts the bases 4a and 4b, engagement of the engaging pawls 41a and 51b of the pair of first engagement protrusion 40a and 40b will be carried out to the edge of the penetrating port of the circuit board 60. The engagement parts 43a and 43b are provided by the engaging pawls 41a and 41b, and the circuit board 60 will be reliably mounted in the lower case 4 by engagement of these engagement parts 43a and 43b being carried out to the edge of the penetrating port 61. Since the process of fixing a circuit board with a screw will become unnecessary so that it may be the former if the engaging structure of this penetrating port 60 and the pair of first engagement protrusion 40a and 40b is united with the size of the circuit board 60 and four angles, near a center, etc. apply it suitably, cost and assembly nature become good.

[0016]

Next, after the circuit board 60 is mounted in the lower case 4, it describes about the method of combining the upper case 5 with the lower case 4. The engaging pawls 52a and 52b of the pair of second engagement protrusion 51a and 51b of the upper case 5, It has the inclined planes 53a and 53b which incline toward a way outside the pair of second engagement protrusion 51a and 51b, and the inclined planes 54a and 54b sloping toward the inner direction of the pair of second engagement protrusion 51a and 51b. The interval at the tips 55a and 55b which comprise the inclined planes 53a and 53b and the inclined planes 54a and 54b, respectively is narrower than the interval of pair of first engagement protrusion 40a40b. Therefore, the inclined planes 53a and 53b enter into the side to which the first engagement protrusion 40a and 40b opposes mutually. If the upper case 5 is pushed in, the inclined planes 53a and 53b will push in the upper case 5 in the lower case 4 direction further in the state of carrying out elastic deformation in the direction which approaches mutually the first engagement protrusion 40a and 40b.

[0017]

If the upper case 5 is pushed in as shown in Fig.4, the inclined planes 54a and 54b of the second engagement protrusion 51a and 51b will abut the inclined planes 71 and 72 of the locking piece 70. If the upper case 5 is pushed in further, the inclined planes 54a and 54b will come to be pushed in the first engagement protrusion 40a and the direction of 40b by the inclined planes 71 and 72 of the locking piece 70. Therefore, the engaging pawls 52a and 52b of the second engagement protrusion 51a and 51b enter the engagement holes 42a and 42b of the first engagement protrusion 40a and 40b, and engagement of the first engagement protrusion 40a and 40b and the second engagement protrusion 51a and 51b is carried out. Since the locking piece 70 furthermore exists between second engagement protrusion, the engagement of the first engagement protrusion 40a and 40b and the second engagement protrusion 51a and 51b is not released by preparation. As for the bases 5a and 5b currently provided by upper case 5 inner surface, the upper surface 60b of the circuit board 60 is abutted. The circuit board 60 is reliably fixed by such composition between the upper case 5 and the lower case 4.

[0018]

By composition which was described above, the engagement of the circuit board which is placed the combination with an upper case and a lower case and an upper case, a lower case, and between them is easily combinable.

[0019]

Although it described about combination of the upper case, the lower case, and the circuit board in this embodiment, it may be used, other component parts, for example, hinge device etc., etc., and may apply to a change of a circuit board at combination of only an upper case and a lower case. When attaching parts to the inner surface of an upper case or a lower case, it may be made to combine the separate part for attaching an upper case or a lower case, component parts, and component parts to an upper case or a lower case. In this case, first engagement protrusion can be provided to a separate part at an upper case or a lower case, second engagement protrusion can be earned to a separate part, and it can join together easily like carrying of this enforcement by providing a penetrating port to component parts.

[0020]

As described above, it is possible to combine each other easily, without using a screw as much as possible in combination of two or three parts.

[Brief Description of the Drawings]

[0021]

[Drawing 1]The perspective view of an electronic device.

[Drawing 2]The exploded perspective view showing an upper case, a lower case, and a circuit board.

[Drawing 3]The cross sectional view showing the state before combining an upper case with the lower case in the state where the circuit board was mounted.

[Drawing 4]The cross sectional view showing the state where the upper case, the lower case, and the circuit board were combined.

[Explanations of letters or numerals]

[0022]

1 -- notebook computer (electronic device), 2 -- body casing, 3 -- display part housing, 4 -- lower case (first component), 5 -- an upper case (second component), and 4a and 4b, 5a and 5b -- a base and 6 -- the upper surface and 7 -- a palm rest and 8 -- a keyboard placing part -- 9 -- keyboard, 10 -- display part case, 11 -- display mask, 13 -- display panel (LCD), Pair of first engagement protrusion 40a, 40b, 41a, and 41b -- An engaging pawl, 42a, 42b -- Engagement hole, 43a and 43b -- an engagement part, and 51a and 51b -- pair of second engagement protrusion, and 52a and 52b -- an engaging pawl, and 53a, 53b, 54a and 54b -- an inclined plane, and 55a and 55b -- a tip and 60 -- a circuit board (the 3rd component) and 61 -- a penetrating port and 70 -- a locking piece, and 71 and 72 -- an inclined plane

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[Translation done.]

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CALSONIC KANSEI CORP [SUZUKI HITOSHI]
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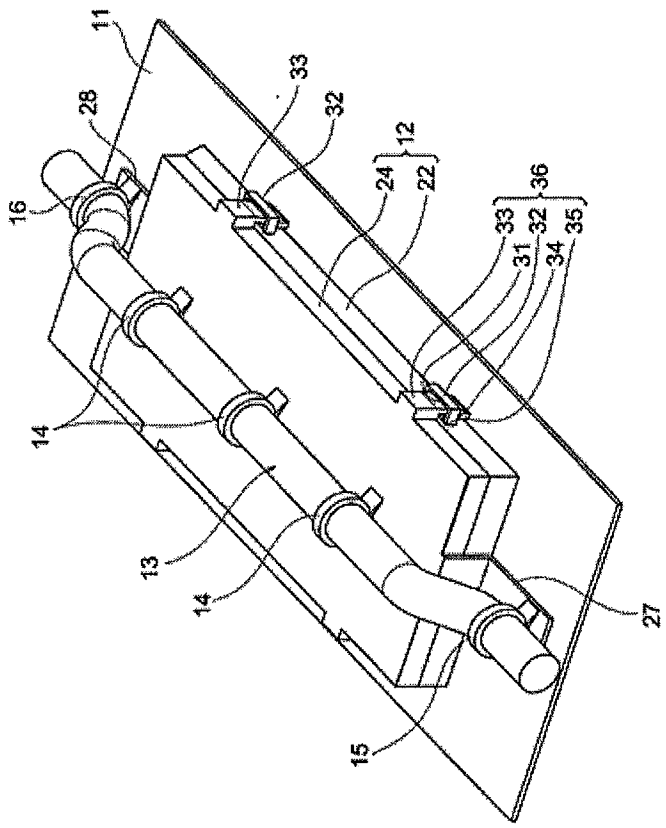
DISASSEMBLABLE MOUNTING STRUCTURE OF ELECTRIC CONNECTION BOX

[57]ABSTRACT:

PROBLEM TO BE SOLVED: To simultaneously disassemble an electric connection box when the electric connection box is mainly removed.SOLUTION: The electric connection box 12 comprises a case body 22 which is arranged so as to abut on a mounting base 11, and can accommodate and hold a circuit board 21, and a lid body 24. The lid body 24 has a locking hole 26 which locks a clip member 14 mounted to a harness 13, and a lid-side mounting piece 27 which can be mounted to the mounting base 11 by another clip member 15, the case body 22 has a body-side mounting piece 28 which can be mounted to the mounting base 11 by still another clip member 16, an outward protrusion 32 is formed at the external side of the case body 22, a case-fixing claw piece 33 is protrusively arranged at the lid body 24, a claw-fixing protrusion 35 which can constrain the retreat of the case-fixing claw piece 33 is protrusively formed at the mounting base 11, a board lower-part supporting part 41 and a board-fixing claw piece 42 are protrusively arranged in the case body 22, and a claw stopper 44 which can regulate the retreat of the board-fixing claw piece 42 is protrusively arranged in the lid body 24.COPYRIGHT: (C)2009,JPO&INPIT



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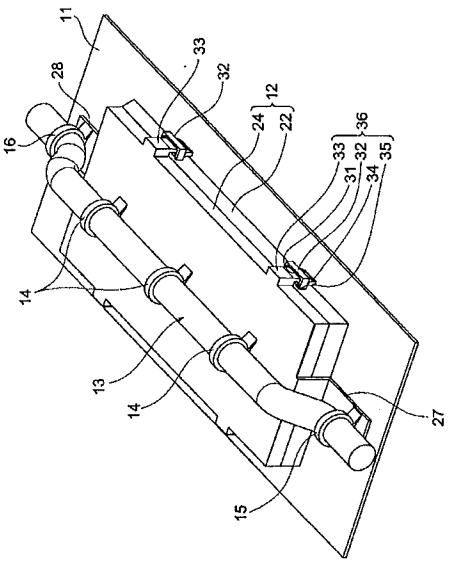
最終頁に続く

(54)【発明の名称】電気接続箱の分解可能取付構造

(57)【要約】
【課題】主に、電気接続箱の取外時に、電気接続箱が同時に分解されるようにする。
【解決手段】電気接続箱１２が、取付土台部１１に当接配設されて回路基板２１を収容保持可能なケース本体２２と、蓋体２４とを備え、蓋体２４が、ハーネス１３に取付けられたクリップ部材１４に対する係止穴２６と、別のクリップ部材１５によって取付土台部１１へ取付可能な蓋側取付片２７とを備え、ケース本体２２が、更に別のクリップ部材１６によって取付土台部１１へ取付可能な本体側取付片２８を備え、ケース本体２２の外側部に外方突起部３２が設けられ、蓋体２４にケース固定用爪片３３が突設され、取付土台部１１にケース固定用爪片３３の退避を拘束可能な爪固定用突起部３５が突設され、ケース本体２２の内部に、基板下部支持部４１と基板固定用爪片４２とが突設され、蓋体２４の内部に、基板固定用爪片４２の退避を規制可能な爪ストッパ４４が突設されるようにしている。
【選択図】図１



【特許請求の範囲】
【請求項１】
取付土台部に、電気接続箱を配置し、該電気接続箱を、取付土台部に沿って配索されたハーネスで押えると共に、ハーネスに取付けられた複数のクリップ部材で係止固定する電気接続箱の分解可能取付構造であって、
電気接続箱が、取付土台部に当接配設されて回路基板を収容保持可能なケース本体と、ケース本体の取付土台部とは反対側に設けられた開口部に対して着脱自在に嵌合される蓋体とを備え、
蓋体が、少なくともその中間部に、前記クリップ部材に対する係止穴を備えると共に、蓋体が、その一端部のみに、別の前記クリップ部材によって取付土台部へ取付可能な蓋側取付片を備え、ケース本体が、その他端部のみに、更に別の前記クリップ部材によって取付土台部へ取付可能な本体側取付片を備え、
ケース本体の外側部に、爪穴部を有する外方突起部が設けられ、蓋体に、爪穴部へ挿入係止可能なケース固定用爪片が突設され、爪穴部とケース固定用爪片との間に、ケース固定用爪片が係止保持状態を解除する方向へ退避可能な爪片退避用間隙部が形成され、取付土台部に、爪片退避用間隙部へ差込まれることにより、ケース固定用爪片の退避を拘束可能な爪固定用突起部が突設され、
ケース本体の内部に、回路基板の下部を支持可能な基板下部支持部が設けられ、ケース本体の内部に、回路基板の上側部を係止保持可能な基板固定用爪片が突設され、ケース本体と基板固定用爪片との間に、基板固定用爪片が係止保持状態を解除する方向へ退避可能な爪片退避用空間が形成され、蓋体の内部に、爪片退避用空間へ差込まれることにより、基板固定用爪片の退避を規制可能な爪ストッパが突設されたことを特徴とする電気接続箱の分解可能取付構造。
【発明の詳細な説明】
【技術分野】
【０００１】
この発明は、電気接続箱の分解可能取付構造に関するものである。
【背景技術】
【０００２】
自動車などの車両には、多数の電気接続箱が取付けられている。このような電気接続箱には、車体に対して容易に取外すことができるように取付けられたものが存在している（例えば、特許文献１参照）。
【０００３】
この文献に記載された電気接続箱の取外可能取付構造では、図１２、図１３に示すように、取付土台部１に対して電気接続箱２が配設される。そして、この電気接続箱２に設けられた複数のコネクタ３に対し、複数本のハーネス４の先端に取付けられたコネクタ部５がそれぞれ結合される。更に、各ハーネス４に取付けられたクリップ部材６を用いて、電気接続箱２の両端部に設けられた複数の取付片７が取付土台部１に設けられた係止孔８へ固定される。
【０００４】
このような構成によれば、電気接続箱２の両端部に設けられた複数の取付片７と取付土台部１との間に、各ハーネス４に取付けられたクリップ部材６を挿入係止させることにより、電気接続箱２を取付土台部１に簡単且つ確実に固定することができる。
【０００５】
反対に、各ハーネス４を引張って、クリップ部材６を外すか或いはクリップ部材６を破壊することにより、電気接続箱２を取付土台部１から容易に取外すことができる。
【特許文献１】特許第３７０７３８７号
【発明の開示】
【発明が解決しようとする課題】
【０００６】

しかしながら、上記特許文献１に記載された電気接続箱の取外可能取付構造では、取付土台部１からの取外時に、電気接続箱２自体を分解させることができなかったので、取外した電気接続箱２に対して、後工程で分解する作業が必要となり、その分、工程数が増えると共に、分解作業に時間や手間を要するという問題があった。

【課題を解決するための手段】

【０００７】

上記課題を解決するために、請求項１に記載された発明では、取付土台部に、電気接続箱を配置し、該電気接続箱を、取付土台部に沿って配索されたハーネスで押えると共に、ハーネスに取付けられた複数のクリップ部材で係止固定する電気接続箱の分解可能取付構造であって、電気接続箱が、取付土台部に当接配設されて回路基板を収容保持可能なケース本体と、ケース本体の取付土台部とは反対側に設けられた開口部に対して着脱自在に嵌合される蓋体とを備え、蓋体が、少なくともその中間部に、前記クリップ部材に対する係止穴を備えると共に、蓋体が、その一端部のみに、別の前記クリップ部材によって取付土台部へ取付可能な蓋側取付片を備え、ケース本体が、その他端部のみに、更に別の前記クリップ部材によって取付土台部へ取付可能な本体側取付片を備え、ケース本体の外側部に、爪穴部を有する外方突起部が設けられ、蓋体に、爪穴部へ挿入係止可能なケース固定用爪片が突設され、爪穴部とケース固定用爪片との間に、ケース固定用爪片が係止保持状態を解除する方向へ退避可能な爪片退避用間隙部が形成され、取付土台部に、爪片退避用間隙部へ差込まれることにより、ケース固定用爪片の退避を拘束可能な爪固定用突起部が突設され、ケース本体の内部に、回路基板の下部を支持可能な基板下部支持部が設けられ、ケース本体の内部に、回路基板の上側部を係止保持可能な基板固定用爪片が突設され、ケース本体と基板固定用爪片との間に、基板固定用爪片が係止保持状態を解除する方向へ退避可能な爪片退避用空間が形成され、蓋体の内部に、爪片退避用空間へ差込まれることにより、基板固定用爪片の退避を規制可能な爪ストッパが突設されたことを特徴としている。

【発明の効果】

【０００８】

請求項１の発明によれば、上記構成により、以下のような作用効果を得ることができる。即ち、取付土台部から電気接続箱を取外すことによって、同時に、電気接続箱を分解させることが可能となる。これにより、分解工程が不要となるため、工程数が削減されると共に、分解作業が不要となり、分解作業に要していた時間や手間を省略することができる。

【発明を実施するための最良の形態】

【０００９】

以下、本発明を具体化した実施例について、図示例と共に説明する。

【実施例】

【００１０】

図１～図１０は、この発明の実施例を示すものである。

【００１１】

まず、構成について説明する。

【００１２】

自動車などの車両に対し、電気接続箱を、車体に対して容易に取外すことができるように取付ける。

【００１３】

即ち、図１、図２に示すように、取付土台部１１に、電気接続箱１２を配置する。そして、電気接続箱１２を、取付土台部１１に沿って配索されたハーネス１３で押えるようにする。更に、ハーネス１３に取付けられた複数のクリップ部材１４～１６で係止固定するようにする。なお、取付土台部１１は、車体パネルやステアリングサポートメンバなどの車体強度部材などとすることができる。クリップ部材１４～１６は、クリップ部とバンド部とを一体に有すると共に、バンド部によってハーネス１３に結着し得るようなものとさ

れている。

【００１４】

より具体的には、電気接続箱１２は、少なくとも、取付土台部１１に当接配設されて回路基板２１を収容保持可能なケース本体２２（或いは、ロワケース）と、ケース本体２２の取付土台部１１とは反対側に設けられた開口部２３に対して着脱自在に嵌合される蓋体２４（或いは、アッパケース）とを備えている。

【００１５】

そして、蓋体２４は、少なくともその中間部に、クリップ部材１４に対する係止穴２６を備えている。また、蓋体２４は、その一端部のみに、別のクリップ部材１５によって取付土台部１１へ取付可能な蓋側取付片２７を備えている。更に、ケース本体２２は、その他端部のみに、更に別のクリップ部材１６によって取付土台部１１へ取付可能な本体側取付片２８を備えている。蓋側取付片２７は、蓋体２４を単独で取付土台部１１に取付けるようにするものである。本体側取付片２８は、ケース本体２２を単独で取付土台部１１に取付けるようにするものである。

【００１６】

また、ケース本体２２の外側部には、爪穴部３１を有する外方突起部３２が設けられている。また、蓋体２４には、爪穴部３１へ挿入係止可能なケース固定用爪片３３が突設されている。そして、爪穴部３１とケース固定用爪片３３との間には、ケース固定用爪片３３が係止保持状態を解除する方向へ退避可能な爪片退避用間隙部３４が形成されている。更に、取付土台部１１には、爪片退避用間隙部３４へ差込まれることにより、ケース固定用爪片３３の退避を拘束可能な爪固定用突起部３５が突設されている。これらにより、外側分解可能取付構造部３６が構成されている。

【００１７】

この場合、外方突起部３２は、平面視ほぼコ字状などを呈している。ケース固定用爪片３３は、取付土台部１１とほぼ面直な方向、或いは、ケース本体２２に対する蓋体２４の着脱方向に向けて延設されている。爪固定用突起部３５は、取付土台部１１に設けられた切起片などとされている。爪固定用突起部３５は、その先端を尖らせるようにしても良い。ケース固定用爪片３３と爪固定用突起部３５とは、ほぼ平行に設けられている。

【００１８】

上記とは別に、ケース本体２２の内部には、回路基板２１の下部を支持可能な基板下部支持部４１が設けられている。また、ケース本体２２の内部には、回路基板２１の上側部を係止保持可能な基板固定用爪片４２が突設されている。そして、ケース本体２２と基板固定用爪片４２との間に、基板固定用爪片４２が係止保持状態を解除する方向へ退避可能な爪片退避用空間４３が形成され、蓋体２４の内部に、爪片退避用空間４３へ差込まれることにより、基板固定用爪片４２の退避を規制可能な爪ストッパ４４が突設されている。これらにより、内側分解可能取付構造部４６が構成されている。

【００１９】

この場合、基板固定用爪片４２および爪ストッパ４４とは、ケース固定用爪片３３および爪固定用突起部３５と、ほぼ平行に設けられている。

【００２０】

外側分解可能取付構造部３６と内側分解可能取付構造部４６とは、ほぼ同じ位置に設けられている。この場合には、これらは、電気接続箱１２の両側部における、各コーナー部分の近傍に対して、４箇所設けられている。

【００２１】

次に、この実施例の作用について説明する。

【００２２】

電気接続箱１２を取付土台部１１に取付ける場合、先ず、以下のようにして電気接続箱１２を組立てる。

【００２３】

ケース本体２２の内部に回路基板２１を収容して、回路基板２１の下部を基板下部支持

部４１で支持させると共に、回路基板２１の上側部を基板固定用爪片４２で係止させる。

【００２４】

次に、ケース本体２２の取付土台部１１とは反対側に設けられた開口部２３に対して蓋体２４を嵌着する。

【００２５】

この時、蓋体２４の内部に突設された爪ストッパ４４が、ケース本体２２と基板固定用爪片４２との間に形成された爪片退避用空間４３へ差込まれることにより、基板固定用爪片４２の退避が規制され、基板固定用爪片４２が係止状態にてロックされる。これにより、回路基板２１がケース本体２２に確実に保持される。

【００２６】

また、ケース本体２２の外側部に設けられた外方突起部３２の爪穴部３１に、蓋体２４から突設されたケース固定用爪片３３が挿入係止される。

【００２７】

このようにして、組立てられた電気接続箱１２を、取付土台部１１の所定の位置に当接配置する。

【００２８】

この時、取付土台部１１に突設された爪固定用突起部３５が、爪穴部３１とケース固定用爪片３３との間に形成された爪片退避用間隙部３４へ差込まれることにより、ケース固定用爪片３３の退避が拘束され、ケース固定用爪片３３が係止保持状態にてロックされる。これにより、ケース本体２２と蓋体２４とが確実に固定される。また、電気接続箱１２が、取付土台部１１に一部拘束された状態となる。

【００２９】

そして、電気接続箱１２を、取付土台部１１に沿って配索されたハーネス１３で上から押えるようにする。

【００３０】

この時、ハーネス１３に取付けられた複数のクリップ部材１４～１６で係止固定を行う。即ち、蓋体２４の中間部に設けられた係止穴２６にクリップ部材１４を挿入係止すると共に、蓋体２４の一端部のみに設けられた蓋側取付片２７を、別のクリップ部材１５によって取付土台部１１へ取付け、且つ、ケース本体２２の他端部のみに設けられた本体側取付片２８を、更に別のクリップ部材１６によって取付土台部１１へ取付ける。

【００３１】

以上により、図１、図２に示すように、電気接続箱１２が取付土台部１１に確実に取付けられる。

【００３２】

そして、上記とは反対に、電気接続箱１２を取付土台部１１から取外す場合、図３、図４に示すように、ハーネス１３の一端側を上に引張って、例えば、蓋側取付片２７を取付土台部１１に取付けているクリップ部材１４を外すか或いはクリップ部材１４を破壊するようにする。

【００３３】

すると、電気接続箱１２の一端部と取付土台部１１との固定状態が解除されるので、電気接続箱１２の一端部が、取付土台部１１から僅かに浮いた状態となる。

【００３４】

そのまま、ハーネス１３を上に引張り続けると、ハーネス１３は、蓋体２４の中間部の係止穴２６とクリップ部材１４で繋がっているので、電気接続箱１２が、図５、図６に示すように、他端部の本体側取付片２８を中心として回動するように、斜めに持上げられる。

【００３５】

この時、取付土台部１１から突設された爪固定用突起部３５が、爪穴部３１とケース固定用爪片３３との間に形成された爪片退避用間隙部３４から引抜かれるため、ケース固定用爪片３３の退避が可能となり、ケース固定用爪片３３が係止保持状態を解除可能となる

。これにより、ケース本体２２と蓋体２４との固定状態も解除可能となる。

【００３６】

更に、ハーネス１３の一端側を上に引張り続けると、電気接続箱１２の持上げ角度が大きくなるため、図７、図８に示すように、蓋体２４に対するケース本体２２や回路基板２１の自重などの影響が大きくなり、ケース本体２２と蓋体２４との固定状態が解除されて、ケース本体２２と蓋体２４とが分離される。

【００３７】

このように、ケース本体２２と蓋体２４とが分離されると、更に、蓋体２４の内部に突設された爪ストッパ４４が、ケース本体２２と基板固定用爪片４２との間に形成された爪片退避用空間４３から引抜かれるため、図９、図１０に示すように、基板固定用爪片４２の退避が可能となり、基板固定用爪片４２が係止状態を解除可能となる。これにより、ケース本体２２による回路基板２１の係止状態が解除されて、回路基板２１がケース本体２２から分離される。

【００３８】

更に、ハーネス１３を上に引張ると、最後に、本体側取付片２８を取付土台部１１に取付けているクリップ部材１６が外れるか或いはクリップ部材１６が破壊される。

【００３９】

すると、電気接続箱１２の他端部と取付土台部１１との固定状態が解除されるので、電気接続箱１２が、取付土台部１１から完全に取外される。

【００４０】

この時、回路基板２１とケース本体２２とは、取付土台部１１およびハーネス１３に対し、それぞれ単独状態となる。そして、蓋体２４のみが、クリップ部材１４によってハーネス１３に繋がっている状態になるので、蓋体２４を手などで引張ることにより、クリップ部材１４が外れるか或いはクリップ部材１４が破壊されるので、蓋体２４がハーネス１３から分離されることとなる。

【００４１】

以上により、電気接続箱１２は、完全に分解される。なお、ハーネス１３は、本体側取付片２８の側から外すようにしても良い。

尚、上記実施例では、ケース本体２２の内部の、回路基板２１の上側部を係止保持可能な基板固定用爪片４２は、ケース固定用爪片３３および爪固定用突起部３５とほぼ平行に形成し、回路基板２１をケース本体２２に挿入する時に基板固定用爪片４２を撓ませて（弾性変形させて）係合する構造になっているが、図１３に示すように、基板固定用爪片４２bをケース本体の外側へ傾斜させて形成し、回路基板２１をケース本体２２への組み付ける時に、基板固定用爪片４２を撓ませることなく回路基板２１を組み付け、その後、爪片退避用空間４３に蓋体２４側の爪ストッパ４４を差込む事により、基板固定用爪片４２bを回路基板側に倒し、係合状態にロックさせてもよい。

【００４２】

このように、この実施例によれば、取付土台部１１に、電気接続箱１２を配置し、電気接続箱１２を、取付土台部１１に沿って配索されたハーネス１３で押えると共に、ハーネス１３に取付けられた複数のクリップ部材１４～１６で係止固定する電気接続箱の分解可能取付構造であって、電気接続箱１２が、取付土台部１１に当接配設されて回路基板２１を収容保持可能なケース本体２２と、ケース本体２２の取付土台部１１とは反対側に設けられた開口部２３に対して着脱自在に嵌合される蓋体２４とを備え、蓋体２４が、少なくともその中間部に、クリップ部材１４に対する係止穴２６を備えると共に、蓋体２４が、その一端部のみに、別のクリップ部材１５によって取付土台部１１へ取付可能な蓋側取付片２７を備え、ケース本体２２が、その他端部のみに、更に別のクリップ部材１６によって取付土台部１１へ取付可能な本体側取付片２８を備え、ケース本体２２の外側部に、爪穴部３１を有する外方突起部３２が設けられ、蓋体２４に、爪穴部３１へ挿入係止可能なケース固定用爪片３３が突設され、爪穴部３１とケース固定用爪片３３との間に、ケース固定用爪片３３が係止保持状態を解除する方向へ退避可能な爪片退避用間隙部３４が形成

され、取付土台部１１に、爪片退避用間隙部３４へ差込まれることにより、ケース固定用爪片３３の退避を拘束可能な爪固定用突起部３５が突設され、ケース本体２２の内部に、回路基板２１の下部を支持可能な基板下部支持部４１が設けられ、ケース本体２２の内部に、回路基板２１の上側部を係止保持可能な基板固定用爪片４２が突設され、ケース本体２２と基板固定用爪片４２との間に、基板固定用爪片４２が係止保持状態を解除する方向へ退避可能な爪片退避用空間４３が形成され、蓋体２４の内部に、爪片退避用空間４３へ差込まれることにより、基板固定用爪片４２の退避を規制可能な爪ストッパ４４が突設されたことにより、以下のような作用効果を得ることができる。

【００４３】

即ち、取付土台部１１から電気接続箱１２を取外すことによって、同時に、電気接続箱１２を分解させることが可能となる。これにより、分解工程が不要となるため、工程数が削減されると共に、分解作業が不要となり、分解作業に要していた時間や手間を省略することができる。

【００４４】

以上、この発明の実施例を図面により詳述してきたが、実施例はこの発明の例示にしか過ぎないものであるため、この発明は実施例の構成にのみ限定されるものではなく、この発明の要旨を逸脱しない範囲の設計の変更等があってもこの発明に含まれることは勿論である。また、例えば、各実施例に複数の構成が含まれている場合には、特に記載がなくとも、これらの構成の可能な組合せが含まれることは勿論である。また、複数の実施例や変形例が示されている場合には、特に記載がなくとも、これらに跨がった構成の組合せのうちの可能なものが含まれることは勿論である。また、図面に描かれている構成については、特に記載がなくとも、含まれることは勿論である。

【図面の簡単な説明】

【００４５】

【図１】本発明の実施例にかかる電気接続箱の分解可能取付構造の取付状態の斜視図である。

【図２】図２の断面図である。

【図３】取外工程を示す斜視図である。

【図４】図３の断面図である。

【図５】図３に続く取外工程を示す斜視図である。

【図６】図５の断面図である。

【図７】図５に続く取外工程を示す斜視図である。

【図８】図７の断面図である。

【図９】図７に続く取外工程を示す斜視図である。

【図１０】図９の断面図である。

【図１１】本発明の変形例である。

【図１２】従来例にかかる電気接続箱の分解可能取付構造の分解斜視図である。

【図１３】図１２の側断面図である。

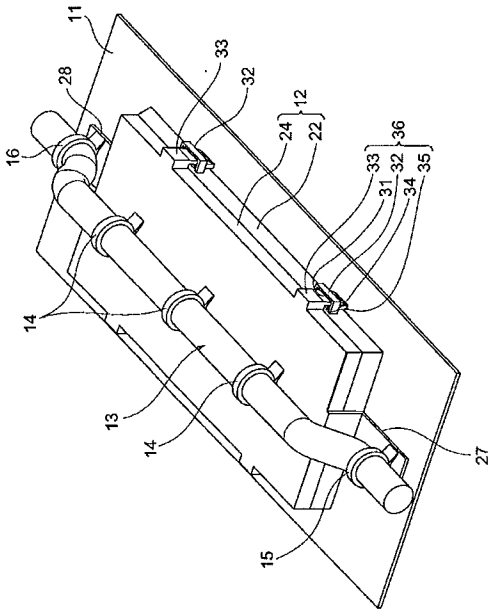
【符号の説明】

【００４６】

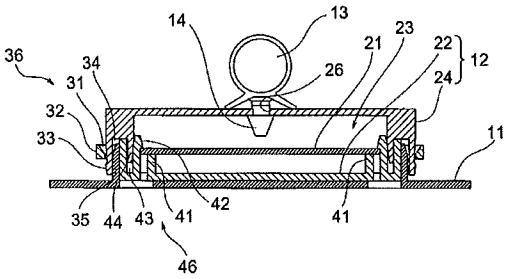
１１　取付土台部
１２　電気接続箱
１３　ハーネス
１４　クリップ部材
１５　クリップ部材
１６　クリップ部材
２１　回路基板
２２　ケース本体
２３　開口部
２４　蓋体

２６　係止穴
２７　蓋側取付片
２８　本体側取付片
３１　爪穴部
３２　外方突起部
３３　ケース固定用爪片
３４　爪片退避用間隙部
３５　爪固定用突起部
４１　基板下部支持部
４２　基板固定用爪片
４３　爪片退避用空間
４４　爪ストッパ

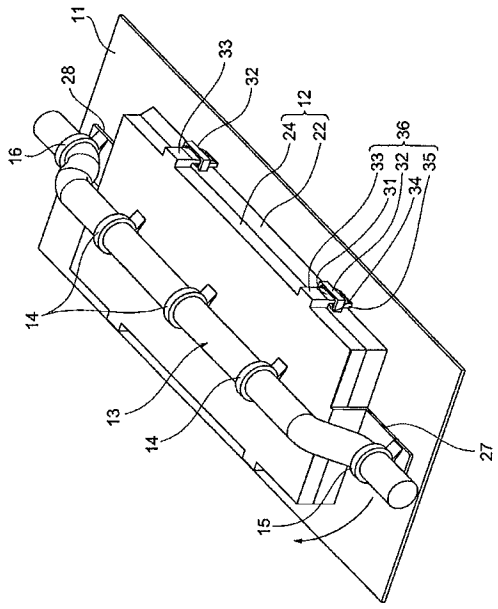
【図１】



【図２】



【図３】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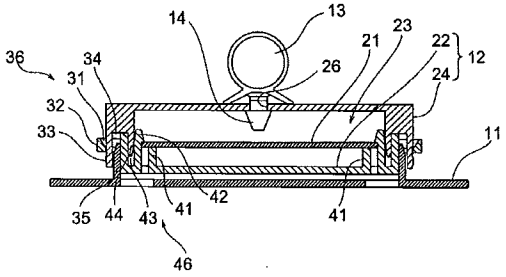
【図４】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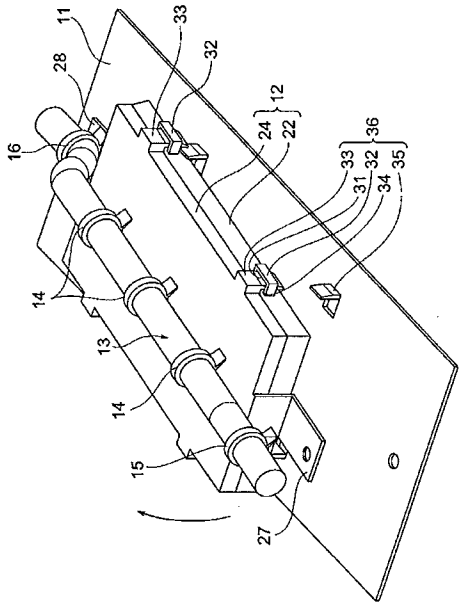
【図５】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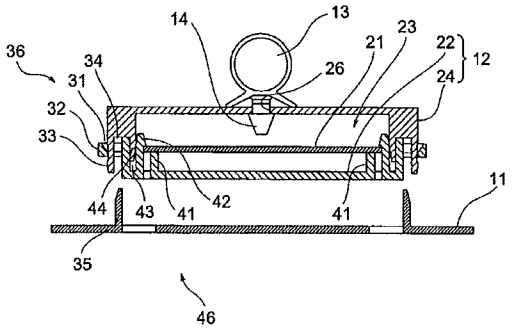
【図６】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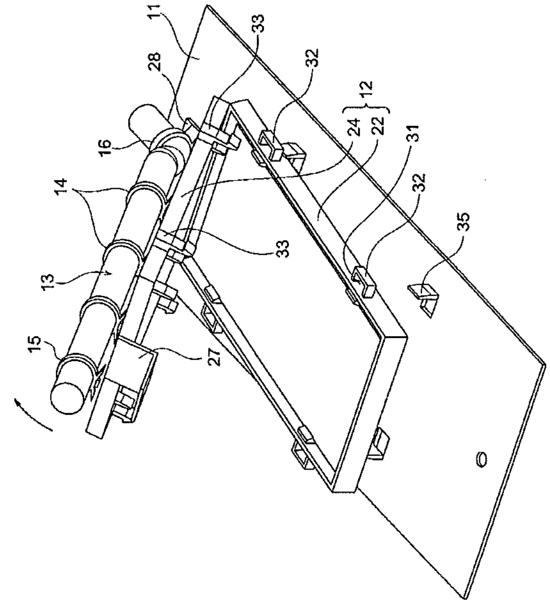
【図７】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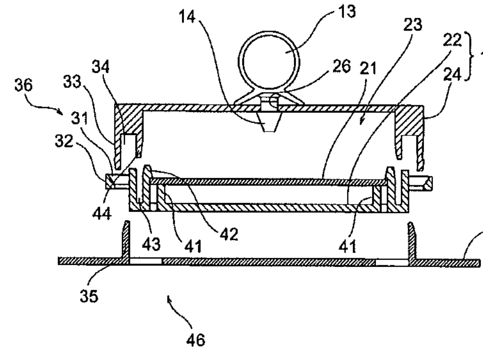
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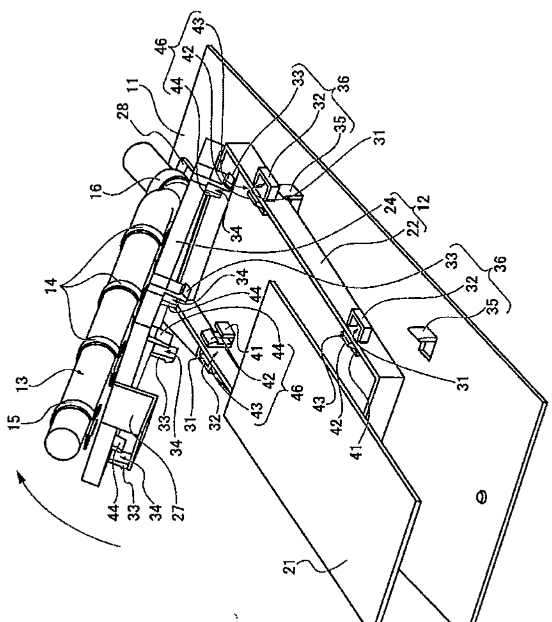
【図９】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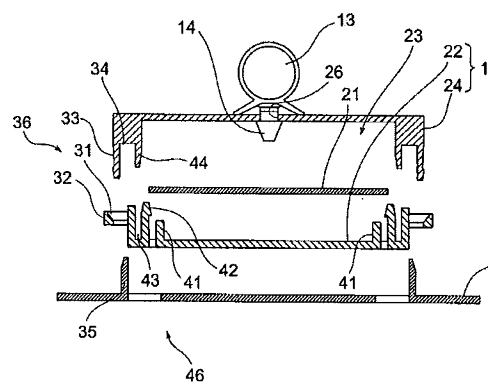
【図１０】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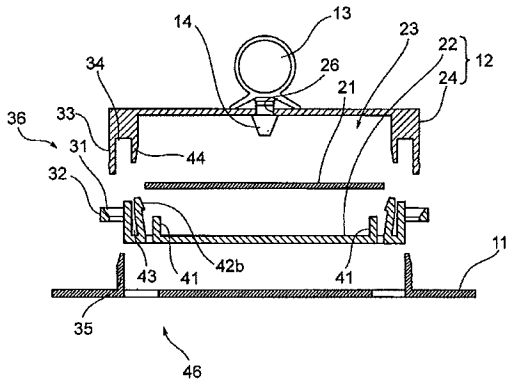
【図１１】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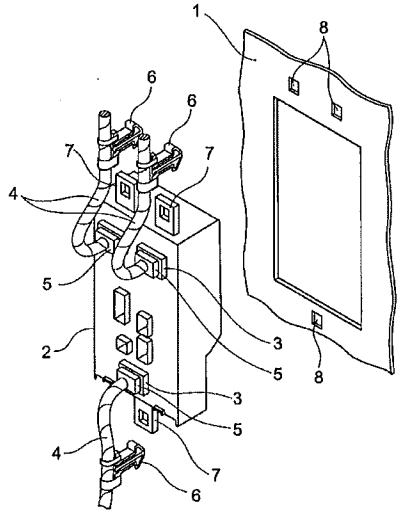
【図１２】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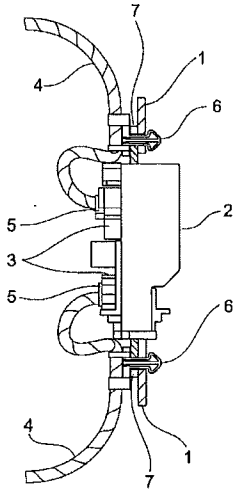
【図１３】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フロントページの続き

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Ｆターム(参考) 4E360 AB11 BA08 BC04 CA02 EA03 EA11 EA24 ED12 GA53 GB92
5G361 AA06 AC02 AC03 AC05 AD02

CLAIMS

[Claim(s)]
[Claim 1]
To an attachment base part, arrange an electric junction box, and this electric junction box is pressed down by harness cabled along with an attachment base part, and it is the fixing structure of an electric junction box which carries out a lock and fix by two or more clip components attached to harness which can be decomposed,
Abutment arrangement is carried out at an attachment base part, and an electric junction box is provided with a lid by which fitting is carried out freely attachable/detachable to an opening by which a case body in which housing and holding is possible, and an attachment base part of a case body were provided by opposite side in a circuit board,
At least, equip the pars intermedia with a locking hole to the aforementioned clip component, and a lid. A lid equips only the one end part with the lid side installation piece which can be attached to an attachment base part by the another aforementioned clip component, and a case body equips only the other end with the main part side installation piece which can be attached to an attachment base part by the another aforementioned clip component,
A method protruding part of outside which has a claw hole part in a lateral part of a case body is provided, and a claw piece for case fixing in which insertion locking is possible protrudes on a lid to a claw hole part, and to it between a claw hole part and a claw piece for case fixing, An interval part for claw piece evacuation which can evacuate in the direction in which a claw piece for case fixing releases a locking hold condition is formed, and a protruding part for nail fixing which can restrain evacuation of a claw piece for case fixing protrudes by being inserted in an attachment base part to an interval part for claw piece evacuation,
A substrate lower supporting part which can support the lower part of a circuit board inside a case body is provided, and a claw piece for substrate fixing in which locking holding is possible protrudes an upper section of a circuit board on an inside of a case body, and it between a case body and a claw piece for substrate fixing, Fixing structure of an electric junction box, wherein a nail stopper which can restrict evacuation of a claw piece for substrate fixing protrudes by forming space for claw piece evacuation which can be evacuated in the direction in which a claw piece for substrate fixing releases a locking hold condition, and being inserted in an inside of a lid in space for claw piece evacuation which can be decomposed.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
This invention relates to the fixing structure of an electric junction box which can be decomposed.
[Background of the Invention]
[0002]
The many electric junction box is attached to vehicles, such as an automobile. What was attached so that it could demount easily to a vehicle body exists in such an electric junction box (for example, see Patent Document 1).
[0003]
In the fixing structure of the electric junction box described in this document which can be removed, as shown in Fig.12 and Fig.13, the electric junction box 2 is arranged to the attachment base part 1.And the connector area 5 attached at the tip of two or more harness 4 is combined, respectively to two or more connectors 3 provided by this electric junction box 2. Two or more installation pieces 7 provided by the both ends of the electric junction box 2 are fixed to the engagement hole 8 provided by the attachment base part 1 using the clip component 6 attached to each harness 4.
[0004]
According to such composition, the electric junction box 2 can be fixed to the attachment base part 1 simply and reliably by carrying out insertion locking of the clip component 6 attached to each harness 4 between two or more installation pieces 7 and the attachment base part 1 which were provided by the both ends of the electric junction box 2.
[0005]
The electric junction box 2 can be easily demounted from the attachment base part 1 by tension removing the clip component 6 for each harness 4, or destroying the clip component 6 on the contrary.
[Patent document 1] Patent No. 3707387
[Description of the Invention]
[Problem to be solved by the invention]
[0006]
However, in the fixing structure of the electric junction box described in the above-mentioned Patent document 1 which can be removed, Since electric junction box 2 the very thing was not able to be made to decompose at the time of removal from the attachment base part 1, the work decomposed by a post process was needed to the demounted electric junction box 2, the part and a routing counter increased, and there was a problem that disassembling operation took time and time and effort.
[Means for solving problem]
[0007]

In order to solve an aforementioned problem, in invention described in Claim 1, To an attachment base part, arrange an electric junction box, and press down this electric junction box by the harness cabled along with the attachment base part, and. Are the fixing structure of the electric junction box which carries out a lock and fix by two or more clip components attached to harness which can be decomposed, and abutment arrangement is carried out at an attachment base part, and an electric junction box a circuit board The case body in which housing and holding is possible, Have a lid by which fitting is carried out to the attachment base part of a case body freely attachable/detachable to the opening provided by the opposite side, and a lid equips the pars intermedia with the locking hole to the aforementioned clip component at least, and. A lid equips only the one end part with the lid side installation piece which can be attached to an attachment base part by the another aforementioned clip component, A case body equips only the other end with the main part side installation piece which can be attached to an attachment base part by the another aforementioned clip component, The method protruding part of outside which has a claw hole part in the lateral part of a case body is provided, and the claw piece for case fixing in which insertion locking is possible protrudes on a lid to a claw hole part, and to it between a claw hole part and the claw piece for case fixing, By forming the interval part for claw piece evacuation which can evacuate in the direction in which the claw piece for case fixing releases a locking hold condition, and being inserted in an attachment base part to the interval part for claw piece evacuation, The protruding part for nail fixing which can restrain evacuation of the claw piece for case fixing protrudes, and inside a case body, The substrate lower supporting part which can support the lower part of a circuit board is provided, and the claw piece for substrate fixing in which locking holding is possible protrudes the upper section of a circuit board on the inside of a case body, and it between a case body and the claw piece for substrate fixing, It is characterized by the nail stopper which can restrict evacuation of the claw piece for substrate fixing protruding by forming space for claw piece evacuation which can be evacuated in the direction in which the claw piece for substrate fixing releases a locking hold condition, and being inserted in the inside of a lid in space for claw piece evacuation.

[Effect of the Invention]

[0008]

According to invention of Claim 1, the following operation effects can be obtained by the above-mentioned composition. That is, it becomes simultaneously possible by demounting an electric junction box from an attachment base part to make an electric junction box disassemble. Since a decomposition process becomes unnecessary by this, a routing counter is reduced, and disassembling operation becomes unnecessary and the time and time and effort which disassembling operation had taken can be omitted.

[Best Mode of Carrying Out the Invention]

[0009]

Hereafter, it describes with an illustrated example about the working example which materialized the present invention.

[Working example]

[0010]

Fig.1 - Fig.10 show the working example of this invention.

[0011]

First, it describes about composition.

[0012]

To vehicles, such as an automobile, it attaches so that an electric junction box can be easily demounted to a vehicle body.

[0013]

That is, as shown in Fig.1 and Fig.2, the electric junction box 12 is arranged to the attachment base part 11.And the electric junction box 12 is pressed down by the harness 13 cabled along with the attachment base part 11. It is made to carry out a lock and fix by two or more clip components 14-

16 attached to the harness 13. The attachment base part 11 can be used as body strength components, such as a car body panel and a steering support member, etc. A band part seems for the clip components 14-16 to have a clip part and a band part integrally, and to bind them to the harness 13.

[0014]

More specifically, at least, abutment arrangement is carried out at the attachment base part 11, and the electric junction box 12 is the case body 22 (or) in which housing and holding is possible about the circuit board 21. ROWAKESU and the attachment base part 11 of the case body 22 are provided with the lid 24 (or upper case) by which fitting is carried out freely attachable/detachable to the opening 23 provided by the opposite side.

[0015]

And the lid 24 equips the pars intermedia with the locking hole 26 to the clip component 14 at least. The lid 24 equips only the one end part with the lid side installation piece 27 which can be attached to the attachment base part 11 by another clip component 15. The case body 22 equips only the other end with the main part side installation piece 28 which can be attached to the attachment base part 11 by another clip component 16. The lid side installation piece 27 attaches the lid 24 to the attachment base part 11 independently. The main part side installation piece 28 attaches the case body 22 to the attachment base part 11 independently.

[0016]

The method protruding part 32 of outside which has the claw hole part 31 is provided by the lateral part of the case body 22. The claw piece 33 for case fixing in which insertion locking in the claw hole part 31 is possible protrudes on the lid 24. And between the claw hole part 31 and the claw piece 33 for case fixing, the interval part 34 for claw piece evacuation which can evacuate in the direction in which the claw piece 33 for case fixing releases a locking hold condition is formed. The protruding part 35 for nail fixing which can restrain evacuation of the claw piece 33 for case fixing protrudes on the attachment base part 11 by being inserted in the interval part 34 for claw piece evacuation. The fixing structure part 36 which can be outside decomposed is constituted by these.

[0017]

In this case, the method protruding part 32 of outside is presenting the plane view **** U shape etc. the claw piece 33 for case fixing -- the attachment base part 11 -- substantially -- a surface -- it is installed towards the direct direction or the path of insertion of the lid 24 to the case body 22. Let the protruding part 35 for nail fixing be the piece of cutting and raising etc. which were provided by the attachment base part 11. It may be made for the protruding part 35 for nail fixing to sharpen the tip. The claw piece 33 for case fixing and the protruding part 35 for nail fixing provide substantially in parallel.

[0018]

Inside the case body 22, the substrate lower supporting part 41 which can support the lower part of the circuit board 21 is provided separately from the above. The claw piece 42 for substrate fixing which can locking hold the upper section of the circuit board 21 protrudes on the inside of the case body 22. And by forming space 43 for claw piece evacuation which can be evacuated in the direction in which the claw piece 42 for substrate fixing releases a locking hold condition between the case body 22 and the claw piece 42 for substrate fixing, and being inserted in the inside of the lid 24 in space 43 for claw piece evacuation, The nail stopper 44 which can restrict evacuation of the claw piece 42 for substrate fixing protrudes. The fixing structure part 46 which can be inside decomposed is constituted by these.

[0019]

In this case, it provides substantially in parallel with the claw piece 33 for case fixing, and the protruding part 35 for nail fixing in the claw piece 42 for substrate fixing, and the nail stopper 44.

[0020]

The position in which the fixing structure part 36 which can be outside decomposed and the fixing

structure part 46 which can be inside decomposed are substantially the same provides. In this case, these [four] are provided [near each corner part in the side part of the electric junction box 12].
[0021]
Next, it describes about an operation of this working example.
[0022]
When attaching the electric junction box 12 to the attachment base part 11, the electric junction box 12 is assembled as follows first.
[0023]
Accommodate the circuit board 21 in the inside of the case body 22, and the lower part of the circuit board 21 is made to support with the substrate lower supporting part 41, and the upper section of the circuit board 21 is made to lock with the claw piece 42 for substrate fixing.
[0024]
Next, the lid 24 is attached to the opening 23 provided by the opposite side in the attachment base part 11 of the case body 22.
[0025]
At this time, by fitting the nail stopper 44 which protruded on the inside of the lid 24 over space 43 for claw piece evacuation formed between the case body 22 and the claw piece 42 for substrate fixing, evacuation of the claw piece 42 for substrate fixing is restricted, and the claw piece 42 for substrate fixing is locked in a locking state. Thereby, the circuit board 21 is held reliably at the case body 22.
[0026]
Insertion locking of the claw piece 33 for case fixing which protruded on the claw hole part 31 of the method protruding part 32 of outside provided by the lateral part of the case body 22 from the lid 24 is carried out.
[0027]
Thus, abutment arrangement of the assembled electric junction box 12 is carried out at the position of the attachment base part 11.
[0028]
At this time, by inserting the protruding part 35 for nail fixing which protruded on the attachment base part 11 in the interval part 34 for claw piece evacuation formed between the claw hole part 31 and the claw piece 33 for case fixing, evacuation of the claw piece 33 for case fixing is restrained, and the claw piece 33 for case fixing is locked in a locking hold condition. Thereby, the case body 22 and the lid 24 are fixed reliably. The electric junction box 12 will be in the state where the part was restrained by the attachment base part 11.
[0029]
And the electric junction box 12 is pressed down from a top by the harness 13 cabled along with the attachment base part 11.
[0030]
At this time, a lock and fix is performed by two or more clip components 14-16 attached to the harness 13. Namely, to the locking hole 26 provided by the pars intermedia of the lid 24, carry out insertion locking of the clip component 14, and. The main part side installation piece 28 which attached to the attachment base part 11 the lid side installation piece 27 provided by only the one end part of the lid 24 by another clip component 15, and was provided by only the other end of the case body 22 is attached to the attachment base part 11 by another clip component 16.
[0031]
As shown in Fig.1 and Fig.2, the electric junction box 12 is reliably attached to the attachment base part 11 by the above.
[0032]
And contrary to the above, when demounting the electric junction box 12 from the attachment base part 11, as shown in Fig.3 and Fig.4.The clip component 14 to which tension has attached the lid

side installation piece 27 for the end side of the harness 13 upwards at the attachment base part 11, for example is removed, or the clip component 14 is destroyed.

[0033]

Then, since the fixed state of the one end part of the electric junction box 12 and the attachment base part 11 is released, the one end part of the electric junction box 12 will be in the state where it floated slightly from the attachment base part 11.

[0034]

Then, if it continues pulling the harness 13 upwards, since it is connected in the locking hole 26 and the clip component 14 of pars intermedia of the lid 24, the harness 13 will be aslant lifted so that it may rotate around the center of the main part side installation piece 28 of the other end, as the electric junction box 12 is shown in Fig.5 and Fig.6.

[0035]

Since the protruding part 35 for nail fixing which protruded from the attachment base part 11 is drawn out from the interval part 34 for claw piece evacuation formed between the claw hole part 31 and the claw piece 33 for case fixing at this time, evacuation of the claw piece 33 for case fixing is attained, and release of a locking hold condition of the claw piece 33 for case fixing is attained. As for this, the fixed state of the case body 22 and the lid 24 is also can be canceled.

[0036]

Since the angle of fall of the electric junction box 12 will become largely if it continues pulling the end side of the harness 13 upwards, As shown in Fig.7 and Fig.8, the influence of the case body 22 to the lid 24, weight of the circuit board 21, etc. becomes largely, the fixed state of the case body 22 and the lid 24 is released, and the case body 22 and the lid 24 are separated.

[0037]

Thus, since the nail stopper 44 which protruded on the inside of the lid 24 will be further drawn out from space 43 for claw piece evacuation formed between the case body 22 and the claw piece 42 for substrate fixing if the case body 22 and the lid 24 are separated, As shown in Fig.9 and Fig.10, evacuation of the claw piece 42 for substrate fixing is attained, and release of a locking state of the claw piece 42 for substrate fixing is attained.Thereby, the locking state of the circuit board 21 by the case body 22 is released, and the circuit board 21 is separated from the case body 22.

[0038]

If the harness 13 is pulled upwards, finally the clip component 16 which has attached the main part side installation piece 28 to the attachment base part 11 will separate, or the clip component 16 will be destroyed.

[0039]

Then, since the fixed state of the other end of the electric junction box 12 and the attachment base part 11 is released, the electric junction box 12 is completely demounted from the attachment base part 11.

[0040]

At this time, the circuit board 21 and the case body 22 are independent to the attachment base part 11 and the harness 13, respectively. And since the clip component 14 separates or the clip component 14 is destroyed by pulling the lid 24 by hand etc. since only the lid 24 will be in the state where it is connected with the harness 13 by the clip component 14, the lid 24 will be separated from the harness 13.

[0041]

The electric junction box 12 is completely disassembled by the above. It may be made to remove the harness 13 from the main part side installation piece 28 side.

The claw piece [in the above-mentioned working example] 42 for substrate fixing which can locking hold the upper section of the circuit board 21 inside the case body 22, When forming substantially in parallel with the claw piece 33 for case fixing, and the protruding part 35 for nail fixing and inserting the circuit board 21 in the case body 22, have structure engaged by sagging the claw piece 42 for

substrate fixing (carrying out elastic deformation), but. As shown in Fig.13, make the claw piece 42b for substrate fixing incline toward the outside of a case body, and it is formed, By attaching the circuit board 21, without the circuit board 21 sagging the claw piece 42 for substrate fixing, when [to the case body 22] attaching, and fitting the nail stopper 44 by the side of the lid 24 over space 43 for claw piece evacuation after that, The claw piece 42b for substrate fixing may be moved to the circuit-board position, and an engagement state may be made to lock.

[0042]

Thus, according to this working example, arrange the electric junction box 12 to the attachment base part 11, and press down the electric junction box 12 by the harness 13 cabled along with the attachment base part 11, and. Are the fixing structure of the electric junction box which carries out a lock and fix by two or more clip components 14-16 attached to the harness 13 which can be decomposed, and abutment arrangement is carried out at the attachment base part 11, and the electric junction box 12 the circuit board 21 The case body 22 in which housing and holding is possible, Have the lid 24 by which fitting is carried out freely attachable/detachable to the opening 23 provided by the opposite side in the attachment base part 11 of the case body 22, and the lid 24 equips the pars intermedia with the locking hole 26 to the clip component 14 at least, and. The lid 24 equips only the one end part with the lid side installation piece 27 which can be attached to the attachment base part 11 by another clip component 15, The case body 22 equips only the other end with the main part side installation piece 28 which can be attached to the attachment base part 11 by another clip component 16, The method protruding part 32 of outside which has the claw hole part 31 in the lateral part of the case body 22 is provided, and the claw piece 33 for case fixing in which insertion locking is possible protrudes on the lid 24 to the claw hole part 31, and to it between the claw hole part 31 and the claw piece 33 for case fixing, By forming the interval part 34 for claw piece evacuation which can evacuate in the direction in which the claw piece 33 for case fixing releases a locking hold condition, and being inserted in the attachment base part 11 to the interval part 34 for claw piece evacuation, The protruding part 35 for nail fixing which can restrain evacuation of the claw piece 33 for case fixing protrudes, The substrate lower supporting part 41 which can support the lower part of the circuit board 21 inside the case body 22 is provided, The claw piece 42 for substrate fixing in which locking holding is possible protrudes the upper section of the circuit board 21 on the inside of the case body 22, and it between the case body 22 and the claw piece 42 for substrate fixing, By forming space 43 for claw piece evacuation which can be evacuated in the direction in which the claw piece 42 for substrate fixing releases a locking hold condition, and being inserted in the inside of the lid 24 in space 43 for claw piece evacuation, When the nail stopper 44 which can restrict evacuation of the claw piece 42 for substrate fixing protruded, the following operation effects can be obtained.

[0043]

That is, it becomes simultaneously possible by demounting the electric junction box 12 from the attachment base part 11 to make the electric junction box 12 disassemble. Since a decomposition process becomes unnecessary by this, a routing counter is reduced, and disassembling operation becomes unnecessary and the time and time and effort which disassembling operation had taken can be omitted.

[0044]

As mentioned above, since an working example is that over which it passes only to illustration of this invention, even if this invention has change etc. of a design of the range which is not limited only to the composition of an working example and does not deviate from the summary of this invention, of course [although the working example of this invention has been explained in full detail with Drawings], it is contained in this invention. In particular when two or more composition is included in each working example for example, even if there is no description, of course, the possible combination of these composition is included. In particular when two or more working examples and modifications are shown, even if there is no description, of course, the possible thing of the

combination of the composition over these is contained. Especially about the composition currently drawn on Drawings, even if there is no description, of course, it is contained.

[Brief Description of the Drawings]

[0045]

[Drawing 1]It is a perspective view of the fixing state of the fixing structure of the electric junction box concerning the working example of the present invention which can be decomposed.

[Drawing 2]It is a cross sectional view of Fig.2.

[Drawing 3]It is a perspective view showing a removal process.

[Drawing 4]It is a cross sectional view of Fig.3.

[Drawing 5]It is a perspective view showing a subsequent removal process in Fig.3.

[Drawing 6]It is a cross sectional view of Fig.5.

[Drawing 7]It is a perspective view showing a subsequent removal process in Fig.5.

[Drawing 8]It is a cross sectional view of Fig.7.

[Drawing 9]It is a perspective view showing a subsequent removal process in Fig.7.

[Drawing 10]It is a cross sectional view of Fig.9.

[Drawing 11]It is a modification of the present invention.

[Drawing 12]It is an exploded perspective view of the fixing structure of the electric junction box concerning a conventional example which can be decomposed.

[Drawing 13]It is a sectional side elevation of Fig.12.

[Explanations of letters or numerals]

[0046]

11 Attachment base part
12 Electric junction box
13 Harness
14 Clip component
15 Clip component
16 Clip component
21 Circuit board
22 Case body
23 Opening
24 Lid
26 Locking hole
27 Lid side installation piece
28 Main part side installation piece
31 Claw hole part
32 Method protruding part of outside
33 The claw piece for case fixing
34 The interval part for claw piece evacuation
35 The protruding part for nail fixing
41 Substrate lower supporting part
42 The claw piece for substrate fixing
43 Space for claw piece evacuation
44 Nail stopper

[Translation done.]

Electronic Acknowledgement Receipt

EFS ID:	19230025
Application Number:	13724001
International Application Number:	
Confirmation Number:	5472
Title of Invention:	ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Yoshimasa Sano
Customer Number:	27572
Filer:	Michael John Schmidt/Paula Gibbs
Filer Authorized By:	Michael John Schmidt
Attorney Docket Number:	4041J-002077/US
Receipt Date:	06-JUN-2014
Filing Date:	21-DEC-2012
Time Stamp:	10:30:17
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	Petition to make special under Patent Prosecution Hwy	PPH_Request.PDF	167434 c992c39bf0c7aa41ff94ad2fd2ba25a80f6a45b4	no	3

Warnings:	
Information:	

2	Petition to make special under Patent Prosecution Hwy	Petition_To_Make_Special.PDF	38309 954db4fb50258ab6f129b846dac5d4aba3db8b95	no	2
Warnings:					
Information:					
3	Preliminary Amendment	Preliminary_Amendment.PDF	116579 e33c36cb7fc77c4728f3ab0a142ab2efe06d7a08	no	5
Warnings:					
Information:					
4	Transmittal Letter	Supp_IDS.PDF	215588 cce210b3b96af1d0064fda2becb69dd76efd520f	no	5
Warnings:					
Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	1449.PDF	35100 aa276b2a78f257d9b850c255f589d182c473646b	no	1
Warnings:					
Information:					
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6	Foreign Reference	JPUS53055751.PDF	250112 e6a7d1d8af6cf29105e3beebdbecc98a7d003f59	no	12
Warnings:					
Information:					
7	Foreign Reference	JPUS63110090.PDF	258533 d764de7fb50ffcf40924470714e8734b374e1c79	no	10
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Information:					
8	Foreign Reference	JP2003175780.PDF	704687 fbffae7a5241102080bbc55fb54ecf5c0bc791d6	no	11
Warnings:					
Information:					
9	Foreign Reference	JP2006110315.PDF	3192709 ab8e519e3e5b31ce428bcc390750d03609261320	no	41
Warnings:					
Information:					
10	Foreign Reference	JP2007156553.PDF	851494 30ad0d19dd2884fabfa5ce1d729d1380ccde8ab7	no	12

Warnings:					
Information:					
11	Foreign Reference	JP2008301602.PDF	1256641 5259d5ffb8a60d398a571264369ffd24a4c4b2d8	no	21
Warnings:					
Information:					
			Total Files Size (in bytes):	7087186	

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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.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	13/724,001
Confirmation No.:	5472
Filing Date:	12/21/2012
Applicant:	Yoshimasa Sano
Group Art Unit:	2846
Examiner:	Keith A. Depew
Title:	ELECTRONIC DEVICE
Attorney Docket:	4041J-002077-US

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

PETITION TO MAKE SPECIAL UNDER PPH 2.0 PROGRAM

Sir:

Enclosed is a Request for Participation in the Patent Prosecution Highway (PPH2.0) Program between the JPO and the USPTO which includes a Petition to Make Special under the PPH program.

The following documents are enclosed:

1. A Preliminary Amendment to the US application which amends the US claims to be consistent with the allowed JP claims as noted in the Claims Correspondence Table.

2. A Supplemental Information Disclosure Statement citing the references

which have not been cited.

The decision to grant a patent was based upon the filing of the new claims in the JP priority application.

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: June 6, 2014

By: _____
Michael J. Schmidt, Reg. No. 34,007

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

MJS/pmg

18663215.1

PTO/SB/20JP (02-12)
Approved for use through 01/31/2015. OMB 0651-0058
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE

REQUEST FOR PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PROGRAM BETWEEN THE JAPAN PATENT OFFICE (JPO) AND THE USPTO

Application No.:	13/724,001	First Named Inventor:	Yoshimasa Sano
Filing Date:	12/21/2012	Attorney Docket No.:	4041J-002077-US
Title of the Invention:	ELECTRONIC DEVICE		

THIS REQUEST FOR PARTICIPATION IN THE PPH PROGRAM ALONG WITH THE REQUIRED DOCUMENTS MUST BE SUBMITTED VIA EFS-WEB. INFORMATION REGARDING EFS-WEB IS AVAILABLE AT HTTP://WWW.USPTO.GOV/EBC/EFS_HELP.HTML.

APPLICANT HEREBY REQUESTS PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PROGRAM AND PETITIONS TO MAKE THE ABOVE-IDENTIFIED APPLICATION SPECIAL UNDER THE PPH PROGRAM.

The above-identified application and the corresponding JP application(s) have the same priority/filing date. If JPO is not the office of first filing (OFF), identify the OFF and the OFF application no.

The JP application number(s) is/are: 2011-287974

The filing date of the JP application(s) is/are: 12/28/2011

I. List of Required Documents:

a. **A copy of the latest JP office action prior to the "Decision to Grant a Patent" in the above-identified JP application(s) along with an English translation (if the office action is not in the English language)**

☐ is attached.

☐ is not attached because applicant hereby requests the USPTO to obtain the required office action and any required translation thereof via the Dossier Access System.

☑ is not attached because the JP application was allowed in a first office action.

Notes:

- It is not necessary to submit a copy of the "Decision to Grant a Patent" and an English translation thereof.
- The English translation of the office action may be a machine translation.
- An accuracy statement for the English language translation of the office action is not required.

b. **(1) An information disclosure statement listing the documents cited in the JP office action**

☑ is attached.

☑ has already been filed in the above-identified U.S. application on 12/21/2012.

(2) Copies of all documents (except for U.S. patents or U.S. patent application publications)

☑ are attached.

☑ have already been filed in the above-identified U.S. application on 12/21/2012.

REQUEST FOR PARTICIPATION IN THE PPH PROGRAM BETWEEN JPO AND THE USPTO
(continued)

Application No.:	13/724,001	First Named Inventor:	Yoshimasa Sano

II. Claims Correspondence Table:

Claims in US Application	Patentable Claims in JP Application	Explanation regarding the correspondence
1	1	Sufficiently correspond
2	2	Sufficiently correspond
3	3	Sufficiently correspond except for dependency
4	4	Sufficiently correspond except for dependency
5	5	Sufficiently correspond except for dependency
6	6	Sufficiently correspond except for dependency

III. All the claims in the US application sufficiently correspond to the patentable/allowable claims in the JP application.

Signature /Michael J. Schmidt/	Date June 6, 2014
Name (Print/Typed) Michael J. Schmidt	Registration Number 34,007

Privacy Act Statement

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

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

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

PTO/SB/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 13/724,001	Filing Date 12/21/2012	☐ 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 **06/06/2014**

	(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))	* 6	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 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
/TONYA MCBRIDE/

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.

出願年月日 Date of Application:	２０１１年１２月２８日
出願番号 Application Number:	特願２０１１－２８７９７４
パリ条約による外国への出願に用いる優先権の主張の基礎となる出願の国コードと出願番号 The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is	ＪＰ２０１１－２８７９７４
出願人 Applicant(s):	株式会社デンソー

２０１３年　７月３１日

特許庁長官
Commissioner,
Japan Patent Office　羽藤秀雄

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【整理番号】　P-19713
【提出日】　平成23年12月28日
【あて先】　特許庁長官殿
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　【予納台帳番号】　009438
　【納付金額】　15,000円
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　【物件名】　明細書　1
　【物件名】　特許請求の範囲　1
　【物件名】　要約書　1
　【物件名】　図面　1
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【書類名】明細書
【発明の名称】電子装置
【技術分野】
【０００１】
本発明は、回路基板をケース内に収容してなる電子装置に関する。
【背景技術】
【０００２】
従来、回路基板を車両に固定する場合において、実装された素子等を守るために、回路基板をケースに収容した後、車体に固定することが行われている。また、コストダウンを目的として、回路基板をケースに固定する際に、ねじを使用することなく固定する構造が提案されている（特許文献１、２）。
【先行技術文献】
【特許文献】
【０００３】
【特許文献１】特開２０１１－１６６０４８号公報
【特許文献２】特開２００５－３１７６９２号公報
【発明の概要】
【発明が解決しようとする課題】
【０００４】
しかしながら、特許文献１や特許文献２の構造は、基本的に上ケースと下ケースとで回路基板を挟むので、回路基板を保持する力は上ケースと下ケースの係合状態に影響されてしまう。また、積極的に回路基板を強固に固定しようとするものではないため、不要な外力により回路基板にがたつきがあると、長期間にわたって振動が加わることにより、基板や素子等の機能に悪影響を与えることになる。
【０００５】
これらの回路基板には、加速度センサやジャイロセンサを実装してセンサ基板としたものがある。たとえば、エアバッグ用ＥＣＵ（エアバッグ用電子制御装置）は二方向の加速度センサを実装している。これらのセンサは回路基板上で車両に加わる運動に関するパラメータを測定するものであるから、基板と基板を収容するケースにがたつきが無い状態で保持されていなければならない。がたつきがあれば、正確な測定ができないとともに、誤検知を招き、安全装置が作動すべきでないときに作動するといった不都合が生じる。
【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り、ねじを使用することなく、回路基板をケースにがたつきなく固定可能な電子装置を提供することを目的とする。
【課題を解決するための手段】
【０００７】
上記目的を達成するためになされた請求項１に記載の発明は、電子回路が実装された回路基板と、上面が開口し前記回路基板を内部に収容する樹脂製の下部ケースと、下面が開口し前記下部ケースの上面側に装着される上部ケースとを備えた電子装置であって、前記回路基板は、固定用のスリットが開口し、前記下部ケースは、内面側に前記回路基板の端縁部をスライド挿入して収容する溝部が形成されると共に、ピン状に突設され且つ先端に返し状の係止部を有する固定用突設部が設けられ、前記固定用突設部は、先端の前記係止部を上方から前記スリットに挿入し、前記係止部が前記回路基板の下面に係止されることにより、前記回路基板を上方へ弾性付勢して前記溝部の上側内壁に押止することを特徴としている。
【０００８】
この構成によれば、電子回路が実装されスリットが開口した回路基板は、端縁部を下部ケースにスライド挿入され、ピン状に突設された固定用突設部は先端の返し状の係止部を上方からスリットに挿入され、係止部が回路基板の下面に係止されることにより回路基板を上方へ弾性付勢して溝部の上側内壁に押止するため、ねじを使用することなく基板をケ

ースに固定することができる。
【０００９】
請求項２に記載の発明は、前記上部ケースは、前記下部ケースを囲繞して吊設し、装置全体を取り付けるための脚部を下端に有することを特徴としている。
【００１０】
この構成によれば、回路基板が収容された下部ケースは取り付ける面に接することなく装置全体を取り付けることができる。
【００１１】
請求項３に記載の発明は、前記下部ケースは、前記固定用突設部が、上方又は下方に突出して設けられることを特徴としている。この構成によれば、固定用突設部を指や工具によりスリットに挿入することができ、ねじを使用することなく容易に基板をケースに固定することができる。
【００１２】
請求項４に記載の発明は、前記上部ケースは、内面がＵ字形状のガイド部を有し、前記下部ケースに設けられた前記固定用突設部は上方に突出して設けられ、前記下部ケースに前記上部ケースを装着する際に、前記ガイド部により突出する向きと反対の向きに転回されて前記スリットに導かれることによって前記係止部が前記スリットに挿入されることを特徴としている。
【００１３】
この構成によれば、基板を収容した下部ケースに上部ケースを装着するだけで、上方に突出して設けられた固定用突設部は、ガイド部により突出する向きと反対の向きに転回されてスリットに導かれ、係止部は回路基板のスリットに挿入されるため、少ない工数で電子装置とすることができる。
【００１４】
請求項５に記載の発明は、前記上部ケースは、斜面からなるガイド部を有し、前記下部ケースは、前記固定用突設部が前記スリット上方の位置に下方に突出して設けられ、前記下部ケースに前記上部ケースを装着する際に、前記固定用突設部が前記ガイド部により下方に押下されることによって前記係止部が前記回路基板の前記スリットに挿入されることを特徴としている。
【００１５】
この構成によれば、基板を収容した下部ケースに上部ケースを装着するだけで、下方に突出して設けられた固定用突設部はガイド部により下方に押下されて、係止部は回路基板のスリットに挿入されるため、少ない工数で電子装置とすることができる。
【００１６】
請求項６に記載の発明は、回路基板が、加速度センサまたはジャイロセンサを実装したものであることを特徴とする。この構成によれば、電子装置をエアバッグ用ＥＣＵや、センサ基板、ＥＳＣ（横滑り防止装置）用ＥＣＵ等とすることができる。
【図面の簡単な説明】
【００１７】
【図１】本発明の第１の実施形態の電子装置を組立途中（ａ）と完成時（ｂ）を示す断面図である。
【図２】本発明の第１の実施形態の上面図である。
【図３】本発明の第１の実施形態の下部ケースと回路基板を示す上面図である。
【図４】本発明の固定用突設部と係止部とを示す斜視図（ａ）と変形例を示す斜視図（ｂ）である。
【図５】本発明の第１の実施形態の組立途中（ａ）～（ｃ）と完成時（ｄ）を示す断面図であり、（ｃ）と（ｄ）は固定用突設部とガイド部を示す拡大図である。
【図６】本発明の第２の実施形態の組立途中（ａ）と完成時（ｂ）を示す断面図である。
【発明を実施するための形態】

【００１８】
以下、本発明の電子装置の具体的な実施形態について図面を参照しつつ説明する。
【００１９】
＜第１の実施形態＞
本実施形態の電子装置１は、図２の電子装置のＡ－Ａ断面図である図１（ａ）、（ｂ）に示すように、上部ケース２と、回路基板３と、下部ケース４とからなる。図１（ａ）は組立途中を示し、図１（ｂ）は完成時を示す。上部ケース２と下部ケース４は共に樹脂製であり、ＰＰ（ポリプロピレン）を使用した。上部ケース２は図２に示すように電子装置１全体を取り付け固定するための４箇所の脚部５と、後述の固定用突設部１２をガイドするためのＵ字状のガイド部６と、後述の下部ケース４のフック１３と係合するための係合部７とを有している。
【００２０】
回路基板３は、回路素子（電子回路、図示せず）と、外部に接続するためのコネクタ８が実装されたプリント配線基板（以下単に基板と称する）であり、下部ケース４に保持される。また、基板３には４箇所の固定用のスリット９が設けられている。
【００２１】
下部ケース４は、基板３を挿入するための溝部１０と、それぞれ４個の係止部１１を備えて上方に突出する４箇所の固定用突設部１２と、上部ケース２を固定するための６箇所のフック１３とを有している。係止部１１は固定用突設部１２の先端に、図３からわかるようそれぞれ４個設けられた短冊状の小片であり、斜視図である図４（ａ）に示すように、先端から離れるにしたがって寸法が拡大するような形状となっている。スリット９を通過するとき樹脂の弾性により、いったん縮径して通過した後、再び元の寸法に復帰し、「返し」（または「戻り」、「返り」等）として抜け止めの作用をする。
【００２２】
本実施形態の電子装置１の組立方法を説明する。まず、基板３を下部ケース４の溝部１０にスライド挿入する。図３は基板３が下部ケース４に挿入された状態を示す上面図である。図３から明らかなように、基板３に設けられたスリット９に対応する位置に下部ケース４の固定用突設部１２が設けられている。
【００２３】
次に下部ケース４の底面に小さい面積で接する所定の治具（不図示）にセットする。図５（ｃ）でわかるように、上部ケース２の下端は、下部ケース４より下がる場合があり、また図２に示した脚部５は上部ケース２の下端より下方に設けられる。そこで脚部５や上部ケース２が作業台等に干渉することを避け、上部ケース２が下部ケース４に対して十分に押し込まれるようにするために治具を使用する。
【００２４】
つづいて上部ケース２をかぶせて押圧する。するとまず、図５（ａ）に示すように、フック１３とそれに対応する部分の上部ケース２が互いに樹脂の弾性によりたわんで、上部ケース２に挿入可能となる。このとき下部ケース４の固定用突設部１２の先端は、上部ケース２の内面がＵ字形状となったガイド部６に導かれて、突出する向きと反対の向きに転回されている。
【００２５】
さらに上部ケース２が降下すると、図５（ｂ）のように係止部１１は短冊状の小片が樹脂の弾性により、傘が閉じるようにして進行方向の投影面積が減少し、スリット９を通過できるようになる。
【００２６】
つづいて、図５（ｃ）に拡大して示すように、固定用突設部１２の係止部１１はスリット９を抜け切り、元の形状に復帰する。この状態で、固定用突設部１２の根元の水平部に上部ケース２が接触し、上部ケース２はこれ以上下降しない。またこのとき、フック１３は上部ケース２の係合部７の空間に入り、フック１３と上部ケース２のたわみは解消している。このとき、６箇所のフック１３が上部ケース２の係合部７に入ったことは音や手に

伝わる衝撃で容易にわかり、外観からもたわみがないことから確認可能である。また、前述のように上部ケース２の下端は、下部ケース４の下端より下方に位置する。

【００２７】

係止部１１のガイド部６に導かれたときの先端位置は大きくばらつくため、十分なマージンをもって係止部１１が抜け切るように設定する。したがって、図５（ｃ）はもっとも押し切ったところを表した図であるが、このとき上部ケース２の係合部７と下部ケース４のフック１３はかみ合っていない。

【００２８】

押圧を解消すると、固定用突設部１２は弾性により元の形状に戻ろうとする。しかしながら元の形状に復帰した係止部１１が「返し」として基板３の下面に係止されるため、この力は係止部１１により基板３を上方に引き上げるように作用し、図５（ｄ）に示すように基板３は溝部１０の上面側の壁面に押止されるようになる。このとき基板３は溝部１０内で基板３の余裕代だけ上方に移動するので、基板３の下側には溝部１０の下面側の壁面との間に隙間が生じる。また、この移動によりフック１３は係合部７と嵌合し上部ケース２と下部ケース４は外れないようになる。

【００２９】

基板３は固定用突設部１２の弾性により、以後は常に溝部１０に対して押圧される。よって、ねじを使うことなく基板３を固定でき、がたつきなく下部ケース４内に収めることができる。

【００３０】

以上、説明したことから明らかなように、第１の実施形態によれば、電子装置１は、電子回路が実装された回路基板３と、上面が開口し回路基板３を内部に収容する樹脂製の下部ケース４と、下面が開口し下部ケース４の上面側に装着される上部ケース２とを備えた電子装置であって、回路基板３は、固定用のスリット９が開口され、下部ケース４は、内側面に回路基板３の端縁部をスライド挿入して収容する溝部１０が形成されると共に、ピン状に突設され且つ先端に返し状の係止部１１を有する固定用突設部１２が設けられ、固定用突設部１２は、先端の係止部１１を上方からスリット９に挿入し、係止部１１が回路基板３の下面に係止されることにより、回路基板３を上方へ弾性付勢して溝部１０の上側内壁に押止する。

【００３１】

よって、回路基板３は、下部ケース４にスライド挿入され、固定用突設部１２は先端の係止部１１をスリット９に挿入され、係止部１１が回路基板３を上方へ弾性付勢して溝部１０の上側内壁に押止するため、ねじを使用することなく基板をケースに固定することができる。また、回路基板３は上部ケース２と下部ケース４とによって保護される。固定用突設部１２の先端の係止部１１をスリット９に挿入する方法としては、たとえば指で挿入すればよい。

【００３２】

また、第１の実施形態によれば、上部ケース２は、内面がＵ字形状のガイド部６を有し、下部ケース４は、固定用突設部１２が上方に突出して設けられ、下部ケース４に上部ケース２を装着する際に、ガイド部６により突出する向きと反対の向きに転回されてスリット９に導かれることによって、係止部１１がスリット９に挿入されるという構成も可能である。

【００３３】

この構成によれば、基板３を収容した下部ケース４に上部ケース２を装着するだけで、上方に突出して設けられた固定用突設部１２はガイド部６により突出する向きと反対の向きに転回されて、スリット９に導かれ、係止部１１はスリット９に挿入されるため、少ない工数で電子装置１とすることができる。

【００３４】

＜第２の実施形態＞

本発明の第２の実施形態は、図６（ａ）に示すように下部ケース４に設けられた固定用

突設部１２の配置が第１の実施形態と異なり、先端がスリット９上方の位置に配置され下方を向いている。上部ケース２のガイド部６の形状もこれに対応するよう異なっており、図６の断面図に示すように、直線的な形状となっていて、斜面を有している。ガイド部６と固定用突設部１２以外は第１の実施形態と同様の形状であり、係止部１１の形状も同様である。

【００３５】

ガイド部６は上部ケース２が下方に押圧されると、固定用突設部１２をスリットに向けて押下し、完成時の図６（ｂ）に示すように、係止部１１により、基板３を上方に引き上げるように作用し、基板３は溝部１０の上面側の壁面に押止されるようになる。また、フック１３は係合部７と嵌合し上部ケース２と下部ケース４は外れないようになる。

【００３６】

基板３は固定用突設部１２の弾性により、以後は常に溝部１０に対して押圧される。よって、ねじを使うことなく基板３を固定でき、がたつきなく下部ケース４内に収めることができる。

【００３７】

したがって、第２の実施形態によれば、電子装置１は、上部ケース２は斜面からなるガイド部６を有し、下部ケース４は固定用突設部１２がスリット９上方の位置に下方に突出して設けられ、下部ケース４に上部ケース２を装着する際に、固定用突設部１２がガイド部６により下方に押下されることによって係止部１１が回路基板３のスリット９に挿入されることを特徴としている。

【００３８】

この構成によれば第１の実施形態と同様に、上部ケース２を下部ケース４に被せて押圧するだけで、基板３の固定と上部ケース２の固定が同時に達成される。

【００３９】

なお、本発明は上述した実施の形態に限定されるものではなく、本発明の主旨を逸脱しない範囲で種々の変更を施すことが可能である。

【００４０】

上部ケース２を下部ケース４に被せて押圧するときに固定用突設部１２をガイドして基板３に挿入するものとしたが、基板３を下部ケース４にスライド挿入した後、指で固定用突設部１２をスリット９に差し込んで固定してもよい。この場合上部ケース２は基板３を保護する機能があればよく、ガイド部６のような複雑な形状は必要なくなり、射出成形用の金型の加工費用が安価になる。

【００４１】

係止部１１は固定用突設部１２毎に４箇所設けるものとしたが、図４（ｂ）に示すようにこれらを連結して両面（２箇所）又は片面（１箇所）に設けるものとしてもよい。

【００４２】

実施形態では、上部ケース２および下部ケース４の材質は、ＰＰ（ポリプロピレン）であったが、ＰＢＴ（ポリブチレンテレフタレート）や、ＰＥＴ（ポリエチレンテレフタレート）、ＰＣ（ポリカーボネート）、ＡＢＳ樹脂等やこれらのポリマーアロイ等の樹脂が利用できる。樹脂は導電グレードであってもよく、ガラス繊維や炭素繊維等の充填材を含んでいてよい。また、上部ケース２と下部ケース４の材質は、互いに異なる材質であってもよい。

【符号の説明】

【００４３】

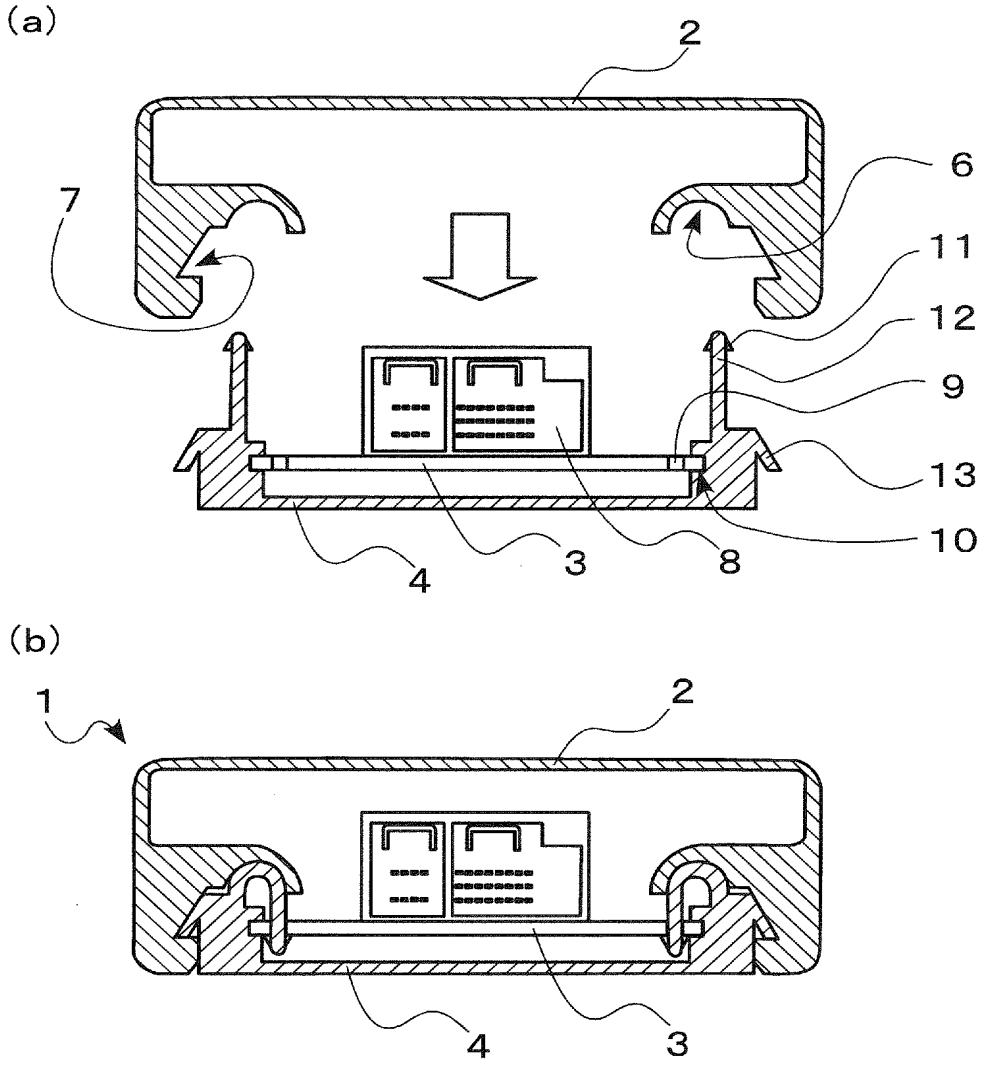
１　電子装置
２　上部ケース
３　基板（回路基板、プリント配線基板）
４　下部ケース
５　脚部
６　ガイド部

７　係合部
８　コネクタ
９　スリット
１０　溝部
１１　係止部
１２　固定用突設部
１３　フック

【書類名】特許請求の範囲
【請求項１】
　電子回路が実装された回路基板と、上面が開口し前記回路基板を内部に収容する樹脂製の下部ケースと、下面が開口し前記下部ケースの上面側に装着される上部ケースとを備えた電子装置であって、
　前記回路基板は、固定用のスリットが開口され、
　前記下部ケースは、内側面に前記回路基板の端縁部をスライド挿入して収容する溝部が形成されると共に、ピン状に突設され且つ先端に返し状の係止部を有する固定用突設部が設けられ、
　前記固定用突設部は、先端の前記係止部を上方から前記スリットに挿入し、前記係止部が前記回路基板の下面に係止されることにより、前記回路基板を上方へ弾性付勢して前記溝部の上側内壁に押止することを特徴とする電子装置。
【請求項２】
　前記上部ケースは、前記下部ケースを囲繞して吊設し、装置全体を取り付けるための脚部を下端に有することを特徴とする請求項１に記載の電子装置。
【請求項３】
　前記下部ケースは、前記固定用突設部が、上方又は下方に突出して設けられることを特徴とする請求項１又は２に記載の電子装置。
【請求項４】
　前記上部ケースは、内面がＵ字形状のガイド部を有し、
　前記下部ケースは、前記固定用突設部が上方に突出して設けられ、
　前記下部ケースに前記上部ケースを装着する際に、前記ガイド部により突出する向きと反対の向きに転回されて前記スリットに導かれることによって前記係止部が前記スリットに挿入されることを特徴とする請求項１又は２に記載の電子装置。
【請求項５】
　前記上部ケースは、斜面からなるガイド部を有し、
　前記下部ケースは、前記固定用突設部が前記スリット上方の位置に下方に突出して設けられ、
　前記下部ケースに前記上部ケースを装着する際に、前記固定用突設部が前記ガイド部により下方に押下されることによって前記係止部が前記回路基板の前記スリットに挿入されることを特徴とする請求項１又は２に記載の電子装置。
【請求項６】
　前記回路基板は、加速度センサまたはジャイロセンサを実装したものであることを特徴とする請求項１乃至５のいずれか一項に記載の電子装置。

【書類名】要約書
【要約】
【課題】回路基板を、ねじを使用せず、がたつきなくケースに固定可能な電子装置を提供する。
【解決手段】電子装置１は、電子回路が実装された回路基板３と、上面が開口し回路基板３を内部に収容する樹脂製の下部ケース４と、下面が開口し下部ケース４の上面側に装着される上部ケース２とを備えた電子装置であって、回路基板３は、固定用のスリット９が開口され、下部ケース４は、内側面に回路基板３の端縁部をスライド挿入して収容する溝部１０が形成されると共に、ピン状に突設され且つ先端に返し状の係止部１１を有する固定用突設部１２が設けられ、固定用突設部１２は、先端の係止部１１を上方からスリット９に挿入し、係止部１１が回路基板３の下面に係止されることにより、回路基板３を上方へ弾性付勢して溝部１０の上側内壁に押止することを特徴とする。
【選択図】図１

【書類名】図面
【図１】



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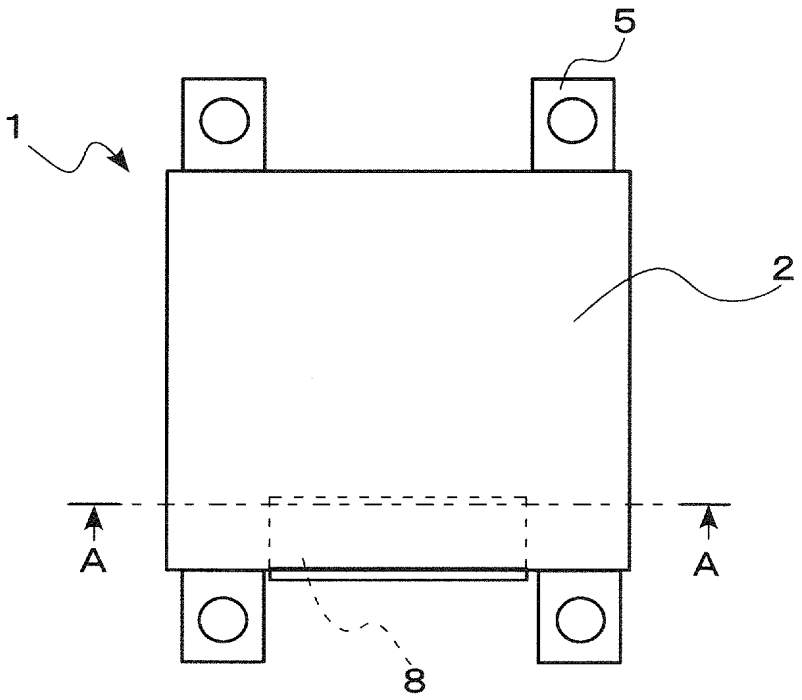

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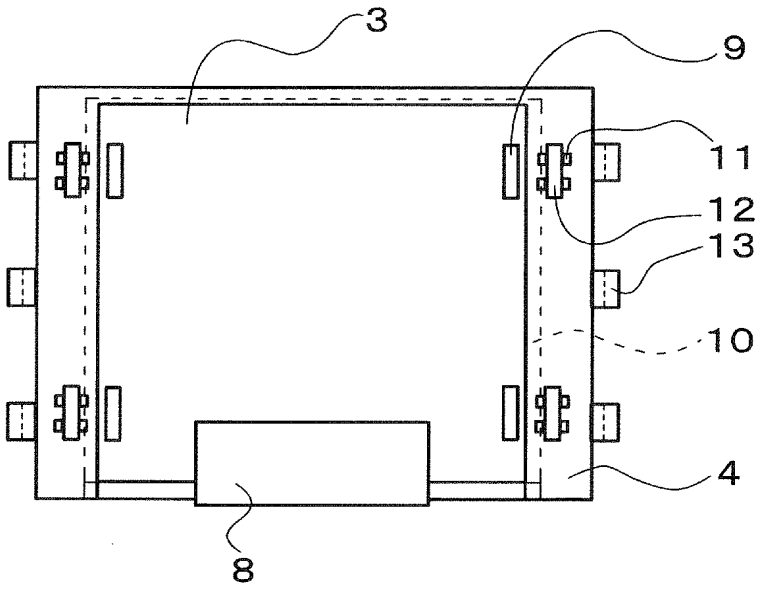

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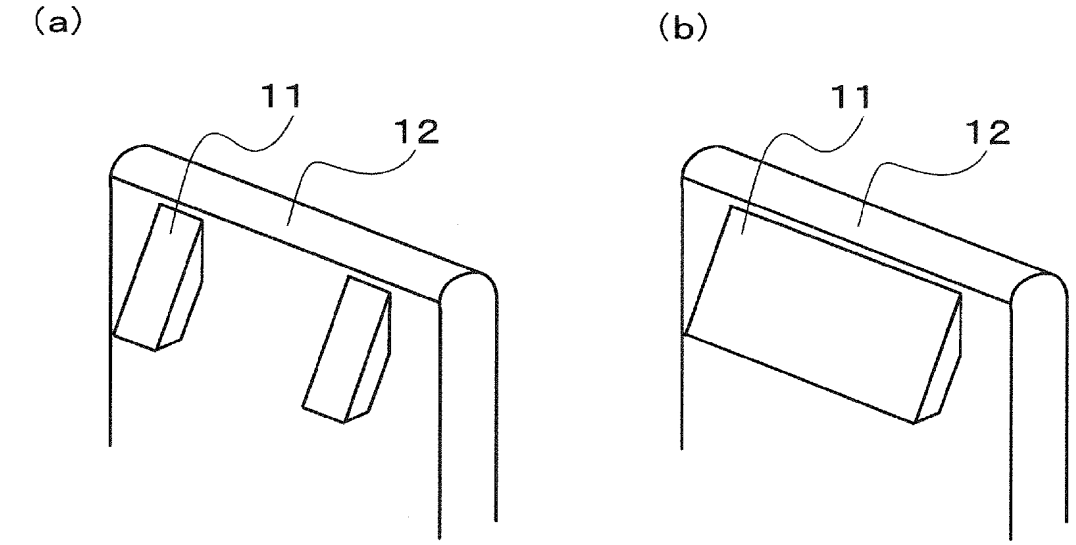

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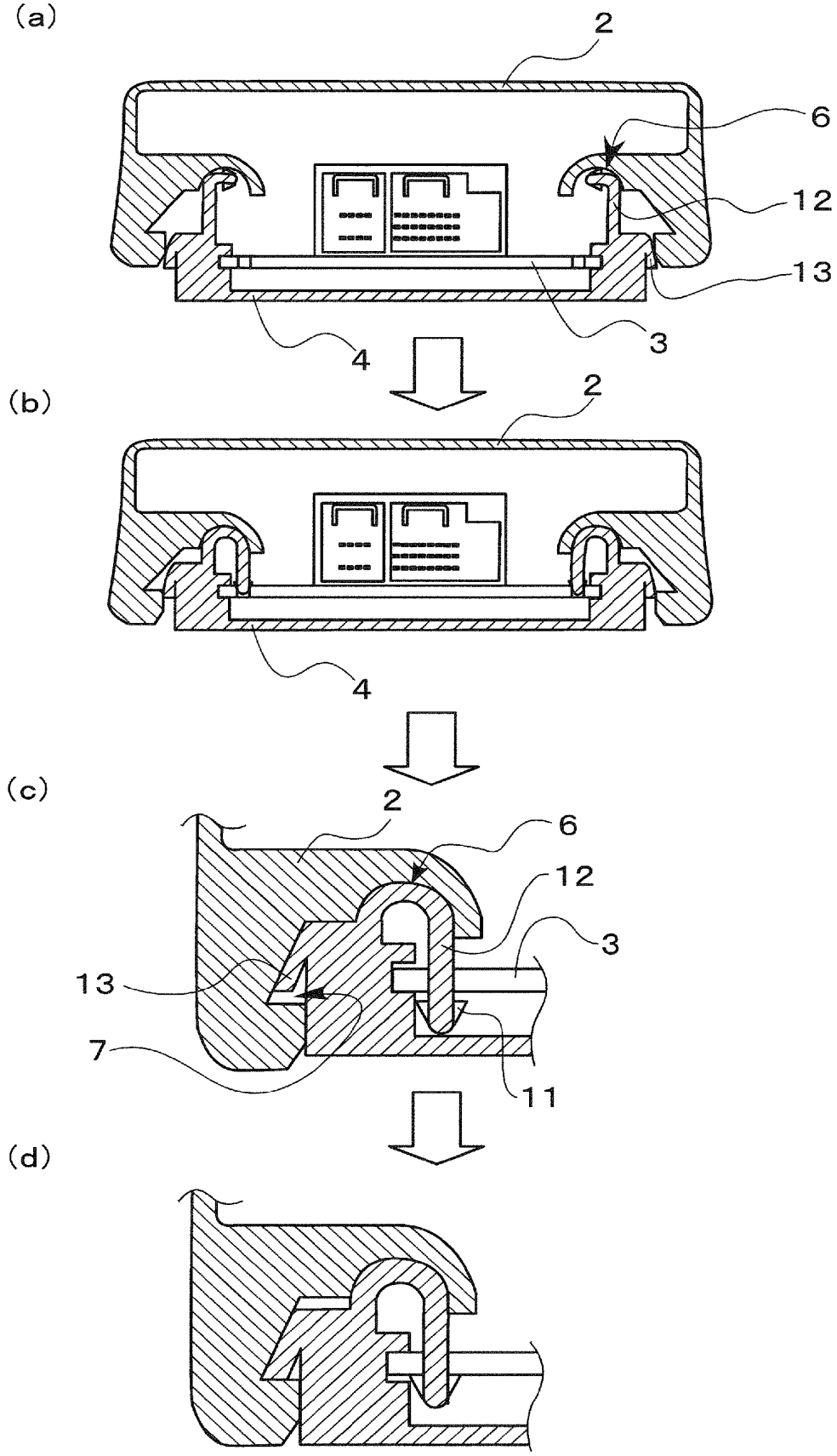
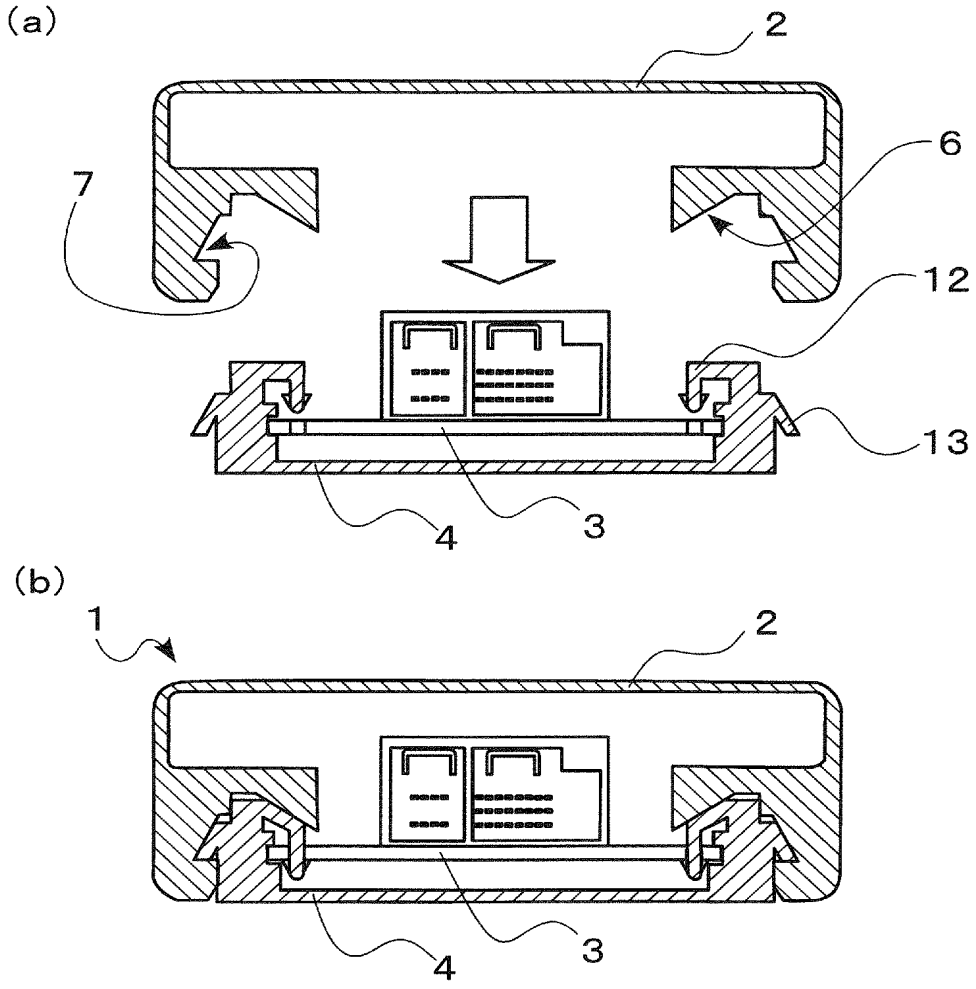


【図６】



出願人履歴

０００００４２６０

19961008

名称変更

愛知県刈谷市昭和町１丁目１番地

株式会社デンソー

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US

CONFIRMATION NO. 5472

27572
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

PUBLICATION NOTICE

Title:ELECTRONIC DEVICE

Publication No.US-2013-0170160-A1
Publication Date:07/04/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/724,001	12/21/2012	2811	1260	4041J-002077/US	6	1

CONFIRMATION NO. 5472

27572
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

FILING RECEIPT

Date Mailed: 01/28/2013

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)

Yoshimasa Sano, Anjo-city, JAPAN;

Applicant(s)

Denso Corporation, Kariya-city, JAPAN

Assignment For Published Patent Application

DENSO CORPORATION, Kariya-city, JAPAN

Power of Attorney: The patent practitioners associated with Customer Number 27572

Domestic Applications for which benefit is claimed - None.

A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
JAPAN 2011-287974 12/28/2011

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Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 01/22/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/724,001**

Projected Publication Date: 07/04/2013

Non-Publication Request: No

Early Publication Request: No

Title

ELECTRONIC DEVICE

Preliminary Class

257

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/724,001

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	390
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	6 minus 20 =	*			OR	x 62 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1260

APPLICATION AS AMENDED - PART II

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

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

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

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

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

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

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/724,001	12/21/2012	Yoshimasa Sano	4041J-002077/US

CONFIRMATION NO. 5472

27572
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

POA ACCEPTANCE LETTER

OC000000058804980

Date Mailed: 01/28/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/21/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/dberios/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/AIA/82A (07-12)
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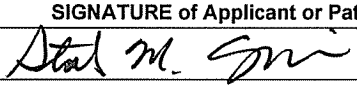
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	to be assigned
Filing Date	December 21, 2012
First Named Inventor	Yoshimasa SANO
Title	ELECTRONIC DEVICE
Art Unit	
Examiner Name	to be assigned
Attorney Docket Number	4041J-002077/US

SIGNATURE of Applicant or Patent Practitioner

Signature		Date	12/21/2012
Name	Stanley M. Erjavac	Telephone	248-641-1600
Registration Number	38442		

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

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

☒ I hereby appoint 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 equivalent): 27572

OR

☐ I hereby appoint Practitioner(s) named below 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 equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

☐ The address associated with the above-mentioned Customer Number.

OR

☒ The address associated with Customer Number: 27572

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant:

☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ 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)

SIGNATURE of Applicant for Patent

Signature	Yoshihiro Suzuki	Date	October 8, 2012
Name	Yoshihiro SUZUKI	Telephone	81-566-25-8591
Title and Company	Director, Intellectual Property Division, DENSO CORPORATION		

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. Submit multiple forms for more than one signature, see below *.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4041J-002077/US
	Application Number	
Title of Invention	ELECTRONIC DEVICE	

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
	Yoshimasa		Sano	

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

City	Anjo-city	Country of Residence	JP

Mailing Address of Inventor:

Address 1	DENSO CORPORATION		
Address 2	1-1, Showa-cho		
City	Kariya-city, Aichi-pref.	**State/Province**	
Postal Code	448-8661	**Country**	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	27572		
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	4041J-002077/US
	Application Number	
Title of Invention	ELECTRONIC DEVICE	

Application Information:

Title of the Invention	ELECTRONIC DEVICE		
Attorney Docket Number	4041J-002077/US	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	5	**Suggested Figure for Publication (if any)**	

Publication Information:

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

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Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Priority Claimed
2011-287974	JP	2011-12-28	(•) Yes ( ) No

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ELECTRONIC DEVICE

CROSS REFERENCE TO RELATED APPLICATION

This application is based on Japanese Patent Application No. 2011-287974 filed on December 28, 2011, the contents of which are incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosure relates to an electronic device in which a circuit substrate is accommodated in a case.

BACKGROUND

Conventionally, a circuit substrate accommodated in a case is fixed to a vehicle for protecting an attachment element on the circuit substrate. JP-A-2011-166048 and JP-A-2005-317692 describe a structure without using a fastener such as screw, so as to reduce a cost when the circuit substrate is fixed to the case.

The above structure basically includes a top case and a bottom case. The circuit substrate is inserted between the top case and the bottom case. A force for holding the circuit substrate is affected by an engagement state between the top case and the bottom case, and thereby the circuit substrate may be loosely received in the top case and the bottom case. Since the circuit substrate cannot be strongly received, one of the top case and the bottom case may be readily apart from the other one by an external force. Thus, a displacement may be caused, and the circuit substrate and the element may be affected by an oscillation applied to the cases for a long time.

Further, an acceleration sensor or a gyro sensor may be attached to the circuit substrate. For example, an acceleration sensor for two directions is attached to an airbag electronic control unit (airbag ECU). Since the sensor on the circuit substrate is for measuring parameters relative to movement applied to the vehicle, a no-displacement state is necessary to be maintained between the substrate and the cases. When the displacement occurs, the sensor cannot correctly measure the parameters, and an abnormality such as an erroneous detection may be caused. For example, a security device may activate when the security device should not be activated.

SUMMARY

It is an object of the present disclosure to provide an electronic device, in which a circuit substrate is fixable without using a fastener such as screw, while a displacement of the circuit substrate can be prevented.

According to an aspect of the present disclosure, an electronic device includes a circuit substrate, a bottom case, and a top case. The circuit substrate is provided with an electronic circuit. The bottom case has an opening portion at a top side, and the bottom case receives and holds the circuit substrate. The top case has an opening portion at a bottom side, and is attached to the bottom case from the top side of the bottom case. The circuit substrate has a plurality of slits penetrating through the circuit substrate. The bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion. Besides, a plurality of pin-shaped protrusion portions is provided in the bottom case to be snib-fitted with the top case, and each protrusion portion has a plurality of locking portions at a tip end portion. Each protrusion portion elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits.

As described above, the circuit substrate is slidable in the groove portion of the bottom case, and the locking portions of the protrusion portions are respectively inserted into the slits. Because the locking portions elastically bias the circuit substrate toward the top side of the bottom case and press the circuit substrate to the top surface of the groove portion, the circuit substrate can be fixed without using a fastener such as screw.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the present disclosure will be more readily apparent from the following detailed description made with reference to the accompanying drawings. In the drawings:

Fig. 1A is a cross-sectional view showing an assembling state of an electronic device, and Fig. 1B is a cross-sectional view showing the electronic device after being assembled, which are taken along the line I-I in Fig. 2 according to a first embodiment of the present disclosure;

Fig. 2 is a top view showing a top case of the electronic device according to the first

embodiment;

Fig. 3 is a top view showing a bottom case and a circuit substrate of the electronic device according to the first embodiment;

Figs. 4A and 4B are enlarged views showing a tip end portion of a protrusion portion according to the first embodiment and another embodiment;

Fig. 5A is a cross-sectional view showing an assembling state of the electronic device, Fig. 5B is a cross-sectional view showing another assembling state of the electronic device, Fig. 5C is an enlarged view showing the protrusion portion and a guide portion in another assembling state of the electronic device, and Fig. 5D is an enlarged view showing the protrusion portion and the guide portion after the electronic device being assembled, according to the first embodiment; and

Fig. 6A is a cross-sectional view showing an assembling state of an electronic device, and Fig. 6B is a cross-sectional view showing the electronic device after being assembled, according to a second embodiment of the present disclosure.

DETAILED DESCRIPTION

Embodiments of the present disclosure will be described. In the embodiments, a part that corresponds to a matter described in a preceding embodiment may be assigned with the same reference numeral, and redundant explanation for the part may be omitted. When only a part of a configuration is described in an embodiment, another preceding embodiment may be applied to the other parts of the configuration. The parts may be combined even if it is not explicitly described that the parts can be combined. The embodiments may be partially combined even if it is not explicitly described that the embodiments can be combined, provided there is no harm in the combination.

Hereafter, an electronic device 1 according to embodiments of the present disclosure will be described with reference to the drawings.

(First embodiment)

Figs. 1A and 1B are cross-sectional views of the electronic device 1 taken along I-I in Fig. 2. Fig. 1A is a cross-sectional view showing an assembling state of the electronic device 1, and Fig. 1B is a cross-sectional view showing the electronic device 1 after being assembled, according to a first embodiment of the present disclosure

As shown in Figs. 1A and 1B, the electronic device 1 includes a top case 2, a circuit substrate 3, and a bottom case 4. Both the top case 2 and the bottom case 4 are made of resin such as polypropylene (PP).

The top case 2 includes four leg portions 5, a plurality of guide portions 6, and a plurality of engagement portions 7. The leg portions 5 are for fixing the whole electronic device 1, as shown in Fig. 2. Each guide portion 6 is U-shaped so as to guide a protrusion portion 12. Each engagement portion 7 engages with a hook 13 of the bottom case 4 when the top case 2 is assembled to the bottom case 4.

The circuit substrate 3 is a printed-circuit substrate board mounted with a circuit element and a connector 8, and is held in the bottom case 4. The circuit element may be an electronic circuit (not shown). The connector 8 is for connecting to the exterior. Four slits 9 are provided in the circuit substrate 3 to fix the circuit substrate 3 to the top case 2.

The bottom case 4 includes a groove portion 10, four protrusion portions 12 and six hooks 13, for example. The groove portion 10 is provided such that the circuit substrate 3 is slidable in the groove portion 10. Four locking portions 11 are provided at a tip end portion of each protrusion portion 12. As shown in Fig. 3, the locking portions 11 look like squares viewed from top. In the example of Fig. 4A, each locking portion 11 is shaped to expand outside of a surface of the protrusion portion 12 in accordance with increase in distance from the tip of the protrusion portion 12. In this case, the thickness of the locking portion 11 may be set approximately in uniform. While the locking portions 11 are respectively passed through the slits 9, the locking portions 11 are diameter-reduced to pass through the slits 9 by an elasticity of resinous protrusion portion 12 including the locking portions 11, and then return the original shape after being passed through the slits 9. The locking portions 11 are configured to have a snib-shape so as to be prevented from being taken out from the slits 9 after being passed through the slits 9.

An assembling method of the electronic device 1 according to the first embodiment will be described.

The circuit substrate 3 is slid in and inserted into the groove portion 10 of the bottom case 4. Fig. 3 is a top view showing an assembling state where the circuit substrate 3 is completely inserted into the bottom case 4. As shown in Fig. 3, the protrusion portions 12 of the bottom case 4 are provided at positions corresponding to the slits 9 of the circuit substrate 3.

The circuit substrate 3 is set by using jigs (not shown) contacting a bottom surface of the bottom case 4 with a small area. A bottom end portion of the top case 2 may be lower than a bottom surface of the bottom case 4 as in the assembling state of Fig. 5C, or the leg portions 5 may be positioned lower than the bottom end portion of the top case 2. Thus, the jigs are used for pressing the top case 2 sufficiently to the bottom case 4, and for preventing interference between the leg portions 5, the top case 2, and a work table.

The top case 2 is covered and pressed from a top side of the bottom case 4. As shown in Fig. 5A, the hooks 13 and a bottom portion 14 of the top case 2 are deformed and bent by the elasticity of resin so that the bottom case 4 can be inserted into the top case 2. The bottom portion 14 is provided to correspond to the hook 13. The tip end portion of the protrusion portion 12 is guided along the guide portion 6 and is bent to a direction opposite to a protruding direction of the protrusion portion 12. The guide portion 6 is provided in the top case 2 such that an inside surface of the guide portion 6 is U-shaped. The locking portions 11 expand like an umbrella, before being passed through the slits 9.

As shown in Fig. 5B, when the top case 2 is further pressed and lowered, the locking portions 11 are deformed such that a projected area of each locking portion 11 projected in a moving direction decreases. That is, the locking portions 11 are deformed and contracted like an umbrella. In this case, the locking portions 11 can be passed through the slits 9.

As shown in Fig. 5C, after the locking portions 11 of the protrusion portion 12 are completely passed through the slit 9, each locking portion 11 returns its original shape. In this case, a base surface 12a of the protrusion portion 12 of the bottom case 4 contacts the top case 2 and thereby the top case 2 cannot be lowered any more. Further, because the hook 13 is inserted into the engagement portion 7, the deformation (bending) of the hook 13 and the bottom portion 14 is disappeared. It is readily to confirm by a sound or a shock transmitted to a hand that the six hooks 13 are respectively inserted into the engagement portions 7 of the top case 2. It may also be confirmed from appearance of whether the bending is disappeared.

Because the tip end portion of the protrusion portion 12 varies much when the protrusion portion 12 is guided along the guide portion 6, the guide portion 6 are set to have a sufficient margin so that the protrusion portion 12 can U-turn. Fig. 5C is a cross-sectional view showing an assembling state where the top case 2 is pressed to the lowest position.

In the assembling state of Fig. 5C, the engagement portion 7 of the top case 2 and the hook 13 of the bottom case 4 are not fitted to each other.

When the pressure is disappeared, the protrusion portion 12 tends to return its original shape by the elasticity of resin. A returning force of the protrusion portion 12 applies to the circuit substrate 3 toward the top side of the top case 2 by the locking portions 11. As shown in Fig. 5D, the circuit substrate 3 contacts a top surface 10a of the groove portion 10, and a space is generated between the circuit substrate 3 and a bottom surface 10b of the groove portion 10. Because of the returning force, the hook 13 is fitted to the engagement portion 7 such that the top case 2 cannot be readily taken out from the bottom case 4.

The circuit substrate 3 will always be pressed to the groove portion 10 by the elasticity of the protrusion portion 12. Thus, the circuit substrate 3 can be fixed without using fastener such as screw, and can be received in the bottom case 4 without a moving.

According to the first embodiment, the electronic device 1 includes the circuit substrate 3, the bottom case 4, and the top case 2. The circuit substrate 3 is provided with an electronic circuit. The bottom case 4 has an opening portion at a top side, and the bottom case 4 receives and holds the circuit substrate 3. The top case 2 has an opening portion at a bottom side, and is attached to the bottom case 4 from the top side of the bottom case 4. The circuit substrate 3 has the slits 9 penetrating through the circuit substrate 3. The bottom case 4 has a groove portion 10 positioned at the inside surface of the bottom case 4 such that edge portions of the circuit substrate 3 are slidable and inserted into the groove portion 10. Besides, the pin-shaped protrusion portions 12 are provided in the bottom case 4 to be snib-fitted with the top case 2, and each protrusion portion 12 has a plurality of the locking portions 11 at the tip end portion. Each protrusion portion 12 elastically biases the circuit substrate 3 toward the top side of the bottom case 4 and presses the circuit substrate 3 to the top surface 10a of the groove portion 10 by locking the locking portions 11 to the circuit substrate 3 after the locking portions 11 are respectively inserted into the slits 9.

As described above, the circuit substrate 3 is slidable in the groove portion 10 of the bottom case 4, and the locking portions 11 of the protrusion portions 12 are respectively inserted into the slits 9. Because the locking portions 11 elastically bias the circuit substrate 3 toward the top side of the bottom case 4 and press the circuit substrate 3 to the top surface 10a of the groove portion 10, the circuit substrate 3 can be fixed without using a

fastener such as screw. In addition, the circuit substrate 3 is protected by the top case 2 and the bottom case 4. The locking portions 11 may be respectively inserted into the slits 9 by using fingers.

The top case 2 may further have a plurality of guide portions 6 provided such that the inside surface of each guide portion 6 is U-shaped. The protrusion portion 12 is protruded toward the top side of the bottom case 4. When the top case 2 is assembled to the bottom case 4, a configuration in which the locking portions 11 are inserted into the slits 9 may be achieved by guiding and turning the locking portions 11 along the guide portions 6 to the direction opposite to the protruding direction of the protrusion portions 12 to head for the slits 9. Thus, the electronic device 1 can be assembled for a small assembling hours.

(Second embodiment)

According to a second embodiment, protrusion portions 12 are provided differently from the protrusion portions 12 in the first embodiment, as shown in Figs. 6A and 6B. Specifically, the tip end portion of the protrusion portion 12 is positioned at a direct top side of the slit 9 and heads for a bottom side of the bottom case 4. Besides, the guide portion 6 of the top case 2 is also different from the shape of the guide portion 6 in the first embodiment. As shown in Figs. 6A and 6B, a bottom surface of the guide portion 6 declines from a base part 6a of the guide portion 6 to an inner side surface 6b of the guide portion 6. Except for the protrusion portion 12 and the guide portion 6, other parts of the electronic device 1 according to the second embodiment may be the same as the parts of the electronic device 1 according to the first embodiment.

When the top case 2 is pressed toward the bottom side of the bottom case 4, the guide portions 6 guide the protrusion portions 12 to head for the slits 9 such that the protrusion portions 12 are respectively inserted into the slits 9. As shown in Fig. 6B, when the top case 2 is completely assembled to the bottom case 4, the locking portions 11 of the protrusion portions 12 press the circuit substrate 3 to the top surface 10a of the groove portion 10. The hooks 13 are engaged with the engagement portions 7 such that the top case 2 cannot be readily taken out from the bottom case 4.

The circuit substrate 3 will always be pressed to the groove portion 10 by the elasticity of the protrusion portion 12. Thus, the circuit substrate 3 can be fixed without using fastener such as screw, and can be received in the bottom case 4 without a moving.

According to the second embodiment, the bottom surface of the guide portion 6 declines from the base part 6a of the guide portion 6 to the inner side surface 6b of the guide portion 6. The protrusion portion 12 is provided in the bottom case 4 such that the tip end portion is positioned at the direct top side of the slit 9 and heads for the slit 9. When the top case 2 is assembled to the bottom case 4, the locking portions 11 are inserted into the slit 9 because the protrusion portion 12 is pressed toward the bottom side of the bottom case 4 along the guide portion 6.

Then, the circuit substrate 3 and the top case 2 can be fitted to each other by pressing the top case 2 to the bottom case 4.

Such changes and modifications are to be understood as being within the scope of the present disclosure as defined by the appended claims.

The protrusion portion 12 may be inserted into the slit 9 by a finger after the circuit substrate 3 is slid in the bottom case 4. In this case, the top case 2 may be provided to protect the circuit substrate 3 without a structure having a member such as the guide portion 6. Thus, the processing cost of die and mold for injection molding can be reduced.

As shown in Fig. 4B, the locking portions 11 may be provided in a manner that one locking portion 11 is placed at a side surface of the protrusion portion 12. Alternatively, the locking portions 11 may be provided in a manner that two locking portions 11 are respectively placed at two opposing side surfaces of the protrusion portion 12.

The material of the top case 2 and the bottom case 4 is not limited to the PP. Other resin may be used, such as polybutylene terephthalate (PBT), polyethylene-telephthalate (PET), polycarbonate (PC), ABS resin, or polymer alloy. The resin may be conductive grade, or may include filling material such as glass fiber or carbon fiber. Further, the material of the top case 2 and the bottom case 4 may be different from each other.

According to a first aspect of the present disclosure, an electronic device includes a circuit substrate, a bottom case, and a top case. The circuit substrate is provided with an electronic circuit. The bottom case has an opening portion at a top side, and the bottom case receives and holds the circuit substrate. The top case has an opening portion at a bottom side, and is attached to the bottom case from the top side of the bottom case. The circuit substrate has a plurality of slits penetrating through the circuit substrate. The bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion. Besides, a plurality of pin-shaped protrusion portions is provided in the bottom case to be

snib-fitted with the top case, and each protrusion portion has a plurality of locking portions at a tip end portion. Each protrusion portion elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits.

As described above, the circuit substrate is slidable in the groove portion of the bottom case, and the locking portions of the protrusion portions are respectively inserted into the slits. Because the locking portions elastically bias the circuit substrate toward the top side of the bottom case and press the circuit substrate to the top surface of the groove portion, the circuit substrate can be fixed without using a fastener such as screw.

According to a second aspect of the present disclosure, a bottom end portion of the top case may include a plurality of leg portions for attaching the electronic device to a subject. The top case may be positioned to cover the bottom case.

Thus, the bottom case receiving and holding the circuit substrate can be assembled to the whole electronic device without contacting an assembling surface.

According to a third aspect of the present disclosure, the protrusion portion may be provided to protrude toward one of the top side and the bottom side of the bottom case. In this case, the protrusion portion can be inserted into the slit by a finger or a tool, and the circuit substrate can be readily fixed to the bottom case without a fastener such as screw.

According to a fourth aspect of the present disclosure, the top case may further have a plurality of guide portions provided such that the inside surface of each guide portion is U-shaped. The protrusion portion may be protruded toward the top side of the bottom case. The locking portions may be respectively guided along the guide portions and bent to the direction opposite to the protruding direction of the protrusion portions to head for the slits, and may be respectively inserted into the slits, when the top case is assembled to the bottom case. Thus, the electronic device can be assembled for a small assembling hours.

According to a fifth aspect of the present disclosure, the bottom surface of the guide portion may decline from a base part of the guide portion to an inner side surface of the guide portion. The protrusion portion may be provided in the bottom case such that the tip end portion is positioned at the top side of the slit and heads for a bottom side of the bottom case. The locking portions are respectively inserted into the slits due to the protrusion

portions pressed toward the bottom side of the bottom case along the guide portions, when the top case is assembled to the bottom case.

According to a sixth aspect of the present disclosure, the circuit substrate may be provided with an acceleration sensor or a gyro sensor. In this case, the electronic device may be used as an airbag ECU, a sensor substrate, or an electronic stability control ECU (ESC ECU).

While the present disclosure has been described with reference to the embodiments thereof, it is to be understood that the disclosure is not limited to the embodiments and constructions. The present disclosure is intended to cover various modification and equivalent arrangements. In addition, while the various combinations and configurations, which are preferred, other combinations and configurations, including more, less or only a single element, are also within the spirit and scope of the present disclosure.

What is claimed is:

1. An electronic device comprising:

a circuit substrate provided with an electronic circuit;

a bottom case that has an opening portion at a top side, and receives and holds the circuit substrate; and

a top case that has an opening portion at a bottom side, and is attached to the bottom case from the top side of the bottom case, wherein

the circuit substrate has a plurality of slits penetrating through the circuit substrate,

the bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion, and

the bottom case is provided with a plurality of pin-shaped protrusion portions, each protrusion portion has a plurality of locking portions at a tip end portion, and each protrusion portion elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits.

2. The electronic device according to claim 1, wherein

a bottom end portion of the top case includes a plurality of leg portions for attaching the electronic device to a subject, and

the top case is positioned to cover the bottom case.

3. The electronic device according to claim 1, wherein

the protrusion portion is provided to protrude toward one of the top side and the bottom side of the bottom case.

4. The electronic device according to claim 1, further comprising

a plurality of guide portions provided in the top case such that an inside surface of each guide portion is U-shaped, wherein:

the protrusion portion is provided to protrude toward the top side of the bottom case, and

the locking portions are respectively guided along the guide portions and bent to a direction opposite to a protruding direction of the protrusion portions to head for the slits, and are respectively inserted into the slits, when the top case is assembled to the bottom case.

5. The electronic device according to claim 1, further comprising

a plurality of guide portions provided such that a bottom surface of each guide portion declines from a base part of the guide portion to an inner side surface of the guide portion, wherein

the protrusion portion is provided in the bottom case such that the tip end portion is positioned at a direct top side of the slit and heads for a bottom side of the bottom case, and the locking portions are respectively inserted into the slits of the circuit substrate due to the protrusion portions pressed toward the bottom side of the bottom case along the guide portions, when the top case is assembled to the bottom case.

6. The electronic device according to claim 1, wherein

the circuit substrate is provided with an acceleration sensor or a gyro sensor.

ABSTRACT OF THE DISCLOSURE

An electronic device includes a circuit substrate, a bottom case, and a top case. The circuit substrate has a plurality of slits penetrating therethrough. The bottom case has a groove portion positioned at an inside surface of the bottom case such that edge portions of the circuit substrate are slidable and inserted into the groove portion. Besides, a plurality of pin-shaped protrusion portions is provided in the bottom case to be snib-fitted with the top case, and each protrusion portion has a plurality of locking portions at a tip end portion. Each protrusion portion elastically biases the circuit substrate toward the top side of the bottom case and presses the circuit substrate to a top surface of the groove portion by locking the locking portions to the circuit substrate after the locking portions are respectively inserted into the slits.

FIG. 1A

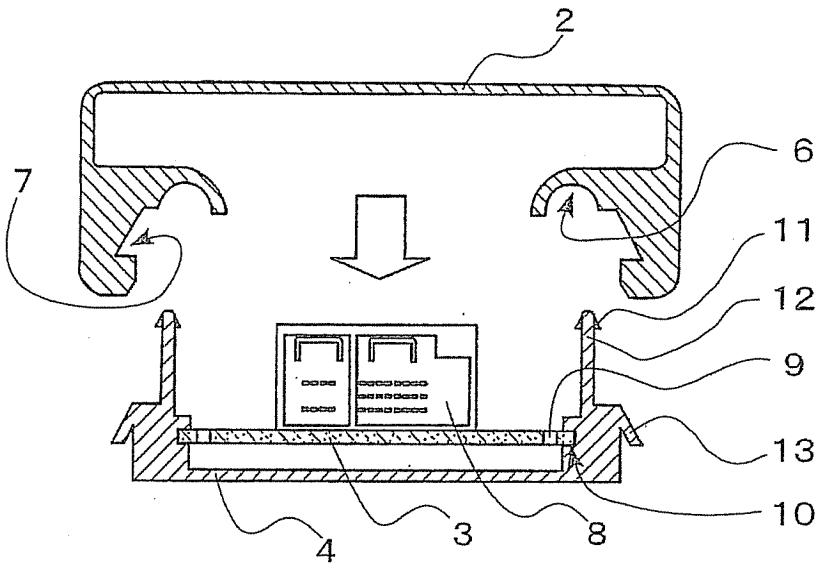


FIG. 1B

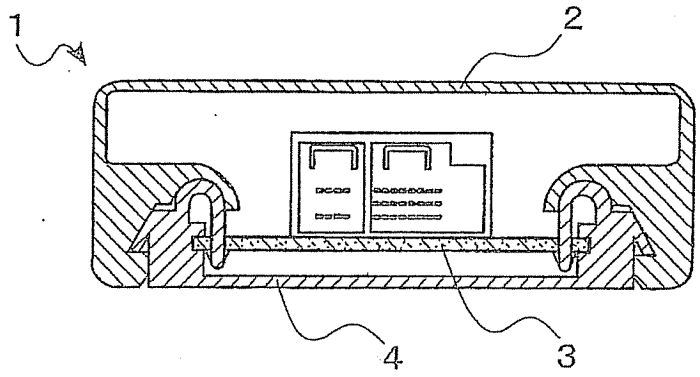


FIG. 2

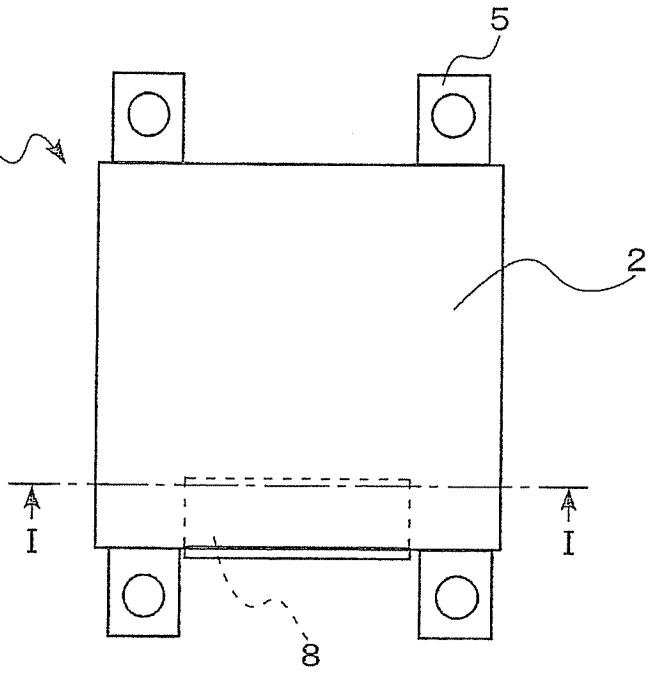


FIG. 3

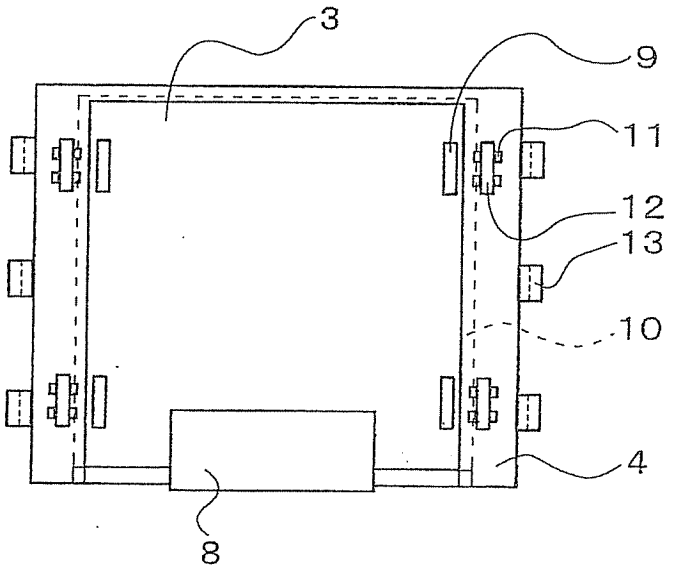


FIG. 4A

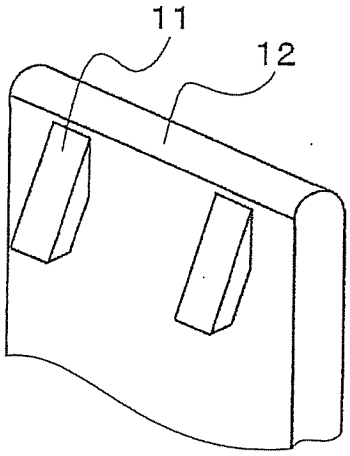


FIG. 4B

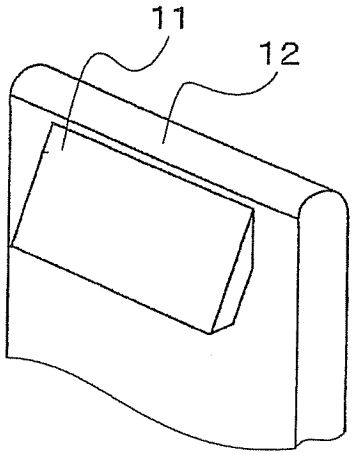


FIG. 5A

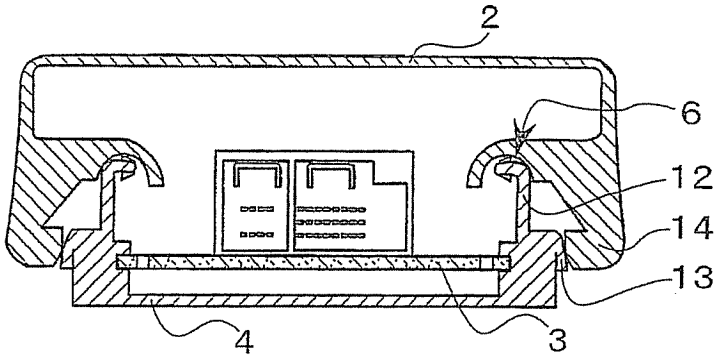


FIG. 5B

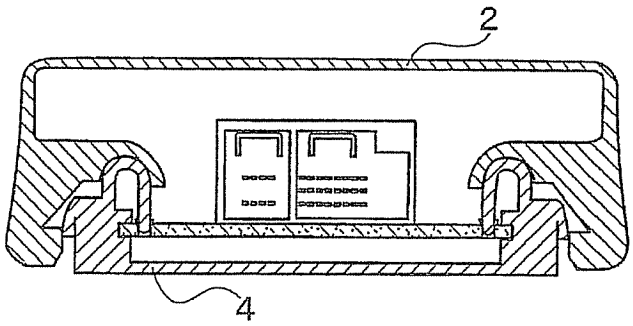


FIG. 5C

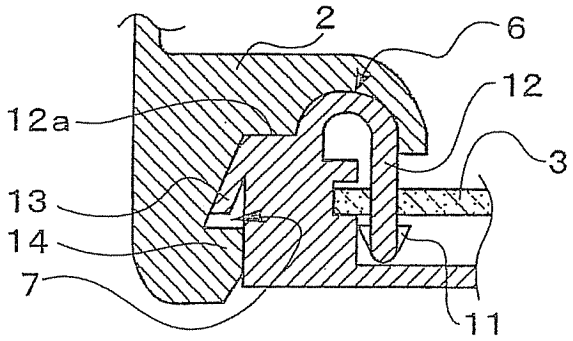


FIG. 5D

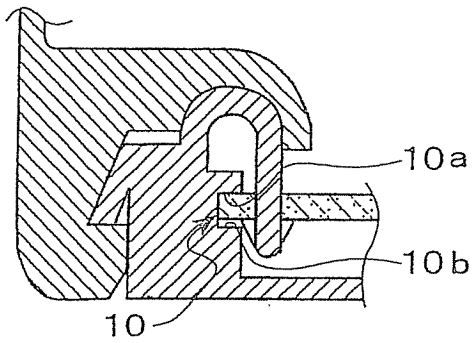


FIG. 6A

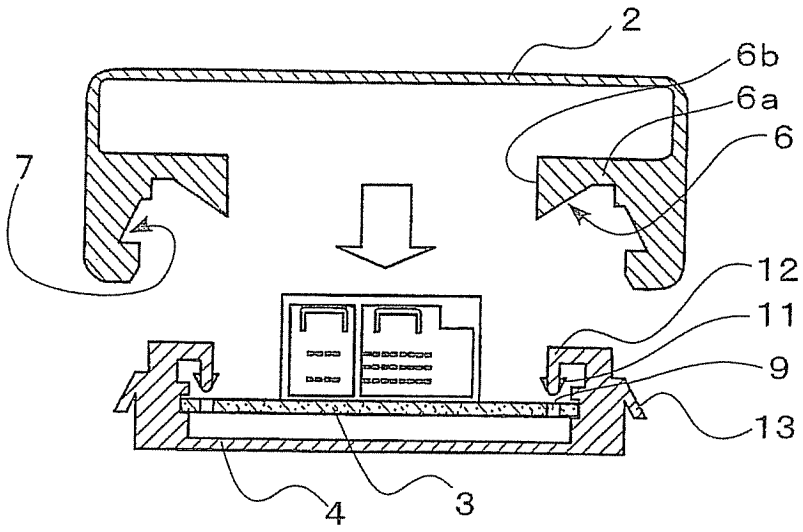
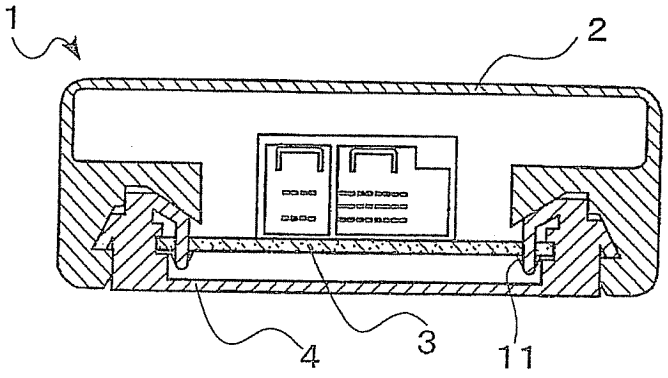


FIG. 6B



147408-US-JSJ-so

出願データシート(37 CFR 1.76)を使った実用特許出願及び意匠特許出願の宣誓書(37 CFR 1.63)
DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

発明の名称 Title of Invention	**ELECTRONIC DEVICE**

私は、以下に記名された発明者として、以下の通り宣言する：
As the below named inventor, I hereby declare that:

本宣言書は
This declaration

is directed to:

ここに添付されている出願、
The attached application,

または
or

(YYYY年 DD月 MM日) _____ (filed on) に出願された米国出願番号 _____ (United States Application No.) または

PCT 国際出願番号 _____ (PCT International Application No.) を有する出願

を対象とする。

上記の出願は私自身によりなされたか、又は私が権限を付与して行われたものです。
The above-identified application was made or authorized to be made by me.

私は、出願の特許請求の範囲で主張されている発明の元々の発明者又は元々の共同発明者であると信じています。
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

私は、本宣言書で故意に虚偽の陳述を行った場合は、米国法典第 18 編第 1001 条に基づき、罰金または五年以下の拘禁、若しくはその両方により処罰されうることを承知しています。
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.

発明者の正式な氏名
LEGAL NAME OF INVENTOR

発明者:
Inventor: Yoshimasa Sano

日付:
Date: December 19. 2012

署名:
Signature: Yoshimasa Sano

本宣言書は以下の注意事項を含まない。Reminders Below Not Part of Declaration.

1. 発明者一人当たり用紙を一部使う事。Use an additional form for each additional inventor.

2. 注：米国特許商標庁の規則では、「特許請求範囲を含む出願書類を読んで内容を理解し、さらに米国特許商標庁に対し連邦規則法典第 37 編規則 1.56 に定義されている通りの特許性に関する重要な情報[先行技術を含む]を開示する義務を認識した上でのみ、宣誓書または宣言書に署名するものとする。」とされている。Note: USPTO Rules state: "A person may not execute an oath or declaration for an application unless that person has reviewed and understands the contents of the application, including the claims, and is aware of the duty to disclose to the Office all information [such as prior art] known to the person to be material to patentability as defined in [37 CFR] § 1.56."

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	To be assigned
Filing Date:	December 21, 2012
Applicant(s):	Yoshimasa SANO
Group Art Unit:	
Examiner:	To be assigned
Title:	Electronic Device
Attorney Docket:	4041J-002077/US

Director of the United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Sir:

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant hereby submits an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS, AND OTHER INFORMATION

The patents, publications and other information requested to be considered by the Office (except unpublished U.S. patent applications) are listed on Form 1449 attached hereto.

II. COPIES

A. ☒ Submitted herewith is a legible copy of (i) each foreign patent; (ii) each publication or that portion which caused it to be listed, other than U.S. patents and U.S. patent application publications unless required by the Office; (iii) each unpublished U.S. application listed below in Section IV (i.e., including the specification, claims, and any drawing of the application, or that portion of the application which caused it to be listed, including any claims directed to that portion), except for such applications filed on or after June 30, 2003, pursuant to the Waiver of the Copy Requirement in 37 C.F.R. 1.98 (OG Notice dated October 19, 2004); and (iv) all other information or that portion which caused it to be listed.

B. ☐ Any patents, publications or other information which are listed on Form 1449 or on the copies of PTO-892, but which are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Serial Number	U.S. Filing Date

C. ☐ This is a PCT application in the entry of the National Phase in the United States. A copy of the International Search Report is attached for the Examiner's information. The documents listed on the International Search report are listed on the attached Form 1449 for consideration by the Examiner and for listing on any patent resulting from this application. If the International Search report was from the US, EPO, or JPO search authorities, copies of these references should have been supplied to the USPTO under the trilateral agreement and are believed to be in the file of the above-identified application. (MPEP 1893.03(g).)

III. CONCISE EXPLANATION OF THE RELEVANCE (check at least one box)

A. ☒ Except as may be indicated below in (B), all of the patents, publications or other information are in the English language (concise explanation not required).

B. ☒ A concise explanation of the relevance of each patent, publication or other information listed that is not in the English language is as follows (see 37 C.F.R. § 1.98(a)(3)):

1. ☐ See the attached foreign patent office communication from a counterpart foreign application:

2. ☒ English translations are provided for the Japanese references cited.

3. ☐ Other:

C. ☐ The following additional information is provided for the Examiner's consideration.

IV. CROSS REFERENCE TO RELATED APPLICATION(S)

A. ☐ The Examiner is advised that the following co-pending application(s) contain(s) subject matter that may be related to the present application. By bringing this(these) application(s) to the Examiner's attention, Applicant(s) does (do) not waive the confidentiality provisions of 35 U.S.C. § 122.

Serial No.	Filing Date	Art Unit

V. THIS IDS IS BEING FILED UNDER

A. ☒ **37 C.F.R. § 1.97(b):** (check only one box)

1. ☒ within three months of the filing date of a national application other than a continued prosecution application under § 1.53(d) (37 C.F.R. § 1.97(b)(1)). No fee or certification is required.

2. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or certification is required.

3. ☐ before the mailing of a first Office Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or certification is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the certification under 37 C.F.R. § 1.97(e) below; or, if no certification has been made, charge our deposit account a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

4. ☐ before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No fee or certification is required.

B. ☐ **37 C.F.R. § 1.97(c):** (check only one box)

before the mailing date of either any Final Office Action under 37 C.F.R. § 1.113, a Notice of Allowance under 37 C.F.R. § 1.311, or an action that otherwise closes prosecution.

1. ☐ No certification; therefore, a fee in the amount of $180.00 is required by 37 C.F.R. § 1.17(p).

2. ☐ See the certification below. No fee is required.

C. ☐ **37 C.F.R. § 1.97(d):**

after the mailing date of either a Final Office Action under 37 C.F.R. § 1.113 or a Notice of Allowance under 37 C.F.R. § 1.311, yet on or before payment of the issue fee.

1. ☐ See the certification below. A fee in the amount of $180.00 is required by 37 C.F.R. § 1.17(p).

VI. CERTIFICATION UNDER 37 C.F.R. § 1.97(e): (check only one box)

The undersigned hereby certifies that:

A. ☐ each item of information contained in this IDS was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS (See 37 C.F.R. § 1.97(e)(1)). See further statement under 37 C.F.R. 1.704(d) below in section VII, if applicable; or

B. ☐ no item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS (See 37 C.F.R. § 1.97(e)(2)).

C. ☐ some of the items of information were first cited in a communication from a foreign patent office. As to this information, the undersigned hereby certifies that each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby certifies that no item of this remaining information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS.

VII. STATEMENT UNDER 37 C.F.R. 1.704(d)

The undersigned hereby states that:

☐ each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this IDS.

VIII. PAYMENT OF FEES (check only one box)

A. ☐ A check in the amount of $180.00 is enclosed for the above identified fee.

B. ☐ Please charge Deposit Account No. 08-0750 in the amount of $180.00 for the above-indicated fee. A duplicate copy of this paper is attached.

The above references are being cited only in the interest of candor and without any admission that they constitute statutory prior art, contain matter which anticipates the invention, or which would render the same obvious, either singly or in combination, to a person of ordinary skill in the art. Furthermore, this Information Disclosure Statement shall not be construed as a representation that a search has been made.

If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule (with a petition if necessary) and charge the appropriate fee to Deposit Account No. 08-0750.

Please charge any additional fees or credit any overpayment pursuant to 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 08-0750.

Respectfully submitted,

Dated: *December 21, 2012*

By: _____
Stanley M. Erjavac, Esq.
Reg. No. 38,442

SME/rf
Harness, Dickey & Pierce, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

14250462.1

FORM HDP-1449 (Based on Form PTO-1449) **PATENT AND TRADEMARK OFFICE** **INFORMATION DISCLOSURE CITATION** (Use several sheets if necessary) Sheet 1 of 1	ATTORNEY DOCKET NO.	SERIAL NO.
	4041J-002077/US	To be assigned
	APPLICANT	
	Yoshimasa SANO	
	FILING DATE	GROUP	CONFIRMATION NO.
	12/21/2012		

U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date

FOREIGN PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Country	Class/ Subclass	Translation Yes	No
1.		2011-166048	8/2011	Japan		Abstract	
2.		2005-317692	11/2005	Japan		Abstract	

OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)

Ref. Desig.	Examiner's Initials	

Examiner:	Date Considered:

EXAMINER: Please initial if citation 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

書誌事項: JP2011166048 (A) — 2011-08-25

HOUSING OF ELECTRONIC APPARATUS OR THE LIKE

発明者: OKAWACHI MITSUO ±

出願人 FUJITSU TELECOM NETWORKS LTD ±

分類: —国際: ***H05K7/14***

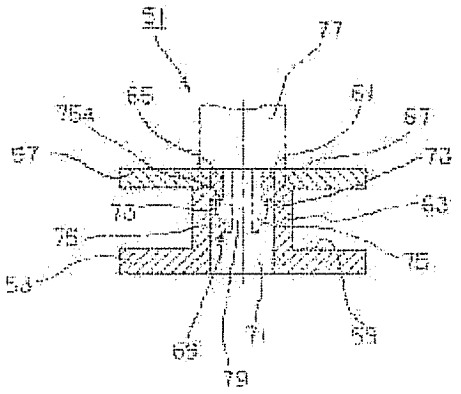
—欧州:

出願番号 JP20100029841 20100215

優先権主張番号: JP20100029841 20100215

要約 **JP2011166048 (A)**

PROBLEM TO BE SOLVED: To provide a housing structure such that a printed board and a cover can be attached to a case through easy operation with respect to a housing of an electronic apparatus etc. ; SOLUTION: In the resin-made housing for the electronic apparatus or the like which comprises a box-shaped case having an opening on the upper side and a cover put thereover and in which a printed board having an electronic component or the like mounted is stored, a plurality of attachment holes are bored on the printed board, and a plurality of boss portions to abut on the printed board are respectively protruded on the case and cover corresponding to the attachment holes. Locking claws to be inserted into the attachment holes are formed at tops of respective boss portions on one side of the case side and cover side, and insertion holes internally having locking portions in which the locking claws can be locked are provided at tops of boss portions on another side of the cover side and case side. ; COPYRIGHT: (C)2011,JPO&INPIT



(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2011-166048
(P2011-166048A)
(43)公開日　平成23年8月25日(2011.8.25)

(51)Int.Cl.		F I		テーマコード（参考）
H05K 7/14	(2006.01)	H05K 7/14	F	5E348

審査請求 未請求　請求項の数 7　ＯＬ　（全 12 頁）

(21)出願番号　特願2010-29841 (P2010-29841)
(22)出願日　平成22年2月15日 (2010.2.15)

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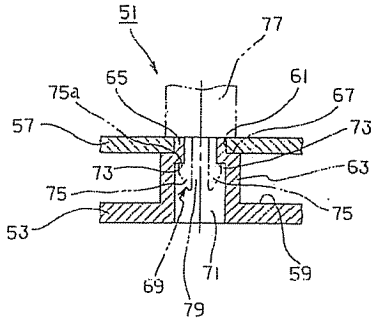
Ｆターム(参考)　5E348 AA13　AA15　AA40

(54)【発明の名称】電子機器等の筐体

(57)【要約】
【課題】　本発明は電子機器等の筐体に係り、簡単な作業でプリント基板とカバーをケースに取り付けることができる筐体構造を提供することを目的とする。
【解決手段】　上部が開口したボックス状のケースと、これに被さるカバーとで構成され、電子部品等を実装したプリント基板を内部に収容した電子機器等の樹脂製の筐体に於て、前記プリント基板に複数の取付穴を穿設し、当該取付穴に対応して前記ケースとカバーに、夫々、プリント基板に当接する複数のボス部を突設すると共に、ケース側またはカバー側のいずれか一方の各ボス部の先端に、前記取付穴を挿通する係止爪を形成し、カバー側またはケース側の他方のボス部の先端に、前記係止爪が係止可能な係止部を内部に有する挿入穴を設けたことを特徴とする。
【選択図】　図３



【特許請求の範囲】
【請求項１】
上部が開口したボックス状のケースと、これに被さるカバーとで構成され、電子部品等を実装したプリント基板を内部に収容した電子機器等の樹脂製の筐体に於て、
前記プリント基板に複数の取付穴を穿設し、当該取付穴に対応して前記ケースとカバーに、夫々、プリント基板に当接する複数のボス部を突設すると共に、
ケース側またはカバー側のいずれか一方の各ボス部の先端に、前記取付穴を挿通する係止爪を形成し、
カバー側またはケース側の他方のボス部の先端に、前記係止爪が係止可能な係止部を内部に有する挿入穴を設けたことを特徴とする電子機器等の筐体。
【請求項２】
前記挿入穴が形成されるボス部の先端に、前記取付穴に挿入可能な円筒状のガイド部が突設され、当該ガイド部周縁のボス部にプリント基板が着座し、当該ガイド部に前記挿入穴が開口することを特徴とする請求項１に記載の電子機器等の筐体。
【請求項３】
前記係止爪は、縦割りスリットが形成された左右一対の弾性片からなり、両弾性片の先端に、前記係止部に係止する爪部が形成されていることを特徴とする請求項１または請求項２に記載の電子機器等の筐体。
【請求項４】
前記爪部は、係止部に係止する板厚差吸収用の傾斜辺が形成されていることを特徴とする請求項３に記載の電子機器等の筐体。
【請求項５】
前記係止爪が形成されたボス部の先端に、プリント基板に圧接する突起が形成されていることを特徴とする請求項１乃至請求項４のいずれか１項に記載の電子機器等の筐体。
【請求項６】
前記係止爪は、前記ボス部の先端に突設された軸部と、当該軸部の先端から斜め後方に延設された左右一対の弾性片とからなることを特徴とする請求項１または請求項２に記載の電子機器等の筐体。
【請求項７】
前記係止爪が形成されたボス部の先端に、前記弾性片とでプリント基板を上下から挟持する押圧片が形成されていることを特徴とする請求項６に記載の電子機器等の筐体。

【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、電子部品が実装されたプリント基板を収容する電子機器等の筐体構造に関する。
【背景技術】
【０００２】
図１５に示すように、従来、電子機器等に使用される樹脂製の筐体（モールド筐体）１は、上部が開口したボックス状のケース３とこれに被さるカバー５とで構成され、その中に電子部品（図示せず）等を実装した一枚のプリント基板７が収容されている。
【０００３】
而して、図１５に示すようにケース３の四隅近傍の底部９には、複数の円筒状のボス部１１が上方へ一体に突設されており、図１６に示すように各ボス部１１は、夫々、ケース３の裏面側に開口している。
【０００４】
更に、夫々のボス部１１の先端中央には、各ボス部１１に対応してプリント基板７に穿設した取付穴１３に挿入可能な円筒状のガイド部１５がボス部１１と中心軸を同じくして一体成形されており、ガイド部１５はボス部１１よりも小径とされている。そして、図１

６に示すように、取付穴１３にガイド部１５を挿入、係合させると、ボス部１１の上面１７にプリント基板７が着座するようになっている。尚、このとき、ガイド部１５の先端がプリント基板７と面一になるようにガイド部１５の高さ寸法が設定されている。

【０００５】

一方、図１５及び図１６に示すようにカバー５の内側（裏面側）には、前記ボス部１１に対応して円筒状のボス部１９が下方へ一体に突設されており、その先端の中央にタッピング用の下穴２１が設けられている。

【０００６】

そして、筐体１内へのプリント基板７の取付けは、図１６に示すように、取付穴１３にガイド部１５を挿入、係合させてボス部１１の上面１７にプリント基板７を着座させた後、ケース３の上方からカバー５を被せ、両ボス部１１、１９の中心軸を一致させてボス部１９の先端をプリント基板７とガイド部１５の先端とに当接させた状態で、図１７の如くケース３の裏面側からタッピングネジ２３をガイド部１７に挿通させて下穴２１にタップを切り乍らねじ込めば、図示するようにプリント基板７がボス部１１、１９間（ケース３とカバー５間）に挟持されて、筐体１内に収容、固定されるようになっている。

【０００７】

尚、通常、前記タッピングネジ２３のねじ込み作業は、筐体１を上下に反転させてケース３を上にして行われる。

【０００８】

また、図１８乃至図２０は特許文献１に開示されたプリント基板の取付構造を示し、この従来例も、上部が開口したボックス状のケース２５とこれに被さるカバー２７とで筐体２９が構成され、その中に電子部品等を実装した一枚のプリント基板３１が収容されている。

【０００９】

そして、この従来例は、プリント基板３１に穿設した複数の取付穴３３に対応して、ケース２５の底部３５に略円柱状のボス部３７を一体成形し、図１９に示すように当該ボス部３７の先端に、頭部が球状に形成された突起３９を突起すると共に、当該突起３９を縦割りするスリット４１をボス部３７に亘って形成したもので、取付穴３３を突起３９に位置合わせした後、プリント基板３１を下方へ押圧すると、突起３９の頭部が縮退、拡開して図２０の如く取付穴３３に係合し、プリント基板３１がボス部３７の上面４３に着座してケース２５に固着される。

【００１０】

この後、図２０の如くケース２５の上方からカバー２７を被せ、また、仕様に応じネジ止め等の手段でカバー２７をケース２５に固定して、プリント基板３１が収容、固定された筐体２９が形成される。

【先行技術文献】

【特許文献】

【００１１】

【特許文献１】特開平５−１６７２７３号公報

【発明の開示】

【発明が解決しようとする課題】

【００１２】

このように、図１５の従来例は、タッピングネジ２３のねじ込み作業によって、カバー５とプリント基板７を同時にケース３に固定することが可能であるが、タッピングネジ２３を下穴２１にねじ込む際に、ケース３にカバー５を被せる方向とは逆に、ケース３の底部が上方を向くように筐体１を反転させなければならず、また、タッピングネジ２３のねじ締めトルクの管理を必要とするため、作業性が悪いといった指摘がなされていた。

【００１３】

また、タッピングネジ２３を使用した構造上、再組立時にねじ山を壊してしまう不具合がある。

【００１４】
一方、図１８乃至図２０の従来例にあっては、取付穴３３と突起３９を利用して、プリント基板３１をワンタッチでボス部３７に止着することができるものの、この取付作業とは別にカバー２７をケース２５に被せなければならず、また、既述したように仕様に応じ、別途、ネジ止め等の手段でカバー２７をケース２５に固定する作業が必要で、筐体２９全体としての組立作業性が悪かった。
【００１５】
本発明は斯かる実情に鑑み案出されたもので、上部が開口したボックス状のケースとこれに被さるカバーとで構成され、その中に電子部品等を実装したプリント基板を収容した電子機器等の筐体に改良を加え、簡単な作業でプリント基板とカバーをケースに取り付けることができる筐体構造を提供することを目的とする。
【課題を解決するための手段】
【００１６】
斯かる目的を達成するため、請求項１に係る発明は、上部が開口したボックス状のケースと、これに被さるカバーとで構成され、電子部品等を実装したプリント基板を内部に収容した電子機器等の樹脂製の筐体に於て、前記プリント基板に複数の取付穴を穿設し、当該取付穴に対応して前記ケースとカバーに、夫々、プリント基板に当接する複数のボス部を突設すると共に、ケース側またはカバー側のいずれか一方の各ボス部の先端に、前記取付穴を挿通する係止爪を形成し、カバー側またはケース側の他方のボス部の先端に、前記係止爪が係止可能な係止部を内部に有する挿入穴を設けたことを特徴とする。
【００１７】
そして、請求項２に係る発明は、請求項１に記載の電子機器等の筐体に於て、前記挿入穴が形成されるボス部の先端に、前記取付穴に挿入可能な円筒状のガイド部が突設され、当該ガイド部周縁のボス部にプリント基板が着座し、当該ガイド部に、前記挿入穴が開口することを特徴とする。
【００１８】
また、請求項３に係る発明は、請求項１または請求項２に記載の電子機器等の筐体に於て、前記係止爪は、縦割りスリットが形成された左右一対の弾性片からなり、両弾性片の先端に、前記係止部に係止する爪部が形成されていることを特徴とし、請求項４に係る発明は、請求項３に記載の電子機器等の筐体に於て、前記爪部は、係止部に係止する板厚差吸収用の傾斜辺が形成されていることを特徴とする。
【００１９】
更に、請求項５に係る発明は、請求項１乃至請求項４のいずれか１項に記載の電子機器等の筐体に於て、前記係止爪が形成されたボス部の先端に、プリント基板に圧接する突起が形成されていることを特徴とする。
【００２０】
そして、請求項６に係る発明は、請求項１または請求項２に記載の電子機器等の筐体に於て、前記係止爪は、前記ボス部の先端に突設された軸部と、当該軸部の先端から斜め後方に延設された左右一対の弾性片とからなることを特徴とし、請求項７に係る発明は、請求項６に記載の電子機器等の筐体に於て、前記係止爪が形成されたボス部の先端に、前記弾性片とでプリント基板を上下から挟持する押圧片が形成されていることを特徴とする。
【発明の効果】
【００２１】
各請求項に係る発明によれば、従来に比しケースとカバーの取付け、そして、ケース内へのプリント基板の収容、固定に当たりタッピングネジが不要になり、ねじ締めトルクの管理も不要となる。
【００２２】
また、係止爪をガイド部から挿入穴内に挿入させてこれを係止部に係止させるだけの作業で、カバーをケースに固定することができると同時にプリント基板を両ボス部間で挟持して筐体内に収容、固定でき、而も、ケースへのプリント基板とカバーの取り付けが同一

方向から行えるため、従来に比し作業性が著しく良好となり、コストの面も有利となる。

【００２３】

そして、請求項２に係る発明によれば、ガイド部周縁のボス部にプリント基板が着座しているため、プリント基板ががたつくことがない。

【００２４】

更に、請求項４乃至請求項７に係る発明によれば、仕様に応じた板厚の異なるプリント基板に対応可能で、傾斜辺、突起、弾性片等の作用により板厚差を吸収することで、板厚の異なるプリント基板を筐体内に確実且つ良好に収容、固定することができる利点を有する。

【図面の簡単な説明】

【００２５】

【図１】請求項１乃至請求項３の第一実施形態に係る筐体の分解斜視図である。

【図２】カバー側のボス部に突設した係止爪の側面図である。

【図３】ケース側に形成したボス部とこの上面に着座するプリント基板の断面図である。

【図４】プリント基板の収容、固定方法の説明図である。

【図５】プリント基板を収容、固定した筐体の部分断面図である。

【図６】カバーとプリント基板の取り外し方法の説明図である。

【図７】請求項１乃至請求項４の一実施形態に於ける係止爪の側面図である。

【図８】プリント基板を収容、固定した筐体の部分断面図である。

【図９】請求項１乃至請求項３及び請求項５の一実施形態に於ける係止爪の側面図である。

【図１０】プリント基板を収容、固定した筐体の部分断面図である。

【図１１】請求項１、請求項２、請求項６及び請求項７の一実施形態に於ける係止爪の側面図である。

【図１２】プリント基板を収容、固定した筐体の部分断面図である。

【図１３】請求項１乃至請求項３の第二実施形態に於ける係止爪の側面図である。

【図１４】プリント基板を収容、固定した筐体の部分断面図である。

【図１５】従来の筐体の分解斜視図である。

【図１６】従来のプリント基板の収容、固定方法の説明図である。

【図１７】従来のプリント基板を収容、固定した筐体の部分断面図である。

【図１８】従来の他の筐体の分解斜視図である。

【図１９】従来のプリント基板の収容、固定方法の説明図である。

【図２０】従来のプリント基板を収容、固定した筐体の部分断面図である。

【発明を実施するための最良の形態】

【００２６】

以下、本発明の実施形態を図面に基づいて詳細に説明する。

【００２７】

図１乃至図６は請求項１乃至請求項３に係る筐体の第一実施形態を示し、図１５に示す筐体１と同様、本実施形態に係る筐体５１も樹脂で形成されたモールド筐体で、上部が開口したボックス状のケース５３とこれに被さるカバー５５とで構成され、その中に電子部品（図示せず）等を実装したプリント基板５７が収容、固定される。

【００２８】

而して、図１及び図３に示すようにケース５３の底部５９には、プリント基板５７の四隅近傍に穿設した複数の取付穴６１に対応して複数の円筒状のボス部６３が上方へ一体に突設されており、図３に示すように各ボス部６３は、夫々、ケース５３の裏面側に開口している。

【００２９】

また、各ボス部６３の先端中央には、前記取付穴６１に挿入可能な円筒状のガイド部６５がボス部６３と中心軸を同じくして一体成形されている。そして、ガイド部６５はボス部６３よりも小径とされており、図３に示すように取付穴６１にガイド部６５を挿入、係

合させると、ボス部６３の上面６７にプリント基板５７が着座し、また、ガイド部６５の先端がプリント基板５７と面一になるようにガイド部６５の高さ寸法が設定されている。

【００３０】

そして、図３に示すように前記ガイド部６５を挿通して、後述する係止爪６９が円筒状に形成されたボス部６３内の挿入穴７１に挿入されるようになっており、当該挿入穴７１は上部が前記ガイド部６５に開口している。そして、前記挿入穴７１内に、前記ボス部６３の内周とこれより小径なガイド部６５の内周との境目に段差状の係止部７３が設けられており、この係止部７３に、後述する係止爪６９の爪部７５が係止するようになっている。

【００３１】

一方、図１に示すようにカバー５５の内側（裏面側）には、前記取付穴６１に対応して円柱状のボス部７７が下方へ一体に突設されている。そして、図２乃至図５に示すように、当該ボス部７７の先端中央に係止爪６９が一体に突設されている。

【００３２】

図２に示すように係止爪６９は、縦割りスリット７９が形成された左右一対の弾性片８１からなり、両弾性片８１の先端に前記係止部７３に係止する爪部７５が形成されている。

【００３３】

爪部７５は、先細で外方へ突出する断面略三角形状のラチェット状に形成されており、取付穴６１にガイド部６５を挿入、係合させて、ボス部６３の上面６７にプリント基板５７を着座させた後、係止爪６９をガイド部６５の開口部に位置合わせしてカバー５５を下方へ押圧すると、図４に示すように弾性片８１の先端側が内方へ変形し、係止爪６９の先端側が縮退、拡開して図３及び図５の如く爪部７５の直角辺７５ａが係止部７３に係止し、これにより、カバー５５がケース５３に固定されると同時に、プリント基板５７が両ボス部６３、７７間に挟持されて筐体１内に収容、固定されるようになっている。

【００３４】

また、再組立等でケース５３とカバー５５を開けたい場合には、一例として図６に示す分解治具８３を用いればよい。

【００３５】

図示するように分解治具８３の先端には、円錐状にえぐり貫かれた操作部８５が設けられており、ケース５３の裏面側からボス部６３内に分解治具８３の先端側を挿入し、操作部８５の内周に両爪部７５の外周を当該させて分解治具８３全体を上方に押圧すると、係止部７３に係止する両爪部７５が縮退して係止部７３との係止状態が解除されるようになっている。

【００３６】

従って、この状態でカバー５５を引き上げれば、ケース５３からカバー５５が開くこととなる。

【００３７】

本実施形態はこのように構成されているから、ケース５３とカバー５５とからなる筐体５１内に電子部品等が実装されたプリント基板５７を収容、固定するには、既述したように先ず、図３に示すようにプリント基板５７の取付穴６１にガイド部６５を挿入、係合させて、ボス部６３の上面６７にプリント基板５７を着座させる。

【００３８】

そして、ケース５３の上方からカバー５５を被せ乍ら、係止爪６９の爪部７５をガイド部６５の開口部に位置合わせしてカバー５５を下方へ押圧すると、図４に示すように弾性片８１の先端側が内方へ変形し、係止爪６９の先端側が縮退、拡開して図３及び図５の如く係止爪６９の爪部７５の直角辺７５ａが係止部７３に係止し、これにより、カバー５５がケース５３に固定されると同時に、プリント基板５７が両ボス部６３、７７間に挟持されて筐体１内に収容、固定されることとなる。

【００３９】

また、再組立等でケース５３とカバー５５を開けたい場合には、図６の如く前記分解治具８３を用いて既述した取り外し手順を採ることで、ケース５３からカバー５５が取り外せることとなる。

【００４０】

このように本実施形態によれば、図１５乃至図１７に示す従来例に比し、タッピングネジ２３が不要になり、ねじ締めトルクの管理も不要となる。

【００４１】

而も、斯かる従来例と異なり、本実施形態ではケース５３へのプリント基板５７とカバー５５の取り付けが同一方向から行えるため、作業性が良好となり、コストの面も有利となる。

【００４２】

更に、本実施形態は前記係止爪６９と係止部７３との係止作用を利用しているため、係止部７３に対する係止爪６９の係脱によって、図１５の従来例と異なり何度でも再組立が可能となる利点を有する。

【００４３】

そして、本実施形態は、プリント基板５７の取付穴６１にガイド部６５を挿入、係合させて、ボス部６３の上面６７にプリント基板５７を着座させた後、係止爪６９をガイド部６５から挿入穴７１内に挿入させてこれを係止部７３に係止させるだけの作業で、カバー５５をケース５３に固定することができると同時に、プリント基板５７を両ボス部６３、７７間で挟持して筐体５１内に収容、固定できるため、図１８に示す従来例に比し、筐体５１内へのプリント基板５７の収容、固定作業が簡単で作業性が著しく向上する利点を有する。

【００４４】

而も、ボス部６３の上面６７にプリント基板５７が着座しているため、プリント基板５７ががたつくこともない。

【００４５】

図７及び図８は請求項１乃至請求項４に係る筐体の一実施形態を示し、図２及び図３に示すように前記実施形態では、係止爪６９の爪部７５を先細で外方へ突出する断面略三角形状のラチェット状に形成して、その直角辺７５ａを前記係止部７３に係止させたが、図７及び図８に示すように本実施形態は、カバー５５側のボス部７７の先端に突設する係止爪８７の爪部８９を先細で外方へ突出する断面略三角形状に形成すると共に、前記直角辺７５ａに代えて、前記係止部７３に係止する傾斜辺８９ａを爪部８９に設けたものである。

【００４６】

尚、その他の構成は前記実施形態と同様であるので、同一のものには同一符号を付してそれらの説明は省略する。

【００４７】

本実施形態はこのように構成されているから、ケース５３とカバー５５とからなる筐体５１内にプリント基板５７を収容、固定するには、前記実施形態と同様、プリント基板５７の取付穴６１にガイド部６５を挿入、係合させて、ボス部６３の上面６７にプリント基板５７を着座させた後、ケース５３の上方からカバー５５を被せ乍ら、係止爪８７の爪部８９をガイド部６５の開口部に位置合わせしてカバー５５を下方へ押圧すればよい。

【００４８】

而して、これにより、弾性片８１の先端側が内方へ変形し、係止爪８７の先端側が縮退、拡開して図８の如く係止爪８７の爪部８９の傾斜辺８９ａが係止部７３に係止するため、カバー５５がケース５３に固定されると同時に、プリント基板５７が両ボス部６３、７７間に挟持されて筐体５１内に収容、固定されることとなる。

【００４９】

そして、斯様に爪部８９の傾斜辺８９ａに係止部７３が係止する構造上、仕様に応じ板厚の大きなプリント基板が使用されると、係止部７３と傾斜辺８９ａとの係止位置が傾斜

辺８９ａ上を移動してプリント基板の板厚差が吸収され、プリント基板が両ボス部６３、７７間に挟持されて筐体１内に良好に収容、固定されることとなる。

【００５０】

このように本実施形態によっても、前記実施形態と同様、所期の目的を達成することが可能であると共に、仕様に応じ板厚の大きなプリント基板が使用された場合にも、係止爪８７の爪部８９の傾斜辺８９ａが板厚差を吸収するため、前記プリント基板５７に比し板厚の大きな多くのプリント基板を筐体５１内に確実且つ良好に収容、固定することができる。

【００５１】

尚、前記ガイド部６５の高さ寸法をプリント基板５７の板厚よりも短寸に設定すれば、プリント基板５７よりも板厚の薄いプリント基板の取付けも可能となる。

【００５２】

図９及び図１０は請求項１乃至請求項３及び請求項５に係る筐体の一実施形態を示し、図示するように本実施形態は、図１の実施形態の構成に加え、係止爪６９が突設されたボス部７７の先端の周縁部に先細な断面三角形状の変形可能な突起９１を複数設けて、係止部７３への係止爪６９の係止時に、前記突起９１を取付穴６１周縁のプリント基板５７の表面に弾性変形させて、仕様に応じた板厚の大きなプリント基板の板厚差を吸収し、プリント基板を両ボス部６３、７７間に挟持して筐体１内に良好に収容、固定できるようにしたものである。

【００５３】

従って、本実施形態によっても、図７の実施形態と同様、仕様に応じ板厚の大きなプリント基板が使用された場合にもプリント基板の板厚差を吸収することが可能で、板厚の大きなプリント基板を筐体５１内に確実且つ良好に収容、固定することができる利点を有する。

【００５４】

また、本実施形態も、ガイド部６５の高さ寸法をプリント基板５７の板厚よりも短寸に設定することで、プリント基板５７よりも板厚の薄いプリント基板の取付けも可能である。

【００５５】

図１１及び図１２は請求項１、請求項２、請求項６及び請求項７の一実施形態に係る筐体を示し、図示するように本実施形態は、カバー５５側のボス部７７の先端に突設する係止爪９３を、前記ボス部７７の先端中央に突設された一本の軸部９５と、当該軸部９５の先端から斜め後方に延設された左右一対の弾性片９７とで構成して、係止部７３への係止爪９３の係止時に、左右の弾性片９７を係止部７３に圧接係止可能とすると共に、ボス部７７の先端の周縁部に、前記弾性片９７とでプリント５７を上下から挟持する複数の弾性変形可能な押圧片９９を形成したことを特徴としている。

【００５６】

尚、本実施形態に於ても、その他の構成は図１の実施形態と同様であるので、同一のものには同一符号を付してそれらの説明は省略する。

【００５７】

本実施形態はこのように構成されているから、図示するように係止部７３に係止爪９３が係止してカバー５５がケース５３に固定されると共に、プリント基板５７が両ボス部６３、７７間及び弾性片９７と押圧片９９とで上下から挟持されて、筐体５１内に収容、固定されることとなる。

【００５８】

また、仕様に応じ板厚の大きなプリント基板が利用されても、前記弾性片９７、そして、当該弾性片９７とでプリント５７を上下から挟持する複数の押圧片９９が夫々弾性変形してプリント基板の板厚差を吸収する。

【００５９】

従って、本実施形態によっても、図７の実施形態と同様、所期の目的を達成することが

可能であると共に、仕様に応じ板厚の大きなプリント基板が使用された場合にもその板厚差を吸収することが可能で、板厚の大きなプリント基板を筐体５１内に確実且つ良好に収容、固定することができる利点を有する。

【００６０】

そして、本実施形態にあっても、ガイド部６５の高さ寸法をプリント基板５７の板厚よりも短寸に設定することで、プリント基板５７よりも板厚の薄いプリント基板の取付けも可能である。

【００６１】

図１３及び図１４は請求項１乃至請求項３に係る筐体の第二実施形態を示し、図１の実施形態では、カバー５５側のボス部７７に係止爪６９を設けると共に、ケース５３側のボス部６３の先端中央に当該係止爪６９が挿入可能な挿入穴７１を設けたが、図１３及び図１４に示すようにケース５３側に前記ボス部７７と係止爪６９を形成し、カバー５５側にボス部６３と、前記係止爪６９が挿入可能な挿入穴７１やガイド部６５、係止部７３等を設けてもよい。

【００６２】

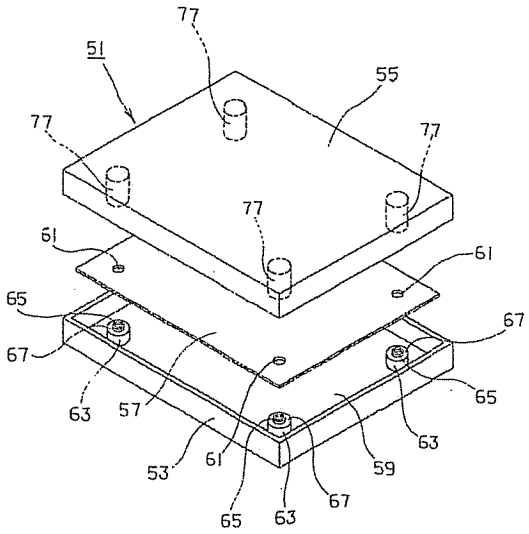
而して、この実施形態によっても、図１の実施形態と同様、所期の目的を達成することが可能で、タッピングネジ２３が不要になり、ねじ締めトルクの管理も不要となると共に、ケース５３へのプリント基板５７とカバー５５の取り付けが、同一方向から行えるため、作業性が良好となり、コストの面も有利となる等、優れた利点を有する。

【符号の説明】

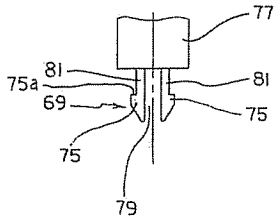
【００６３】

５１　筐体
５３　ケース
５５　カバー
５７　プリント基板
５９　ケースの底部
６１　取付穴
６３，７７　ボス部
６５　ガイド部
６９、８７、９３　係止爪
７１　挿入穴
７３　係止部
７５、８９　爪部
７７　縦割りスリット
８１、９７　弾性片
８３　分解治具
８９ａ　傾斜辺
９１　突起
９５　軸部
９９　押圧片

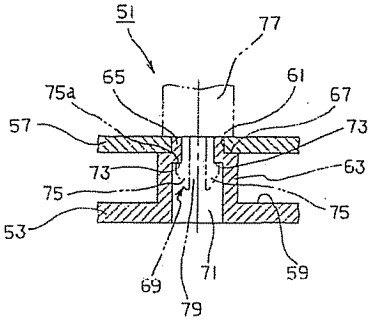
【図１】



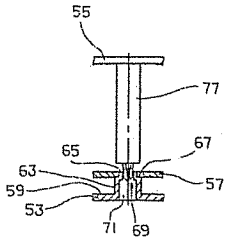
【図２】



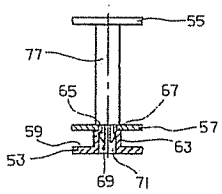
【図３】



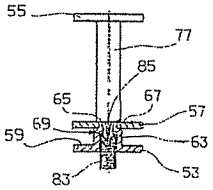
【図４】



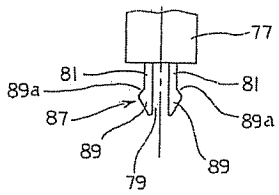
【図５】



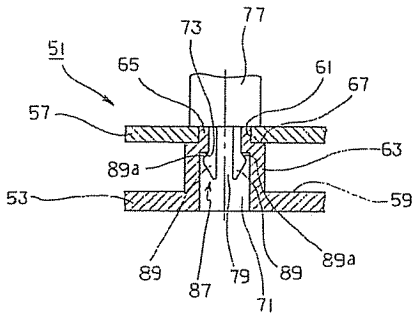
【図６】



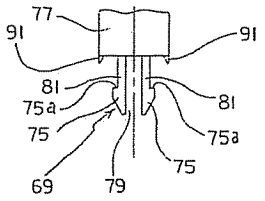
【図７】



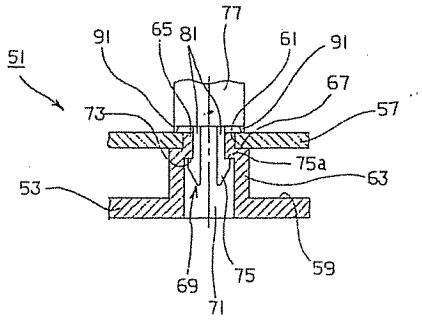
【図８】



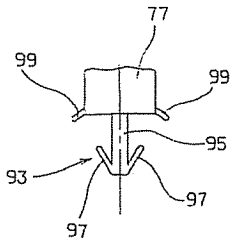
【図９】



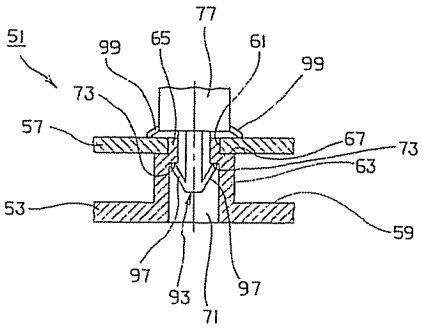
【図１０】



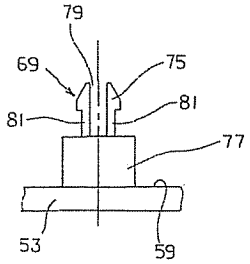
【図１１】



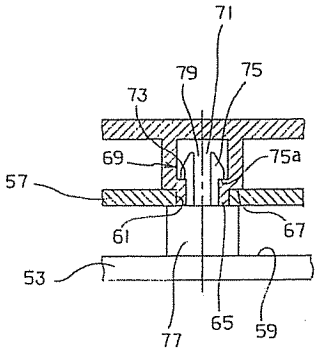
【図１２】



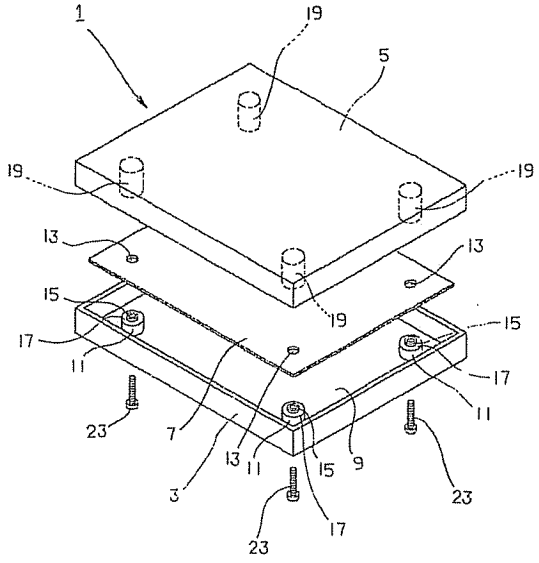
【図１３】



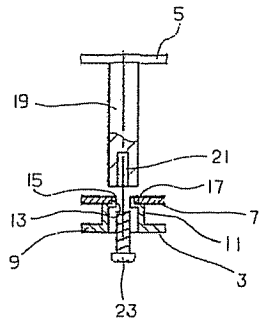
【図１４】



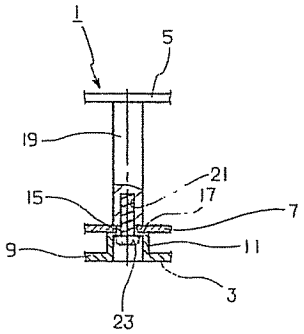
【図１５】



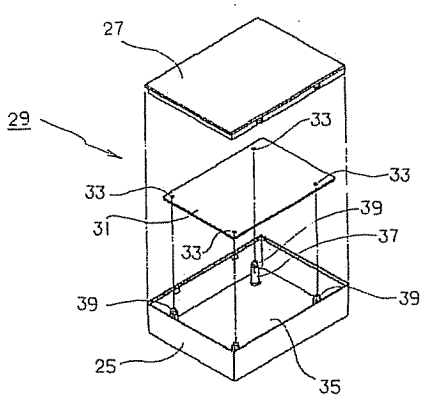
【図１６】



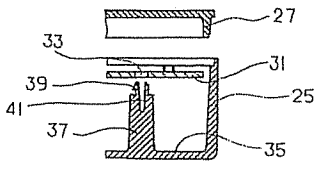
【図１７】



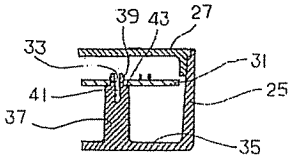
【図１８】



【図１９】



【図２０】



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BOARD-TYPE PART FIXING STRUCTURE

発明者: NAGAHISA DAICHI ±

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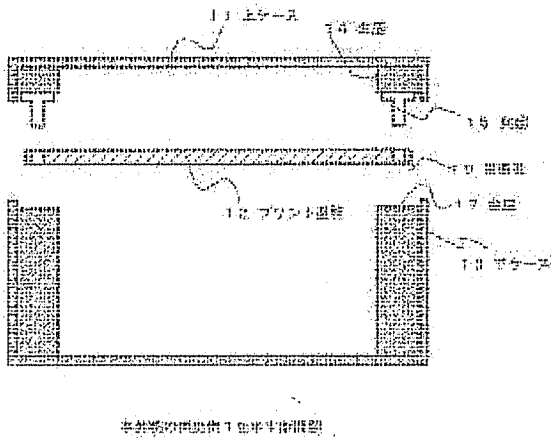
優先権主張番号: JP20040132514 20040428

要約 **JP2005317692 (A)**

PROBLEM TO BE SOLVED: To provide a structure for steadily fixing a board-type part wherein the protrusions of a first case are fitted into the through-holes of a board-type part for steadily fixing the board-type part in the horizontal direction, and then the protrusions are deformed in between the seatings of the first case and the seatings of the second case for steadily fixing the board-type part in the direction of thickness. ; SOLUTION: A printed board 12 has through holes 16 provided at prescribed positions, and an upper case 11 has seatings 14 having protrusions 15 each corresponding to one of the through holes 16. A lower case 13 is also provided, and it has seatings 17 corresponding to the seatings 14 for supporting the printed board 12. The protrusions 15 of the upper case 11 are fitted into the through holes 16 of the printed board 12, the printed board 12 is sandwiched in between the seatings 14 and the seatings 17, so that the protrusions 15 are deformed for fixing immovable the printed board 12. ; COPYRIGHT: (C) 2006,JPO&NCIPI



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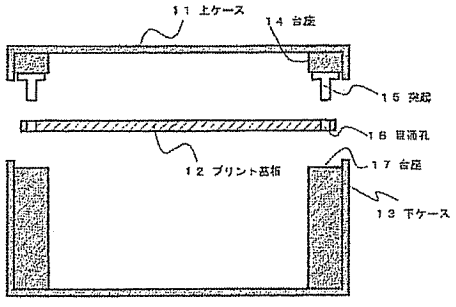
(54)【発明の名称】板状物品の固定構造

(57)【要約】
【課題】プリント基板を一対のケースで挟持して固定する場合、プリント基板の水平方向の固定は摩擦力のみによって行われているので、落下衝撃などが加わった場合、位置がずれる可能性があった。
【解決手段】プリント基板１２の所定位置に複数の貫通孔１６を設け、貫通孔１６にそれぞれ対応する突起１５を有する台座１４を設けた上ケース１１と、その台座１４に対応してプリント基板１２を支持する台座１７を設けた下ケース１３とを備え、上ケース１１の突起１５とプリント基板１２の貫通孔１６とを嵌合して、台座１４と台座１７でプリント基板１２を挟むことにより突起１５を変形させてプリント基板１２を固定するようにした。
【選択図】図１



本発明の実施例１を示す断面図

【特許請求の範囲】
【請求項１】
板状物品を一対のケースで挟持して固定する板状物品の固定構造において、
所定位置に複数の貫通孔を設けた板状物品の前記複数の貫通孔にそれぞれ対応する突起を有する台座を設けた第１のケースと、前記台座に対応して前記板状物品を支持する台座を設けた第２のケースとを備え、
前記第１のケースの突起と前記板状物品の貫通孔とを嵌合して、前記第１のケースの台座と第２のケースの台座で前記板状物品を挟むことにより前記突起を変形させて前記板状物品を固定することを特徴とする板状物品の固定構造。
【請求項２】
前記突起を前記第１のケースと同じ材質の合成樹脂で形成した請求項１記載の板状物品の固定構造。
【請求項３】
前記突起を弾性材で形成した請求項１記載の板状物品の固定構造。
【請求項４】
板状物品を一対のケースで挟持して固定する板状物品の固定構造において、
所定位置に複数の貫通孔を設けた板状物品の前記複数の貫通孔にそれぞれ対応し、穴を明けた弾性材の突起を有する台座を設けた第１のケースと、前記突起の穴に挿入される合成樹脂の突起を形成し、前記台座に対応して前記板状物品を支持する台座を設けた第２のケースとを備え、
前記第１のケースの突起と前記板状物品の貫通孔とを嵌合し、更に前記第１のケースの突起の穴と前記第２のケースとの突起とを嵌合して、前記第１のケースの台座と第２のケースの台座で前記板状物品を挟むことにより前記突起を変形させて前記板状物品を固定することを特徴とする板状物品の固定構造。
【請求項５】
板状物品を一対のケースで挟持して固定する板状物品の固定構造において、
所定位置に複数の貫通孔を設けた板状物品の前記複数の貫通孔にそれぞれ対応する複数の爪を形成した突起を有する台座を設けた第１のケースと、前記台座に対応して前記板状物品を支持する台座を設けた第２のケースとを備え、
前記第１のケースの突起と前記板状物品の貫通孔とを嵌合して、前記第１のケースの台座と第２のケースの台座で前記板状物品を挟むことにより前記突起の爪を開くように変形させて前記板状物品を固定することを特徴とする板状物品の固定構造。
【請求項６】
前記突起を合成樹脂で形成した請求項５記載の板状物品の固定構造。

【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、プリンタ基板等の板状物品をケース内に固定して収納するための板状物品の固定構造に関するものである。
【背景技術】
【０００２】
図９は従来の板状物品の固定構造を示す断面図である（特許文献１参照）。
この構造は、ねじを使用せずにプリント基板をケースに固定するもので、アッパーケース１と、プリント基板２と、ロアーケース３とで構成されている。
ロアーケース３の台座４の上面に、頂角が鋭角をなす二等辺三角形断面の突起５が形成されている。
【特許文献１】特開平０８－１４５０１９号公報
【０００３】
組み付けに際しては図９（ａ）に示すように、プリント基板２の周縁を突起５が形成されたロアーケース３の台座４上に載せる。次に、アッパーケース１をロアーケース３の上

面に被せると、挟圧部６がプリント基板２を押さえ、更にプリント基板２が突起５の先端を潰しつつ台座４側に押し付けられる。そして（ｂ）に示すように、係止鉤部７が復元変形により係止孔８に嵌まって上下のケース１、３が互いに嵌合されると、プリント基板２の周縁がアッパーケース１の挟圧部６と、ロアーケース３の台座４上の潰された突起５との間で挟まれて、ケース１、３内で移動不能に固定されて収納される。

【発明の開示】

【発明が解決しようとする課題】

【０００４】

しかしながら、従来の構造では、プリント基板の厚み方向の固定は確実であるが、水平方向の固定は摩擦力のみによって行われており、落下衝撃などが加わった場合、位置がずれる可能性があるという問題があった。

【課題を解決するための手段】

【０００５】

上記課題を解決するため、本発明は、所定位置に複数の貫通孔を設けた板状物品のその貫通孔にそれぞれ対応する突起を有する台座を設けた第１のケースと、その台座に対応して板状物品を支持する台座を設けた第２のケースとを備え、第１のケースの突起と板状物品の貫通孔とを嵌合して、第１のケースの台座と第２のケースの台座で板状物品を挟むことにより突起を変形させて板状物品を固定するようにしたものである。

【発明の効果】

【０００６】

本発明によれば、第１のケースの突起と板状物品の貫通孔とを嵌合することにより、板状物品の水平方向の固定が確実に実施でき、板状物品を第１のケースの台座と第２のケースの台座で挟んで上記突起を変形させることにより、板状物品の厚み方向の固定が確実に実施できる効果がある。

【発明を実施するための最良の形態】

【０００７】

本発明は、プリント基板の所定位置に、固定用の複数の貫通孔を設け、第１のケースの台座に上記した貫通孔にそれぞれ対応する突起を形成し、この突起と貫通孔とを嵌合して第１のケースの台座と第２のケースの台座でプリント基板を挟持することにより、突起を変形させて板状物品の水平方向及び厚み方向の位置固定を実現することができる。

【実施例１】

【０００８】

図１は本発明の実施例１を示す断面図である。

実施例１は、従来と同じようにねじを使用せずにプリント基板をケースに固定するもので、第１のケースである上ケース１１と、板状物品である例えばプリント基板１２と、第２のケースである下ケース１２とで構成されている。

プリント基板１２には、周縁部の所定位置、例えば周縁部の複数個所や四隅に複数の貫通孔１６が設けられている。

【０００９】

下面を開口した上ケース１１には、複数の貫通孔１６にそれぞれ対応する突起１５を有する台座１４が設けられている。台座１４は上ケース１１の内部の周辺部全体に又は貫通孔１６に対応する位置に複数個設けられる。

上ケース１１、台座１４及び突起１５は、同一材質の合成樹脂で一体に成形されるが、突起１５を別個に作成して接着剤等で一体に固着しても、また突起１５と台座１４を一体に作成して上ケース１１に一体に固着しても良い。

上面を開口した下ケース１３には、上ケース１１の台座１４と対応した位置に、プリント基板１２を支持する台座１７が形成される。上ケース１１の押圧部となる台座１４と、受け台となるこの台座１７とでプリント基板１２を挟持する。

下ケース１３及び台座１７は、同一材質の合成樹脂で上ケース１１の場合と同様に作成される。

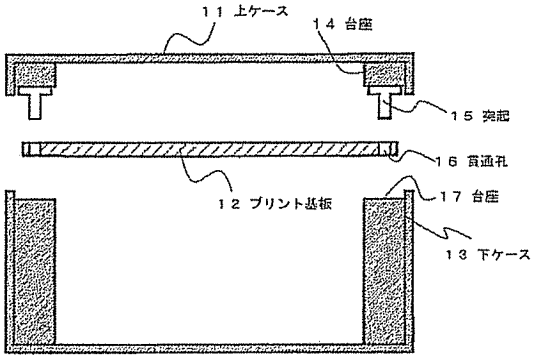
【００１０】
プリント基板１２の貫通孔１６は、上ケース１１の突起１５が嵌合するので、突起１５が入るだけの大きさが必要である。
また、突起１５の断面が円形であれば貫通孔１６はそれに対応して丸穴に、突起１５の断面が四角形であれば貫通孔１６も四角形にするのが適当である。
【００１１】
図２は実施例１の動作を示す断面図である。
まず、上ケース１１の突起１５をプリント基板１２の貫通孔１６（図１参照）に挿入するか、突起１５に貫通孔１６を嵌め込むかして、突起１５と貫通孔１６とを嵌合する。
次に、突起１５と貫通孔１６とが嵌合した状態で、上ケース１１とプリント基板１２を下ケース１３の台座１７上に載せ、プリント基板１２を上の台座１４と下の台座１７で挟むようにする。
上ケース１１と下ケース１３は、上ケース１１を下ケース１３の方向に押圧することにより、図示してないが、例えばフックと穴との係合等の手段で固定される。
この際、突起１５は下の台座１７に押しつけられて潰され、プリント基板１２と台座１７の隙間を埋めるように変形する。これによりプリント基板１２は上の台座１４側の突起１５の部分と下の台座１７側の突起１５の変形した部分で挟まれ、上ケース１１及び下ケース１３内に位置が固定される。
【００１２】
以上のように実施例１によれば、上ケース１１の突起１５とプリント基板１２の貫通孔１６とを嵌合することにより、プリント基板１２の面と平行な方向、即ち水平方向の位置を確実に固定することができる。
また、プリント基板１２を上ケース１１の台座１４と下ケース１３の台座１７で挟んで突起１５を変形させることにより、プリント基板１２の厚み方向の位置を確実に固定することができる。
なお、突起１５と貫通孔１６を嵌合し、プリント基板１２を台座１５、１７で挟み込む一連の作業で、プリント基板１２の水平方向及び厚み方向の位置の固定を同時に実施できるので、作業効率も向上するという利点もある。
【実施例２】
【００１３】
図３は本発明の実施例２を示す断面図、図４は実施例２の動作を示す断面図である。
実施例１の突起１５（図１参照）は上ケース１１と同一材料で作成されていたが、実施例２はこれに代えて弾性材で作成した突起２５を使用したもので、その他の構成要素は実施例１と同じである。
即ち、上ケース２１の台座２４には、ゴム材のように弾力性のある弾性材で形成した突起２５が例えば接着剤等で一体に固着して設けられる。
突起２５は例えば円錐台のような形状をしており、プリント基板１２の貫通孔１６と嵌合する。
なお、突起２５の中央部に穴を明けたり、また切り込みを入れたりして変形し易くしても良い。
【００１４】
実施例２の動作は実施例１と同様であるが、突起２５を弾性材で形成しているので、プリント基板１２の貫通孔１６に突起２５を挿入して上の台座２４と下の台座１７とでプリント基板１２を挟み込んだ時に、突起２５は小さな力で変形し、プリント基板１２を容易に固定することができる。
【００１５】
以上のように実施例２によれば、実施例１の効果と同等の効果が得られるだけでなく、更に、実施例１ではプリント基板をケースから外す際には、突起を破壊する必要があるが、実施例２では突起２５をゴム材のような弾性材で形成したので、弾性材の弾力及び復元力を利用して突起２５を破壊することなくプリント基板１２の取り外しをすることができ

る。
また、突起２５を弾性材にすることにより、上ケース２１、下ケース１３に落下や振動等の衝撃が加わった場合にも、プリント基板１２への衝撃を吸収する効果もある。
【実施例３】
【００１６】
図５は本発明の実施例３を示す断面図、図６は実施例３の動作を示す断面図である。
実施例２とは、上ケース３１の台座３４に設けた突起３５に穴３６を明けたことと、下ケース３３の台座３７に突起３８を設けたことが異なるだけで、その他は同じである。
上ケース３１の弾性材の突起３５には、中央部分に穴３６が明けられ、この穴３６は下ケース３３の突起３８と嵌合する。
下ケース３３の突起３８は下ケース３３、台座３７と同じ材質の合成樹脂で一体に成形しても、突起３８を別個に作成して接着剤等で一体に固着しても、また突起３８と台座３７を一体に作成して下ケース３３に一体に固着しても良い。
【００１７】
実施例３の動作は実施例２と同様であり、弾性材の突起３５をプリント基板１２の貫通孔１６に挿入して上の台座３４と下の台座３７とでプリント基板１２を挟み込んだ時に、弾性材の突起３５の穴３６に下の突起３８が挿入され、プリント基板１２が固定されるまで穴３６が拡大するように弾性材の突起３５を変形させる。
このようにして、上ケース３１と下ケース３３内にプリント基板1.2を容易に固定することができる。
【００１８】
以上のように実施例３によれば、実施例２の効果に加えて、上ケース３１の突起３５の穴３６と下ケース３３の突起３８とが嵌合するので、位置決めが容易になるという効果がある。
【実施例４】
【００１９】
図７は本発明の実施例４を示す断面図、図８は実施例４の動作を示す断面図である。
実施例１とは、上ケース４１の台座４４に設けた突起４５の先端に爪４９を形成したことが異なるだけで、その他は同じである。
合成樹脂で作成された突起４５の先端の中央に溝を入れて複数例えば２つの爪４９を形成する。勿論、溝の数を増やして３つ以上の爪を形成しても良い。
【００２０】
実施例４の動作は実施例１と同様であり、上ケース４１の突起４５をプリント基板１２の貫通孔１６に挿入して上の台座４４と下の台座１７とでプリント基板１２を挟み込んだ時に、突起４５に複数の爪４９が形成されているので、小さな力で爪４９が互いに外側に開くように変形してプリント基板１２を容易に固定することができる。
【００２１】
以上のように実施例４によれば、実施例１の効果に加えて、突起４５に複数の爪４９を設けることにより小さな力でプリント基板１２を容易に固定することができる。
更に、実施例２、３では、上ケースの突起として上ケースと別部材の弾性材が必要であったが、実施例４によれば上ケース４１と同一の合成樹脂の部材で良く、また上ケース４１の一部として一体に成形することもできる。
【００２２】
以上の実施例では、上ケースの突起をプリント基板の貫通孔に挿入する構造で説明したが、この突起を下ケースに設けて突起の位置を上下で入れ替えた構造にしても良い。この場合は、下ケースが第１のケース、上ケースが第２のケースに相当することになる。
なお、このように構成した場合には、下ケースの突起にプリント基板の貫通孔を挿入して嵌合し、プリント基板の位置を先に確定してから上ケースを被せることになるので、プリント基板の位置の固定が容易になり、その作業効率が更に向上する。
【図面の簡単な説明】

【００２３】
【図１】本発明の実施例１を示す断面図である。
【図２】実施例１の動作を示す断面図である。
【図３】本発明の実施例２を示す断面図である。
【図４】実施例２の動作を示す断面図である。
【図５】本発明の実施例３を示す断面図である。
【図６】実施例３の動作を示す断面図である。
【図７】本発明の実施例４を示す断面図である。
【図８】実施例４の動作を示す断面図である。
【図９】従来の固定構造を示す断面図である。
【発明の詳細な説明その他】【符号の説明】
【００２４】

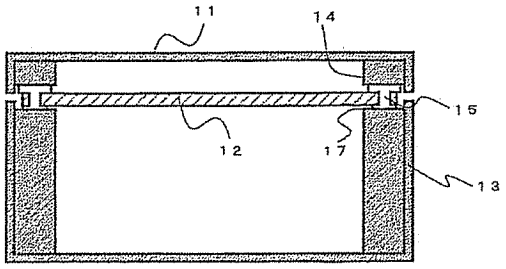
１１，２１，３１，４１	上ケース
１２	プリント基板
１３，２３	下ケース
１４，２４，３４，４４	台座
１５，２５，３５，４５	突起
１６	貫通孔
１７，３７	台座
３６	穴
３８	突起
４９	爪

【図１】



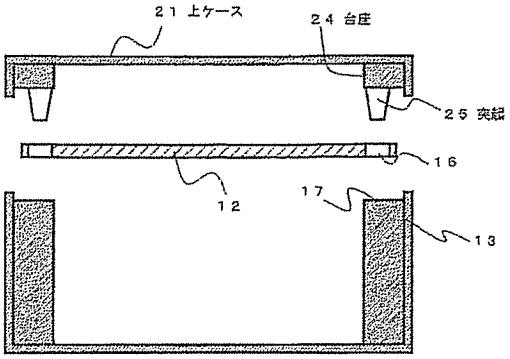
本発明の実施例１を示す断面図

【図２】



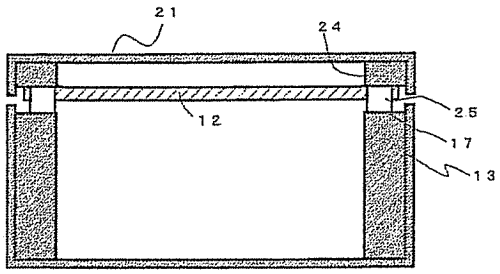
実施例１の動作を示す断面図

【図３】



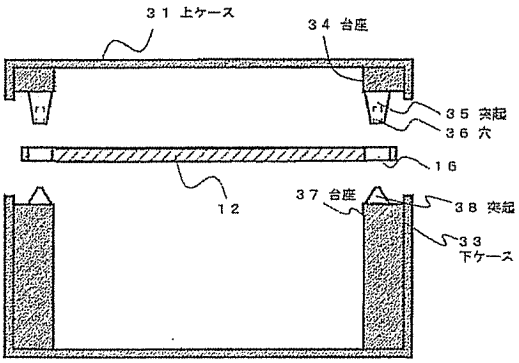
本発明の実施例２を示す断面図

【図４】



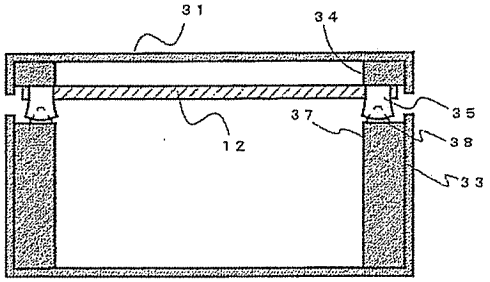
実施例２の動作を示す断面図

【図５】



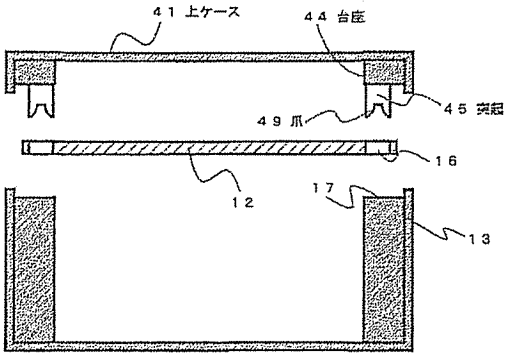
本発明の実施例３を示す断面図

【図６】



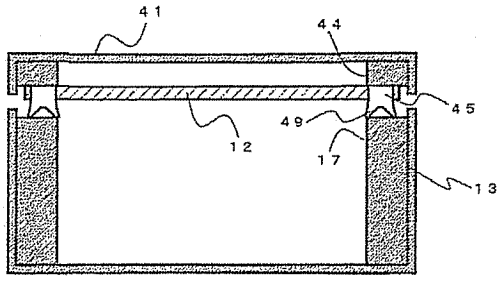
実施例３の動作を示す断面図

【図７】



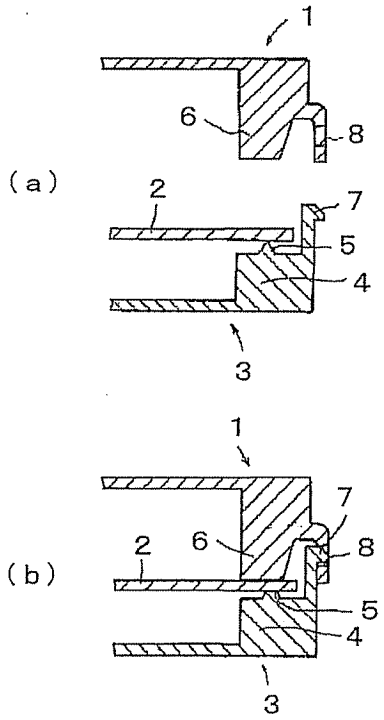
本発明の実施例４を示す断面図

【図８】



実施例４の動作を示す断面図

【図９】



従来の固定構造を示す断面図

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Yoshimasa Sano
Filer:	Stanley Matthew Erjavac/Rose Faul
Attorney Docket Number:	4041J-002077/US

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	390	390
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1260**

Electronic Acknowledgement Receipt

EFS ID:	14543187
Application Number:	13724001
International Application Number:	
Confirmation Number:	5472
Title of Invention:	ELECTRONIC DEVICE
First Named Inventor/Applicant Name:	Yoshimasa Sano
Customer Number:	27572
Filer:	Stanley Matthew Erjavac/Rose Faul
Filer Authorized By:	Stanley Matthew Erjavac
Attorney Docket Number:	4041J-002077/US
Receipt Date:	21-DEC-2012
Filing Date:	
Time Stamp:	14:18:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1260
RAM confirmation Number	852
Deposit Account	080750
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File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1	Power of Attorney	POA_Transmittal.PDF	198108 d68e36cc217534f8155c381241ec73482f99e3f8	no	2
Warnings:					
Information:					
2	Application Data Sheet	Application_Data_Sheet.PDF	1432780 8baa2eebcb7867e90279466b6151657dcddd3829	no	6
Warnings:					
Information:					
3		Specification.PDF	847754 c459b30debe9d3c788a41942e2730f8652233f62	yes	13
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	10	
	Claims		11	12	
	Abstract		13	13	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	Drawings.PDF	143762 d5177fa298e59bd1521506a1ab6c568613e12b66	no	5
Warnings:					
Information:					
5	Oath or Declaration filed	Declaration.PDF	83382 74f765577853af365e108df9676a2675c4276767	no	1
Warnings:					
Information:					
6	Transmittal Letter	Transmittal_IDS.PDF	299254 112062855c4bb3bb9950edf7fe34c707f722bb23	no	5
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Information:					

7	Information Disclosure Statement (IDS) Form (SB08)	IDS_Form1449.PDF	97527 428d47831fe5e6ea1705b5aab5895c516233abb2	no	1
Warnings:					
Information:					
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8	Foreign Reference	JP2011-166048.PDF	771759 5f7ce2f5aebf2fd936c577dfd1977b8399282488	no	13
Warnings:					
Information:					
9	Foreign Reference	JP2005-317692.PDF	557522 a22134b8cb004d5b30c0e6ed928bda63bf5e0115	no	9
Warnings:					
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10	Fee Worksheet (SB06)	fee-info.pdf	33024 38711cd12289598652ffc67c585060f3110eeabe	no	2
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		Total Files Size (in bytes):	4464872		

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