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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/011,213	08/13/2019	10378218	061470.179271	1023

24335 7590 07/24/2019

WARNER NORCROSS & JUDD LLP
INTELLECTUAL PROPERTY GROUP
900 FIFTH THIRD CENTER
111 LYON STREET, N.W.
GRAND RAPIDS, MI 49503-2487

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

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

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

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

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

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

National Nail Corp., Grand Rapids, MI
Roger A. Vandenberg, Hudsonville, MI;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
16011213	18-Jun-2018	Roger Vandenberg	061470.179271	1023

TITLE OF INVENTION :

HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Small	Utility under 35 USC 111(a)	3633	582100	RODNEY MINTZ
Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
\$500	\$0	\$500	16-Sep-2019	\$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
24335 WARNER NORCROSS & JUDD LLP INTELLECTUAL PROPERTY GROUP 900 FIFTH THIRD CENTER 111 LYON STREET, N.W. GRAND RAPIDS MI 49503-2487 UNITED STATES 616-752-2000 ckleinheksel@wnj.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status**Change in Entity Status**

Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.

Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
 If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.



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.



Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

☐ If in **addition** to the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____.
The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. WARNER NORCROSS + JUDD, LLP
2.
3.

5.Assignee Name(s) and Residence Data To Be Printed

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.

Name	City	State	Country	Category
National Nail Corp.	Grand Rapids		united states	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Gregory P. Bondarenko/	Date	06-28-2019
Name	Gregory P. Bondarenko	Registration Number	44547

Electronic Patent Application Fee Transmittal

Application Number:	16011213			
Filing Date:	18-Jun-2018			
Title of Invention:	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE			
First Named Inventor/Applicant Name:	Roger A. Vandenberg			
Filer:	Gregory P. Bondarenko/Wendy Nance			
Attorney Docket Number:	061470.179271			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPL ISSUE FEE	2501	1	500	500
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
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 (\$)				500

Electronic Acknowledgement Receipt

EFS ID:	36440917
Application Number:	16011213
International Application Number:	
Confirmation Number:	1023
Title of Invention:	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE
First Named Inventor/Applicant Name:	Roger A. Vandenberg
Customer Number:	24335
Filer:	Gregory P. Bondarenko/Wendy Nance
Filer Authorized By:	Gregory P. Bondarenko
Attorney Docket Number:	061470.179271
Receipt Date:	28-JUN-2019
Filing Date:	18-JUN-2018
Time Stamp:	10:05:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	\$ 500
RAM confirmation Number	062819INTEFSW10054200
Deposit Account	
Authorized User	

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

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	46182	no	2
			238b0e64818ecd8bca919e168dc259ba4fd03b61		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32163	no	2
			c3606c44b2ef524873f282306bf936c333a9d590		
Warnings:					
Information:					
Total Files Size (in bytes):			78345		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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NOTICE OF ALLOWANCE AND FEE(S) DUE

24335 7590 06/14/2019
WARNER NORCROSS & JUDD LLP
INTELLECTUAL PROPERTY GROUP
900 FIFTH THIRD CENTER
111 LYON STREET, N.W.
GRAND RAPIDS, MI 49503-2487

EXAMINER

MINTZ, RODNEY K

ART UNIT

PAPER NUMBER

3633

DATE MAILED: 06/14/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/011,213	06/18/2018	Roger A. Vandenberg	061470.179271	1023

TITLE OF INVENTION: HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	09/16/2019

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

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

PART B - FEE(S) TRANSMITTAL

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

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

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

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

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

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

24335 7590 06/14/2019
WARNER NORCROSS & JUDD LLP
INTELLECTUAL PROPERTY GROUP
900 FIFTH THIRD CENTER
111 LYON STREET, N.W.
GRAND RAPIDS, MI 49503-2487

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/011,213	06/18/2018	Roger A. Vandenberg	061470.179271	1023

TITLE OF INVENTION: HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	09/16/2019

EXAMINER	ART UNIT	CLASS-SUBCLASS
MINTZ, RODNEY K	3633	052-582100

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

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

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

2. For printing on the patent front page, list

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

1 _____

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

2 _____

3 _____

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

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

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

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

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

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

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

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

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

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

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

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/011,213	06/18/2018	Roger A. Vandenberg	061470.179271	1023
24335	7590	06/14/2019	EXAMINER	
WARNER NORCROSS & JUDD LLP INTELLECTUAL PROPERTY GROUP 900 FIFTH THIRD CENTER 111 LYON STREET, N.W. GRAND RAPIDS, MI 49503-2487			MINTZ, RODNEY K	
			ART UNIT	PAPER NUMBER
			3633	
DATE MAILED: 06/14/2019				

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

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

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

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

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

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

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

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 16/011,213	Applicant(s) Vandenberg, Roger A.	
	Examiner RODNEY MINTZ	Art Unit 3633	AIA (FITF) Status Yes

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

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

1. ☒ This communication is responsive to 31 May 2019.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

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

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

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

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

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

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

* Certified copies not received: _____.

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

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

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

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

Attachment(s)

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

/RODNEY MINTZ/
Primary Examiner, Art Unit 3633

REASONS FOR ALLOWANCE

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

2. The following is the Examiner's statement of reasons for allowance:

The prior art of record neither teaches nor suggests as a whole, either alone or in combination, a fastener unit having the combination of structural elements set forth in the independent claims, the structural cooperative relationships of elements set forth in the independent claims and the recited configuration providing the capability of performing the functions set forth in the independent claims. In this regard, it is the Examiner's view, based on a totality of the record, that it would not have been obvious to modify the relevant prior art to arrive at the claimed invention, as any modification of the prior art of record that would arrive at the claimed invention would require improper hindsight. In this instance, the preponderance of evidence lies on the side of Applicant.

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

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY MINTZ whose telephone number is (571)270-7327. The examiner can normally be reached on M-Th 0730 - 1630 EDT.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Glessner can be reached on 571-272-6754. 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.

/RODNEY MINTZ/
Primary Examiner, Art Unit 3633

Issue Classification 	Application/Control No. 16/011,213	Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.	
	Examiner RODNEY MINTZ	Art Unit 3633	

CPC						
Symbol					Type	Version
E04F	/	15	/	02044	F	2013-01-01
E04B	/	5	/	023	I	2013-01-01
F16B	/	5	/	002	I	2013-01-01
F16B	/	5	/	0088	I	2013-01-01
E04F	/	2201	/	0517	A	2013-01-01
E04F	/	2015	/	02122	A	2013-01-01
E04F	/	2015	/	02094	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 20	
/RODNEY MINTZ/ Primary Examiner, Art Unit 3633 (Primary Examiner) _____ (Date) 10 June 2019		O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Issue Classification</i> 	Application/Control No. 16/011,213	Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.	
	Examiner RODNEY MINTZ	Art Unit 3633	

INTERNATIONAL CLASSIFICATION			
CLAIMED			
E04F15/02	/	15	/ 02
E04B5/02	/	5	/ 02
F16B5/00	/	5	/ 00
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

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

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/RODNEY MINTZ/ Primary Examiner, Art Unit 3633	10 June 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification 	Application/Control No. 16/011,213	Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.
	Examiner RODNEY MINTZ	Art Unit 3633

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

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 20	
/RODNEY MINTZ/ Primary Examiner, Art Unit 3633 (Primary Examiner) _____ (Date) 10 June 2019		O.G. Print Claim(s) 1	O.G. Print Figure 1

<i>Search Notes</i> 	Application/Control No. 16/011,213	Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.
	Examiner RODNEY MINTZ	Art Unit 3633

CPC - Searched*		
Symbol	Date	Examiner
E04F15/02044	05/27/2019	RM
F16B5/0088	05/27/2019	RM
F16B5/002	05/27/2019	RM
E04B5/023	05/27/2019	RM
E04F2201/0517	05/27/2019	RM
E04F2015/02122	05/27/2019	RM

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
Inventor Name search	05/27/2019	RM
Updated Inventor Name and Classification searches	06/10/2019	RM

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
Text of claims	(see EAST search history for details)	06/10/2019	RM

	/RODNEY MINTZ/ Primary Examiner, Art Unit 3633
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S30	2	us-20190055738-\$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2019/06/10 08:55
S31	0	("2019/0055738").URPN.	USPAT	OR	ON	2019/06/10 08:55
S32	44	vandenberg-r\$.in.	US-PGPUB; USPAT	OR	ON	2019/06/10 08:56
S33	0	("d850897").PN.	US-PGPUB; USPAT	OR	OFF	2019/06/10 08:57
S34	2	(E04F15/02044 or F16B5/0088 or F16B5/002 or E04B5/023 or E04F2201/0517 or E04F2015/02122).cpc. and @pd> "20190527"	US-PGPUB; USPAT; DERWENT	OR	ON	2019/06/10 08:57

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S35	2	(fastener and spacer and block and grip and resilient).clm.	US-PGPUB; USPAT	OR	ON	2019/06/10 08:59
S36	0	("2019/0055974").URPN.	USPAT	OR	ON	2019/06/10 08:59

6/ 10/ 2019 9:06:41 AM

C:\ Users\ RMINTZ\ Documents\ EAST\ Workspaces\ 16011213.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner : Rodney K. Mintz
Confirmation No. : 1023
Art Unit : 3633
First Named Inventor : Roger A. Vandenberg
Appl. No. : 16/011,213
Filing Date : June 18, 2018
Attorney Docket No. : 061470.179271
For : HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

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

RESPONSE TO EX PARTE QUAYLE ACTION

In response to the Office Action dated May 31, 2019, the period for response being until July 31, 2019, please amend the above identified patent application as set forth on the following pages.

[The remainder of this page is intentionally blank.]

Electronic Acknowledgement Receipt

EFS ID:	36167764
Application Number:	16011213
International Application Number:	
Confirmation Number:	1023
Title of Invention:	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE
First Named Inventor/Applicant Name:	Roger A. Vandenberg
Customer Number:	24335
Filer:	Gregory P. Bondarenko/Annette Thompson
Filer Authorized By:	Gregory P. Bondarenko
Attorney Docket Number:	061470.179271
Receipt Date:	31-MAY-2019
Filing Date:	18-JUN-2018
Time Stamp:	13:29:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		179271Response.pdf	42309	yes	10
			1b71f015ebaec0669aa133e3154102797d0117c4		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Applicant Arguments/Remarks Made in an Amendment	10	10
	Claims	2	9
	Response after Ex Parte Quayle Action	1	1
Warnings:			
Information:			
Total Files Size (in bytes):		42309	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>			

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Appl. No. : 16/011,213
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REMARKS

Applicant respectfully requests reconsideration of the application identified above. Claims 1-20 are pending; and claims 1, 8, 9, 12 and 20 have been amended. Applicant thanks Examiner Mintz for his statement that the application is allowed.

As previously presented, the Examiner objected to claims 1, 8, 9, 12 and 20 to address formal matters and offered helpful suggestions to overcome the objections. These suggestions have been implemented, along the lines suggested by the Examiner, but with the acceptable language “configured to be” being added. Accordingly, Applicant respectfully submits that the objections have been overcome.

In view of the above amendments and these remarks, it is respectfully submitted that the present application is in full condition for allowance. A notice to that effect is earnestly and respectfully requested. Should the Examiner have any questions or suggestions, he is invited to contact the undersigned.

Respectfully submitted,

/Gregory P. Bondarenko/

Gregory P. Bondarenko

Registration No. 44547

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18566577.2

First Named Inventor : Roger A. Vandenberg

Appl. No. : 16/011,213

Page No. : 2

CLAIMS

1. (Currently Amended) A fastener unit adapted to secure at least one board to a support, the fastener unit comprising:

a spacer block defining a first fastener hole configured to receive a fastener therein, the spacer block including a front surface, an opposing rear surface, a first side surface and a second side surface opposite the first side surface, the spacer block having a thickness extending from [[a]] the front surface to [[a]] the rear surface, the thickness corresponding to a preselected gap between a first board and a second adjacent board;

a grip element joined with the spacer block, the grip element defining a second fastener hole aligned with the first fastener hole of the spacer block, the grip element configured to fit in and engage a first groove defined by the first board, the grip element having at least one downwardly facing projection;

wherein the spacer block includes a first resilient compression element extending outwardly from the first side surface and a second resilient compression element extending outwardly from the second side surface, each of the first and second compression elements having vertically compressible upper and lower wings configured to fit within and forcibly expand within the first groove of the first board, thereby securing the spacer block in a position adjacent the first groove defined by the first board;

wherein at least one of the first resilient compression element and the second resilient compression element is joined with the spacer block at a fracturable joint such that the at least one of

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the first and second resilient compression elements ~~[[ean]]~~ is configured to be selectively broken off and removed from the spacer block.

2. (Original) The fastener unit of claim 1,

wherein the respective vertically compressible upper and lower wings are separated from one another by a first distance in an open mode;

wherein the respective vertically compressible upper and lower wings are configured to move toward one another so that each are separated from one another by a second distance in a compression mode,

wherein the second distance is less than the first distance,

wherein the second distance is less than a height of the groove of the first board.

3. (Original) The fastener unit of claim 2,

wherein the first distance is greater than the height of the groove of the first board.

4. (Original) The fastener unit of claim 1,

wherein the respective vertically compressible upper and lower wings each include a front edge and a rear edge,

wherein the front edge is coplanar with the front surface of the spacer block,

wherein the grip element extends forward of both the front edge and the front surface.

5. (Original) The fastener unit of claim 4,

wherein the rear edge extends outward, beyond the rear surface of the spacer block.

6. (Original) The fastener unit of claim 1,

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Appl. No. : 16/011,213

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wherein the spacer block defines a spacer block horizontal plane that extends between the respective vertically compressible upper and lower wings,

wherein the respective vertically compressible upper and lower wings are configured to resiliently deform and move toward the spacer block horizontal plane in a compressed mode.

7. (Original) The fastener unit of claim 1,

wherein the grip element is constructed from metal and disposed in a correspondingly shaped grip element aperture defined by the spacer body,

wherein the spacer body is constructed from a polymeric material.

8. (Currently Amended) The fastener unit of claim 1,

wherein the spacer body thickness is configured so that the spacer body ~~[ean]~~ is configured to establish a gap between the first board and the second board of at least 0.200 inches,

wherein the gap is equal to or greater than a diameter of a head of the fastener.

9. (Currently Amended) A fastener unit adapted to secure at least one board to a support, the fastener unit comprising:

a spacer block defining a first fastener hole configured to receive a fastener therein, the spacer block including a front surface, an opposing rear surface, a first side surface and a second side surface opposite the first side surface, the spacer block having a thickness extending from ~~[[a]]~~ the front surface to ~~[[a]]~~ the rear surface, the thickness corresponding to a gap between a first board and a second adjacent board, the spacer block including a vertical axis;

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a grip element extending from the front surface and the rear surface of the spacer block, the grip element aligned with the first fastener hole of the spacer block, the grip element configured to fit in and engage a first groove defined by the first board;

wherein the spacer block includes a first resilient compression element extending outwardly from the first side surface on a first side of the vertical axis, the first resilient compression element being vertically compressible toward a first plane that is orthogonal to the vertical axis, the first resilient compression element configured to fit in and forcibly expand within the first groove of the first board, thereby securing the spacer block in a position adjacent the first groove defined by the first board,

whereby the spacer block ~~[[ean]]~~ is configured to be disposed in the gap between the first board and the second adjacent board.

10. (Original) The fastener unit of claim 9,

wherein the first resilient compression element includes a first front edge and a first rear edge,

wherein the first rear edge is configured to fit within the first groove of the first board.

11. (Original) The fastener unit of claim 9,

wherein the first resilient compression element includes a first wing and a second wing joined at a junction,

wherein the first wing and second wing are compressible toward the first plane so that the vertical distance between the first wing and the second wing decrease upon such compression.

12. (Currently Amended) The fastener unit of claim 11,

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wherein the first wing and the second wing are joined at the junction adjacent the spacer block,

wherein the first wing and the second wing are joined with the spacer block via a fracturable joint so that the first resilient compression element ~~[[ean]]~~ is configured to be selectively broken off and removed from the spacer block.

13. (Original) The fastener unit of claim 9,

wherein the grip element is a channel that opens toward a lower surface of the spacer block,

wherein the grip element extends forwardly from the front surface and rearwardly from the rear surface of the spacer block.

14. (Original) The fastener unit of claim 9,

wherein the front surface and the opposing rear surface of the spacer block are separated by a spacer block thickness,

wherein the first resilient compression element includes a front edge and a rear edge that are separated by a compression element width,

wherein the spacer block thickness is less than the compression element width.

15. (Original) The fastener unit of claim 9,

wherein the spacer block includes a second resilient compression element extending outwardly from the second side surface on a second side of the vertical axis, opposite the first side, the second resilient compression element being vertically compressible toward the first plane, the second resilient compression element configured to fit and forcibly expand within the first groove of

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the first board, while the first resilient compression element is within the first groove, but distal from the first resilient compression element.

16. (Original) The fastener unit of claim 9,

wherein the spacer body and first compressible resilient element are constructed from a polymeric material,

wherein the grip element is in the form of a metal c-channel that is oriented with the c-channel opening downward,

wherein the grip element defines a second fastener hole aligned with the first fastener hole.

17. (Original) A fastener unit adapted to secure at least one board to a support, the fastener unit comprising:

a spacer block defining a first fastener hole, the spacer block having a thickness extending from a front surface to a rear surface, the thickness corresponding to a gap between a first board and a second adjacent board, the spacer block including a vertical axis;

a grip element extending from the spacer block, the grip element configured to fit in and engage a first groove defined by the first board, without the spacer block extending into the first groove, the grip element configured to receive a fastener through at least a portion of the grip element;

wherein the spacer block includes a first resilient compression element extending from the spacer block, the first resilient compression element being vertically compressible toward a first plane that is transverse to the vertical axis, the first resilient compression element configured to compress and fit in, and forcibly expand within the first groove of the first board, thereby securing

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the spacer block in a position adjacent the first groove defined by the first board, with the spacer block being disposed in the gap between the first board and the second adjacent board.

18. (Original) The fastener unit of claim 17,

wherein the first resilient compression element includes first and second portions that are separated from one another by a first distance in an open mode,

wherein the first and second portions are configured to move relative to one another upon application of a force in a compression mode so that the first and second portions are separated from one another by a second distance, the second distance being less than the first distance,

wherein when the first and second portions are in the compression mode, the first and second portions are narrower than a width of the first groove of the first board so that the first and second portions are configured to fit within the first groove.

19. (Original) The fastener unit of claim 17,

wherein the grip element includes a grip element length,

wherein the spacer block includes a spacer block thickness,

wherein the first resilient compression element includes a first resilient compression element width extending from a front edge to a rear edge,

wherein the grip element length is greater than the first resilient compression element width,

wherein the first resilient compression element width is greater than the spacer block thickness.

20. (Currently Amended) A method of using a fastener unit comprising:

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providing ~~[[a]]~~ the fastener unit including a fastener, a spacer body defining a first fastener hole therethrough, a grip element joined with the spacer body and projecting outward from the spacer body, with the fastener projecting through at least a portion of the grip element, and a first resilient compression element extending laterally from the spacer body, the first resilient compression element including first and second portions that are operable in an open mode, and in a compression mode in which the first and second portions are moved toward a first plane that is ~~[generally]~~ orthogonal relative to a longitudinal axis of the fastener;

converting the first and second portions from the open mode to the compression mode;

inserting the first and second portions into a first groove of a first board;

releasing the first and second portions so that the first and second portions forcibly engage the first groove, thereby holding the spacer body adjacent a first side surface of the first board adjacent the first groove.

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 16/011,213		Filing Date 06/18/2018		☐ To be Mailed		
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO										
APPLICATION AS FILED - PART I										
		(Column 1)	(Column 2)							
FOR		NUMBER FILED	NUMBER EXTRA	RATE (\$)		FEE (\$)				
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A	N/A						
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A	N/A	N/A						
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A	N/A						
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*	x \$50 =						
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*	x \$230 =						
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL						
APPLICATION AS AMENDED - PART II										
		(Column 1)	(Column 2)	(Column 3)						
AMENDMENT	05/31/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	x \$50 =		0		
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 0	x \$230 =		0		
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE		0		
		(Column 1)	(Column 2)	(Column 3)						
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	x \$0 =				
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x \$0 =				
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE				
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						LIE				
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/TERRY BRYANT/				
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".										
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/011,213	06/18/2018	Roger A. Vandenberg	061470.179271	1023
24335 7590 05/31/2019 WARNER NORCROSS & JUDD LLP INTELLECTUAL PROPERTY GROUP 900 FIFTH THIRD CENTER 111 LYON STREET, N.W. GRAND RAPIDS, MI 49503-2487			EXAMINER MINTZ, RODNEY K	
			ART UNIT 3633	PAPER NUMBER
			NOTIFICATION DATE 05/31/2019	DELIVERY MODE 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):

ckleinheksel@wnj.com
patents@wnj.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Status of Claims

2. Subject to addressing the formal matters identified below, **claims 1-20 are allowed**.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 06/18/2018 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the Examiner. In this regard, please note the Examiner's comments provided thereon.

Claim Objections

4. This application is in condition for allowance except for the following formal matters:
 - a. **Claim 1** (approx. 2nd line from the end): delete the phrase "can be" and replace with --is--.
 - b. **Claim 8** (approx. line 3): delete the phrase "can establish" and replace with --establishes--.
 - c. **Claim 9** (approx. 2nd line from the end): delete the phrase "can be" and replace with --is--.
 - d. **Claim 12** (approx. 2nd line from the end): delete the phrase "can be" and replace with --is--.

- e. **Claim 20** (1st step): “providing a fastener unit including...” should be --providing the fastener unit including...--.
- f. **Claim 20** (2nd to last line of the 1st step): delete the word “generally”.

Conclusion

- 5. Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm’r Pat. 1935).
- 6. A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY MINTZ whose telephone number is (571)270-7327. The examiner can normally be reached on M-Th 0730 - 1630 EDT.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Brian Glessner can be reached on 571-272-6754. 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.

/RODNEY MINTZ/
Primary Examiner, Art Unit 3633

<i>Notice of References Cited</i>	Application/Control No. 16/011,213		Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.	
	Examiner RODNEY MINTZ		Art Unit 3633	Page 1 of 2

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
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*	E	US-20130025230-A1	01-2013	Turner; Arthur Raymond	E04F15/02044	52/586.1
*	F	US-20130340377-A1	12-2013	Shadwell; Peter J.	E04F15/04	52/698
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*	H	US-20170037643-A1	02-2017	MITCHELL; Steven A.	E04F15/02044	1/1
*	I	US-20170114536-A1	04-2017	Tebo; Glenn J.	E04B5/023	1/1
*	J	US-20170138063-A1	05-2017	BOSCHIAN; Louis	E04F13/0803	1/1
*	K	US-20170321434-A1	11-2017	Shadwell; Peter J.	E04F15/04	1/1
*	L	US-20170314278-A1	11-2017	LEE; Jae Youl	E04F15/04	1/1
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	EP-2995744-A2	03-2016	EP	EHRENREICH STEFAN	E04F15/02183
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Search Report and Written Opinion for PCT/US2018/042823 (13 pages). (Year: 2019)
	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. 16/011,213		Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.	
	Examiner RODNEY MINTZ		Art Unit 3633	Page 2 of 2

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*	C	US-9874032-B1	01-2018	Chen; Timmy	E04F21/20	1/1
*	D	US-9976312-B2	05-2018	Boschian; Louis	E04F13/0803	1/1
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*	F	US-10113306-B2	10-2018	Brigham; Gueary Andrew	E04B1/003	1/1
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	N					
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	P					
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	R					
	S					
	T					

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

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Search Notes</i> 	Application/Control No. 16/011,213	Applicant(s)/Patent Under Reexamination Vandenberg, Roger A.
	Examiner RODNEY MINTZ	Art Unit 3633

CPC - Searched*		
Symbol	Date	Examiner
E04F15/02044	05/27/2019	RM
F16B5/0088	05/27/2019	RM
F16B5/002	05/27/2019	RM
E04B5/023	05/27/2019	RM
E04F2201/0517	05/27/2019	RM
E04F2015/02122	05/27/2019	RM

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
Search Notes	Date	Examiner
Inventor Name search	05/27/2019	RM

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

	/RODNEY MINTZ/ Primary Examiner, Art Unit 3633
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Doc code: IDS

PTO/SB/08a (02-18)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 11/30/2020. OMB 0651-0031

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

Application Number

Filing Date

First Named Inventor

Roger A. Vandenberg

Art Unit

Examiner Name

Attorney Docket Number

061470.179271

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	0547169		2007-07-24	Harris	
	2	9476208		2016-10-25	Vermeulen et al	
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STATEMENT BY APPLICANT**
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Application Number		
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Examiner Name		
Attorney Docket Number	061470.179271	

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7	2968366	FR		2012-06-08	Peugeot Citroen Automobiles SA (English Abstract)	☒

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	1	DeckLock Limited Universal Decking Spacers, downloaded from http://www.hellotrader.com/decklock/universal-decking-spacers.html (viewed 6/8/2017)	
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	3	 Picture of a Spacer clip, discovered 2017	

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Attorney Docket Number	061470.179271	

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

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	(16/011213).app.	US-PGPUB; USPAT	OR	ON	2019/05/27 10:40
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S16	44	vandenberg-r\$.in.	US-PGPUB; USPAT	OR	ON	2019/05/27 10:59
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S18	1874	(E04F15/02044 or F16B5/0088 or F16B5/002 or E04B5/023 or E04F2201/0517 or E04F2015/02122).cpc.	US-PGPUB; USPAT; DERWENT	OR	ON	2019/05/27 11:06
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S25	28	("20030154662" "20030221391" "20050257473" "20080222993" "20100257806" "20110192112" "20130025230" "20130104493" "20130247504" "20140096469" "20140318065" "20140366334" "20150252572" "20150275951" "20160362902" "20170037643" "20170044776" "20170314278" "4095385" "5027573" "5997209" "6502362" "7913960" "8167275" "8806829" "9181715" "9422728" "9822809").PN. OR ("9976312").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/05/27 14:29
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EP 2 995 744 A2

(12)

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(51) Int Cl.:
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(22) Anmeldetag: **30.07.2015**

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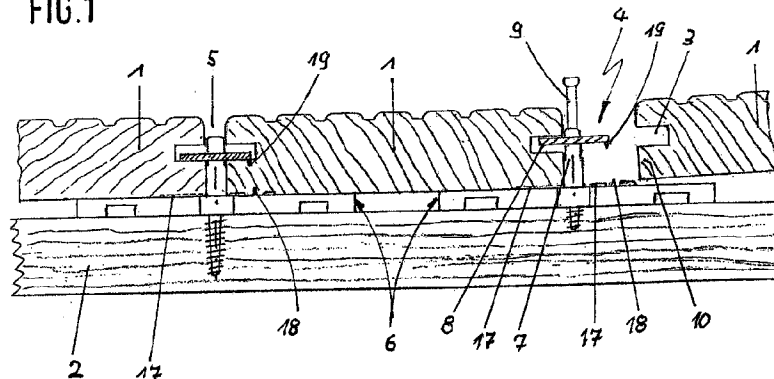
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(54) VORRICHTUNG ZUR BEFESTIGUNG VON DIELEN AUF EINER UNTERKONSTRUKTION

(57) Bei einer Vorrichtung zur Befestigung von Dielen (1) auf einer Unterkonstruktion mit einer zum Eingriff in einander zugewandte Randnuten (3) einander benachbarter Dielen (1) bringbaren Halteplatte (8), die mittels einer zugeordneten Spannschraubenanordnung an die Unterkonstruktion annäherbar ist, und mit einem auf die Unterkonstruktion auflegbaren, die einander zugewandten Randbereiche einander benachbarter Dielen (1) aufnehmenden Unterlegteil (6), dessen dielenseitige Auflageebene von einer den Seitenabstand einander benachbarter Dielen (1) vorgebenden, zwischen diese eingreifenden Abstandshalteinrichtung überragt ist und das eine durch einen quer zur Dielenlängsrichtung angeordneten, gegenüber der Auflagefläche des Unterlegteils (6) erhöhten, als Einschneidorgan ausgebildeten Längssteg (17) gebildete, durch Niederdrücken der zugeordneten Dielen (1) mittels der Halteplatte (8) zum Eingriff mit den Dielen (1) bringbare und diese gegen Wan-

dern in Dielenlängsrichtung blockierende erste Blockiereinrichtung aufweist, lässt sich dadurch ein gutes Erscheinungsbild der Dielenanordnung über längere Zeit aufrechterhalten, dass zumindest das Unterlegteil (6) neben der ersten Blockiereinrichtung eine zweite, nur einer der einander benachbarten Dielen (1) zugeordnete, und diese einseitig gegen Wandern in Richtung der Dielenbreite blockierende Blockiereinrichtung aufweist, wobei die zweite Blockiereinrichtung als den die erste Blockiereinrichtung bildenden, quer zur Dielenlängsrichtung verlaufenden Längssteg (17) kreuzender, in Dielenlängsrichtung verlaufender, gegenüber der Auflagefläche des Unterlegteils (6) erhöhter Quersteg (18) ausgebildet ist und wie die erste Blockiereinrichtung als in die hieran zur Anlage kommende, durch Betätigung der Halteplatte (8) niedergedrückte Diele (1) einschneidendes Einschneidorgan ausgebildet ist.

FIG.1**EP 2 995 744 A2**

Beschreibung

[0001] Die Erfindung betrifft eine Vorrichtung zur Befestigung von Dielen auf einer Unterkonstruktion mit einer zum Eingriff in einander zugewandte Randnuten einander benachbarter Dielen bringbaren Halteplatte, die mittels einer zugeordneten Spannschraubenanordnung an die Unterkonstruktion annäherbar ist, und mit einem auf die Unterkonstruktion auflegbaren, die einander zugewandten Randbereiche einander benachbarter Dielen aufnehmenden Unterlegteil, dessen dielenseitige Auflageebene von einer den Seitenabstand einander benachbarter Dielen vorgebenden, zwischen diese eingreifenden Abstandshalteeinrichtung überragt ist und das eine durch einen quer zur Dielenlängsrichtung angeordneten, gegenüber der Auflagefläche des Unterlegteils erhöhten, als Einschneidorgan ausgebildeten Längssteg gebildet, durch Niederdrücken der zugeordneten Dielen mittels der Halteplatte zum Eingriff mit den Dielen bringbare und diese gegen Wandern in Dielenlängsrichtung blockierende erste Blockiereinrichtung aufweist.

[0002] Eine Anordnung dieser Art ist aus der DE 20 2006 012 772 U1 bekannt. Diese bekannte Anordnung enthält nur eine Blockiereinrichtung zur Blockierung der Dielen in Dielenlängsrichtung. Eine Blockierung der Dielen quer zur Längsrichtung ist nicht vorhanden. In Folge von Schwund- und Quellsbewegungen der aus einem Holzwerkstoff bestehenden Dielen kann es dabei zu unregelmäßigen Dielenabständen kommen. In diesem Zusammenhang ist davon auszugehen, dass der Schwund in Richtung der Dielenbreite von Diele zu Diele und/oder über der Dielenlänge unterschiedlich gerichtet sein kann, d. h. teilweise von rechts nach links und teilweise von links nach rechts. Es besteht daher die Gefahr, dass sich die lichte Weite der Fugen zwischen einander benachbarten Dielen von Fuge zu Fuge und/oder über der Fugenlänge unterschiedlich endet. Diese Erscheinung wird noch verstärkt, wenn es zu einem sog. Verzug der Dielen in Form einer Krümmung kommt. Durch die bei der bekannten Anordnung zu befürchtenden, unregelmäßig unterschiedlichen Fugenweiten ergibt sich eine starke Beeinträchtigung des Erscheinungsbilds der gesamten Dielenanordnung, was unerwünscht ist.

[0003] Aus der EP 2 845 965 A1 ergibt sich zwar eine Vorrichtung zur Befestigung von Dielen auf einer Unterkonstruktion mit einer Blockiereinrichtung zur Blockierung der Dielen in Richtung der Dielenbreite. Eine Blockiereinrichtung zur Blockierung der Dielen in Dielenlängsrichtung ist hier nicht vorgesehen. Bei dieser bekannten Anordnung finden Dielenbefestigungselemente mit einem auf der Unterkonstruktion aufnehmbaren Unterlegteil und einer hiervon beabstandeten, in seitliche Nuten einander benachbarter Dielen eingreifenden Halteplatte Verwendung, wobei diese Dielenbefestigungselemente jeweils als einteilige Bauteile ausgebildet sind. Die Halteplatte ist daher fest mit dem zugeordneten Unterlegteil verbunden und kann dementsprechend gegenüber diesem nicht bewegt werden. Es ist daher nicht

möglich, die mit der Halteplatte zum Eingriff kommenden Dielen mittels der Halteplatte auf das Unterlegteil niederzudrücken. Bei der bekannten Anordnung ist zur Bildung der Blockiereinrichtung der Dielen in Richtung der Dielenbreite entweder eine Verstiftung der betreffenden Diele mit dem Unterlegteil oder alternativ ein Nut- und Federeingriff vorgesehen. Dabei ist die betreffende Diele mit einer nach unten offenen Längsnut versehen, in die ein von der Oberseite des Unterlegteils absteher Steg hineinragt. Dies erfordert eine Einführung der betreffenden Diele in einer gekippten Stellung und führt daher zu einer schwierigen Handhabung.

[0004] Die oben erwähnten bekannten Anordnungen besitzen jeweils nur eine Blockiereinrichtung und ermöglichen daher jeweils nur eine Blockierung der Dielen in Dielenlängsrichtung oder nur quer dazu. Es kann daher in jedem Fall zu Unregelmäßigkeiten im Erscheinungsbild der Dielenanordnung kommen.

[0005] Hiervon ausgehend ist es daher die Aufgabe der vorliegenden Erfindung, eine Anordnung eingangs erwähnter Art so zu verbessern, dass Unregelmäßigkeiten im Erscheinungsbild der Dielenanordnung, insbesondere der Entstehung unregelmäßiger Fugenabstände, zuverlässig entgegengewirkt wird.

[0006] Diese Aufgabe wird erfindungsgemäß dadurch gelöst, dass zumindest das Unterlegteil neben der ersten Blockiereinrichtung eine zweite, nur einer der einander benachbarten Dielen zugeordnete, und diese einseitig gegen Wandern in Richtung der Dielenbreite blockierende Blockiereinrichtung aufweist, wobei die zweite Blockiereinrichtung als den die erste Blockiereinrichtung bildenden, quer zur Dielenlängsrichtung verlaufenden Längssteg kreuzender, in Dielenlängsrichtung verlaufender, gegenüber der Auflagefläche des Unterlegteils erhöhter Quersteg ausgebildet ist und wie die erste Blockiereinrichtung als in die hieran zur Anlage kommende, durch Betätigung der Halteplatte niedergedrückte Diele einschneidendes Einschneidorgan ausgebildet ist.

[0007] Die erfindungsgemäßen Maßnahmen ergeben eine Dielenbefestigungsvorrichtung mit zwei Blockiereinrichtungen zur Blockierung der Dielen in Dielenlängsrichtung und quer hierzu. In beiden Fällen werden die betreffenden Dielen mittels der Halteplatte soweit niedergedrückt, dass die die Blockiereinrichtungen bildenden Einschneidorgane in die Dielenunterseite einschneiden, wodurch sich automatisch der gewünschte Formschluss und damit eine hohe Sicherheit und Zuverlässigkeit ergeben. Dennoch ist eine einfache Lösbarkeit im Falle eines notwendigen Dielenaustauschs möglich. Die erfindungsgemäßen Maßnahmen ergeben daher eine einfache und sinnfällige Montierbarkeit. Da die Dielen durch die der quer zur Dielenlängsrichtung zugeordnete Blockiereinrichtung jeweils nur im Bereich einer Längsseite festgehalten werden, wird erreicht, dass die Schwundbewegung sämtlicher Dielen jeweils nur in dieselbe Richtung erfolgen kann. Es ist daher ausgeschlossen, dass sich die Schwundbewegungen an manchen Stellen addieren und an manchen nicht, so dass sich

über der gesamten Dielenanordnung im Wesentlichen regelmäßige Fugenabstände ergeben und dennoch Ausgleichsbewegungen möglich sind und damit der Entstehung innerer Spannungen, die zu Rissen führen könnten, entgegengewirkt wird. Die erfindungsgemäßen Maßnahmen führen daher in vorteilhafter Weise auch zu einer hohen Lebensdauer.

[0008] Vorteilhafte Ausgestaltungen und zweckmäßige Fortbildungen der übergeordneten Maßnahmen sind in den Unteransprüchen angegeben.

[0009] So können vorteilhaft das Unterlegteil und die Halteplatte mit einer in Dielenlängsrichtung und einer in Richtung der Dielenbreite ausgerichteten Blockiereinrichtung versehen sein. Dies ermöglicht einen beiderseitigen Eingriff an den zu blockierenden Dielen und damit eine besonders hohe Zuverlässigkeit.

[0010] In weiterer Fortbildung der übergeordneten Maßnahmen kann das Unterlegteil kreuzförmig ausgebildet sein, wobei von den Enden eines in Dielenlängsrichtung verlaufenden Schenkels die Abstandshalteeinrichtung bildende Stifte abstehen und der quer zur Dielenlängsrichtung verlaufende Schenkel einen durch eine mittlere, einer Spannschraube zugeordnete Bohrung unterbrochenen, die erste Blockiereinrichtung bildenden Längssteg und einen im Bereich nur eines vom in Dielenlängsrichtung verlaufenden Schenkel abstehenden Abschnitts des anderen Schenkels angeordneten, von der Bohrung distanzierten, die zweite Blockiereinrichtung bildenden Quersteg aufweist. Diese Maßnahmen ergeben eine sehr kompakte Ausführung der jeweils mit zwei Blockiereinrichtungen versehenen Dielenbefestigungselemente.

[0011] Vorteilhaft können die Halteplatten auf den Stiften der die Abstandshalteeinrichtung bildenden Stiftnordnungen beweglich aufgenommen sein, wobei die Stifte mit Zapfen und die Halteplatten mit diesen zugeordneten Bohrungen versehen sind und wobei die Zapfen und die Bohrungen vorzugsweise unterschiedliche Durchmesser oder Querschnitte aufweisen. Hierdurch lässt sich auf einfache Weise eine schwergängige Verschiebbarkeit der Halteplatte auf der Stiftnordnung erreichen, so dass diese auf einfache Weise unverlierbar vormontierbar ist, was den endgültigen Montagevorgang sehr erleichtern kann.

[0012] Weitere vorteilhafte Ausgestaltungen und zweckmäßige Fortbildungen der übergeordneten Maßnahmen sind in den restlichen Unteransprüchen angegeben und aus der nachstehenden Beispielsbeschreibung anhand der Zeichnung näher entnehmbar.

[0013] In der nachstehend beschriebenen Zeichnung zeigen:

Figur 1 eine schematische Darstellung einer aus parallel nebeneinander angeordneten Dielen gebildeten Dielenanordnung und

Figur 2 eine Explosionsdarstellung einer erfindungsgemäßen Vorrichtung zur Befestigung der

Dielen.

[0014] Hauptanwendungsgebiet der Erfindung sind Podien, wie sie beispielsweise zur Bildung von Terrassenbelägen etc., erstellt werden.

[0015] Die in Figur 1 gezeigte Dielenanordnung besteht aus mehreren, parallel nebeneinander angeordneten, aus Holz oder holzartigem Werkstoff hergestellten Dielen 1, die auf einer Unterkonstruktion in Form von quer zur Dielenlängsrichtung angeordneten, durch Kanhölzer etc. gebildeten Lagern 2 aufgenommen sind. Die Dielen 1 sind im Bereich ihrer einander zugewandten Längsseiten mit jeweils einer Randnut 3 versehen und durch hiermit zusammenwirkende Befestigungsvorrichtungen 4 an der Unterkonstruktion festlegbar. Gleichzeitig werden die Dielen 1 durch die zwischen sie eingreifenden Befestigungsvorrichtungen 4 voneinander distanziert, so dass sich zwischen den Dielen 1 durchgehende Fugen 5 ergeben, deren Breite im Bereich der gesamten Dielenanordnung gleich ist.

[0016] Die Befestigungsvorrichtungen 4 enthalten jeweils ein auf ein darunter sich befindendes Lager 2 auflegbares, die einander zugewandten genuteten Randbereiche von jeweils zwei einander benachbarten Dielen 1 aufnehmendes Unterlegteil 6, dessen obere dielenseitige Auflageebene von einer zwischen die zugeordneten Dielen 1 eingreifenden Abstandshalteeinrichtung 7 überragt ist, sowie eine zum Eingriff in einander zugewandte Randnuten 3 einander benachbarten Dielen 1 bringbare Halteplatte 8, die mittels einer hier durch eine in die Unterkonstruktion eindrehbare Spannschraube 9 gebildete Spannschraubenanordnung nach unten, das heißt auf die Unterkonstruktion zu bewegbar ist, wodurch der untere, die Randnut 3 begrenzende Schenkel 10 der seitlichen Randprofilierung der Dielen 1 und damit die zugehörigen Dielen 1 selbst nach unten an das Unterlegteil 6 und dieses an die Unterkonstruktion angedrückt werden.

[0017] Die Abstandshalteeinrichtung 7 wird, wie am besten aus Figur 2 erkennbar ist, durch eine Stiftnordnung gebildet. Diese enthält im dargestellten Beispiel zwei parallele von der oberen Auflagefläche des Unterlegteils 6 nach oben abstehende Stifte 7a, b, auf denen die Halteplatte 8 beweglich aufnehmbar ist. Die Dicke der Stifte 7a, 7b definiert den seitlichen Abstand einander benachbarten Dielen 1, d.h. die Breite der Fuge 5. Zur Erzielung einer flachen Anlage der Dielen 1 können die Stifte 7a, b hierzu zwei einander gegenüberliegende, umfangsseitige Abflachung aufweisen.

[0018] Die Stifte 7a, b sind jeweils mit einem durch einen Bund etc. gebildeten, der Halteplatte 8 zugeordneten Anschlag 11 versehen, dessen Abstand von der oberen Auflagefläche des Unterlegteils 6 gegenüber der Dicke des unteren Schenkels 10 der dielenseitigen Randprofilierung Untermaß aufweist, so dass durch Niederdrücken der Halteplatte 8 eine gewisse Einspannung der hiermit zusammenwirkenden unteren Schenkel 10 der einander gegenüberliegenden Randprofilierungen der zugeordneten Dielen 1 erreicht wird. Zur Führung der

Halteplatte 8 sind die Stifte 7a, b mit oberen, den jeweiligen Anschlag 11 überragenden Zapfen 12 versehen. Diese können mit umfangsseitigen Rippen 13 versehen sein, so dass eine gewisse Schwergängigkeit der mit den Zapfen 12 zugeordneten Bohrungen 14 versehenen Halteplatte 8 erzielbar ist. Zweckmäßig kann der schwergängige Bereich in einen oberen und einen unteren Abschnitt unterteilt sein, wobei zwischen diesen Abschnitten ein überwindbarer Anschlag vorgesehen sein kann, der in Fig. 1 rechts gezeigten Vormontagestellung der Halteplatte 8 zugeordnet ist, die dabei in einer in die Nut 3 einführbaren Position unverlierbar, jedoch anschließend weiter nach unten bewegbar gehalten wird. Dies ermöglicht eine einfache Vormontage der Halteplatte 8. Außerdem erleichtern die Rippen 13, die zweckmäßig nur als dünne Lippen oder Grate ausgebildet sein können auch eine leichte Retourbewegung der Halteplatte 8, sofern diese im Falle des Austausches einer Diele 1 demontiert werden muss. Die Halteplatte 8 ist für jede Spannschraube 9 der Spannschraubenanordnung mit einer Durchgangsbohrung 14 versehen. Im dargestellten Beispiel ist eine zentral angeordnete Durchgangsbohrung 14 vorgesehen, der ein Stabilisierungsdom 15 zugeordnet sein kann.

[0019] Das Unterlegteil 6 ist hier, wie Figur 2 anschaulich zeigt, in der Draufsicht kreuzförmig ausgebildet, wobei ein längerer, im Einsatz gemäß Figur 1 quer zur Dielenlängsrichtung verlaufender Schenkel 6a und ein mittig hierzu angeordneter quer hierzu verlaufender, kürzerer Schenkel 6b vorgesehen sind. Von den Enden des kürzeren Schenkels 6b stehen die die Abstandshalteeinrichtung 7 bildenden Stifte 7a, b ab. Der Schenkel 6b befindet sich dementsprechend in der Einsatzstellung unterhalb der Fuge 5 zwischen zwei einander benachbarten Dielen 1. Der längere Schenkel 6a dient zur Aufnahme der Randbereiche der einander benachbarten Dielen 1. Selbstverständlich sind natürlich auch von der Kreuzform abweichende Konfigurationen für das Unterlegteil 6 denkbar, z.B. eine Rechteck- oder Kreisform oder dergleichen.

[0020] Die Dielen 1 werden im Bereich jeder Befestigungsvorrichtung 4 durch eine hierauf vorgesehene erste Blockiereinrichtung gegen Wandern in Dielenlängsrichtung blockiert. Hierzu ist der im Einsatz quer zur Dielenlängsrichtung verlaufende Schenkel 6a des kreuzförmigen Unterlegteils 6 mit einem hier durch eine mittlere, der Spannschraube 9 zugeordneten Bohrung 16 unterbrochenen, gegenüber der oberen Auflagefläche erhöhten Längssteg 17 versehen. Dieser bildet ein in die Dielenunterseite der beiden auf dem Schenkel 6a zur Auflage kommenden Dielen 1 sich eindrückendes und damit gemäß Figur 1 hiermit in formschlüssigen Eingriff kommendes Eingriffsorgan, das eine quer zur Dielenlängsrichtung angeordnete und dementsprechend eine Wanderung der Dielen 1 in Dielenlängsrichtung verhindernde Blockiereinrichtung ergibt. Die Bohrung 16 fungiert als Führung für die Spannschraube 9, so dass diese automatisch senkrecht ausgerichtet ist und nicht verlaufen

kann.

[0021] Die Dielen 1 werden auch gegen eine unkontrollierte Wanderung in Richtung der Dielenbreite, das heißt quer zu ihrer Längsrichtung, blockiert. Hierzu ist wenigstens ein in der Einsatzstellung in dielenseitige Anlage kommendes Element der Befestigungsvorrichtung 4 mit einer nur einer der beiden auf dem Unterlegteil 6 aufnehmbaren Dielen 1 zugeordneten, mit dieser in Eingriff bringbaren und sie einseitig gegen Wandern in Richtung der Dielenbreite blockierenden, zweiten Blockiereinrichtung versehen. Diese kann dem Unterlegteil 6 und/oder der Halteplatte 8 zugeordnet sein. Im dargestellten Beispiel sind sowohl das Unterlegteil 6 als auch die Halteplatte 8 mit einer in Dielenlängsrichtung ausgerichteten, zweiten Blockiereinrichtung versehen, die wie die erste Blockiereinrichtung durch ein in die betreffende Diele 1 sich einschneidendes Eingriffselement, beispielsweise in Form eines gegenüber einer Auflagefläche erhöhten, scharfkantigen Stegs oder einer Spitze etc. ausgebildet sein kann. Zur Unterstützung kann auch eine Kleberanordnung, beispielsweise in Form eines in Dielenlängsrichtung ausgerichteten Streifens eines Klebers vorgesehen sein.

[0022] Im dargestellten Beispiel ist das Unterlegteil 6 mit einem nur einem vom Querschlenkel 6b weglaufenden Abschnitt des Längsschenkels 6a zugeordneten in Richtung der Dielenlängsrichtung verlaufenden, den oben erwähnten Längssteg 17 kreuzenden Quersteg 18 versehen, der sich in die Unterseite der einen auf dem betreffenden Abschnitt des Unterlegteils 6 zur Anlage kommenden Diele eindrückt und dementsprechend ein hiermit in formschlüssigen Eingriff kommendes Eingriffselement bildet, das eine die betreffende Diele 1 einseitig gegen Wandern in Richtung der Dielenbreite blockierende Blockiereinrichtung bildet, wie aus Figur 1 entnehmbar ist. Auch hier wäre ein unterstützender Streifen eines Klebers denkbar. Der den Längssteg 17 kreuzende Quersteg 18 ist von der zentralen Bohrung 16 des Unterlegteils 6 etwa um die halbe Breite der Halteplatte 8 entfernt. Diese ist im Bereich ihres in Dielenlängsrichtung verlaufenden, oberhalb des eine zweite Blockiereinrichtung bildenden Querstegs 18 sich befindenden Rands mit wenigstens einem, ebenfalls eine zweite Blockiereinrichtung bildenden Zahn 19 versehen, der sich in der Montagestellung in die Oberseite des die Randnut 3 der betreffenden Diele 1 begrenzenden, unteren Schenkels 10 eindrückt und dementsprechend ebenfalls ein über die dielenseitige Auflagefläche der Halteplatte 8 vorspringendes Eingriffsorgan bildet. Im dargestellten Beispiel ist im Bereich des betreffenden Rands der Halteplatte 8 nicht nur ein Zahn, sondern eine Zahnreihe mit mehreren, nach unten vorspringenden Zähnen vorgesehen. Auch ein durchgehender oder unterbrochener Steg und/oder Haftmittelauftrag wären denkbar.

[0023] Die hier vorgesehene Zahnreihe der Halteplatte 8 befindet sich praktisch direkt oberhalb des Querstegs 18 des Unterlegteils 6, wodurch die betreffende Diele 1 im Bereich ihres hiermit zum Eingriff kommenden Rands

zuverlässig gehalten wird. Der gegenüberliegende Randbereich dieser Diele 1 ist in Richtung der Dielenbreite nicht blockiert. Sofern es zu einer Schrumpfung der Diele und damit zu einer Verkleinerung der Dielenbreite kommt, kann sich die Diele 1 nur mit ihrem in Richtung der Dielenbreite nicht blockierten Randbereich von der diesem zugeordneten Abstandshalteeinrichtung 7 der betreffenden Befestigungsvorrichtung 4 wegbewegen. Der andere Randbereich ist dagegen in Richtung der Dielenbreite festgehalten. Diese einseitige Blockierung der Dielen 1 in Richtung der Dielenbreite stellt daher sicher, dass im Falle einer Schrumpfung der Dielen 1 diese nur in einer Richtung erfolgen kann, so dass sich die lichte Weite der Fugen 5 zwar ändert, aber über der gesamten Dielenanordnung im Wesentlichen gleichmäßig.

[0024] Die in Figur 2 in Explosionsdarstellung gezeigte Befestigungsvorrichtung 4 wird zweckmäßig in vormontiertem Zustand, das heißt mit bereits in gegenseitigen Eingriff gebrachten Elementen ausgeliefert. Dabei ist die Halteplatte 8 bereits auf die Zapfen 12 aufgesteckt, wo wie oben schon erwähnt eine gewisse Schwergängigkeit vorgesehen ist, was eine erwünschte Montageposition ermöglicht. Um sicherzustellen, dass dabei die Halteplatte 8 richtig angeordnet ist, das heißt dass der die zweite Blockiereinrichtung hier in Form der Zähne 19 enthaltende Rand sich oberhalb des die zweite Blockiereinrichtung des Unterlegteils 6 bildenden Querstegs 18 befindet, können die Zapfen 12 und die diesen zugeordneten Löcher 14 der Halteplatte 8 unterschiedlich konfiguriert sein, beispielsweise unterschiedliche Durchmesser und/oder unterschiedliche Querschnitte aufweisen. Die Spannschraube 9 ist in der vormontierten Stellung durch die zugeordnete Bohrung 14 der Halteplatte 8 durchgeführt und greift mit ihrem unteren Ende in die zugeordnete Bohrung 16 des Unterlegteils 6 ein, die zweckmäßig durch einen schmalen Steg etc. verengt sein kann, in den sich das Gewinde der Spannschraube 9 einschneiden kann, wodurch diese verliersicher angeordnet ist.

Patentansprüche

1. Vorrichtung zur Befestigung von Dielen (1) auf einer Unterkonstruktion mit einer zum Eingriff in einander zugewandte Randnuten (3) einander benachbarter Dielen (1) bringbaren Halteplatte (8), die mittels einer zugeordneten Spannschraubenanordnung an die Unterkonstruktion annäherbar ist, und mit einem auf die Unterkonstruktion auflegbaren, die einander zugewandten Randbereiche einander benachbarter Dielen (1) aufnehmenden Unterlegteil (6), dessen dielenseitige Auflageebene von einer den Seitenabstand einander benachbarter Dielen (1) vorgebenden, zwischen diese eingreifenden Abstandshalteeinrichtung überragt ist und das eine durch einen quer zur Dielenlängsrichtung angeordneten, gegenüber der Auflagefläche des Unterlegteils (6) erhöhten, als Einschnidorgan ausgebildeten Längssteg (17) gebildete, durch Niederdrücken der zugeordneten Dielen (1) mittels der Halteplatte (8) zum Eingriff mit den Dielen (1) bringbare und diese gegen Wandern in Dielenlängsrichtung blockierende erste Blockiereinrichtung aufweist, **dadurch gekennzeichnet, dass** zumindest das Unterlegteil (6) neben der ersten Blockiereinrichtung eine zweite, nur einer der einander benachbarten Dielen (1) zugeordnete, und diese einseitig gegen Wandern in Richtung der Dielenbreite blockierende Blockiereinrichtung aufweist, wobei die zweite Blockiereinrichtung als den die erste Blockiereinrichtung bildenden, quer zur Dielenlängsrichtung verlaufenden Längssteg (17) kreuzender, in Dielenlängsrichtung verlaufender, gegenüber der Auflagefläche des Unterlegteils (6) erhöhter Quersteg (18) ausgebildet ist und wie die erste Blockiereinrichtung als in die hieran zur Anlage kommende, durch Betätigung der Halteplatte (8) niedergedrückte Diele (1) einschneidendes Einschnidorgan ausgebildet ist.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Unterlegteil (6) und die Halteplatte (8) mit der Dielenlängsrichtung und der Dielenbreite zugeordneten Blockiereinrichtungen versehen sind.
3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Halteplatte (8) zur Bildung der ihr zugeordneten Blockiereinrichtung mit wenigstens einem im Bereich eines in Dielenlängsrichtung verlaufenden Rands vorgesehenen, gegenüber der dielenseitigen Auflagefläche vorspringenden Zahn (19) versehen ist.
4. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Unterlegteil (6) kreuzförmig ausgebildet ist, wobei von den Enden eines in Dielenlängsrichtung verlaufenden Schenkels (6b) die Abstandshalteeinrichtung (7) bildende Stifte (7a, 7b) abstehen und der quer zur Dielenlängsrichtung verlaufende Schenkel (6a) einen durch eine mittlere, einer Spannschraube (9) zugeordnete Bohrung (16) unterbrochenen, die erste Blockiereinrichtung bildenden Längssteg (17) und einen im Bereich nur eines vom in Dielenlängsrichtung verlaufenden Schenkel (7b) abstehenden Abschnitts des anderen Schenkels (6a) angeordneten, von der Bohrung (16) distanziierten, die zweite Blockiereinrichtung bildenden Quersteg (18) aufweist.
5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** der Quersteg (18) des Unterlegteils (6) und der wenigstens eine, randseitige Zahn (19) der Halteplatte (8) mit etwa gleichem Lochabstand übereinander angeordnet sind.

6. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Halteplatte (8) auf den Stiften (7a, b) der die Abstandshalteeinrichtung bildenden Stiftnordnung beweglich aufnehmbar ist, wobei die Stifte (7a, b) mit Zapfen (12) und die Halteplatte mit diesen zugeordneten Bohrungen versehen sind, und wobei die Zapfen (12) und Bohrungen vorzugsweise unterschiedliche Durchmesser oder Querschnitte aufweisen.
7. Vorrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** die Stifte (7a, b) der Stiftnordnung jeweils einen der Halteplatte (8) zugeordneten Anschlag (11) und einen diesen überragenden Zapfen (12) aufweisen, auf dem die Halteplatte (8) schwergängig verschiebbar ist.
8. Vorrichtung nach einem der vorhergehenden Ansprüche 6 oder 7, **dadurch gekennzeichnet, dass** der Abstand des Anschlags (11) der Stiftnordnung von der dielenseitigen Auflagefläche des Unterlegteils (6) gegenüber der Dicke des unteren, die dielenseitige Randnut (3) begrenzenden Schenkels (10) Untermaß aufweist.

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FIG.1

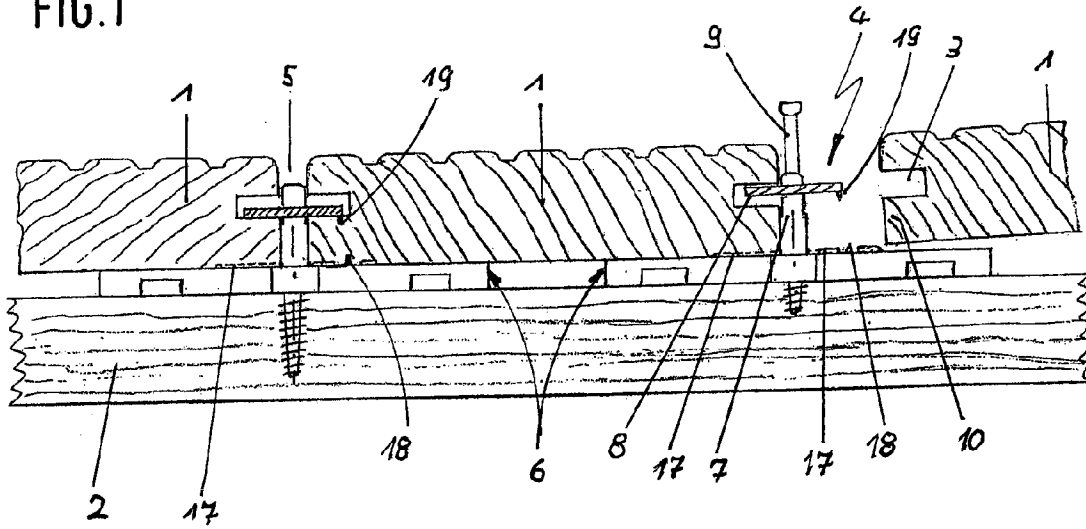
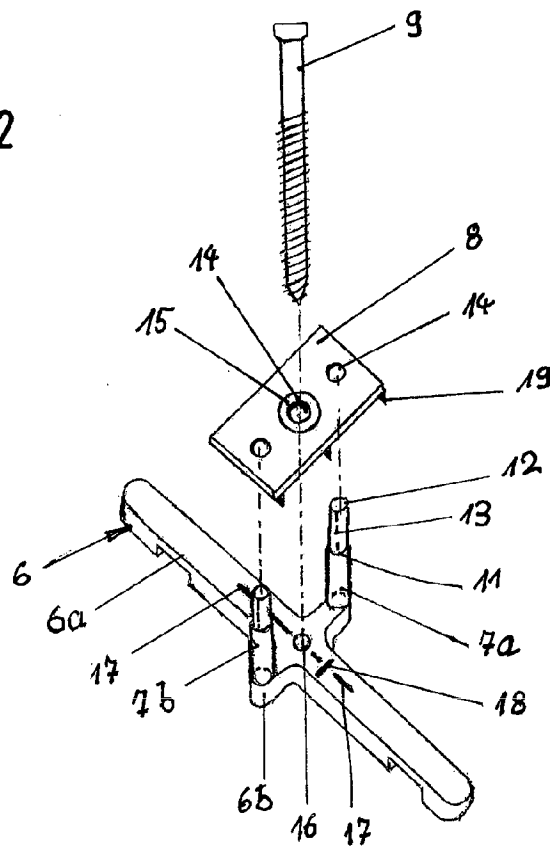


FIG.2



IN DER BESCHREIBUNG AUFGEFÜHRTE DOKUMENTE

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In der Beschreibung aufgeführte Patentdokumente

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/011,213	06/18/2018	Roger A. Vandenberg	061470.179271

CONFIRMATION NO. 1023

PUBLICATION NOTICE



OC000000106038877

24335
WARNER NORCROSS & JUDD LLP
INTELLECTUAL PROPERTY GROUP
900 FIFTH THIRD CENTER
111 LYON STREET, N.W.
GRAND RAPIDS, MI 49503-2487

Title:HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

Publication No.US-2019-0055738-A1

Publication Date:02/21/2019

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/011,213				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *	x 50 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4	minus 3 = *	x 230 =	230						
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						
			TOTAL	1015		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (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))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (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))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
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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
16/011,213	06/18/2018		1015	061470.179271	20	4

CONFIRMATION NO. 1023

FILING RECEIPT



0000000100793516

24335
WARNER NORCROSS & JUDD LLP
INTELLECTUAL PROPERTY GROUP
900 FIFTH THIRD CENTER
111 LYON STREET, N.W.
GRAND RAPIDS, MI 49503-2487

Date Mailed: 07/09/2018

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)

Roger A. Vandenberg, Hudsonville, MI;

Applicant(s)

National Nail Corp., Grand Rapids, MI

Power of Attorney: The patent practitioners associated with Customer Number 24335

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/674,247 05/21/2018
and claims benefit of 62/635,745 02/27/2018
and claims benefit of 62/545,709 08/15/2017
and is a CIP of 29/648,131 05/18/2018
and is a CIP of 29/649,771 06/01/2018

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

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

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If Required, Foreign Filing License Granted: 07/06/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/011,213**

Projected Publication Date: 02/21/2019

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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I hereby appoint:



Practitioners associated with Customer Number:

24335

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

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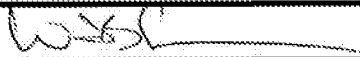
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The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	5/10/13
Name	W. Scott Baker	Telephone	616.538.8000
Title	President		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Roger A. Vandenberg	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	061470.179271	

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	8	9347469		2016-05-24	Pervan et al	

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Application Number		
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First Named Inventor	Roger A. Vandenberg	
Art Unit		
Examiner Name		
Attorney Docket Number	061470.179271	

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Application Number		
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First Named Inventor	Roger A. Vandenberg	
Art Unit		
Examiner Name		
Attorney Docket Number	061470.179271	

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First Named Inventor	Roger A. Vandenberg	
Art Unit		
Examiner Name		
Attorney Docket Number	061470.179271	

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Application Number		
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Art Unit		
Examiner Name		
Attorney Docket Number	061470.179271	

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Art Unit		
Examiner Name		
Attorney Docket Number	061470.179271	

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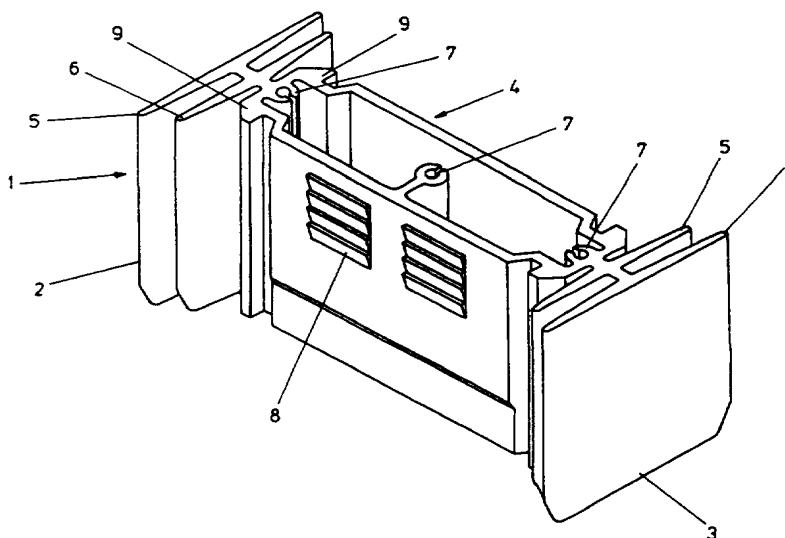
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(21) International Application Number: PCT/GB96/02533 (22) International Filing Date: 16 October 1996 (16.10.96) (30) Priority Data: 9522763.3 7 November 1995 (07.11.95) GB (71) Applicant (for all designated States except US): MICHAEL DYSON ASSOCIATES LTD. [GB/GB]; Midway House, Huddersfield Road, Meltham, Huddersfield HD7 3AF (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): DYSON, John, Michael [GB/GB]; Parkton Grove, Berry Brow, Huddersfield HD4 7QU (GB). FARNDALE, Keith, Dawson [GB/GB]; Inglenook Cottage, Main Street, Gaudall, Goole, North Humberside DN15 0AE (GB). (74) Agent: JOHNSTONE, Helen, M.; Urquhart-Dykes & Lord, Tower House, Merrion Way, Leeds LS2 8PA (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

(54) Title: A CONNECTOR



(57) Abstract

A connector (1) comprises a first head (2) and a second head (3) joined together by an elongate portion (4). The elongate portion (4) is formed with serrations (8) formed on each outside of the elongate portion (4). The connector (1) may be used to connect adjacent panels (60) to one another. A panel (60) comprises a head receiving portion (30) into which a head (2) of the connector (1) may be fitted. The serrations (8) on the sides of the elongate portion (4) of the connector (1) cooperate with the grooves (31) formed on the sides of the head receiving portion (30) and serve to hold the connector with the head receiving portion (30). A building may thus be formed by connecting panels (60) to one another by means of the connector (1).

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A CONNECTOR

This invention relates to a connector and particularly, but not exclusively, to a connector for connecting panels together to form a building or structure.

In developing or emerging countries such as South Africa and India, there is an urgent need for more housing. This is due to the existence of a large and often rapidly increasing population in such countries, which populations are generally often very poor. The existing accommodation is insufficient and inadequate often harbouring disease.

Under such conditions there is an urgent need for low cost housing which is simple and quick to erect.

In such countries there is often available only unskilled or semi-skilled labour. It is important therefore that any housing is capable of being erected by such a labour force.

It is also often necessary to build other structures such as warehouses quickly and economically.

It is known to build structures using concrete panels which are reinforced with steel and are held together by metal bolts.

It is further known to make concrete panels with a relatively thin outer face which face is formed with flanges around the edge of the face substantially perpendicular to the face.. A first concrete panel may then be connected to the second using bolts through holes formed in the flanges.

A disadvantage of this known system is that on tightening the bolts, a concentrated point load is applied to the flanges which leads to a tendency for the flanges to break.

A further disadvantage of such systems is that the steel reinforcement within the concrete panels is prone to rust which

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weakens the structure and can sometimes cause structures made from such panels to collapse.

In addition, the panels must be preformed with apertures extending through the panels to receive the bolts. Such preforming of the panels is time consuming and expensive.

A further disadvantage is that the bolts are capable of being used in a range of engineering applications and therefore the bolts can have significant commercial value. Because of this it is often found that large quantities of bolts are stolen from building sites.

According to a first aspect of the present invention, there is provided:

- a connector for connecting a first panel to a second panel, the connector comprising;

- a first head retainable within a head receiving portion in the panel;

- a second head retainable within a head receiving portion in the panel;

- an elongate portion connecting the first and second heads, whereby each of the first and second heads may be positioned within a head receiving portion in the panel such that they are retained within the head receiving portion, and whereby the length of the elongate member corresponds with the depth of the head receiving portions formed in the panel such that when adjacent panels are connected to one another edges of the adjacent panels substantially abut.

By means of the present invention a structure may be erected using panels connected together by means of the connector according to the present invention. No bolts are necessary. The connectors may be snap fitted into the head receiving portions of the panels resulting in simple and quick erection of buildings.

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In addition, the connectors are unlikely to be of use on the open market and therefore are unlikely to be stolen.

Preferably the panels are made from concrete reinforced with a rustless material.

The material may be in the form of an open mesh, a loose or fibrillated mat, or in the form of loose fibres, for example nylon, polypropylene or other plastics. Carbon fibre may also be used.

Advantageously the connectors are made of a non-rusting material such as a plastics material.

Conveniently, the elongate portion further comprises first barb means positioned along the length of the elongate portion.

The barb means ensures that the connector, once inserted, cannot pull out and this further contributes to the permanent stability of the structure.

In addition, each end of the connector is shaped so that the action of inserting the connector into respective head receiving portions draws together two adjacent panels. The ultimate relative position of adjacent panels, once a connector is securely in place is determined by the shape of the connector and the corresponding shape of the head receiving portion formed within each panel.

Preferably, the head receiving portion comprises second barb means which second barb means is shaped and positioned such that when a connector is positioned with each of the first and second head within a head receiving portion, the first barb means formed on the connector cooperates with the second barb means formed in each head receiving portion.

Advantageously, the connector further comprises one or more

-4-

batten receiving portions.

Battens formed from, for example, soft wood may be used to reinforce the structure of a building formed from the panel and connector according to the present invention. The battens also provide means for subsequent fixture of plaster board and other wall linings behind which insulation can be incorporated within the wall cavity and pipes and cables can be routed.

According to a second aspect of the present invention there is provided a panel formed with a plurality of first and/or second head receiving portions for receiving connectors according to the first aspect of the present invention.

Preferably, the panel comprises a front face and a flange forming an edge around the front face.

The flange may extend partially or completely around the front face.

The panel is preferably formed to have thickened portions surrounding the sockets.

By means of the present invention and particularly due to the thickened portion of the panels around the head receiving portions, the connector when inserted into the head receiving portion is embedded within the thickened region of the panel. This means that the tensions and stresses within the elongate portion are resisted by the head receiving portions and thus transferred to the thickened portion of the panel and ultimately distributed within the face or web of the panel. This reduces the amount of reinforcement necessary.

According to a third aspect of the present invention there is provided a building formed from a plurality of panels according to the second aspect of the invention which panels are connected together by means of the connector according to the

-5-

first aspect of the present invention.

Preferably, the connector is positioned within respective head receiving portions by means of hammering the connector into the head receiving portions.

According to a fourth aspect of the present invention there is provided a method of erecting a building comprising connecting together panels according to the second aspect of the invention using connectors according to the first aspect of the invention.

According to a fifth aspect of the invention there is provided a method of forming a panel according to a second aspect of the invention.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a schematic representation of a connector according to the first aspect of the present invention;

Figures 2a, 2b and 2c are detailed representations of the connector of Figure 1;

Figure 3 is a schematic representation of a head receiving portion of a panel according to a second aspect of the invention;

Figures 4a, 4b and 4c are detailed representations of the head receiving portion of Figure 3;

Figures 5a, 5b and 5c are representations showing the connector of Figure 1 installed in two head receiving portions of Figure 3;

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Figures 6a, 6b, 7a and 7b are schematic representations of a panel according to the third aspect of the present invention;

Figure 8 is a representation of the detail of the panels of Figures 6 and 7;

Figures 9a, 9b and 9c are schematic representations of the panels of Figures 6 and 7;

Figure 10 is a schematic representation of a panel, incorporating connectors and head receiving portions, and connected to an adjacent panels.

Figures 11a and 11b are schematic representations of portions of a building according to a third aspect of the invention;

Figures 12a, 12b and 13 are schematic representations of buildings according to the third aspect of the present invention;

Figure 14 is a representation of a part of a building according to the third aspect of the invention showing the suspended floor/wall joint in a multi storey building;

Figure 15a and 15b are schematic representations showing the position of a ground floor of a building according to the third aspect of the present invention;

Figures 16a, 16b and 17 are representations of a part of a building according to a third aspect of the invention showing internal partition walls;

Figure 18 is a representation of a building according to a third aspect of the invention; and

Figure 19 is a schematic representation of a part of a building according to a third aspect of the invention showing typical

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elevation of panels.

Referring to Figures 1 to 5 a connector according to a first aspect of the present invention is designated generally by the reference numeral 1. The connector comprises a first head 2 and a second head 3. The heads 2, 3 are connected to one another by means of an elongate portion 4. The connector 1 is formed from a plastics material. Each of the heads 2, 3 comprise head portions 5, 6. The elongate portion 4 is hollow and further comprises fixing points 7. In addition, the elongate portion 4 is formed with serrations 8 formed on each outer sides of the elongate portion 4.

The connector 1 is adapted to connect adjacent panels to one another of the type shown in Figures 6 to 10 and to be described hereinbelow. A panel 60 comprises a head receiving portion 30 into which a head 2 of the connector 1 may be fitted. The serrations 8 on the sides of the elongate portion 4 if the connector 1 co-operate with grooves 31 formed on the sides of the head receiving portion 30 and serve to hold the connector 1 within the head receiving portion 30. Portions 32 defining a neck 33 of the head receiving portion 30 co-operate with edge portions 9 of the head 2, 3 of the connector 1 to further secure the connector within the head receiving portion 30.

Referring to Figures 5a, 5b and 5c and 10, a connector 1 fitted within two head receiving portions 30 is shown. It can be seen that the length of elongate portion 4 compared with the dimensions of each head receiving portion 30 are such that when both heads 2, 3 of a connector are pushed into head receiving portions 30, the edges 51, 52 of the head receiving portions 30 which correspond to the edges 100, 110 of panels 60 abut with one another.

Referring to Figures 6a, 6b, 7a, 7b, 8, 9a, 9b and 9c, a mould 90 used to form a panel 60 is shown.

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A panel 60 is formed by initially forming the mould 90 into a shape shown in the Figures. At points 70 defined by markers in the form of small accurately positioned raised portions (not shown), head receiving portions 30 are placed. The mould 90 is shaped such that the thickness of the resulting panel will be greater around the points where the head receiving portions 30 are positioned. Thus in regions 91, the resulting panel will be thicker in order to distribute load.

The panel is formed by pouring the reinforced concrete mix into a flexible polyurethane mould liner which is supported in a stillage formed from steel, concrete or other rigid construction then preferably vibrating the mould to exclude air bubbles before compacting the concrete and allowing it to harden in the usual way before eventually removing the panel from the mould liner. The resultant panel will have the head receiving portions 30 embedded at appropriate points in the panel.

Figure 8 shows a detail of mould showing the thickened portions 91.

Referring to Figure 10, a schematic representation of a panel 60 formed from the mould 90 is shown. It can be seen that the panel 60 has a relatively thin face or web 115 with thicker flanges 120. The panel further comprises thickened portions 91 surrounding the head receiving portions 30 which have been positioned appropriately by positioning the head receiving portions in the mould before the concrete mixture is poured into the mould. Adjacent panels 60 are connected to one another by means of connector 1. In order to connect two panels together the two panels are placed side by side and a connector 1 is hammered into the aperture formed by two adjacent head receiving portions 30. When the elongate portion 4 of the connector is positioned within an elongate portion of each head receiving portion the serrations 8 on the elongate portion 4 cooperate with serrations 31 along an elongate

-9-

portion of each head receiving portion to provide a stable connection.

Figures 11 and 11b show how a building may be erected by joining together panels 60.

Figures 12a, 12b and 13 show possible room layouts for a building 100 which may be formed from the panels 60 and connectors 1.

Referring to Figure 14, a vertical section through an intermediate floor joint of the building 100 is shown. Two panels 60 are connecting to either side of a pre-cast ring beam unit 140. The panels 60 are connected to the ring beam unit 140 by means of connectors 1 (not shown). A timber floor joist 141 is notched into the rear of the ring beam unit 140 to form an intermediate floor joint between, for example, a ground floor and a first floor of a building. The joist may be reinforced by means of a restraining strap formed from perforated then galvanised steel 142.

A batten 143 fixed to connectors 1 (not shown) provides further strength to the building.

Plaster board 144 may then be positioned to form an internal wall surface and timber skirting 145 may also be added to form a skirting board.

Referring to Figures 15a and 15b, the relationship between panels 60 and an in situ concrete floor slab 150 is shown. A first layer of panels 60 is positioned directly onto the concrete slab 150. Due to the inclination of the flange 69 of the panel 60 a wedge 151 is positioned beneath the panel 60 forming the first layer to ensure that the panels and subsequent wall built from the panels are substantially upright. A floor screed 152 may be applied onto an upper surface of the concrete floor slab 150.

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Figure 15b shows a detail of a top layer of panels 60. A wall plate 153 is bolted to a top flange 69 of panels 60. A ceiling board 154 is secured to the wall plate 153.

In both Figures 15a and 15b battens 143 of the type described with reference to Figure 14 are used to add further strength to the building.

Referring to Figures 16a and 16b horizontal cross sections of a building 100 are shown. A vertical member 160 may be screwed to connectors 1 in order to affix the vertical member 160 to the panel 60. One head of each of the connectors to which the vertical member 160 is screwed will previously have been fitted into a head receiving portion of a panel 60.

Figure 17 shows timber studding 170 formed from noggins 171 providing strength to an external wall of a building 100.

Referring to Figures 18a, 18b and 18c horizontal sections of a building 100 incorporating window and door reveals are shown. Figures 18a and 18b show how a window 180 may be affixed to a panel 60, whilst Figure 18c shows how a door frame 181 may be so affixed.

Referring to Figure 19 typical elevations of panels 60 forming a building 100 are shown.

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CLAIMS

1. A connector for connecting a first panel to a second panel, the connector comprising:

a first head retainable within a head receiving portion in the panel;

a second head retainable within a head receiving portion in the panel;

an elongate portion connecting the first and second heads, whereby each of the first and second heads may be positioned within a head receiving portion in the panel such that they are retained within the head receiving portion, and whereby the length of the elongate member corresponds with the depth of the head receiving portions formed in a panel such that when adjacent panels are connected to one another edges of the adjacent panels substantially abut.

2. The connector according to claim 1 wherein the panels are made from concrete reinforced with a rustless material.

3. A connector according to any one of the preceding claims made of a non-rusting material such as a plastics material.

4. A connector according to any one of the preceding claims wherein the elongate portion further comprises first barb means positioned along the length of the elongate portion.

5. A connector according to any one of the preceding claims wherein the head receiving portion comprises second barb means which second barb means is shaped to position such that when a connector is positioned with each of the first and second heads within a head receiving portion, the first barb means formed on the connector co-operates with the second barb means formed in each head receiving portion.

6. A connector according to any one of the preceding claims further comprising one or more baton receiving portions.

-12-

7. A panel formed with a plurality of first and/or second head receiving portions for receiving connectors as claimed in any one of the preceding claims.
8. A panel according to claim 7 comprising a front face and a flange forming an edge around the front face.
9. A building formed from a plurality of panels as claimed in claim 6 or claim 7 which panels are connected together by means of the connector as claimed in any one of claims 1 to 5.
10. A connector according to any one of claims 1 to 5 positioned within the head receiving portions by means of hammering the connector into the head receiving portion.
11. A method of erecting a building comprising connecting together panels as claimed in claim 6 or claim 7 using connectors as claimed in any one of claims 1 to 5.
12. A method of forming a panel as claimed in claim 6 or claim 7.

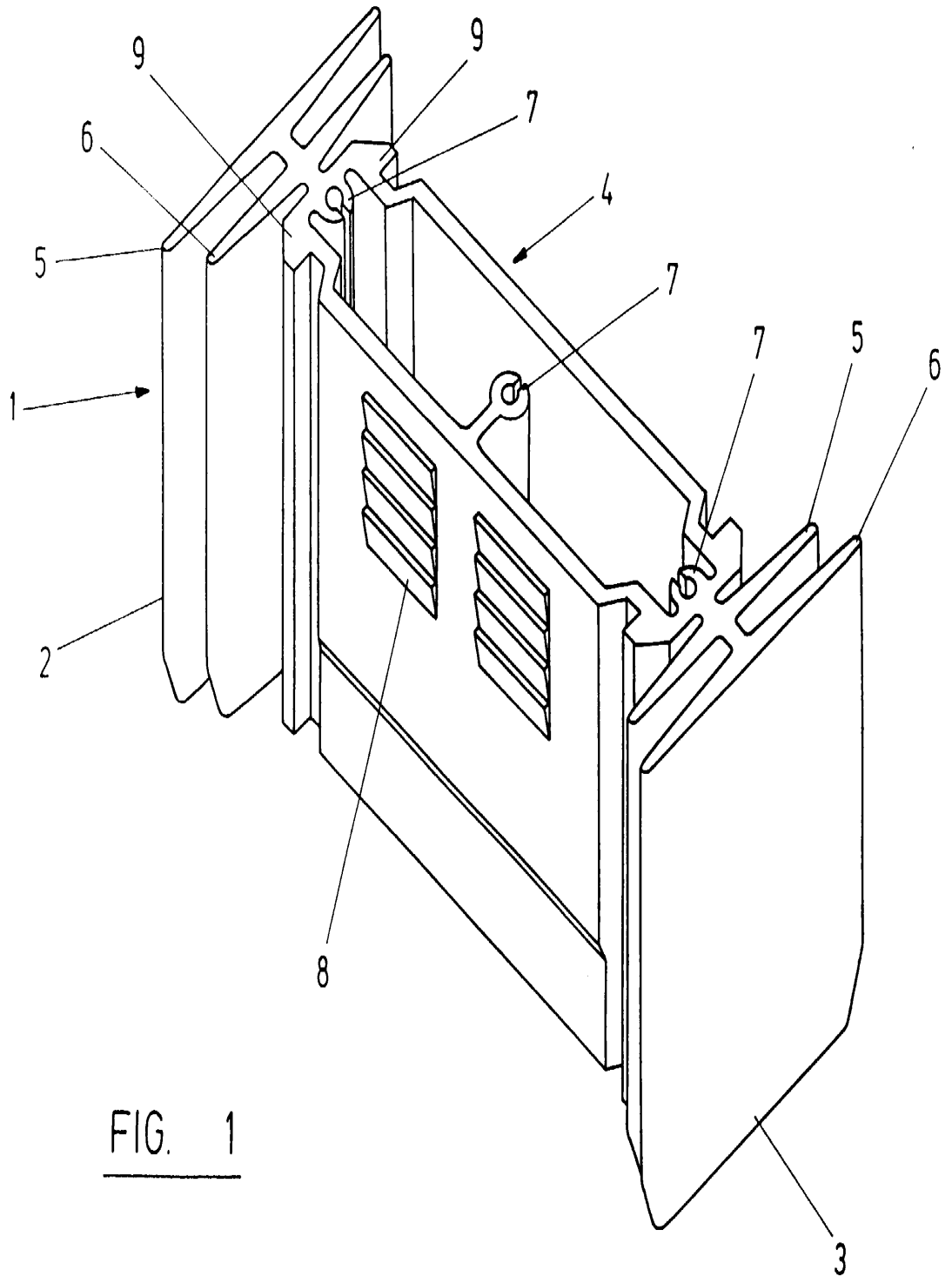


FIG. 1

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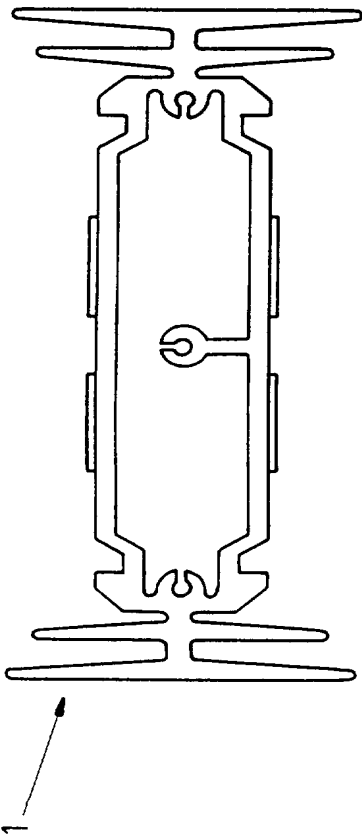


FIG. 2a

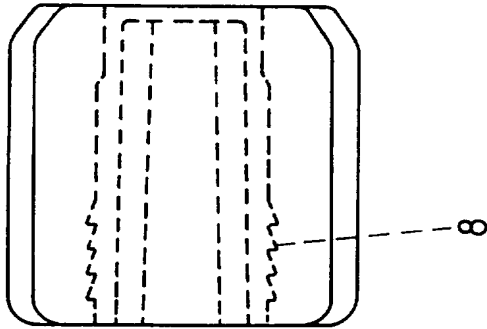


FIG. 2b

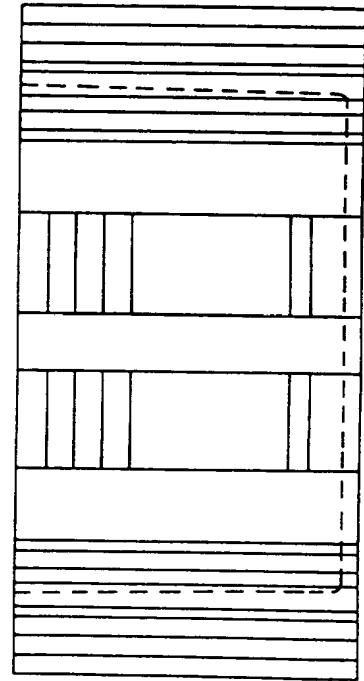
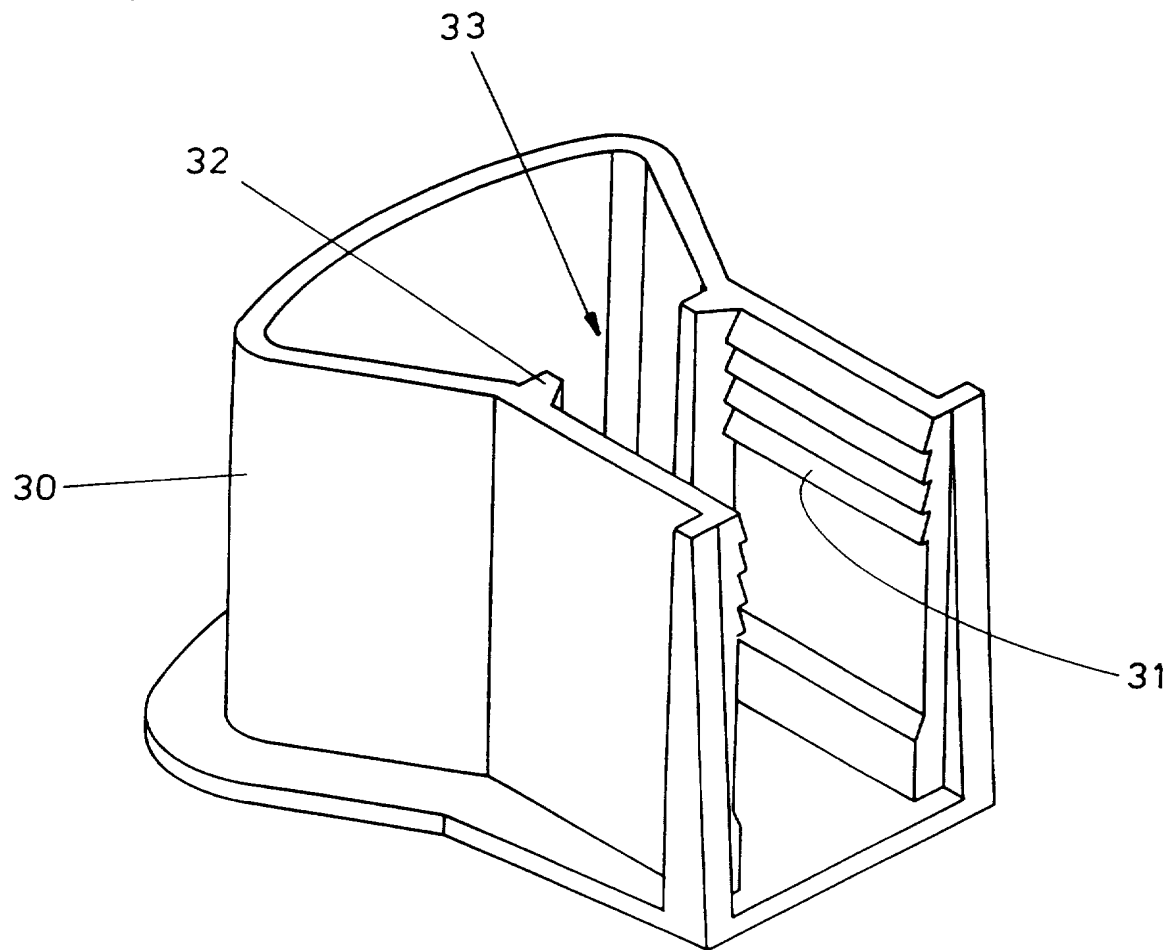


FIG. 2c

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FIG. 3

- 4 / 18 -

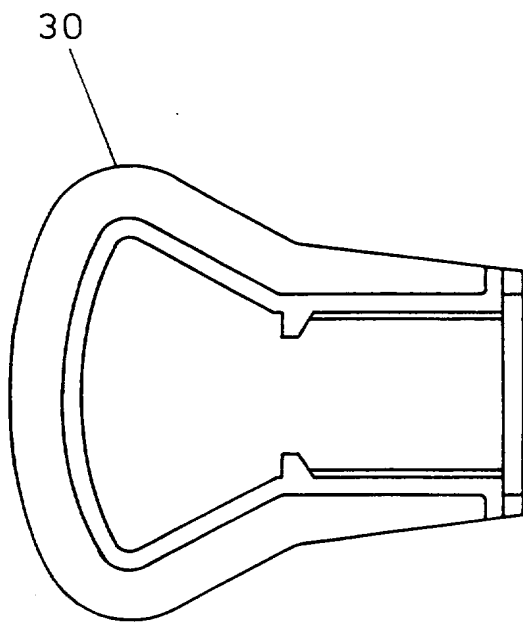


FIG. 4a

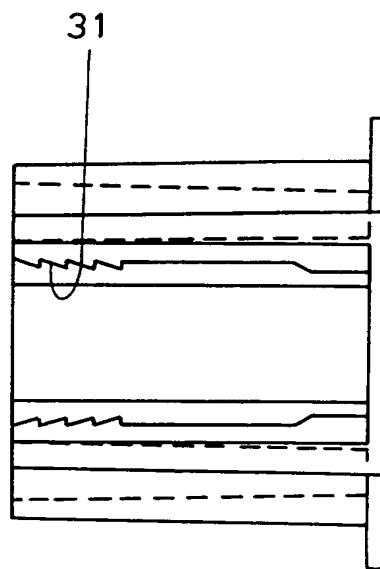


FIG. 4b

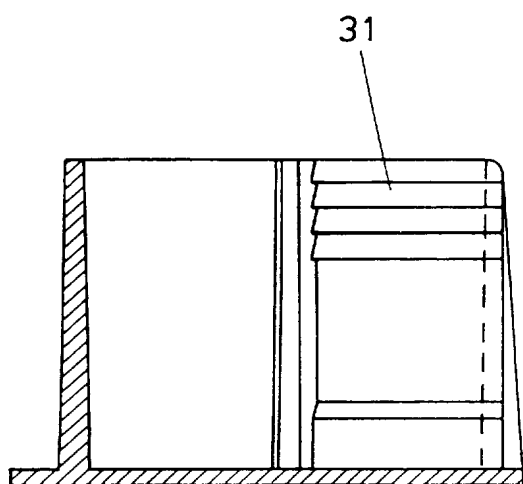


FIG. 4c

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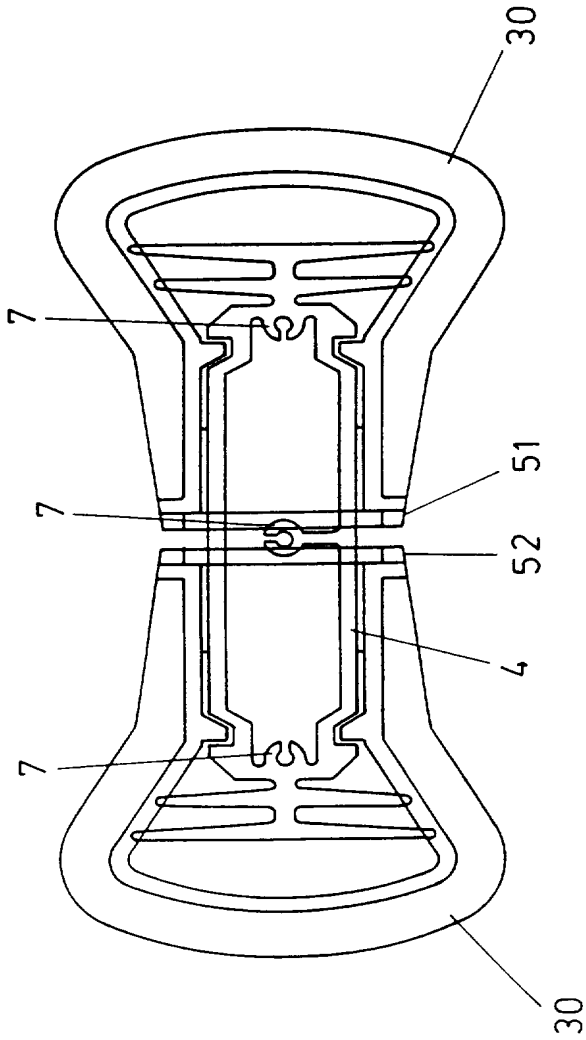


FIG. 5a

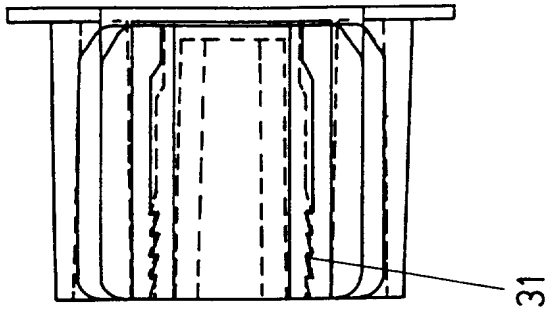


FIG. 5b

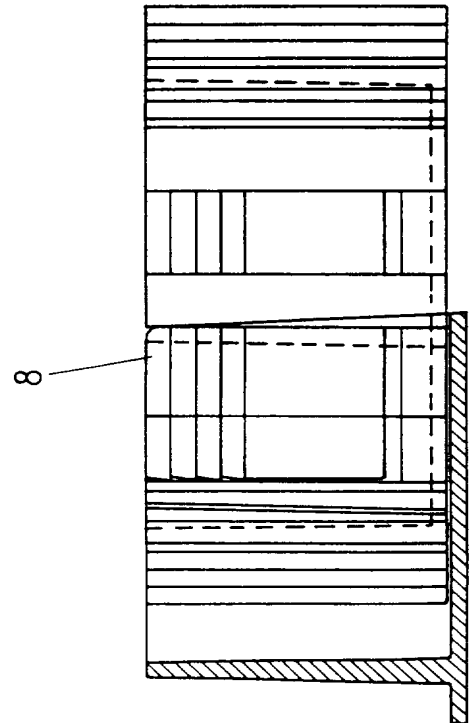


FIG. 5c

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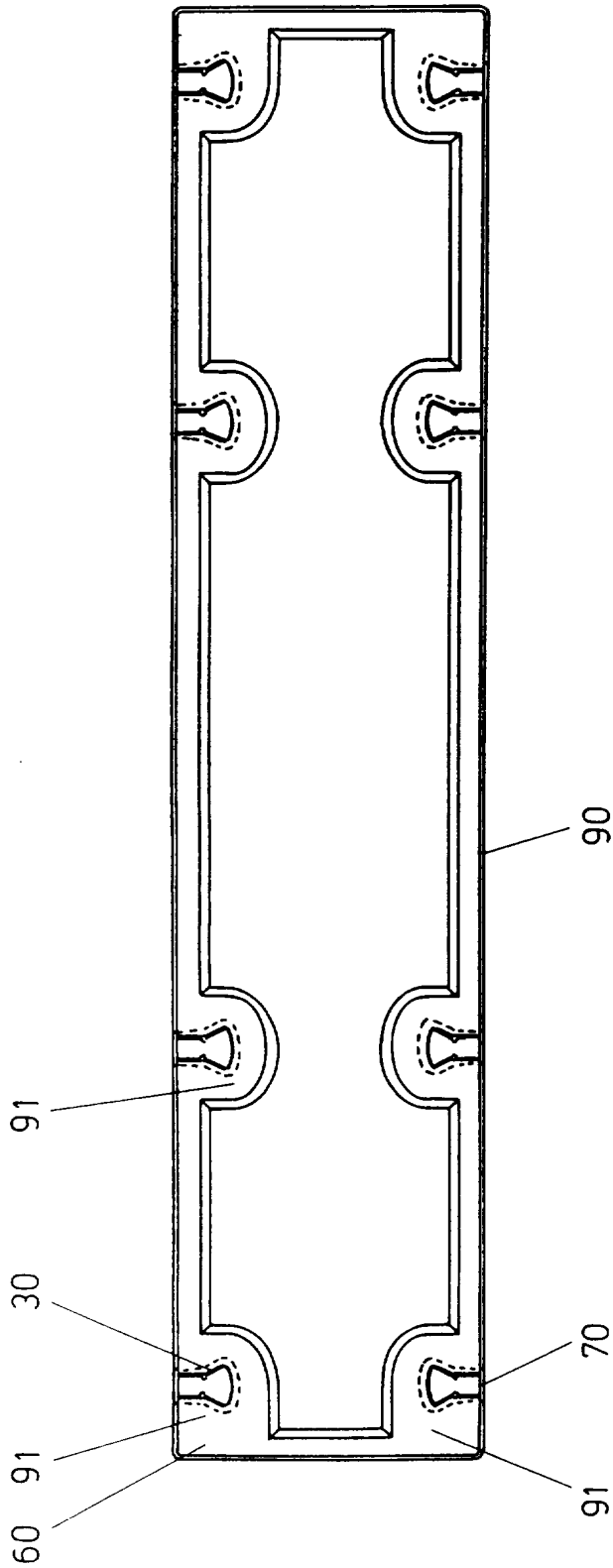


FIG. 6a

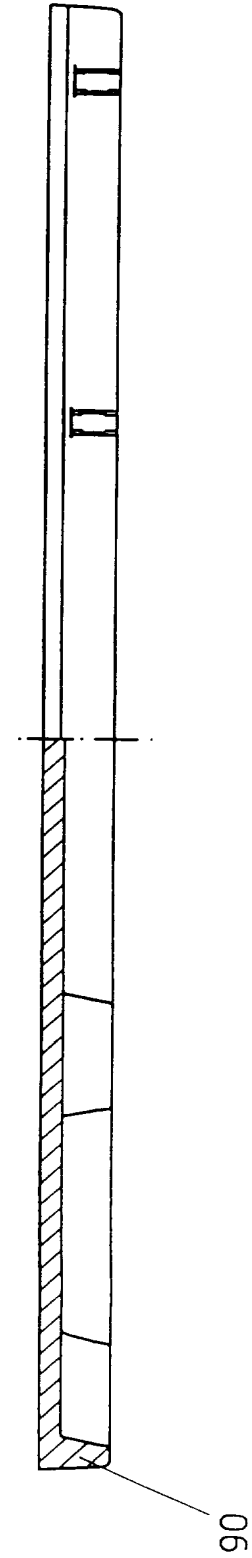


FIG. 6b

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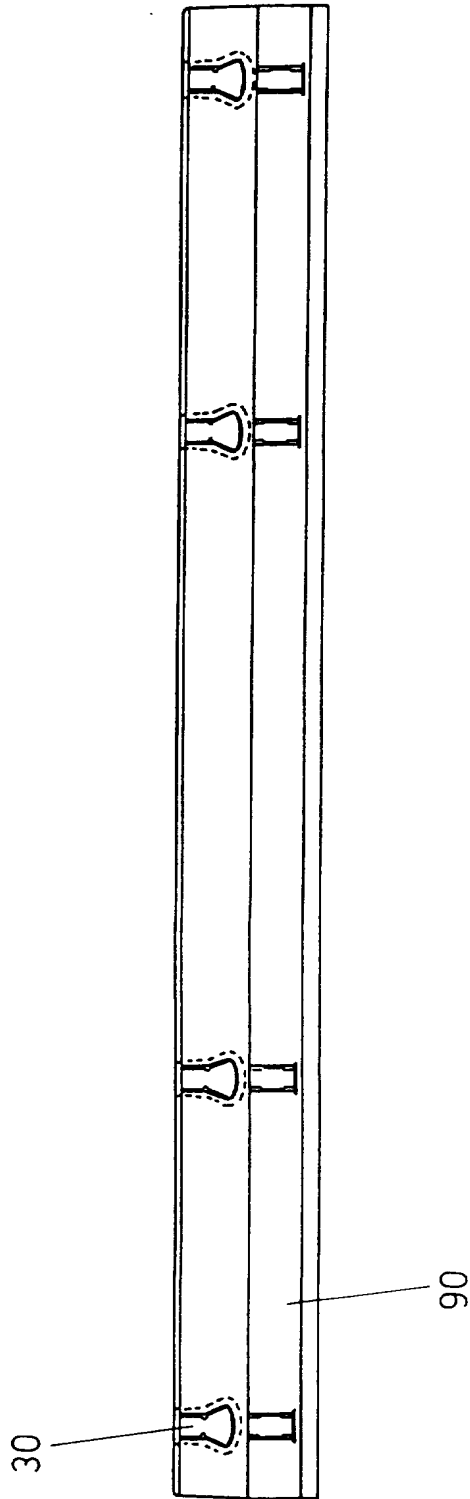


FIG. 7a

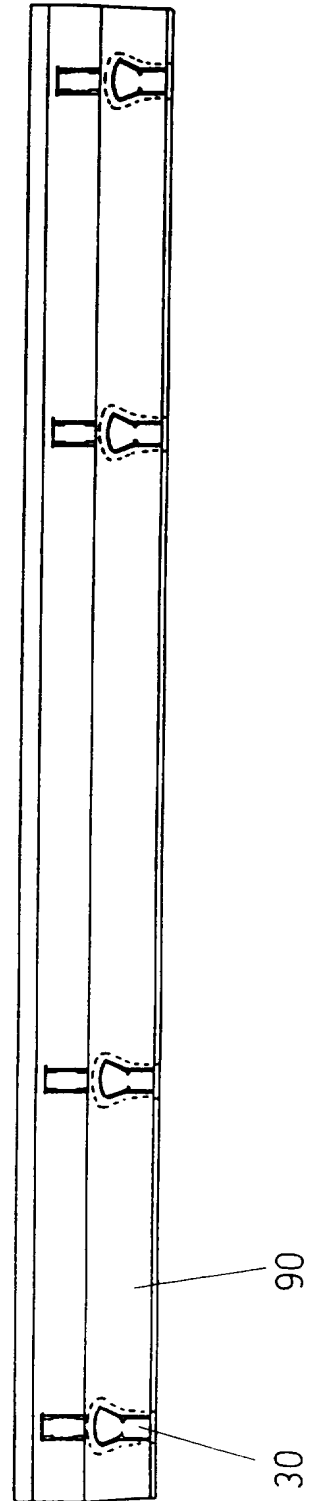


FIG. 7b

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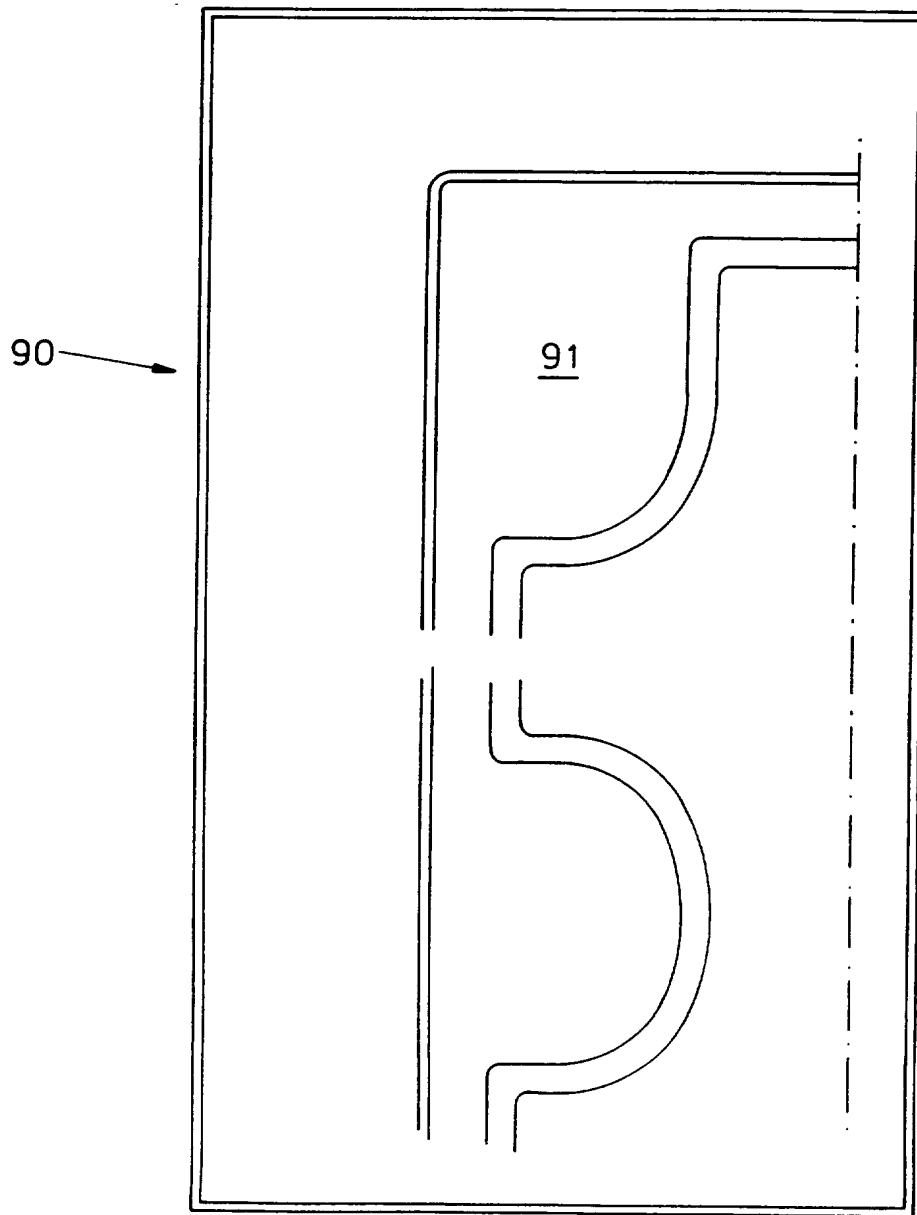


FIG. 8

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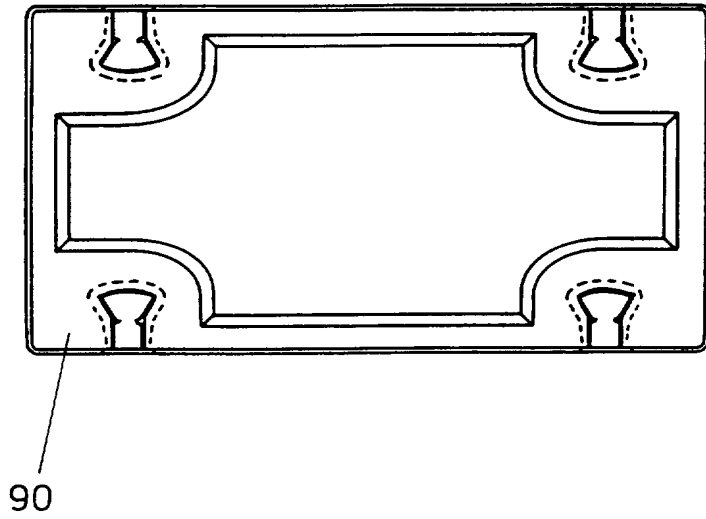


FIG. 9a

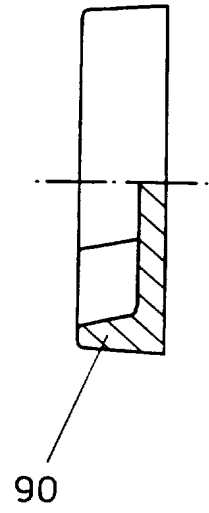


FIG. 9b

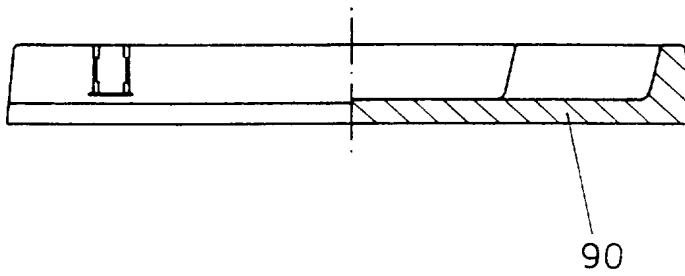


FIG. 9c

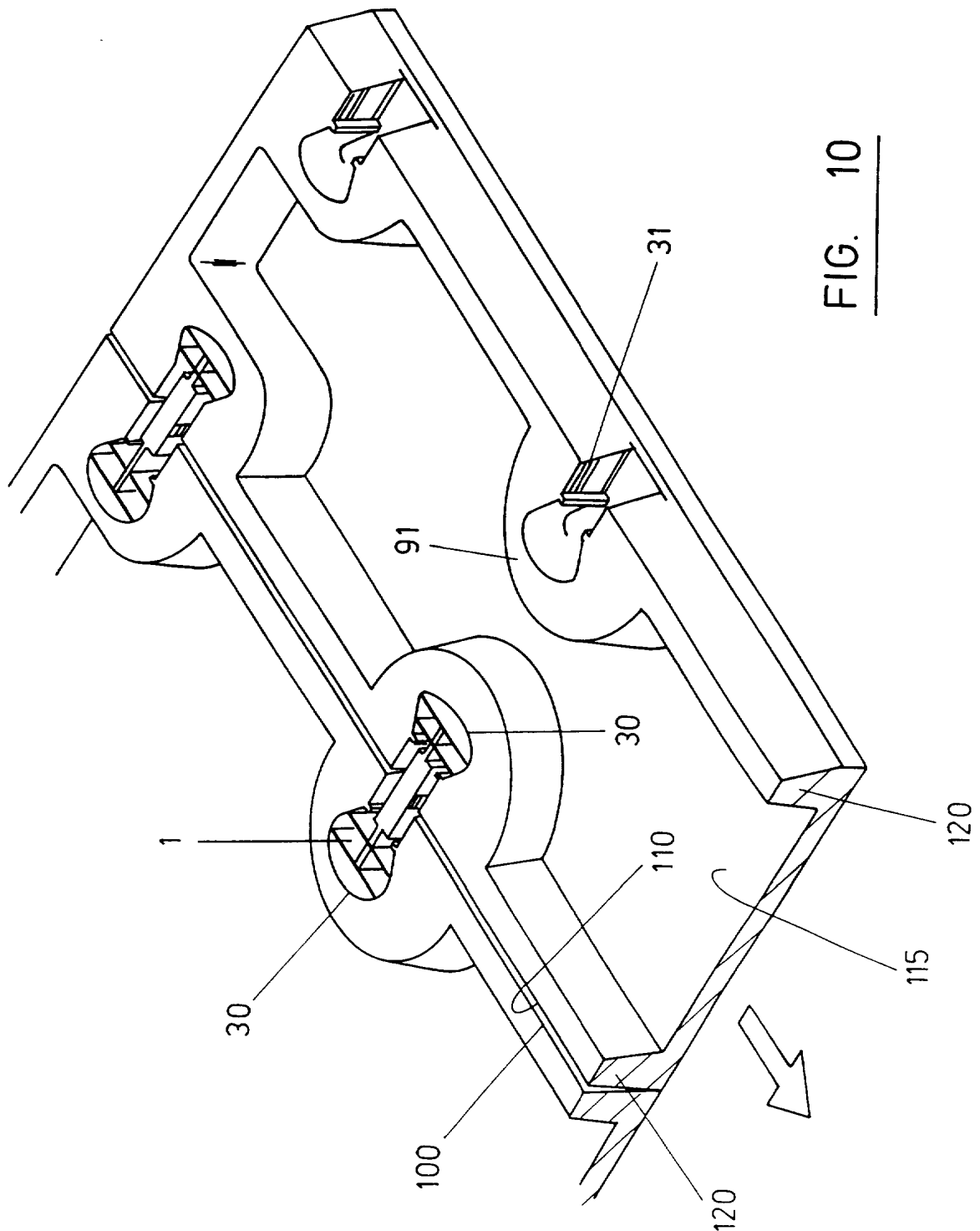


FIG. 10

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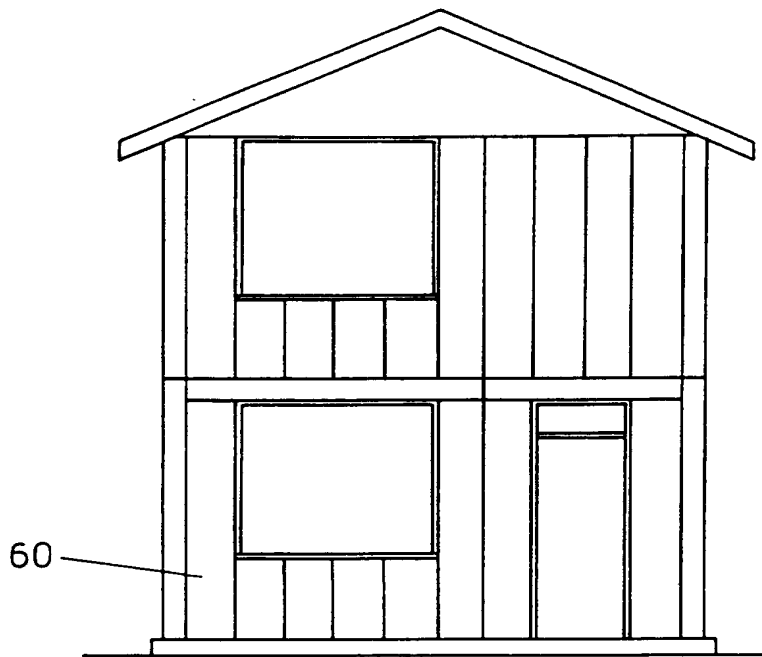


FIG. 11a

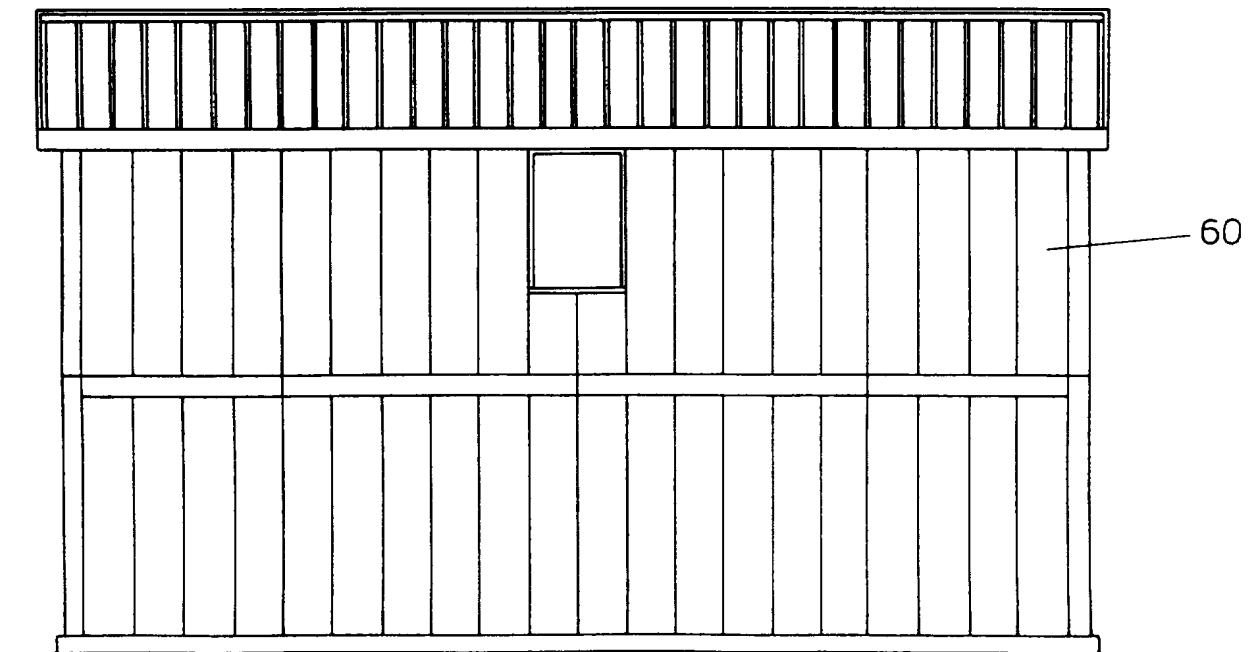


FIG. 11b

- 12/18 -

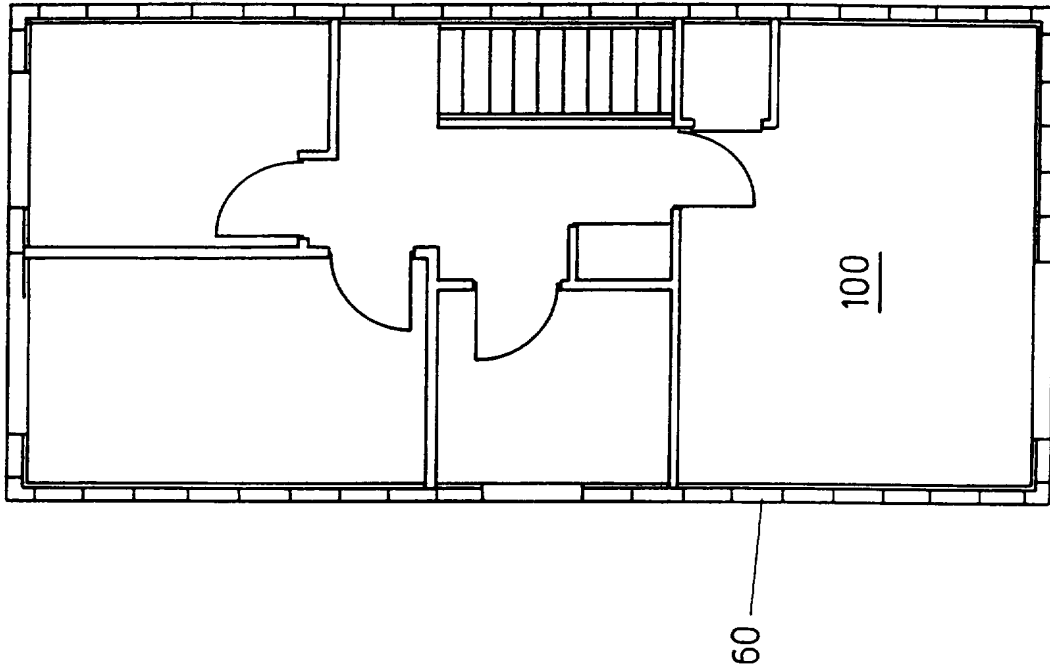


FIG. 12b

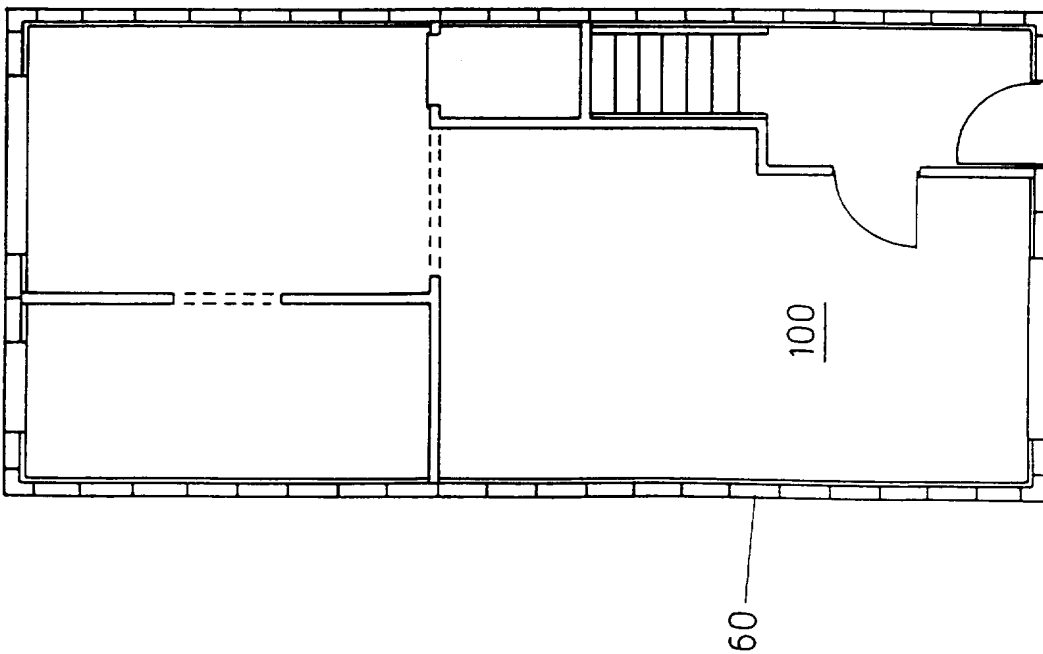


FIG. 12a

-13/18-

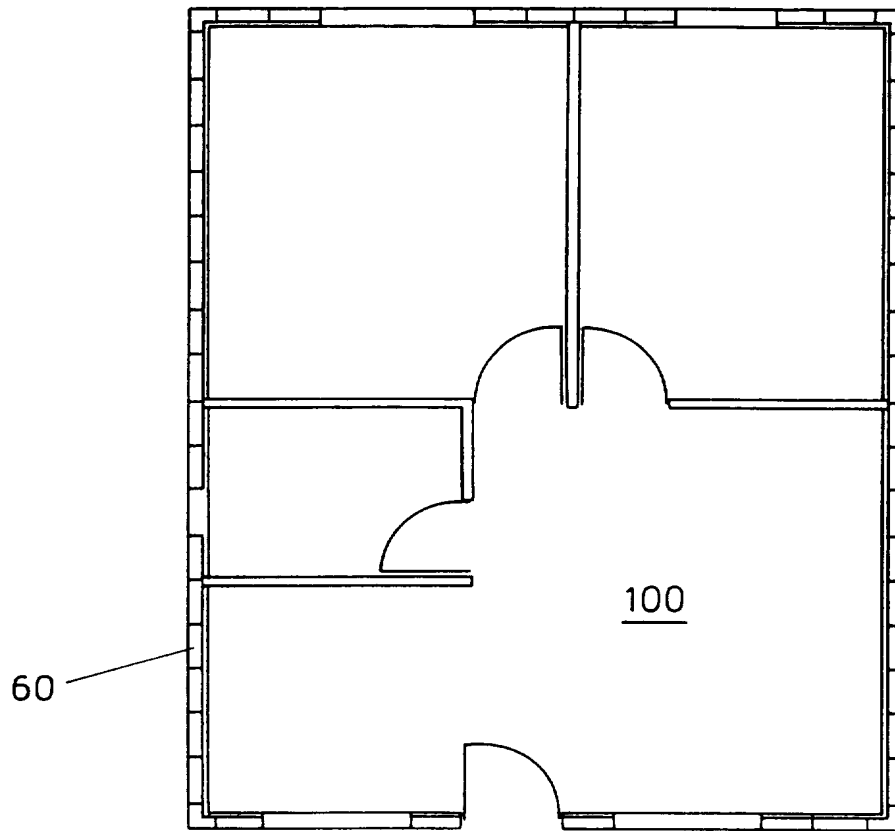
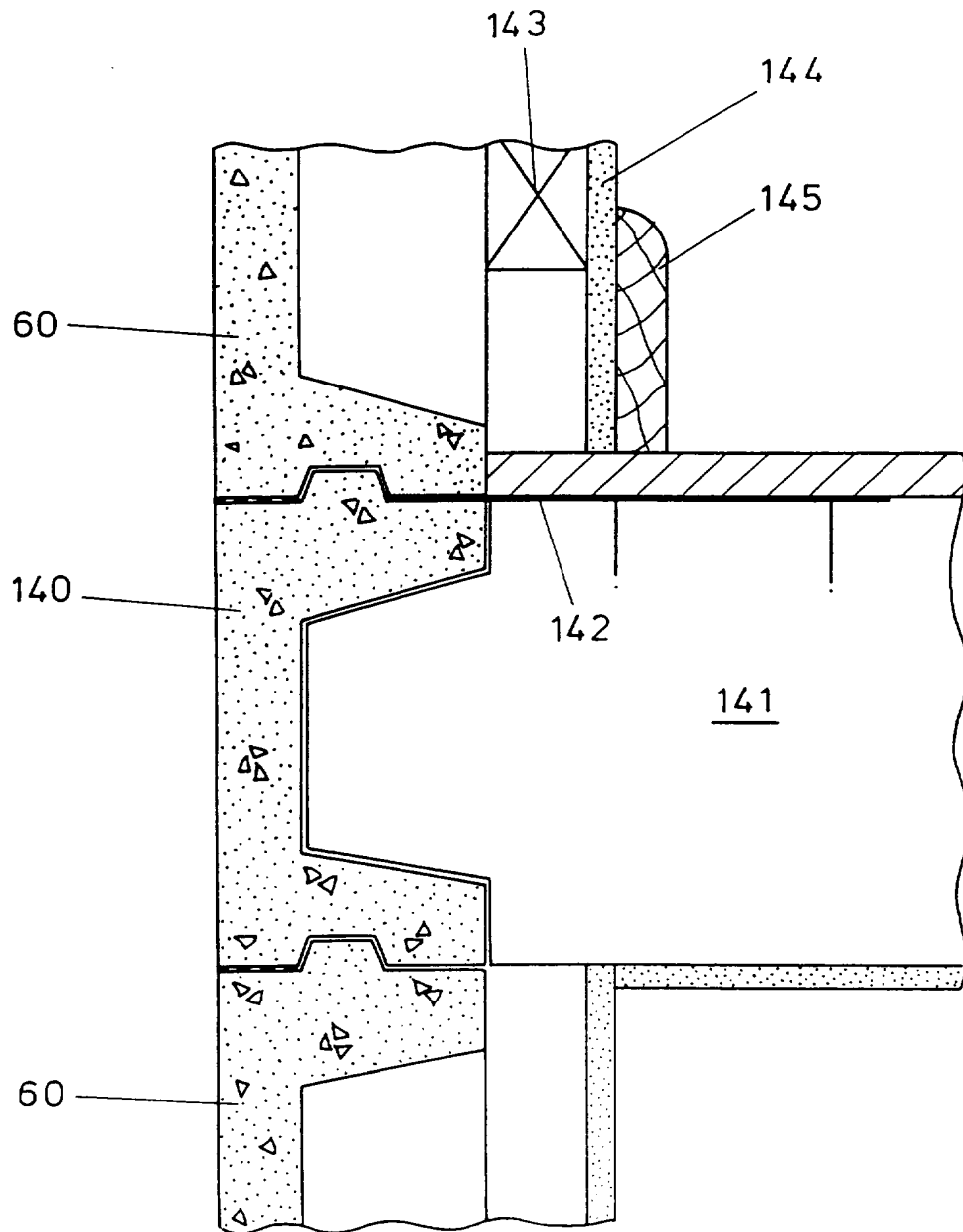


FIG. 13

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FIG. 14

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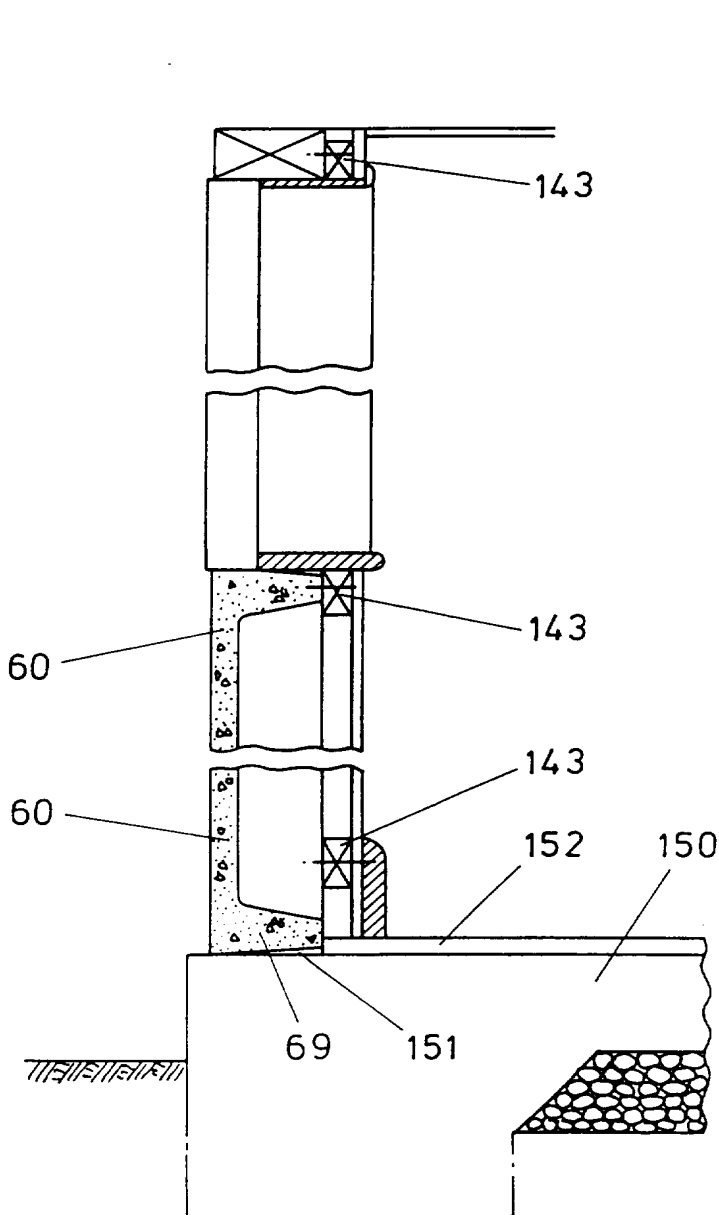


FIG. 15a

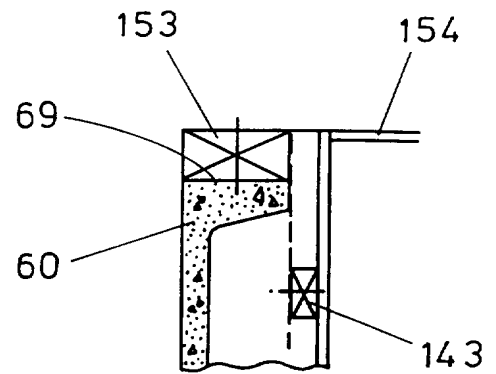


FIG. 15b

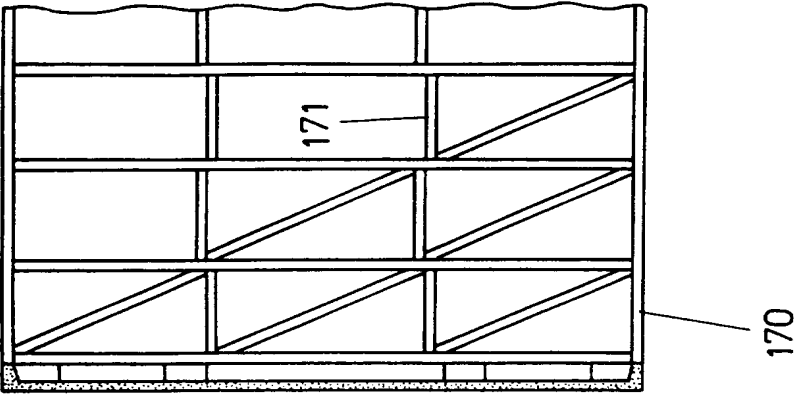


FIG. 17

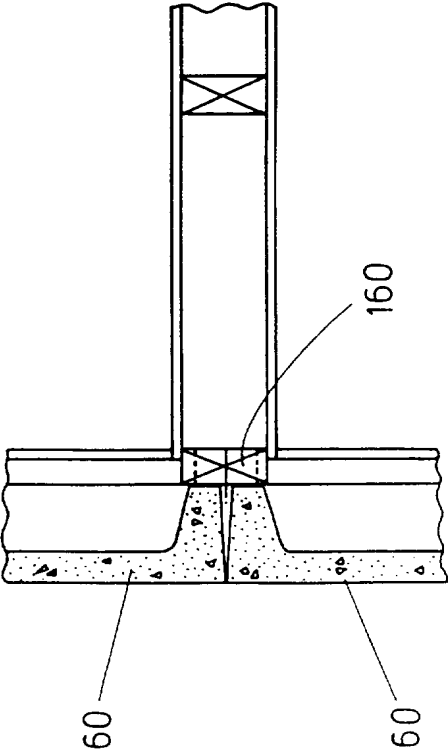


FIG. 16a

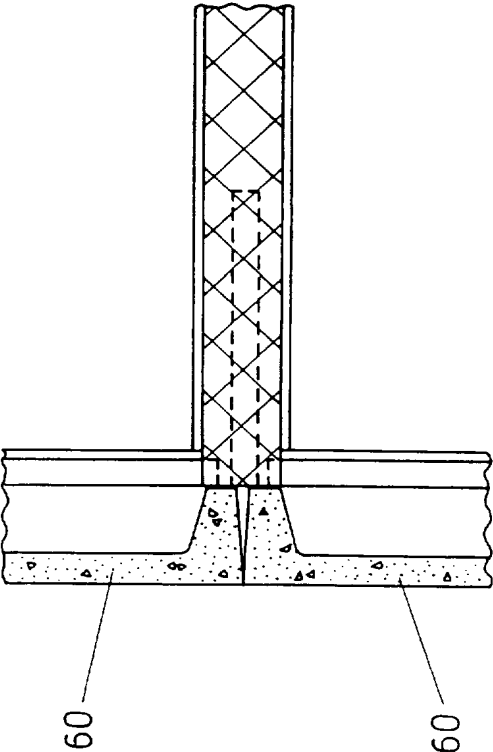


FIG. 16b

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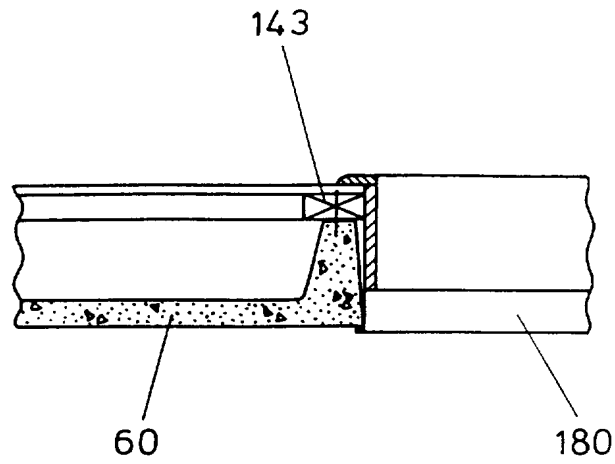


FIG. 18a

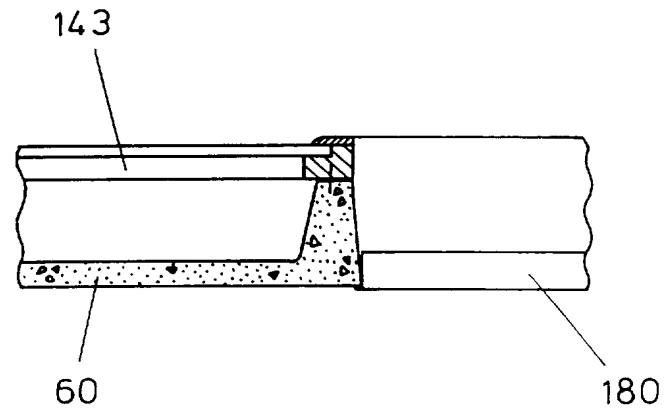


FIG. 18b

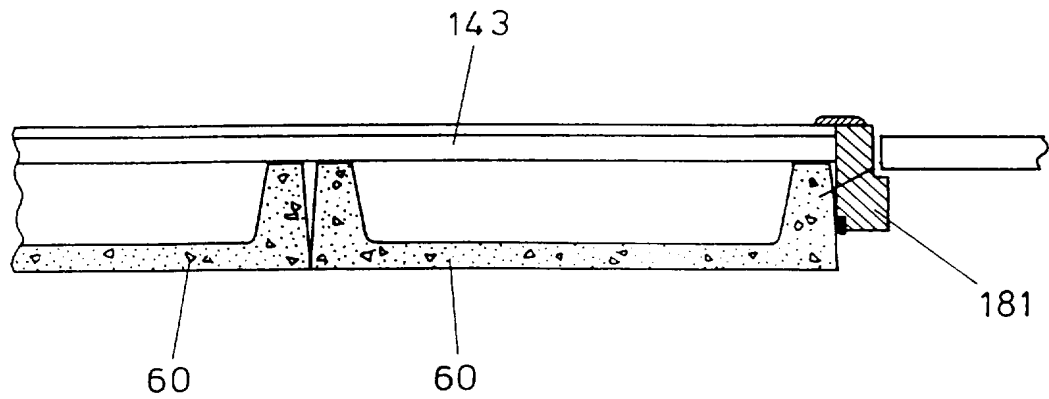


FIG. 18c

-18/18-

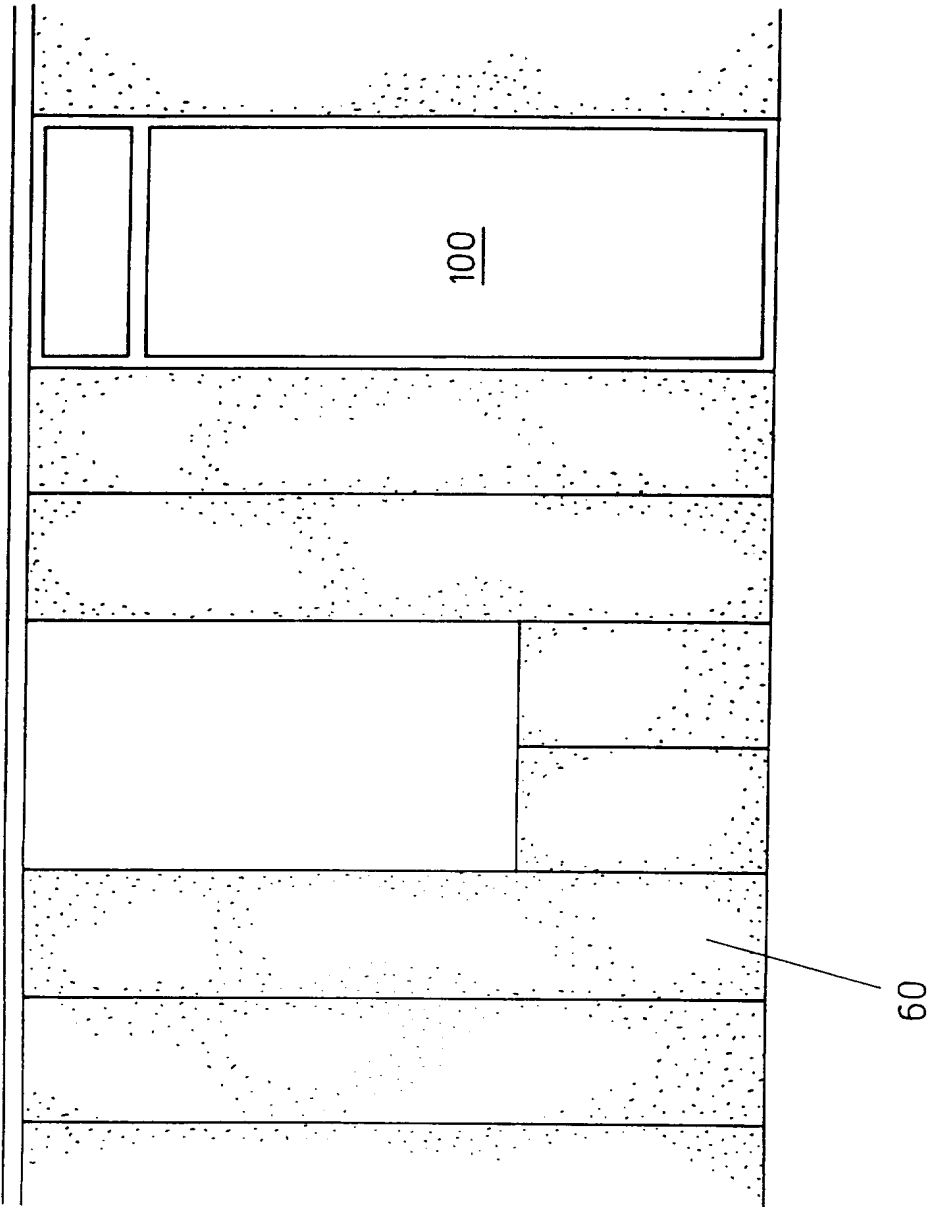


FIG. 19

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 96/02533

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E04B1/61 E04B1/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E04B F16B

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 3 760 547 A (BRENNEMAN) 25 September 1973 see column 1 see column 2, line 58 - column 5, line 54; figure 8 see column 6, line 66 - column 7, line 67; figures 8,15 ---	1,3,7,9, 11,12 4,5
X Y	GB 2 076 103 A (STANLEY) 25 November 1981 see page 2, line 34 - page 3, line 99; figures 1-5 ---	1,3,7,9, 11,12 2
X A	FR 2 592 904 A (SCOBAT) 17 July 1987 see page 3, line 14 - page 5, line 5; figures 1-7 --- -/--	1,7-9, 11,12 10

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

3 February 1997

Date of mailing of the international search report

18.02.97

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Kergueno, J

INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>CH 681 998 A (AC0) 30 June 1993 see column 2, line 36 - column 4, line 34 -----</p>	2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 96/02533

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3760547	25-09-73	US-A- 3627362	14-12-71
GB-A-2076103	25-11-81	NONE	
FR-A-2592904	17-07-87	NONE	
CH-A-681998	30-06-93	NONE	

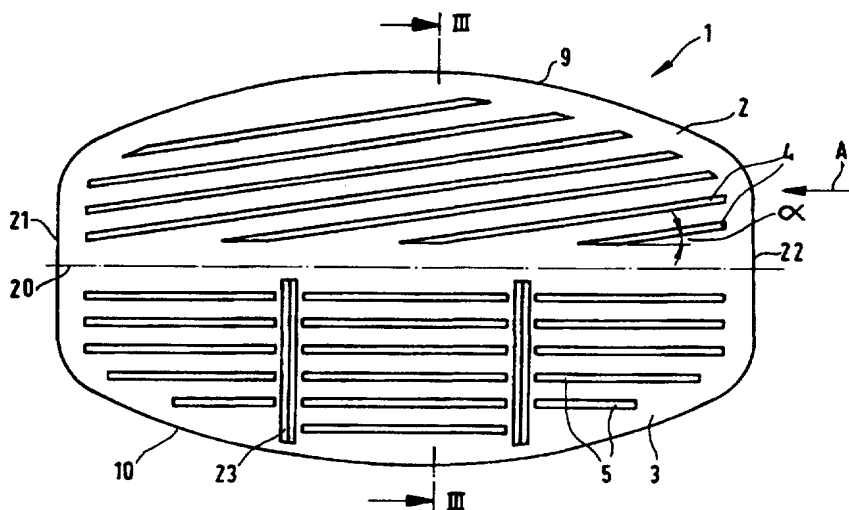


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<p>(51) Internationale Patentklassifikation ⁶ : F16B 12/24, 5/00, E04B 1/48, A47B 96/20</p>	A1	<p>(11) Internationale Veröffentlichungsnummer: WO 97/42420</p> <p>(43) Internationales Veröffentlichungsdatum: 13. November 1997 (13.11.97)</p>
<p>(21) Internationales Aktenzeichen: PCT/EP97/02273</p> <p>(22) Internationales Anmeldedatum: 5. Mai 1997 (05.05.97)</p> <p>(30) Prioritätsdaten: 296 08 207.4 6. Mai 1996 (06.05.96) DE</p> <p>(71) Anmelder (für alle Bestimmungsstaaten ausser US): JOSEF LANGEgger TISCHLEREI UND MÖBELHANDEL [AT/AT]; A-5753 Saalbach 571 (AT).</p> <p>(72) Erfinder; und (75) Erfinder/Anmelder (nur für US): LANGEgger, Josef [AT/AT]; A-5753 Saalbach 571 (AT).</p> <p>(74) Anwalt: HAFT, VON PUTTKAMER, BERNGRUBER, CZYBULKA; Franziskanerstrasse 38, D-81669 München (DE).</p>		<p>(81) Bestimmungsstaaten: US, europäisches Patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Veröffentlicht <i>Mit internationalem Recherchenbericht. Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist. Veröffentlichung wird wiederholt falls Änderungen eintreffen.</i></p>

(54) Title: DEVICE FOR CONNECTING STRUCTURAL COMPONENTS

(54) Bezeichnung: VORRICHTUNG ZUM VERBINDEN VON BAUTEILEN



(57) Abstract

To connect two adjacent structural components (11, 12), a device (1) has two joined strip-like sections (2, 3) which can be inserted into a groove (13) in one component and a groove (14) in the other. The sections (2, 3) have a plurality of ribs (4, 5) of barbed cross-section, where the points of the ribs (4, 5) of the two sections (2, 3) face one another. The ribs (4) of one section (2) are arranged at an angle (α) in relation to the ribs (5) of the other section (3).

(57) Zusammenfassung

Zum Verbinden von zwei aufeinanderstoßenden Bauteilen (11, 12) weist eine Vorrichtung (1) zwei miteinander verbundene leistenförmige Abschnitte (2, 3) zum Einführen in eine Nut (13) in dem einen bzw. in eine Nut (14) in dem anderen Bauteil auf. Die Abschnitte (2, 3) sind mit mehreren im Querschnitt widerhakenförmigen Rippen (4, 5) versehen, wobei die Spitzen der Rippen (4, 5) der beiden Abschnitte (2, 3) einander zugewandt sind. Die Rippen (4) des einen Abschnitts (2) sind in einem Winkel (α) zu den Rippen (5) des anderen Abschnitts (3) angeordnet.

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Vorrichtung zum Verbinden von Bauteilen

Die Erfindung bezieht sich auf eine Vorrichtung zum Verbinden von zwei aufeinanderstoßenden Bauteilen gemäß dem Oberbegriff des Anspruchs 1.

Eine derartige Vorrichtung, die dazu dient, drei zu einer Rinne angeordnete Bretter zu einem Hohlbalken zusammenzufügen, ist bereits aus DE 86 10 592 U1 bekannt. Die beiden leistenförmigen Abschnitte sind dabei jeweils mit einem Fuß versehen und die beiden Füße mit einem Filmscharnier miteinander verbunden. Sie können damit rechtwinklig aufgeklappt mit den widerhakenartigen Leisten in entsprechende Nuten in den Ecken des Hohlbalkens gesteckt werden.

Wenn beispielsweise zwei Holzteile an ihrem Stoß verleimt werden sollen, werden sie im allgemeinen mit Dübeln verbunden, also mit bolzenförmigen Verbindungsstücken aus Holz, die zur Erhöhung der Leimfähigkeit mit Längsrillen versehen sind. Damit die beiden Holzteile beim Aushärten des Leims fest aneinandergepreßt sind, werden Zwingen oder dgl. Spanneinrichtungen verwendet.

In vielen Fällen ist der Einsatz von Zwingen jedoch nicht möglich, beispielsweise, wenn die beiden Holzteile keinen rechten Winkel einschließen oder bei bestimmten Montagesituationen, beispielsweise der Befestigung eines Holzteils an einer Holzdecke.

Aufgabe der Erfindung ist es, eine Vorrichtung bereitzustellen, mit der Bauteile, insbesondere Holzbauteile, an ihren Stoßflächen ohne Zwingen oder dgl. Spanneinrichtungen fest aneinandergepreßt werden können.

Dies wird mit der im Anspruch 1 gekennzeichneten Vorrichtung erreicht. In den Unteransprüchen sind vorteilhafte Ausgestaltungen der Erfindung wiedergegeben.

Die erfindungsgemäße Vorrichtung dient in erster Linie zum Verbinden von zwei an ihrer Stoßfläche miteinander zu verleimenden Holzbauteilen. Sie kann jedoch auch zum Verbinden von Bauteilen aus Metall, Kunststoff oder anderen Werkstoffen verwendet werden.

Nachstehend ist die Erfindung anhand der Zeichnung beispielsweise näher erläutert.

Darin zeigen:

- Fig. 1 eine perspektivische Ansicht einer ersten Ausführungsform der Vorrichtung;
- Fig. 2 eine perspektivische Ansicht von zwei Bauteilen, die mit der Vorrichtung nach Fig. 1 aneinander befestigt werden;
- Fig. 3 eine Draufsicht auf eine zweite Ausführungsform der Vorrichtung; und
- Fig. 4 einen Schnitt entlang der Linie III-III in Fig. 3.

Gemäß Fig. 1 weist die Vorrichtung 1 zwei leistenförmige Abschnitte 2, 3 auf, die an ihren einander zugewandten Längsschmalseiten über ein Gelenk 8 miteinander verbunden sind. Sie weist damit die Form einer rechteckigen Platte auf.

Jeder Abschnitt 2, 3 ist jeweils mit mehreren im Querschnitt widerhakenförmigen Rippen 4, 5 versehen. Die Spitzen 6 der widerhakenförmigen Rippen 4 des Abschnitts 2 sind den Spitzen 7 der widerhakenförmigen Rippen 5 des Abschnitts 3 zugewandt.

Die Vorrichtung 1 ist einstückig ausgebildet, vorzugsweise aus Kunststoff. Das Gelenk 8 wird dabei durch ein Filmscharnier gebildet und bildet die Längsachse 20 der Vorrichtung.

Die Rippen 5 des Abschnitts 3 verlaufen parallel zu dessen Längskante 10, also parallel zur Längsachse 20 zwischen den beiden leistenförmigen Abschnitten 2, 3 bzw. senkrecht zu den Seitenkanten 21, 22. Demgegenüber verlaufen die Rippen 4 des Abschnitts 2 zwar auch parallel zueinander, aber schräg zur Längsachse 20 bzw. Längskante 9 des Abschnitts 2, und zwar mit einem Winkel von ca. 7°. Das heißt, die Rippen 4 und die Rippen 5 schließen einen Winkel α ein, der normalerweise zwischen 2° und 20° liegen kann.

Gemäß Fig. 2 werden zum Verbinden von zwei Holzteilen 11, 12, die verleimt werden sollen, zwei Nuten 13, 14 in deren Stoßflächen 15, 16 gefräst. Die Nuten 13, 14 weisen eine Breite auf, die etwas geringer ist als die Breite der Abschnitte 2, 3, einschließlich der Rippen 4, 5.

Die Bauteile 11, 12 können jetzt so angeordnet werden, dass die Nuten 13, 14 miteinander fluchten, worauf die Vorrichtung 1 von der Seite so eingesteckt wird, dass der eine Abschnitt 2 in die Nut 13 und der andere Abschnitt 3 in die Nut 14 eindringt. Dabei liegen die widerhakenartigen Rippen 4, 5 reibschlüssig, und wenn sie in das Holz eindringen auch formschlüssig, an den Seitenflächen der Nuten 13, 14 an.

Durch einen Schlag auf die Stirnfläche der Vorrichtung 1 gemäß dem Pfeil 17 wird, da die Rippen 4 an dem Abschnitt 2 sich in die Nut 13 nach innen schräg vom Bauteil 12 weggestrecken, das Bauteil 11 an das Bauteil 12 gezogen und damit ein spaltfreier Stoß gebildet. Ein etwaiger aus den Nuten 13, 14 seitlich vorstehender Teil der Vorrichtung 1 kann dann abgetrennt werden.

Die Verbindung kann auch in anderer Weise erfolgen, beispielsweise dadurch, dass die Vorrichtung 1 mit dem einen Abschnitt 3 erst in die Nut 14 von der Seite oder von oben eingeführt wird, worauf das Bauteil 12 mit der Nut 13 seitlich auf den aus der Nut 12 ragenden Abschnitt 2 geschoben wird.

Nach Fig. 1 liegen die Nuten 13, 14 in den Bauteilen 11 und 12 in einer Ebene. Durch das Filmscharnier 8 können die Nuten der miteinander zu verbindenden Bauteile jedoch auch jeden anderen beliebigen Winkel einschließen. Selbstverständlich können auch die miteinander zu verbindenden Bauteile mit jedem anderen beliebigen Winkel aufeinanderstoßen.

Die Ausführungsform nach Fig. 3 und 4 unterscheidet sich von der nach Fig. 1 und 2 im wesentlichen dadurch, dass zwischen den parallel zur Längsachse 20 der Vorrichtung 1 verlaufenden Rippen 5 des einen Abschnitts 3 im Abstand voneinander rippenförmige Stabilisatoren 23 angeordnet sind. Die Stabilisatoren 23 verlaufen senkrecht zu den Rippen 5 bzw. der Längsachse 20. Sie weisen einen Vorstand auf, der dem Vorstand der Rippen 5 entspricht (Fig. 4).

Darüberhinaus ist bei dieser Ausführungsform zwischen den Abschnitten oder Hälften 2, 3 der Vorrichtung 1 kein Gelenk vorgesehen. Das heißt, das Plättchen 1 ist im wesentlichen steif ausgebildet. Zudem sind die Längskanten 9, 10 konvex gekrümmt und symmetrisch zur Längsachse 20 ausgebildet.

Zum Verbinden zweier Bauteile wird der Abschnitt 3 mit den zur Längsachse 20 parallel verlaufenden Rippen 5 und den Stabilisatoren 23 senkrecht zur Stoßfläche in die Nut des ersten Bauteils gesteckt. Dann wird der zweite Abschnitt 3 mit den schrägen Rippen 4 in die Nut des zweiten Bauteils senkrecht zur Stoßfläche gesteckt. Durch einen Schlag auf das zweite Bauteil in Richtung des Pfeiles A (oder auf das erste Bauteil in der Gegenrichtung), wird das zweite Bauteil gegen das erste Bauteil gezogen, so dass die beiden Bauteile mit ihren Stoßflächen aneinanderliegen.

Die Stabilisatoren 23 schneiden mit ihrer Kante in das erste Bauteil und verhindern während des Schlags auf das zweite Bauteil, dass sich das Plättchen 1 im ersten Bauteil verschiebt.

Patentansprüche

1. Vorrichtung zum Verbinden von zwei aufeinanderstoßenden Bauteilen mit zwei miteinander verbundenen leistenförmigen Abschnitten zum Einführen in eine Nut in dem einen bzw. in eine Nut in dem anderen Bauteil, wobei die leistenförmigen Abschnitte jeweils mit mehreren im Querschnitt widerhakenförmigen Rippen versehen sind und die Spitzen der widerhakenförmigen Rippen der beiden Abschnitte einander zugewandt sind, dadurch gekennzeichnet, dass die Rippen (4) des einen Abschnitts (2) in einem Winkel (α) zu den Rippen (5) des anderen Abschnitts (3) angeordnet sind.
2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass die Rippen (4) des einen Abschnitts (2) in einem Winkel (α) von höchstens 20° zu den Rippen (5) des anderen Abschnitts (3) angeordnet sind.
3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Rippen (4, 5) jedes Abschnitts (2, 3) parallel zueinander angeordnet sind.
4. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass die Rippen (5) des einen Abschnitts (3) parallel zur Längsachse (20) der beiden Abschnitte (2, 3) und die Rippen (4) des anderen Abschnitts (2) schräg zur Längsachse (20) verlaufen.
5. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass die beiden Abschnitte (2, 3) gelenkig miteinander verbunden sind.

6. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, dass sie einstückig aus Kunststoff gebildet ist.
7. Vorrichtung nach Anspruch 5 und 6, dadurch gekennzeichnet, dass das Gelenk (8) als Filmscharnier ausgebildet ist.
8. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, dass an dem einen Abschnitt (3) zwischen den Rippen (5), die parallel zur Längsachse (20) verlaufen, wenigstens ein senkrecht verlaufender rippenförmiger Stabilisator (23) vorgesehen ist.

1 / 2

FIG.1

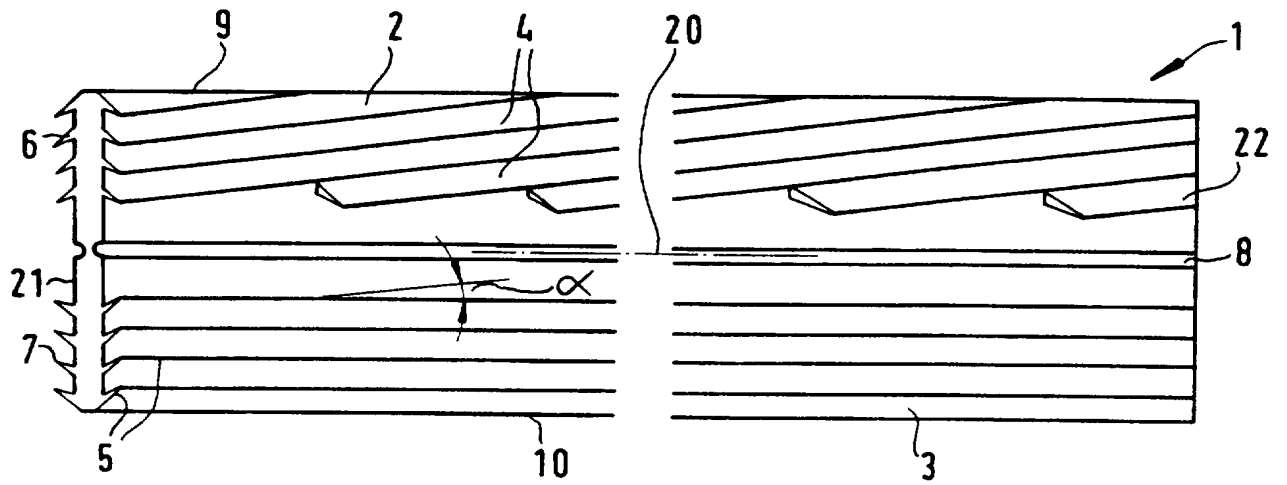


FIG.2

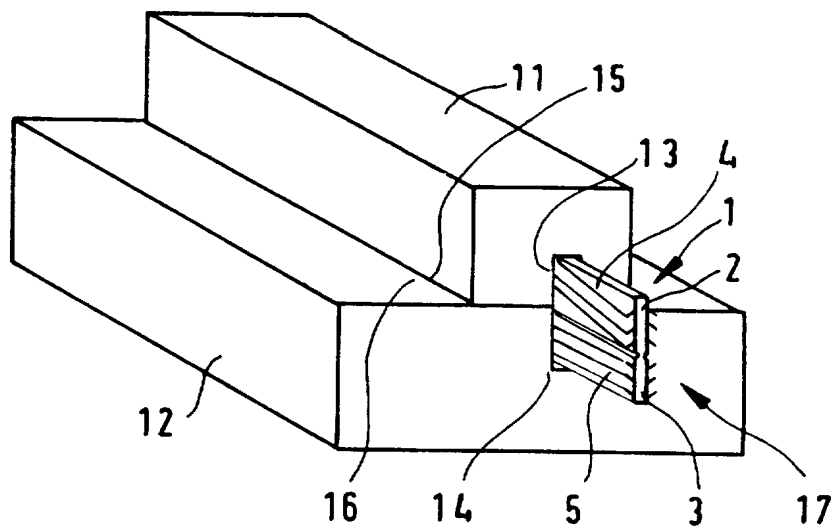


FIG. 4

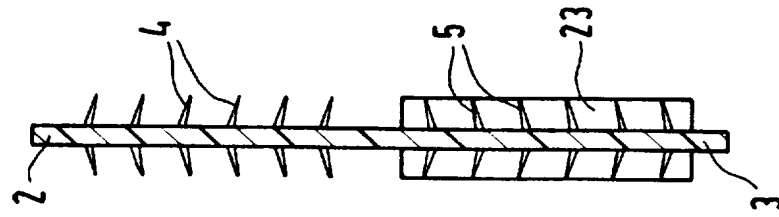
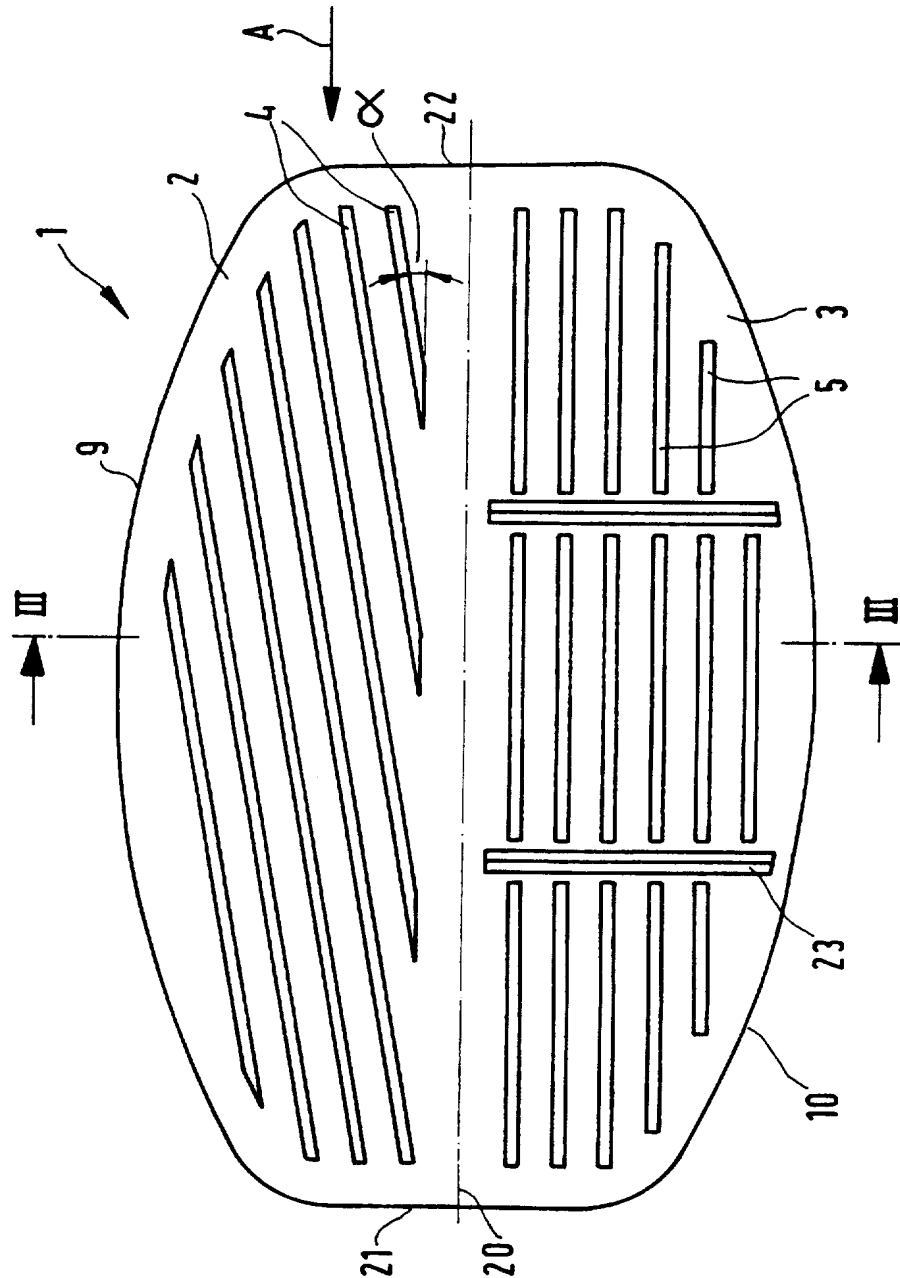


FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 97/02273

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 F16B12/24 F16B5/00 E04B1/48 A47B96/20

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 566 134 A (OSTERMANN & SCHEIWE GMBH & CO) 20 October 1993 see figures 1-3 ---	1,3,5-7
A	US 3 826 053 A (CAMERON W) 30 July 1974 see figures 1-3 ---	1,3,6
A	US 3 760 547 A (BRENNEMAN J) 25 September 1973 see claims 1,4,10; figures 1,2,11 ---	1,3,6
A	GB 1 189 485 A (BRENNEMAN J) 29 April 1970 see figures 1,5-11 ---	1,3,6
A	DE 86 10 592 U (ROTAN GMBH HOLZTECHNIK) 11 September 1986 cited in the application -----	1,3,5-7

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International Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0566134 A	20-10-93	DE 9205273 U	09-07-92
US 3826053 A	30-07-74	NONE	
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GB 1189485 A	29-04-70	FR 1523833 A	18-09-68
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INTERNATIONALER RECHERCHENBERICHT

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Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	EP 0 566 134 A (OSTERMANN & SCHEIWE GMBH & CO) 20.Oktober 1993 siehe Abbildungen 1-3 ---	1,3,5-7
A	US 3 826 053 A (CAMERON W) 30.Juli 1974 siehe Abbildungen 1-3 ---	1,3,6
A	US 3 760 547 A (BRENNEMAN J) 25.September 1973 siehe Ansprüche 1,4,10; Abbildungen 1,2,11 ---	1,3,6
A	GB 1 189 485 A (BRENNEMAN J) 29.April 1970 siehe Abbildungen 1,5-11 ---	1,3,6
A	DE 86 10 592 U (ROTAN GMBH HOLZTECHNIK) 11.September 1986 in der Anmeldung erwähnt -----	1,3,5-7

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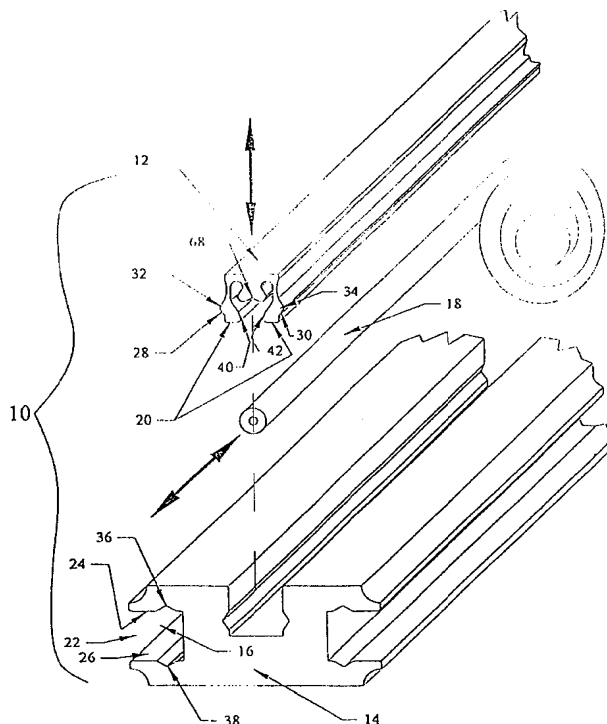


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US99/13831 (22) International Filing Date: 18 June 1999 (18.06.99) (30) Priority Data: 09/102,407 22 June 1998 (22.06.98) US (71)(72) Applicant and Inventor: THEODOROU, Antonis [CY/US]; 737 Danielle Court, Sleepy Hollow, IL 60118 (US). (74) Agent: MERONI, Charles, F., Jr.; Meroni & Meroni P.C., P.O. Box 309, Barrington, IL 60011 (US).		(81) Designated States: CA, CN, MX, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: EXTRUDED FRAME MEMBER FOR STRUCTURAL CONNECTION AND METHOD OF FORMING SAME**(57) Abstract**

A fastener structure (10) for connecting a first connector member (12) to a second connector member (14) having a slot (16) for receiving the first connector member (12). The first connector member (12) has a pair of generally parallel stiff yieldable legs (20) that are spaced apart a distance substantially equivalent to a width of the slot. The slot (16) has an open end (22) defined by confronting spaced apart sidewalls (24 and 26). The legs (20) have outwardly forming cam surfaces for camming engagement with the sidewalls (24 and 26), thus causing the yieldable legs to yield towards one another as the first connector member is pushed into the slot in the second connector member. The yieldable legs (20) have oppositely facing locking abutments (32 and 34) and the slot sidewalls have notched areas (36 and 38) for receiving the locking abutments. The fastener structure further includes a lock key member (18) that is slidable longitudinally between the legs and is engageable with confronting inner faces of the legs.



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EXTRUDED FRAME MEMBER FOR STRUCTURAL CONNECTION AND METHOD OF FORMING SAME

BACKGROUND OF THE INVENTION

5

Field of the Invention

The present invention relates generally to a new and improved method and apparatus for forming frame structures. More specifically the present invention provides a universal type of structural connector that is an integral part of a framing member with
10 standardized outside dimensions, generally replicating dimensional lumber. The invention allow a user to quickly assemble and disassemble simple or complex frame structures using my prefabricated frame members with built-in connectivity.

Description of the Prior Art

15 In the past, it has been the practice for users to insert various connectors as “hardware”, into machined or otherwise prepared framing members at the time of the application. Although this practice promotes and maintains the standardization of the basic shapes of framing members, such as dimensional lumber, and it requires machining or some other adaptation in order to integrate the connectors. Furthermore, the
20 connectors are typically stand-alone parts, not necessarily designed as a system with the framing members.

Also in the past, specialized framing members have been developed, where the connectivity features were an integral part of the framing member, typically in a male to

female order. In this case, one sacrifices universality of the basic shapes by creating more categories of parts, in order to gain the advantage of “no-machining”.

There have been various types of connectors and framing structures available in the marketplace, but none have gained widespread acceptance because of their expense,
5 difficulty of use, lack of universal use and inability for quick assembly and disassembly.

These and other types of connectors and frame members used in the past do not offer the flexibility, universality and productivity derived from the inventive features of my structure connector. As will be described in greater detail hereinafter, the method and apparatus of the structural connector of the present invention differs from those
10 previously proposed.

SUMMARY OF THE INVENTION

According to my present invention I have provided a fastener structure for connecting a first connector member to a second connector member having a slot for receiving the first connector member. The first connector member has a pair of generally parallel, relatively stiff, yieldable legs that are spaced apart a distance substantially equivalent to a width of the slot. The slot has an open end defined by confronting spaced apart sidewalls. The yieldable legs have outwardly forming cam surfaces that are sized and shaped for camming engagement with the confronting spaced apart sidewalls, thus causing the yieldable legs to yield towards one another as the first connector member is pushed into the slot in the second connector member. The yieldable legs have oppositely facing locking abutments, the slot sidewalls have notched areas spaced inwardly from the open end of the slot for receiving the locking abutments to secure the yieldable legs in a secured fitted position in the slot with the yieldable legs being formed and shaped to exert forces to hold the locking abutments in the notched areas. The fastener structure further includes a lock key member that is slideable longitudinally between the yieldable legs and is engageable with confronting inner faces of the yieldable legs to further secure the locking abutments of the yieldable legs in the notched areas.

I have further provided a fastener structure as described above, wherein the first connector member and/or the second connector member and/or the lock key member are made of an extruded material such as plastic and aluminum.

Still another feature of my invention concerns the fastener structure as described above, wherein the lock key member is comprised of a piece of flexible tubing. The

flexible tubing allows a user to insert a screw at one end in order to pull the flexible tubing out from in between the yieldable legs. The flexible tubing is also coilable in order to reduce the amount of space required to insert and remove the flexible tubing from in between the yieldable legs.

5 Still yet another feature of my invention concerns the fastener structure as described above, wherein the second connector member is a structural frame member having a generally rectangular shape.

 Yet another feature of my invention concerns the fastener structure as described above, wherein the second connector member contains at least one slot on its perimeter
10 extending along the length of the second connector member.

 A still further feature of my invention concerns the fastener structure as described above, wherein the first connector member further includes a filler. The filler is positioned at an upper portion between the yieldable legs and has a flat outer surface. The flat outer surface is sized to be flush with an outer surface of the second connector
15 member adjacent the slot when the first connector member is positioned within the slot of the second connector member and the lock key member is positioned in between the yieldable legs.

 An even further feature of my invention concerns the fastener structure as described above, wherein the first connector member further includes an adapter. The
20 adapter is positioned at an upper portion between the yieldable legs and has at least one groove extending along the length of the first connector member on an outer portion thereof. The groove or grooves can be used to hold at least one piece of material in place.

Yet still another feature of my invention concerns the fastener structure as described above, wherein the first connector member further includes an extension. The extension is positioned at an upper portion between the first pair of yieldable legs and extends outwardly away from the yieldable legs. The extension has a second pair of generally parallel, relatively stiff, yieldable legs at an opposite end of the first connector member. The second pair of yieldable legs are sized and shaped similarly to the first pair of yieldable legs, wherein the second pair of yieldable legs allow for connection to a third connector member that has a slot for receiving the second pair of yieldable legs.

According to other features in invention I have provided a fastener structure as described above, wherein the extension is angled between 0 degrees and 120 degrees relative to a vertical axis of the first pair of yieldable legs in order to allow for various different types of structural configurations.

Still yet another feature of my inventions involves the fastener structure as described above, wherein the first connector member further includes a channel, the channel is centrally located at an upper portion in between the yieldable legs, so as to act as a guide for inserting the lock key member as well as providing a marked area of an axially center portion of the first connector member.

Still another feature of my invention concerns the method for connecting at least two connector members together. The method comprises the steps of: a) providing a first connector member, the first connector member having a pair of generally parallel, relatively stiff, yieldable legs; b) providing a second connector member having a slot for receiving the first connector member, the yieldable legs of the first connector member being spaced apart a distance substantially equivalent to a width of the slot, the slot

having an open end defined by confronting spaced apart sidewalls, the yieldable legs having outwardly forming cam surfaces which are sized and shaped for camming engagement with the confronting spaced apart sidewalls, the yieldable legs having oppositely facing locking abutments, the slot sidewalls having notched areas spaced inwardly from the open end of the slot for receiving the locking abutments; c) pushing the first connector member into the slot of the second connector member, thus causing the yieldable legs to initially yield towards one another as the first connector member is pushed into the slot in the second connector member and then causing the locking abutments to enter the notched areas, wherein the yieldable legs are formed and shaped to exert forces to hold the locking abutments in the notched areas; d) providing a lock key member sized to securely fit in between the pair of yieldable legs of the first connector member; and e) sliding the lock key member longitudinally between the yieldable legs, wherein the lock key member is sized to be in engagement with confronting inner faces of the yieldable legs to further secure the locking abutments of the yieldable legs in the notched areas, and thereby connecting at least two connector members together.

Other objects, features and advantages of my invention will become more readily apparent upon reference to the following description when taken in conjunction with the accompanying drawings, which drawings illustrate several embodiments of my invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an enlarged exploded partial perspective view of my fastener structure embodying important features of my invention;

5 FIG. 2 is an enlarged end view of my fastener structure illustrating the way in which my fastener structure works;

FIG. 3 is a partial perspective view of my fastener structure;

FIG. 4 is a partial perspective view of one type of connector having a groove on one end for holding a piece of material that can be used with my fastener structure;

10 FIG. 5 is a partial perspective view of another type of connector having two grooves for holding two pieces of material that can be used with my fastener structure;

FIG. 6 is a partial perspective view of yet another type of connector that can be used in connecting two frame members together;

FIG. 7 is a partial perspective view illustrating how my flat filler connector can be
15 attached to an opposing surface with screws or glue;

FIG. 8 is a perspective view of an elongated connector that can be used to connect two frame members a certain distance apart;

FIG. 9 is an enlarged end view illustrating one way that two frame members can be connected together;

20 FIG. 10 is a partial perspective view of a connector being angled 60 degrees;

FIG. 11 is a partial perspective view of a connector being angled 90 degrees;

FIG. 12 is a partial perspective view of a connector being angled 120 degrees;

FIG. 13 is a partial perspective view of a connector being angled 135 degrees;

FIG. 14 is an end view illustrating one way in which some of my fastener structures can be joined together to create a specific structural design;

FIG. 15 is an end view illustrating another way in which some of my fastener structures can be joined together to create a specific structural design;

5 FIG. 16 is an end view illustrating yet another way in which some of my fastener structures can be joined together to create a specific structural design;

FIG. 17 is an end view illustrating still another way in which some of my fastener structures can be joined together to create a specific structural design;

FIG. 18 is an end view illustrating the way in which some of my fastener
10 structures can be joined together to create the assembled structural frame shown in FIG.
19; and

FIG. 19 is a front view of an assembled structure frame utilizing the fastener structures of my present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, FIGS. 1-3 show my new and improved fastener structure 10. The fastener structure can be used to connect with various different types of other structures, as will be described in greater detail herein, quickly and easily, as well as allowing the fastener structure to be quickly and easily disassembled.

My fastener structure 10 is comprised of a male connector member or a first connector member 12 that connects to a female connector member or a second connector member 14 having at least one slot 16 sized for receiving the first connector member 12, wherein the first connector member 12 is held in place within the slot 16 of the second connector member 14 with a tube or a lock key member 18. The second connector member 14 shown in the drawings has generally a 2 x 4 rectangular shape, however, the second connector member can be made in a variety of different sizes and dimensions that are suitable for frame construction purposes. The slot 16 generally extends along the length of the second connector member 14, furthermore the second connector member 14 can have multiple slots extending about its perimeter in order to provide a more universal connector. The first connector member 12 has a pair of generally parallel, relatively stiff, but bendable or yieldable legs 20 that are spaced apart a distance substantially equivalent to a width of the slot 16. Excellent results can be obtained when the first connector member 12 and the second connector member 14 are made of an extruded plastic or an extruded aluminum. Other types of appropriate materials can also be used to provide the same characteristics of the present invention.

The slot 16 has an open end 22 that is defined by confronting spaced-apart sidewalls 24, 26. The yieldable legs 20 are designed to have outwardly forming cam surfaces 28, 30 that are sized and shaped for camming engagement with the confronting spaced apart sidewalls 24, 26, thereby causing the yieldable legs 20 to bend or yield
5 towards one another as the first connector member 12 is pushed into the slot 16 in the second connector member 14.

The yieldable legs 20 are further defined by having oppositely facing locking abutments 32, 34. The sidewalls 24, 26 are further defined by having notched areas 36, 38 that are spaced inwardly from the open end 22 of the slot 16 for receiving the locking
10 abutments 32, 34, and to secure the yieldable legs 20 in a secured fitted position in the slot 16 with the yieldable legs 20 being formed and shaped to exert forces outwardly against the sidewalls 24, 26 to hold the locking abutments 32, 34 in the notched areas 36, 38.

In order to securely fasten the first connector member 12 to the second connector
15 member 14, a tube or a lock key member 18 is slideable longitudinally between the yieldable legs 20 and is engageable with confronting inner faces 40, 42 of the yieldable legs 20 to fully secure the locking abutments 32, 34 within the notched areas 36, 38. Excellent results can be obtained when the tube or lock key member 18 is made of a material such as extruded plastic, extruded aluminum, or nylon. Other types of
20 appropriate materials could also be used. It is also contemplated that the lock key member 18 be also flexible and coilable to allow room for a user to insert and remove the lock key member 18 in areas that do not provide very much room to assemble a frame structure. Furthermore, it is desirable for the tube or lock key member 18 to have a hole

extending therethrough, whereby one can easily remove the lock key member 18 from in between the yieldable legs 20 by screwing a screw into the hole on the end of the lock key member 18 and then pulling on the screw to remove the lock key member 18 out from in between the yieldable legs 20.

5 The method of attaching and securing the first connector member 12 to the second connector member 14 is fairly quick and easy. As shown in FIG. 2, the first connector member 12 can be snapped in or pushed by a users fingers 44 into the slot 16 of the second connector member 14, thus causing the yieldable legs 20 to initially yield towards one another as the first connector member 12 is pushed into the slot 16 and then causing
10 the locking abutments 32, 34 to enter the notched areas 36, 38. After the first connector member 12 is pushed in place within the slot 16, a user can then slide a tube or lock key member 18 long longitudinally between the yieldable legs 20, wherein the lock key member 18 is sized to be in engagement with confronting inner faces 40, 42 of the yieldable legs 20 to further secure the locking abutments 32, 34 in the notched areas 36,
15 38, and thereby creating a locked assembly of two connector members 12, 14.

When the lock key member 18 is not inserted in between the yieldable legs 20, the cam surfaces 28, 30 on the locking abutments 32, 34 allow the first connector member 12 to easily snap in and snap out of the slot 16 of the second connector member 14. However, when the lock key member 18 is securely positioned between the yieldable legs
20 20, the tightly secured position of the locking abutments 32, 34 within the notched areas 36, 38 due to the force and lift exerted by the lock key member 18 prohibits the first connector member 12 from coming out or snapping out from the slot 16.

In order to make the fastener structure of the present invention universal so that many different types of framing structures can be developed, I have provided a variety of different types of adapters in order to allow flexibility in any type of appropriate frame construction. One such adapter is shown in FIG. 2, wherein the first connector member 12 is a filler for filling an unused slot of a second connector member. The filler 12 has a flat outer surface 46, wherein the flat outer surface is sized to be flush with an outer surface 48 of the second connector member 14 adjacent the slot 16 when the first connector member 12 is positioned within the slot the lock key member 18 is positioned in between the yieldable legs 20. As an additional design feature, the first connector member 12 is sized so that the height of the filler 12 is slightly less than the depth of the slot 16, and when the lock key member 18 is pushed into place, the lock key member then lifts the filler 12 so that the locking abutments 32, 34 are securely locked within the notched areas 36, 38 and the flat outer surface 46 of the filler is flush with the outer surface 48 of the second connector member 14. As can be seen in FIG. 2, a small gap 50 is present when the lock key member 18 is secured between the yieldable legs 20. This same small gap appears as a step between the flat outer surface of the filler and the outer surface of the second connector member when the lock key member is not inserted in between the yieldable legs. This feature can be used as a safety check to allow users to quickly know if the connector is locked in place or if it can snap out.

Another type of adapter that I have developed is a first connector member 52, 54 (FIGS. 4, 5) having at least one groove 56, 58, 60 positioned at an upper portion between the yieldable legs. The grooves 56, 58, 60 extend along the length of the first connector member on an outer portion thereof, and are designed to hold at least one piece of

material in place such as glass, plywood, plastic, and other types of appropriate panels.

The grooves can be made to have varying widths to accommodate various different types of inserts.

The flat outer surface 46 of the filler connector member 12 (FIGS. 7 and 9) can be
5 attached to other surfaces in a variety of different ways. One way is to just apply glue 62
to the outer surface of the filler connector member 12 and adhesively secure the filler
connector member 12 to an opposing surface. Another method of securing the filler
connector member 12 is to pass a screw 64 through the filler connector 12 from the inside
portion of the filler connector. The screw 64 can then securely hold the filler connector
10 member 12 to an opposing surface 66. In order to keep the screw 64 from interfering
with the lock key member 18, a centrally located channel 68 (FIGS. 1 and 2) has been
positioned within the male connector member 12 at an upper portion thereof. This
centrally located channel 68 has multiple purposes: 1) it helps to feed and hold the lock
key member 18 in between the yieldable legs 20; 2) it allows a user to quickly place a
15 screw into the channel in a centrally located position and providing a quick and instant
exact alignment of the screw; and 3) it provides room to hold shavings that would be left
over from screwing in screws, wherein the shaving would not interfere with the quick
insertion of the lock key member 18.

Yet another type of adapter I developed, shown in FIGS. 6 and 8, allows for the
20 connection of multiple fastener structures to create complex framing structures. The
adapter is an extension connector 70, 72 that has two first connector members separated
by an extension that can provide short (FIG. 6) or long (FIG. 8) extensions between
fastener structures. The extension connectors shown in FIGS. 6 and 8 are straight

extensions. FIGS. 10 - 13 illustrate angled extensions 74, 76, 78, 80 for creating corners in framing structures. FIGS. 10 - 13 show angled extension of 60 degrees, 90 degrees, 120 degrees, and 135 degrees respectively for the most common types of angled extensions that can be used to create simple or complex framing structures. If necessary, various other angles can also be used.

FIG. 14 illustrates a triangular framing structure 82 created using the 60 degree angled extensions 74 connected to second connector members 84 separated by straight extension connectors 86. To allow for more flexibility in connecting the connector members of the present invention, I have created notched areas 87 at the corners of the female connector members in order to create tightly angled connections without having interfering corners. FIG. 15 illustrates a square framing structure 88 created using the 90 degree angled extensions 76 connected with second connector members 92.

FIG. 16 illustrates a hexagonal framing structure 94 created using the 120 degree angled extensions 78 connected with second connector members 96. FIG. 17 illustrates an octagonal framing structure 98 created using the 135 degree angled extensions 80 connected with second connector members 100.

FIGS. 18 and 19 further illustrate how a fence or railing structure 102 can be quickly and easily assembled using the connector members of the present invention. The upper rail members of the fence or railing structure is created by attaching three female connector members 104, 106, 108 together. The bottom rail is a female connector member 110. The fencing posts 112 are male extension connectors that extend between female connectors of the upper rail and the bottom rail.

As various possible embodiments may be made in the above invention for use for different purposes and as various changes might be made in the embodiments and method above set forth, it is understood that all of the above matters here set forth or shown in the accompanying drawings are to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A fastener structure for connecting a first connector member to a second connector member having a slot for receiving said first connector member, the first connector member having a first pair of generally parallel, relatively stiff, yieldable legs which are spaced apart a distance substantially equivalent to a width of said slot, the slot having an open end defined by confronting spaced apart sidewalls, the yieldable legs having outwardly forming cam surfaces which are sized and shaped for camming engagement with said confronting spaced apart sidewalls, thus causing the yieldable legs to yield towards one another as said first connector member is pushed into the slot in said second connector member, the yieldable legs having oppositely facing locking abutments, the slot sidewalls having notched areas spaced inwardly from the open end of the slot for receiving said locking abutments to secure the yieldable legs in a secured fitted position in said slot with the yieldable legs being formed and shaped to exert forces to hold the locking abutments in said notched areas, and a lock key member being slideable longitudinally between said yieldable legs and being engageable with confronting inner faces of said yieldable legs to further secure said locking abutments of the yieldable legs in said notched areas.

2. The fastener structure of claim 1, wherein said first connector member, said second connector member, and said lock key member are made of an extruded material selected from the group consisting of: plastic and aluminum.

3. The fastener structure of claim 1, wherein said lock key member comprises a piece of flexible tubing, said flexible tubing allowing a user to insert a screw

at one end in order to pull the flexible tubing out from in between the yieldable legs, said flexible tubing also being coilable in order to reduce the amount of space required to insert and remove the flexible tubing from in between the yieldable legs.

4. The fastener structure of claim 1, wherein said second connector member is a structural frame member having a generally rectangular shape.

5. The fastener structure of claim 1, wherein said second connector member contains at least one slot on its perimeter extending along the length of the second connector member.

6. The fastener structure of claim 1, wherein said first connector member further includes a filler means, said filler means being positioned at an upper portion between the yieldable legs, said filler means having a flat outer surface, wherein said flat outer surface is sized to be flush with an outer surface of the second connector member adjacent the slot when said first connector member is positioned within the slot of the second connector member and said lock key member is positioned in between the yieldable legs.

7. The fastener structure of claim 1, wherein said first connector member further includes an adapter means, said adapter means being positioned at an upper portion between the yieldable legs, said adapter means having at least one groove extending along the length of the first connector member on an outer portion thereof, wherein said at least one groove can be used to hold at least one piece of material in place.

8. The fastener structure of claim 1, wherein said first connector member further includes an extension means, said extension means being positioned at an upper

portion between the first pair of yieldable legs and extending outwardly away from the yieldable legs, said extension means having a second pair of generally parallel, relatively stiff, yieldable legs at an opposite end of the first connector member, said second pair of yieldable legs being sized and shaped similarly to said first pair of yieldable legs, wherein said second pair of yieldable legs allow for connection to a third connector member having a slot for receiving the second pair of yieldable legs.

9. The fastener structure of claim 8, wherein said extension means is angled between 0 degrees and 120 degrees relative to a vertical axis of the first pair of yieldable legs.

10. The fastener structure of claim 1, wherein the first connector member further includes a channel, said channel being centrally located at an upper portion in between the yieldable legs, whereby said channel acts as a guide for inserting the lock key member as well as providing a marked area of an axially center portion of the first connector member.

11. A method for connecting at least two connector members together, comprising the steps of:

a) providing a first connector member, the first connector member having a pair of generally parallel, relatively stiff, yieldable legs;

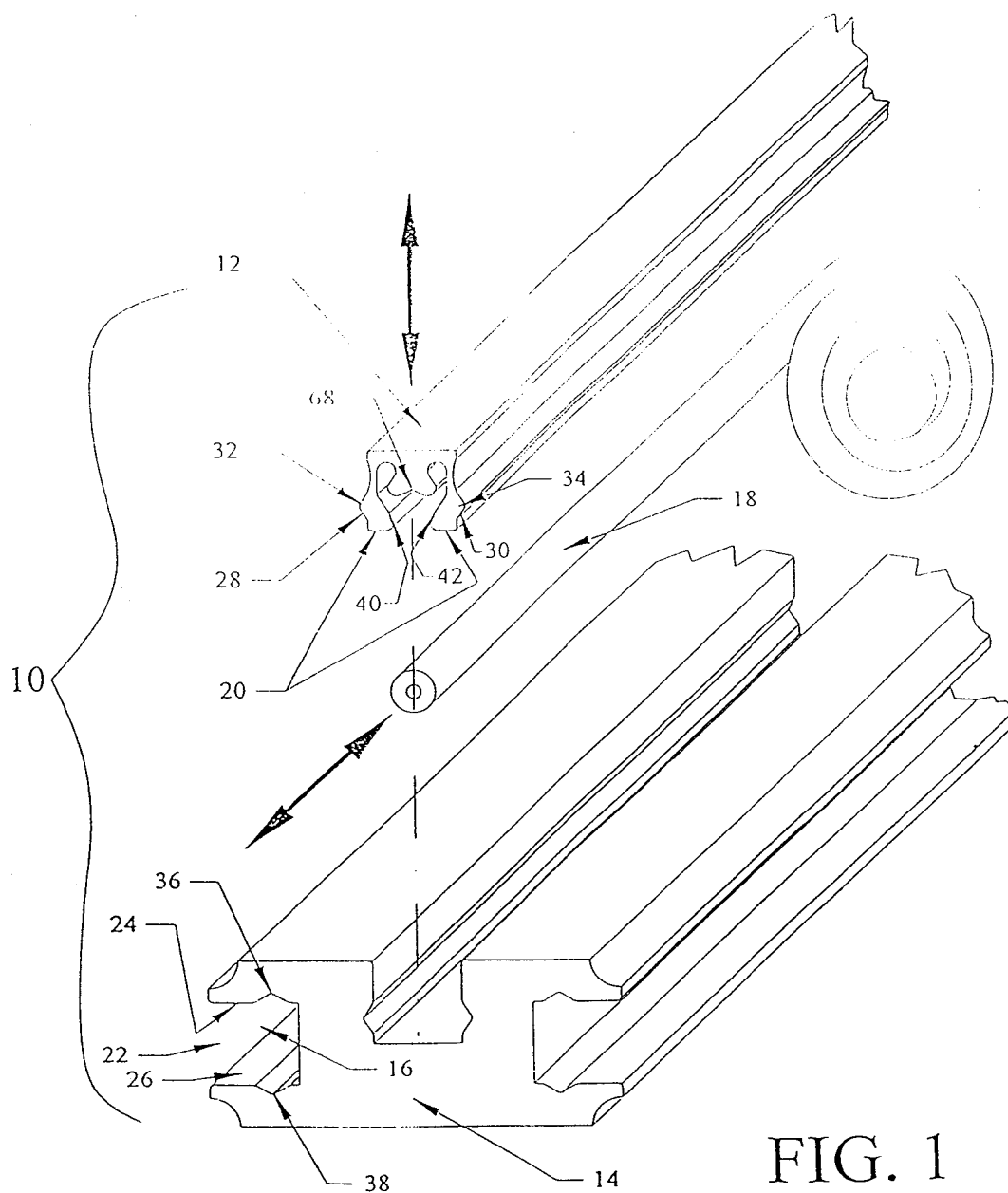
b) providing a second connector member having a slot for receiving the first connector member, the yieldable legs of the first connector member being spaced apart a distance substantially equivalent to a width of the slot, the slot having an open end defined by confronting spaced apart sidewalls, the yieldable legs having outwardly forming cam surfaces which are sized and shaped for camming engagement with the

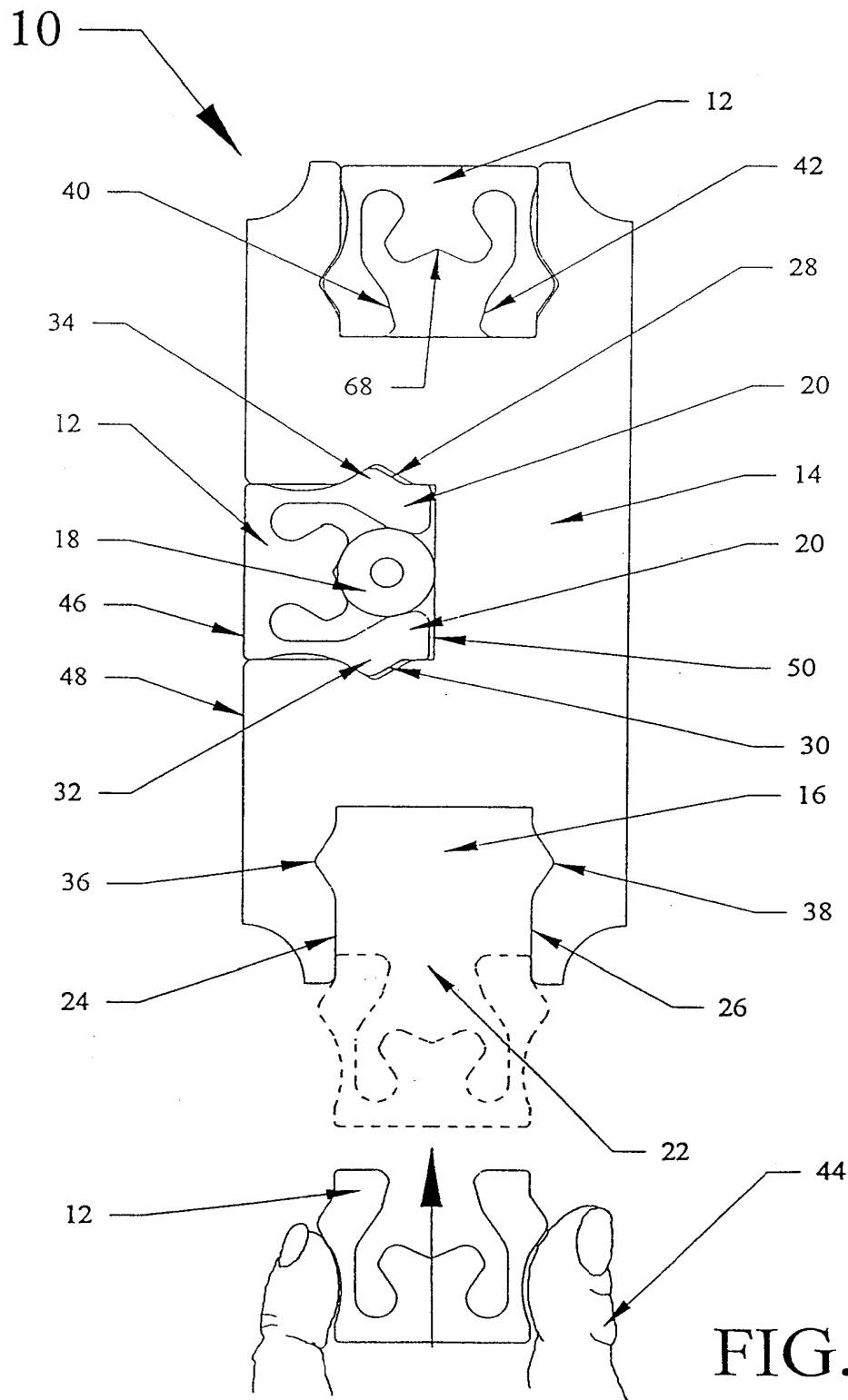
confronting spaced apart sidewalls, the yieldable legs having oppositely facing locking abutments, the slot sidewalls having notched areas spaced inwardly from the open end of the slot for receiving the locking abutments;

c) pushing the first connector member into the slot of the second connector member, thus causing the yieldable legs to initially yield towards one another as the first connector member is pushed into the slot in the second connector member and then causing the locking abutments to enter the notched areas, wherein the yieldable legs are formed and shaped to exert forces to hold the locking abutments in the notched areas;

d) providing a lock key member sized to securely fit in between the pair of yieldable legs of the first connector member; and

e) sliding the lock key member longitudinally between the yieldable legs, wherein the lock key member is sized to be in engagement with confronting inner faces of the yieldable legs to further secure the locking abutments of the yieldable legs in the notched areas, and thereby connecting at least two connector members together.





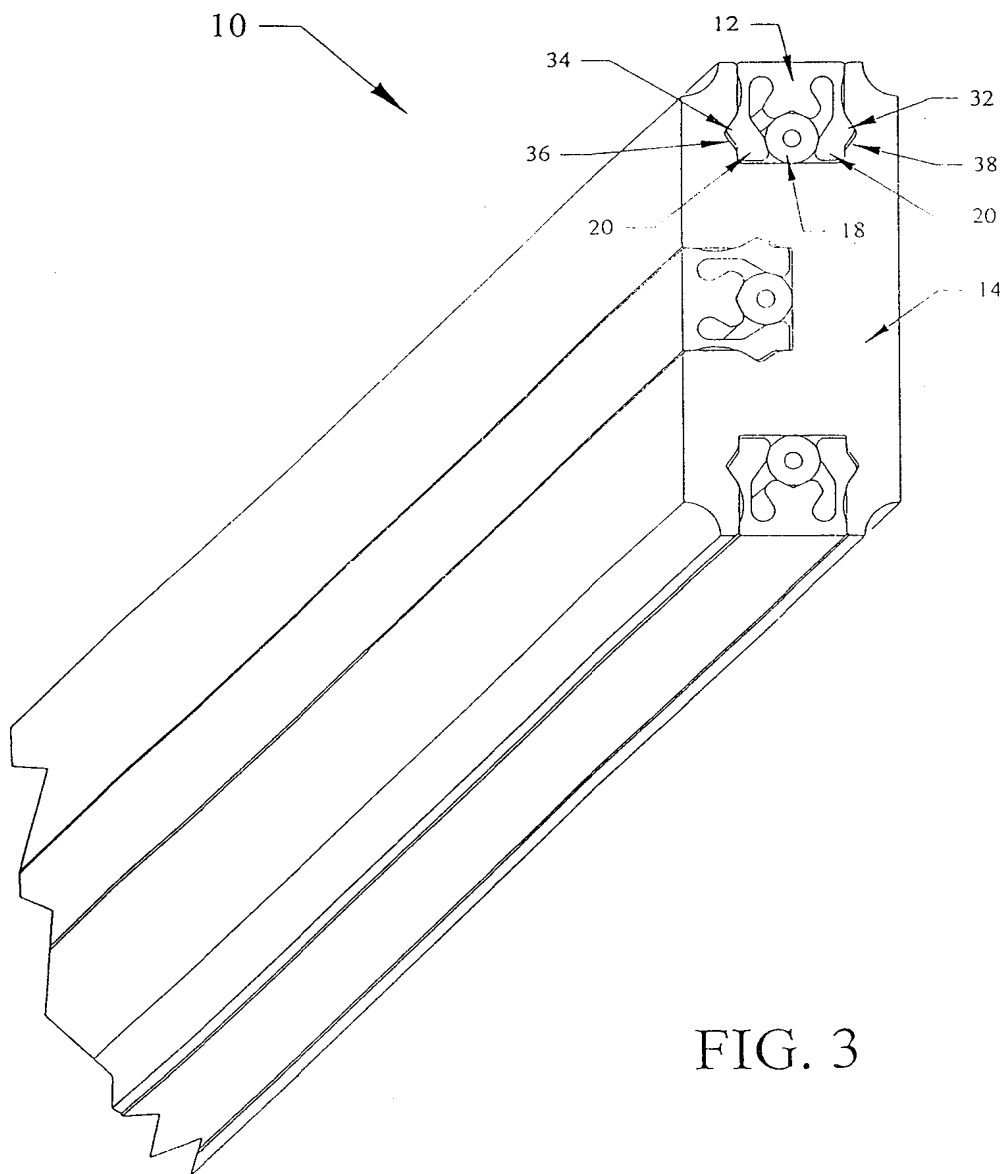


FIG. 3

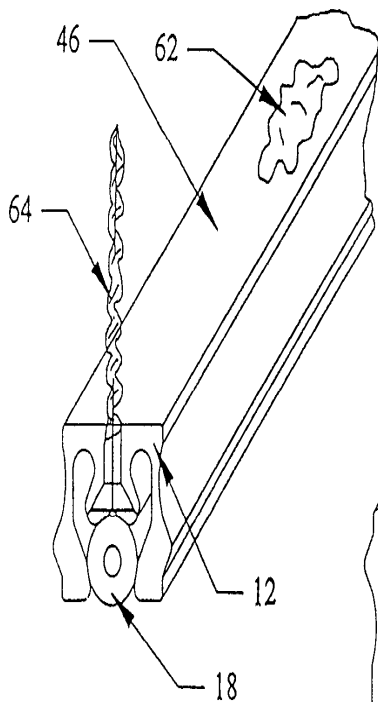


FIG. 7

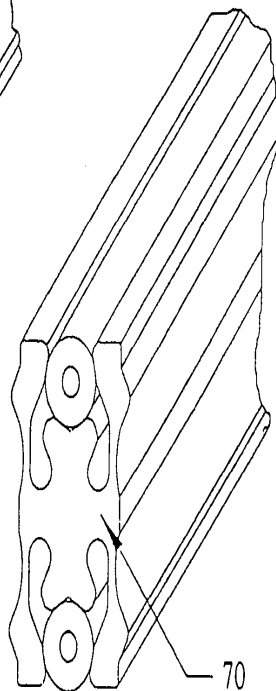


FIG. 6

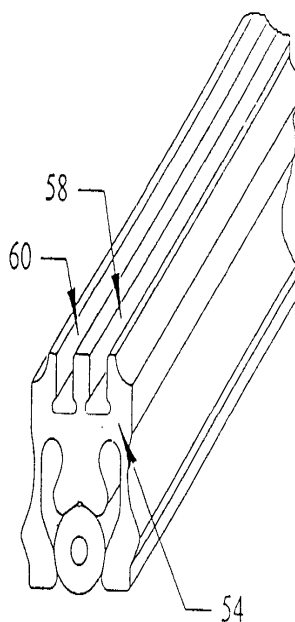


FIG. 5

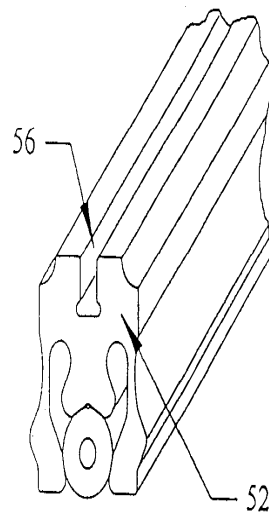


FIG. 4

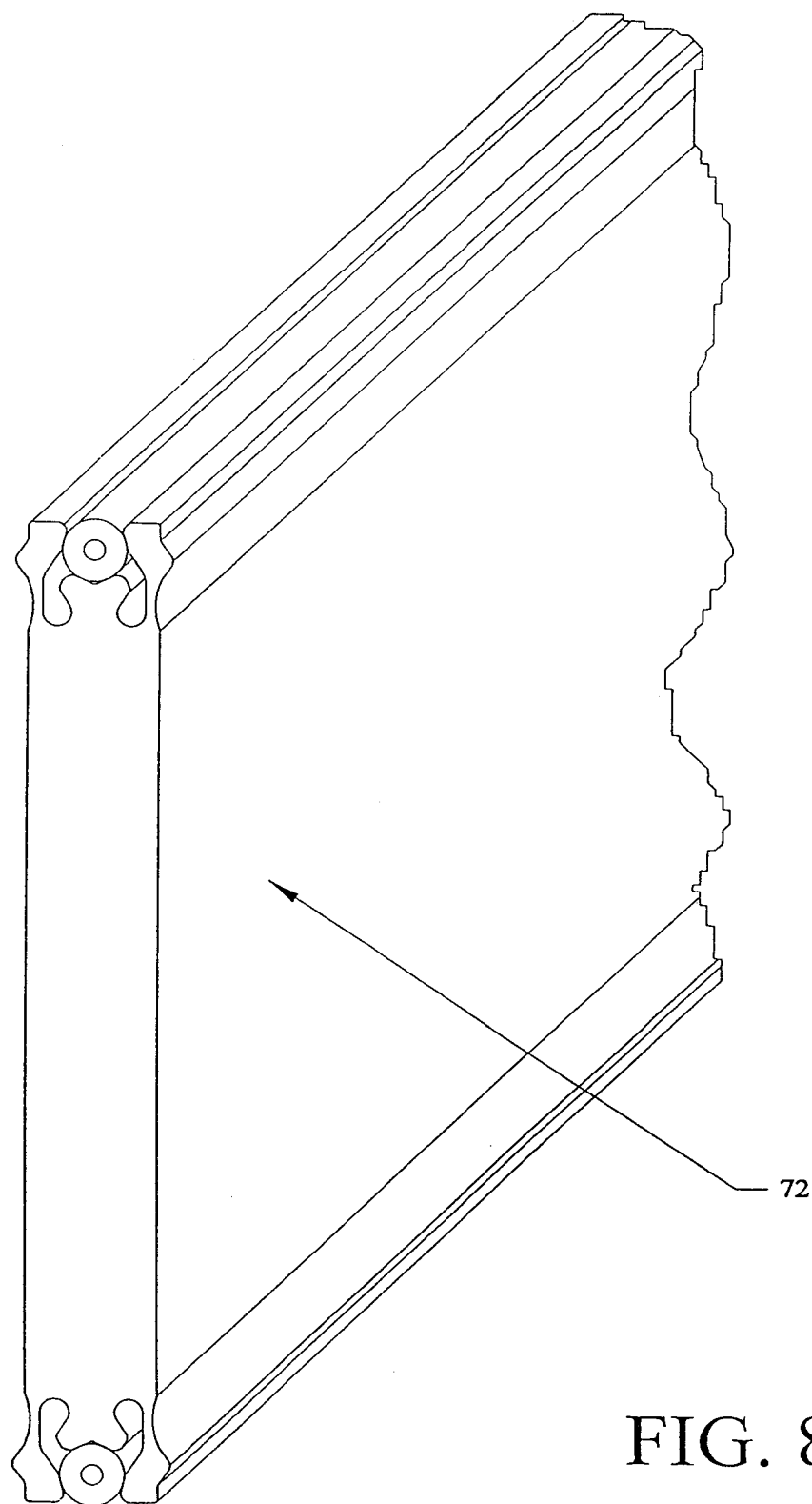


FIG. 8

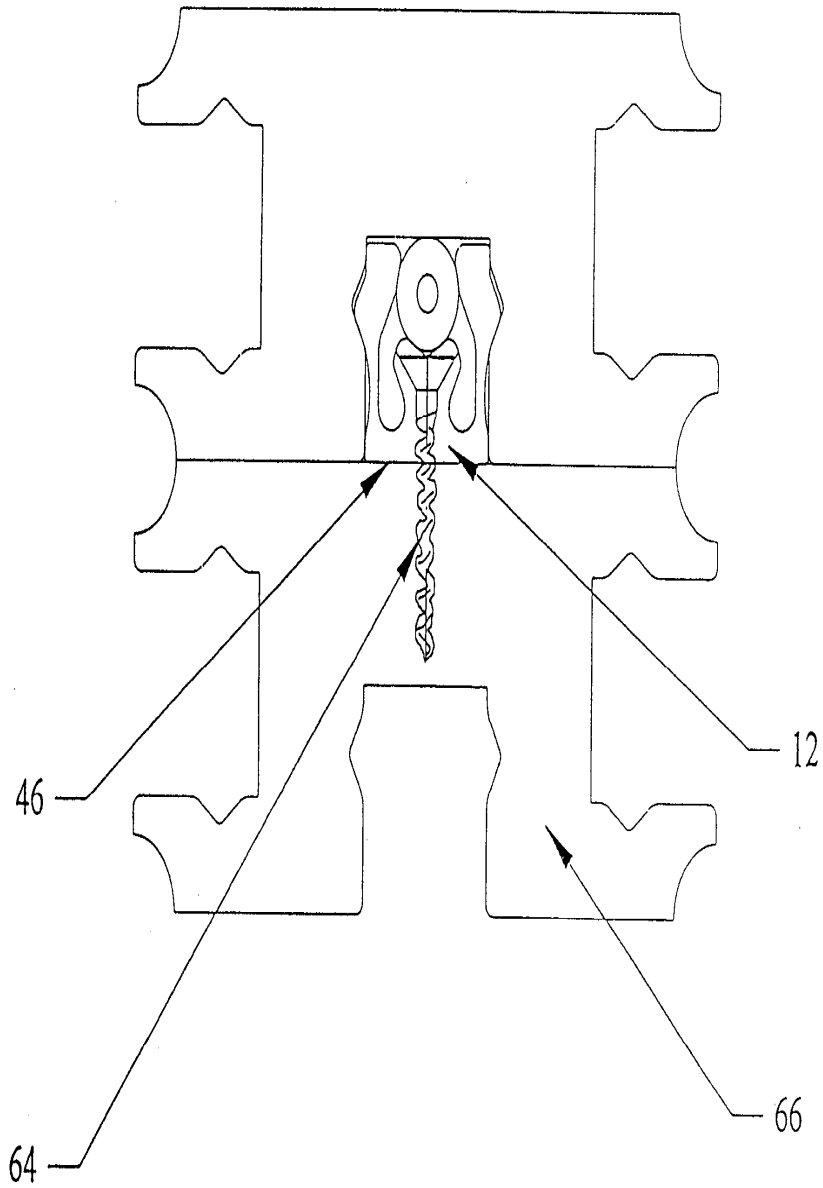


FIG. 9

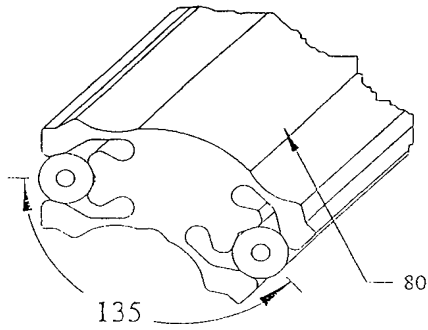


FIG. 13

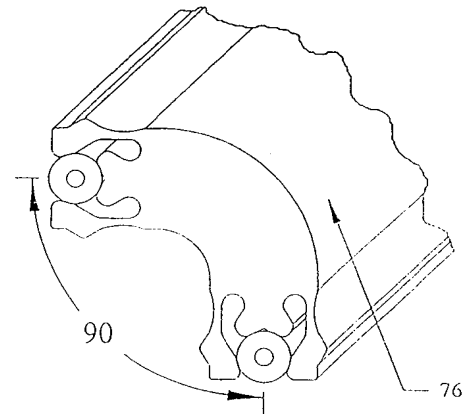


FIG. 11

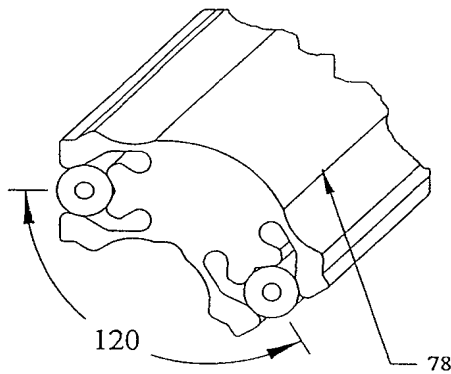


FIG. 12

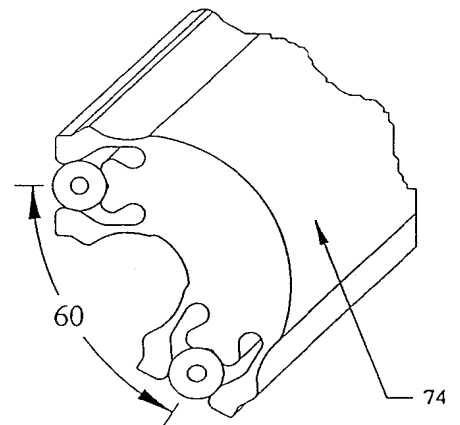


FIG. 10

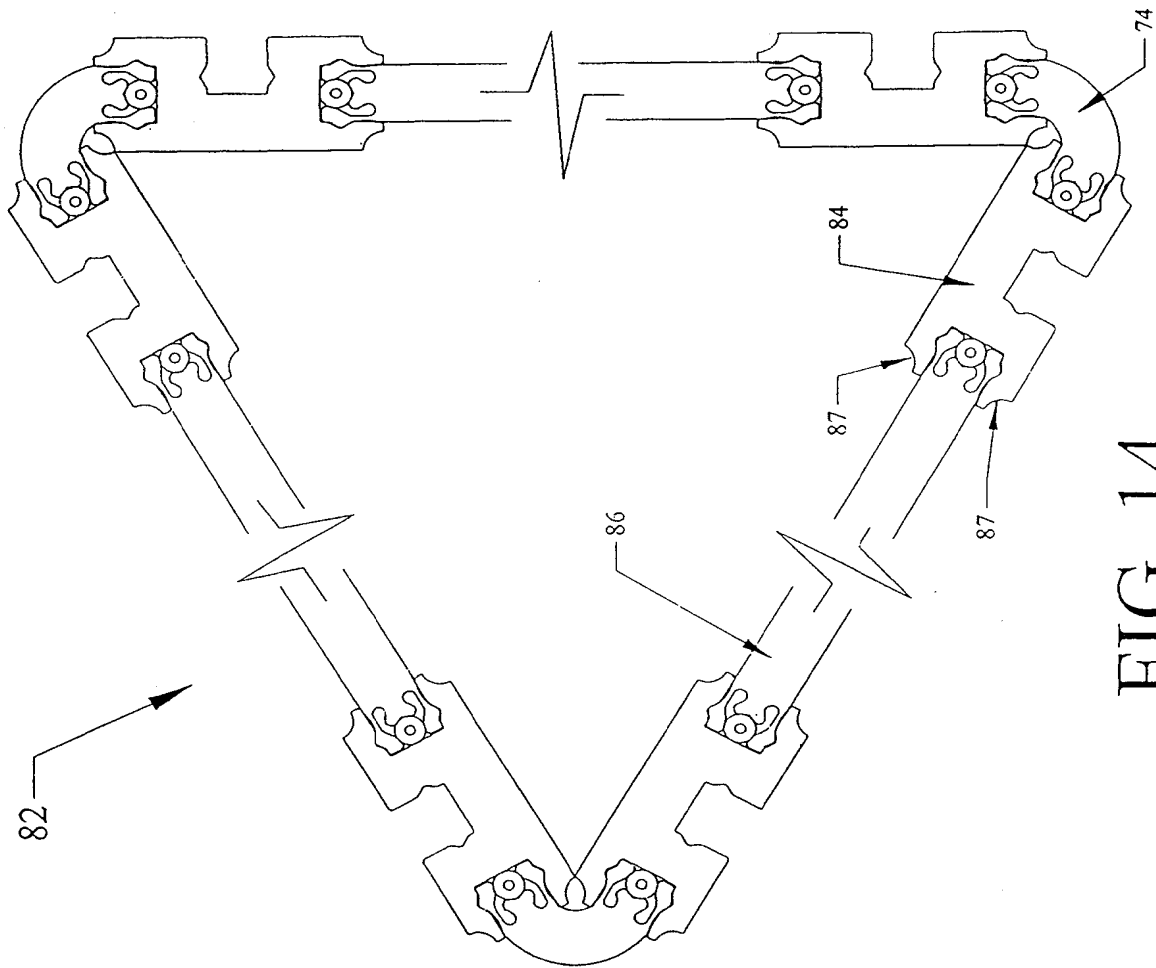


FIG. 14

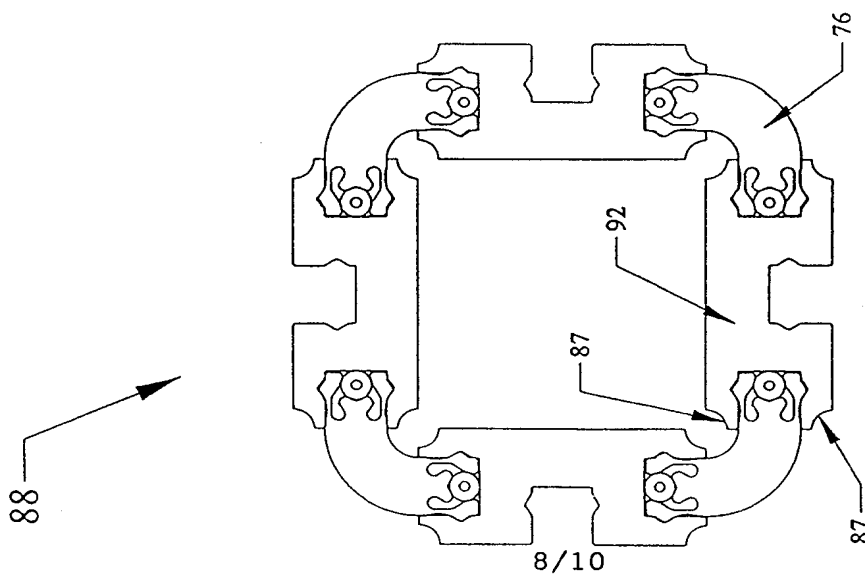


FIG. 15

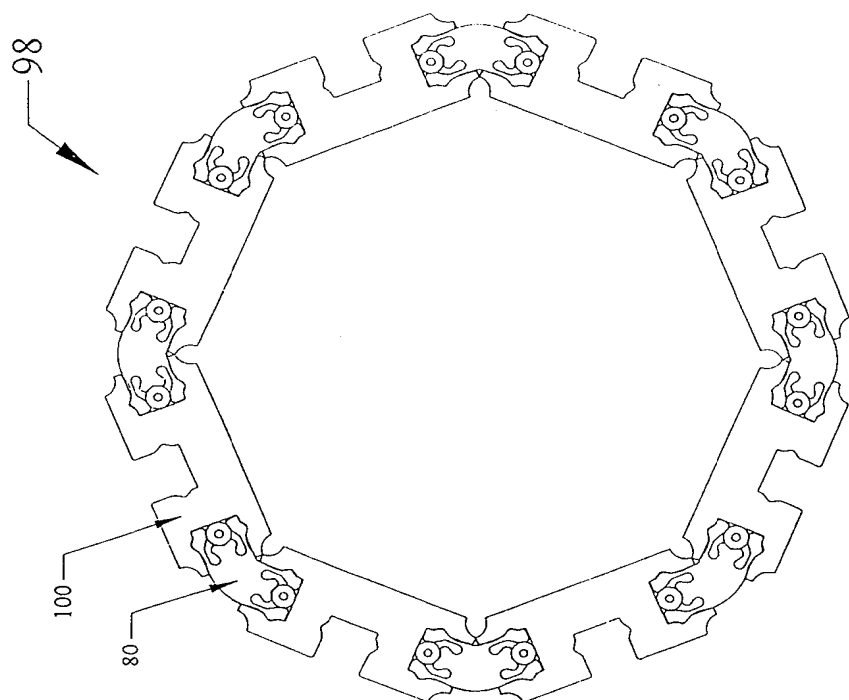


FIG. 17

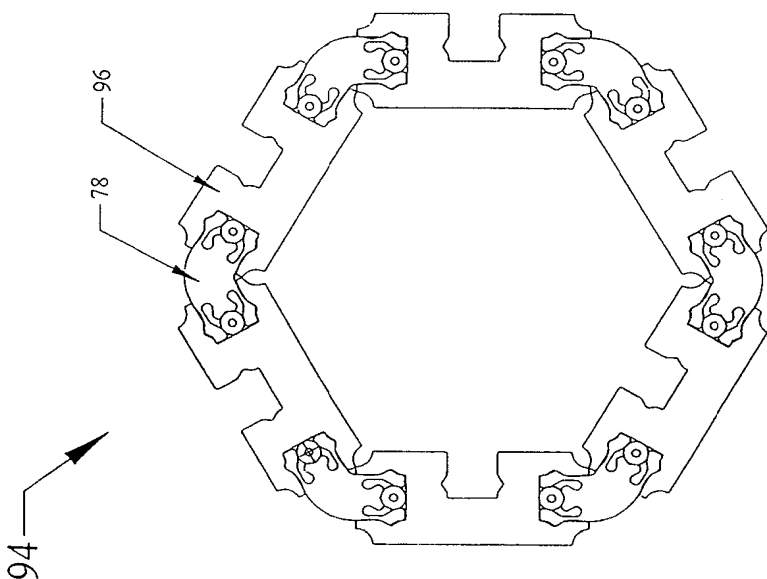


FIG. 16

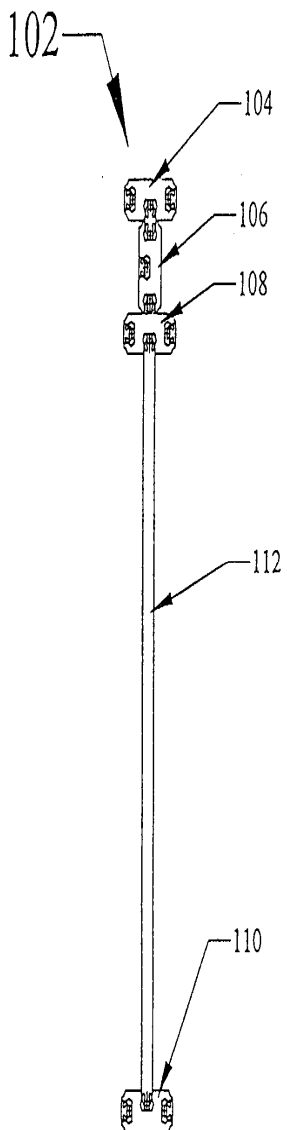


FIG. 18

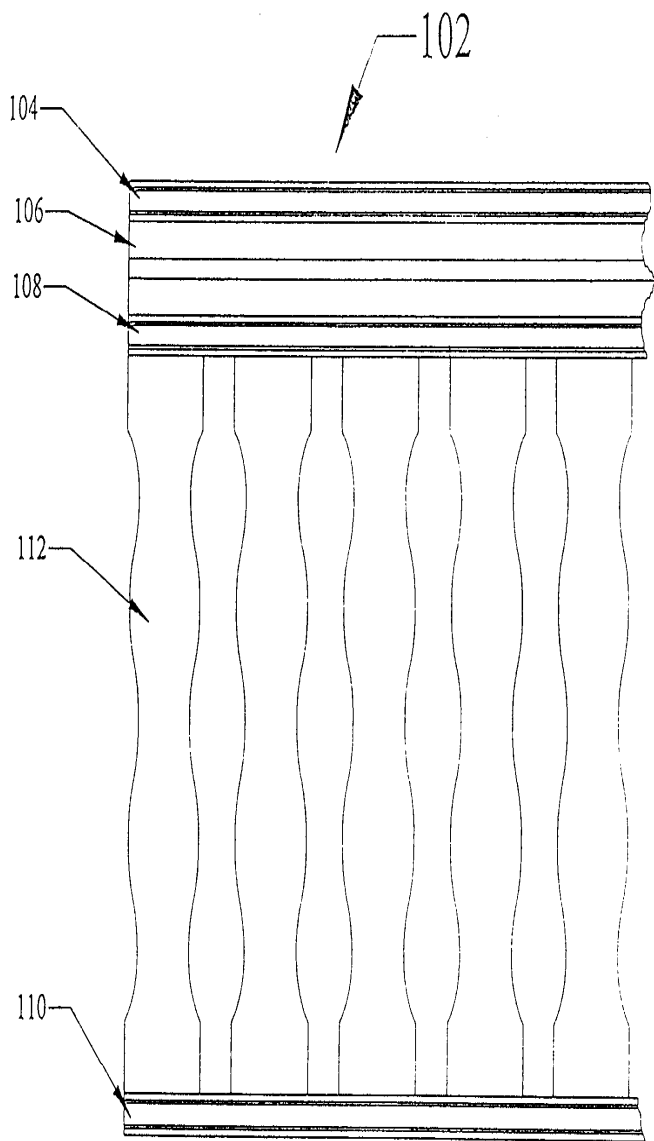


FIG. 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/13831

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : F16B 2/04

US CL : 403/292, 319, 354; 52/586.2

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

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

NONE

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

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,701,066 A (BEAM et al.) 20 OCTOBER 1987 (20/10/87), see entire document.	1-11
A	US 4,599,837 A (WRIGHTMAN) 15 JULY 1986 (15/07/86), see entire document.	1-11
A	US 4,042,307 A (JARVIS) 16 AUGUST 1977 (16/08/77), see entire document.	1-11
A	US 3,760,547 A (BRENNEMAN) 25 SEPTEMBER 1973 (25/09/73), see entire document.	1-11
A	US 3,719,378 A (WINDSOR) 06 MARCH 1973 (06/03/73), see entire document.	1-11
A	US 3,485,519 A (CHIU) 23 DECEMBER 1969 (23/12/69), see entire document.	1-11

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

26 AUGUST 1999

Date of mailing of the international search report

21 OCT 1999

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
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Telephone No.

PrimeSource Building Products, Inc. Exhibit 1002

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/13831

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,452,584 A (JONES) 01 JULY 1969 (01/07/69), see entire document.	1-11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/13831

B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

403/292, 294, 295, 297, 298, 318, 319, 300, 301, 302, 309, 310, 311, 313, 326, 329, 289, 290, 354; 52/586.2, 586.1, 582.1, 590.1, 592.1



Espacenet

Bibliographic data: EP0482363 (A1) — 1992-04-29

Support rail.

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Classification: - **international:** **A47B96/14; F16B12/20; F16B5/06;**
(IPC1-7): A47B96/14; F16B12/20; F16B5/06
- **cooperative:** **A47B96/145; F16B12/20; F16B5/0685**

Application number: EP19910116104 19910921 Global Dossier

Priority number (s): DE19904033703 19901024

Also published as: EP0482363 (B1) AT117519 (T) DE4033703 (A1)
DE4033703 (C2) FR2668644 (A3) more

Abstract of EP0482363 (A1)

The invention relates to a support rail for furniture, having a substantially U-shaped support profile (2) which can be inserted in a groove (3) of a piece of furniture (4) and can be anchored in the groove (3) with the aid of anchoring projections (7) provided on anchoring limbs (5) of the support profile (2) and facing the groove side faces (6), it being possible for the support profile (2) to be plugged with its anchoring limbs (5) onto a narrower holding profile (8), overlapping said holding profile, which can be arranged in the groove (3), whilst spreading the anchoring limbs (5) apart.

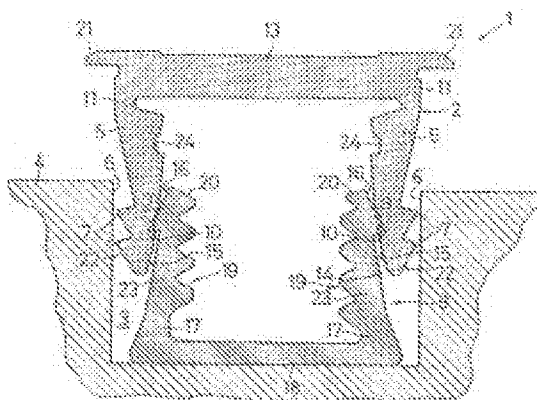


FIG. 1

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Veröffentlichungsnummer: **0 482 363 A1**

(12)

EUROPÄISCHE PATENTANMELDUNG

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(51) Int. Cl.⁵: **A47B 96/14**, F16B 12/20,
F16B 5/06

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(54) Trägerschiene.

(57) Die Erfindung bezieht sich auf eine Trägerschiene für Möbel mit einem im wesentlichen U-förmigen Trägerprofil (2), welches in eine Nut (3) eines Möbelteils (4) einsetzbar und mit Hilfe von an Verankerungsschenkeln (5) des Trägerprofils (2) vorgesehenen, den Nutseitenflächen (16) zugewandten Verankerungsvorsprüngen (7) in der Nut (3) verankerbar ist, wobei das Trägerprofil (2) mit seinen Verankerungsschenkeln (5) auf ein in der Nut (3) anordenbares schmaleres Halteprofil (8), dieses übergreifend, unter Aufspreizung der Verankerungsschenkel (5) aufsteckbar ist.

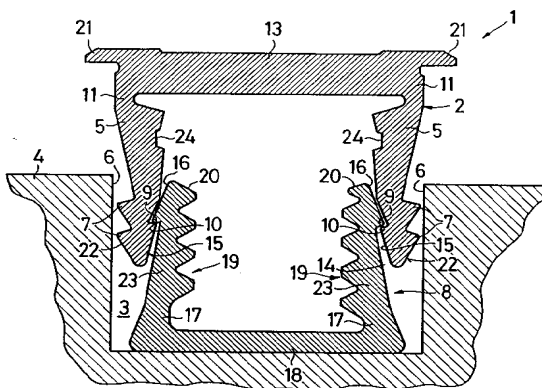


FIG. 1

EP 0 482 363 A1

Die Erfindung betrifft eine Trägerschiene für Möbel, insbesondere gelochte Bodenträgerschiene für Büromöbel, mit einem im wesentlichen U-förmigen Trägerprofil, welches in eine Nut eines Möbelteils einsetzbar ist und mit Hilfe von an Verankerungsschenkeln des Trägerprofils vorgesehenen, den Nutseitenflächen zugewandten Verankerungsvorsprüngen in der Nut verankerbar ist.

Bekannte Trägerschienen dieser Art bestehen aus einem solchen einzigen im wesentlichen U-förmigen Trägerprofil, dessen Verankerungsschenkel einen äußeren Abstand haben, welcher im wesentlichen der lichten Breite der für sie bestimmten Nut des Möbelteils entspricht, d.h. vor und nach dem Einsetzen das Trägerprofil allenfalls geringfügig geringer ist als die Nutbreite, während die Verankerungsvorsprünge seitlich über diese Breite hinausragen und sich in dem die Nut begrenzenden Material der Nutseitenwände verankern sollen. Beim Einsetzen des Trägerprofils in die Nut wird dadurch zwangsläufig das Möbelteil im Grenzbe-
reich zur Nut beschädigt. Außerdem ist ein derart eingesetztes Trägerprofil nur in begrenzter Weise belastbar.

Aufgabe der vorliegenden Erfindung ist es, eine Trägerschiene der eingangs genannten Art so auszubilden, daß sie auf einfache Weise und ohne Beschädigung der an die Nut angrenzenden Bereiche des Möbelteils in letztere einsetzbar und in dieser bei Erzielung hoher Tragfähigkeit verankerbar ist.

Diese Aufgabe wird erfindungsgemäß im wesentlichen dadurch gelöst, daß das Trägerprofil mit seinen Verankerungsschenkeln auf ein in der Nut angeordnetes schmaleres Halteprofil, dieses übergreifend, unter Aufspreizung der Verankerungsschenkel aufsteckbar ist.

Bei der erfindungsgemäßen Tragschiene kann dabei im Ausgangszustand der Außenabstand der Verankerungsvorsprünge - anders als bei Stand der Technik - geringer sein als die lichte Breite der Nut, in welcher das Trägerprofil verankert werden soll. Zur Festlegung der Trägerschiene kann zunächst das Halteprofil, welches noch schmalere als das Trägerprofil ist, problemlos in die Nut eingelegt werden. Dann wird das U-profilförmige Trägerprofil auf das Halteprofil gesteckt und so weit in die Nut eingedrückt, bis es mit der Außenseite des Möbelteils fluchtet bzw. an dem Möbelteil oder dem Halteprofil anschlägt. Während des Aufsteckens des Trägerprofils auf das Halteprofil bis in seine gewünschte Endstellung werden die Verankerungsschenkel des Trägerprofils seitlich so aufgespreizt, daß, allerdings jetzt im Abstand von der Außenseite des Möbelteils, die Verankerungsvorsprünge in dem die Nut seitlich begrenzenden Material des Möbelteils verankert werden. Hierdurch wird ein besonders fester Sitz dadurch erzielt, daß die Ver-

ankerungsschenkel auch bei Beanspruchung nicht mehr nach innen elastisch ausweichen können, weil sie sich nach innen auf dem Halteprofil abstützen. Hierdurch wird also ein außerordentlich fester und dauerhafter Sitz bei beschädigungsfreiem Einsetzen gewährleistet.

Die Verankerungsschenkel können in Ausgestaltung dieses Erfindungsgedankens auf ihren einander zugewandten Seiten Rastmittel, z.B. Rastvertiefungen, für ein Zusammenwirken mit Gegenrastmitteln, z.B. Rastvorsprüngen, an den nach außen weisenden Seiten des Trägerprofils in einer Vorraststellung zwischen Trägerprofil und Halteprofil aufweisen. Hierdurch lassen sich Trägerprofil und Halteprofil zu einer vormontierten Einheit zusammenfügen, die dann als Ganzes, mit dem Halteprofil zum Nutgrund weisend in die Nut einsetzbar ist, wonach erst das Trägerprofil in seine Endstellung auf das Halteprofil vollständig aufgedrückt wird. In der Vorraststellung zwischen Trägerprofil und Halteprofil sind die Verankerungsschenkel des Trägerprofils vorzugsweise überhaupt noch nicht gegenüber der selbständigen Ausgangslage des Trägerprofils seitlich aufgespreizt oder nur so wenig, daß auch für diesen Fall der vormontierten Einheit aus Trägerprofil und Halteprofil diese Einheit zunächst beschädigungsfrei in die Nut eingelegt werden kann, bevor ein weiteres Aufdrücken des Trägerprofils auf das Halteprofil unter Aufspreizung der Verankerungsschenkel und damit die Verankerung in der Nut stattfindet. Hierdurch wird die Montage wesentlich vereinfacht, da das Halteprofil nicht mehr selbständig zentriert in die Nut eingelegt zu werden braucht, bevor die Festlegung des Trägerprofils in der Nut erfolgt.

In weiterer Ausgestaltung der Erfindung wird ferner gelehrt, daß die Verankerungsschenkel über eine Schwächungszone mit einem, ggf. Befestigungslöcher im Rasterabstand aufweisenden Verbindungsabschnitt des Trägerprofils verbunden sind. Auf diese Weise wird das Aufdrücken des Trägerprofils bis in seine in der Nut verrasteten Endstellung erleichtert, weil für das Aufspreizen der Verankerungsschenkel nur ein geringerer Kraftaufwand erforderlich ist.

Ein weiteres Merkmal der Erfindung besteht darin, daß die Verankerungsschenkel auf ihren einander zugewandten Seiten oder das Halteprofil auf seinen voneinander abgewandten Seiten Vertiefungen für die Aufnahme der als Rastvorsprünge ausgebildeten Rastmittel der auf voneinander abgewandten Seiten des Halteprofils oder an den Verankerungsschenkeln des Trägerprofils in der Endstellung des Trägerprofils relativ zu dem Halteprofil aufweisen. Hierdurch wird erreicht, daß die der Vorraststellung dienenden Rastvorsprünge, welche relativ nahe am äußeren Ende der Seitenflächen des Halteprofils vorgesehen sein müssen, um eine

Vorraststellung zu sichern, das Überführen des Trägerprofils in dessen Endstellung auf dem Halteelement nicht behindern.

Ein Aufstecken des Trägerprofils auf das Halteprofil wird dann weiter erleichtert, wenn die einander zugewandten Seiten der Verankerungsschenkel des Trägerprofils zumindest in ihrem an die Öffnung des Trägerprofils angrenzenden Bereich sich zur Öffnung hin konisch aufweitend zueinander geneigt verlaufen. Auf diese Weise werden nämlich die Verankerungsschenkel erst in der letzten Phase des Aufdrückens des Trägerprofils auf das Halteprofil aufgespreizt, so daß sich die Verankerungsvorsprünge relativ dicht am Nutgrund seitlich in dem die Nut begrenzenden Material des Möbelteils eindrücken und verankern.

Diesem Ziel kann auch die Maßnahme dienen, daß die nach außen weisenden Seiten des Halteprofils zumindest in mit den Verankerungsschenkeln des Trägerprofils zusammenwirkenden Bereichen sich zur Aufsteckseite hin konisch verjüngend zueinander geneigt verlaufen.

Das Überstülpen des Trägerprofils über das Halteprofil wird dadurch vereinfacht, wenn die Verankerungsschenkel an ihren Enden innenseitige Einführungsschrägen aufweisen.

Zur Förderung dieses Ziels kann auch das Halteprofil auf dem auf der Aufsteckseite liegenden außenseitigen Ende Einführungsschrägen aufweisen.

Der Aufspreizvorgang kann beim Aufstecken des Trägerprofils auf das Halteprofil dadurch beeinflußt werden, daß die nach außen weisenden Seiten des Halteprofils von der Aufsteckseite aus gesehen in einem mittleren Bereich unter geringerer Schräge verlaufen als in einem nutgrundseitigen Endbereich. Auf diese Weise werden beim Aufdrücken des Trägerprofils auf das Halteprofil die Verankerungsschenkel zunächst nur allmählich und erst in der Endphase stark aufgespreizt.

Auch können die Halteschenkel über einen Schwächungsbereich mit einem nutbodenseitigen Basisabschnitt verbunden sein. Hierdurch können die Halteschenkel beim Aufstecken des Trägerprofils zum Ausgleich von Maßtoleranzen, falls dies erwünscht ist, geringfügig elastisch nach innen ausweichen.

Wenn die einander zugewandten Seiten der Halteschenkel des Halteelements mit einer Zahnung für die Aufnahme eines Gewindebolzens ausgestattet sind, können z.B. im Abstand der in dem Trägerprofil vorgesehenen Befestigungslöchern Gewindebolzen, bspw. Schrankböden oder Schrankbodenträger in die Trägerschiene eingeschraubt werden. Da hierdurch die Halteschenkel des Halteprofils zusätzlich nach außen verspannt

werden, erhält die Trägerschiene mit dem Einschrauben derartiger Gewindebolzen einen noch festeren Sitz in der Nut.

Die Halteschenkel können ferner an ihrem aufsteckseitigen Ende innenseitige Einführungsschrägen aufweisen, wodurch das Einsetzen von Gewindebolzen erleichtert wird.

Einführungsschrägen können darüber hinaus auch an den nutgrundseitigen Enden der Verankerungsschenkel außenseitig vorgesehen sein, so daß das anfängliche Einführen des Trägerprofils in die Nut oder der Einheit aus Trägerprofil und Halteprofil erleichtert wird.

Nachteilig ist, daß die Ränder der Nuten für das Einsetzen von Trägerschienen insbesondere bei weichem Material der Möbelteile, wie z.B. bei Preßspanplatten, ungleichmäßig aussehen. Diese Ränder können bei einer erfindungsgemäßen Trägerschiene dadurch einfach abgedeckt werden, daß der Verbindungsabschnitt des Trägerprofils über die Verbindungsstellen der Verankerungsschenkel und damit auch über die Nut seitlich hinausragende Abdeckflansche aufweist, welche auch als Anschlag des Trägerprofils beim Aufstecken desselben auf das Halteprofil dienen können, so daß das Trägerprofil überall gleichmäßig tief in die Nut eingefügt und darin verankert ist.

Weitere Ziele, Merkmale, Vorteile und Anwendungsmöglichkeiten der vorliegenden Erfindung ergeben sich aus der nachfolgenden Beschreibung von Ausführungsbeispielen anhand der Zeichnung. Dabei bilden alle beschriebenen und/oder bildlich dargestellten Merkmale für sich oder in beliebiger sinnvoller Kombination den Gegenstand der Erfindung, auch unabhängig von ihrer Zusammenfassung in den Ansprüchen oder deren Rückbeziehung.

Es zeigen:

Fig. 1 im Querschnitt eine die Erfindung aufweisende Trägerschiene in vorverrasteter Stellung einer Einheit aus Trägerprofil und Halteprofil, welche bereits in eine Nut eines Möbelteils eingefügt worden ist, und

Fig. 2 im Schnitt eine erfindungsgemäße Trägerschiene gemäß einem anderen Ausführungsbeispiel, wobei das Trägerprofil bereits vollständig auf das Halteprofil aufgedrückt und somit die Trägerschiene in der Nut des Möbelstücks verankert worden ist.

Die für Möbel, insbesondere Büromöbel bestimmte Trägerschiene 1 weist ein im wesentlichen U-förmiges Trägerprofil 2 auf, welches in einer Nut 3 eines Möbelteils 4 verankert werden soll. Zu diesem Zweck sind an Verankerungsschenkeln 5 des Trägerprofils 2 den Nutseitenflächen 6 zugewandte Verankerungsvorsprünge 7 vorgesehen.

Das Trägerprofil 2 ist mit seinen Verankerungsschenkeln 5 auf ein in der Nut 3 befindliches schmales Halteprofil 8, dieses übergreifend, aufsteckbar. Die lichte Weite der Verankerungsschenkel 5 und der Abstand der Außenseiten des Halteprofils 8 sind dabei so bemessen und gestaltet, daß beim Aufstecken des Trägerprofils 2 auf das Halteprofil 8 die Verankerungsschenkel 5 derart aus der aus Fig. 1 ersichtlichen Ausgangsstellung in die aus Fig. 2 ersichtliche Verankerungsstellung aufspreizbar sind. Wie aus Fig. 1 ersichtlich, ist der maximale Abstand der Außenseiten der Verankerungsschenkel 5 einschließlich deren Verankerungsvorsprünge 7 in der Ausgangsstellung geringer ist als die lichte Weite der Nut 3, in welcher die Trägerschiene 1 verankert werden soll. Erst in der aufgespreizten Verankerungsstellung greifen die Verankerungsschenkel 5 mit ihren Verankerungsvorsprüngen 7 in das die Nut 3 seitlich begrenzende Material des Möbelteils 4 zur Verankerung ein.

Aus Fig. 1 ist auch ersichtlich, daß die Verankerungsschenkel 5 auf ihren einander zugewandten Seiten Rastmittel 9, im dargestellten Falle Rastvertiefungen, für ein Zusammenwirken mit Gegenrastmitteln 10, im dargestellten Falle Rastvorsprüngen, an nach außen weisenden Seiten des Halteprofils 8 in einer Vorraststellung zwischen Trägerprofil 2 und Halteprofil 8 aufweisen. Trägerprofil 1 und Halteprofil 8 bilden in dieser Form eine vormontierte Einheit, welche als solche in die Nut 3, wie aus Fig. 1 ersichtlich, eingelegt werden kann. Erst aus dieser Stellung heraus erfolgt das vollständige Aufdrücken des Trägerprofils 1 auf das Halteprofil 8 in die verrastete Endstellung, wie sie aus Fig. 2 ersichtlich ist.

Die Verankerungsschenkel 5 sind je über eine Schwächungszone 11 mit einem Verbindungsabschnitt 13 des Trägerprofils 2 verbunden, wobei in dem Verbindungsabschnitt 13, in Fig. 1 nicht dargestellt, in Fig. 2 dargestellt, im Rasterabstand Befestigungslöcher 12 vorgesehen sein können. Aufgrund der Schwächungszone 11 können die Verankerungsschenkel 5 beim Aufdrücken auf das Halteprofil 8 leicht nach außen aufgespreizt werden, während sie vorher einen hinreichenden Spannsitz des Trägerprofils 2 auf dem Halteprofil 8 gewährleisten.

Wie aus den Fig. 1 und 2 gleichermaßen ersichtlich, weisen die Verankerungsschenkel 5 auf ihren einander zugewandten Seiten in der Nähe des Verbindungsabschnitts 13 Vertiefungen 24 auf, welche der Aufnahme der als Rastvorsprünge ausgebildeten Rastmitteln 9 in der Endstellung des Trägerprofils 2 auf dem Halteprofil 8 dienen. Hierdurch wird verhindert, daß sich die Verankerungsschenkel 5 in der Nähe des Verbindungsabschnitts 13 zu stark aufspreizen.

Wie ebenfalls aus den Fig. 1 und 2 ersichtlich, sind die einander zugewandten Seiten der Verankerungsschenkel 5 des Trägerprofils 2 zumindest in ihrem an die Öffnung 14 des Trägerprofils 2 angrenzenden Bereich sich zur Öffnung 14 hin konisch aufweitend zueinander geneigt. Ebenso sind die nach außen weisenden Seiten des Halteprofils 8 zumindest in mit den Verankerungsschenkeln 5 des Trägerprofils 2 zusammenwirkenden Bereichen sich zur Aufsteckseite hin konisch verjüngend zueinander geneigt. Hierdurch ist ein Aufstülpen des Trägerprofils 2 auf das Halteprofil 8 ohne zu frühes Aufspreizen der Verankerungsschenkel 5 möglich. Dies soll nämlich in der Weise erfolgen, daß die äußeren Verankerungsvorsprünge 7 erst möglichst dicht am Nutgrund in den die Nut 3 seitlich begrenzenden Materialbereichen des Möbelteils 4 eingreifen. Zu diesem Zweck ist bspw. auch vorgesehen, daß die nach außen weisenden Seiten des Halteprofils 8 von der Aufsteckseite aus gesehen in einem mittleren Bereich unter geringerer Schräge verlaufen als in einem nutgrundseitigen Endbereich.

Die Verankerungsschenkel 5 weisen an ihren freien Enden innenseitige Einführungsschrägen 15 zur Erleichterung des Ansteckens an das Halteprofil 8 auf. Zum gleichen Zweck hat das Halteprofil 8 an dem auf der Aufsteckseite liegenden außenseitigen Ende Einführungsschrägen 16.

Bei beiden in den Fig. 1 und 2 dargestellten Ausführungsbeispielen ist das Halteprofil 8, wie das Trägerprofil 2, als U-Profil ausgebildet, und zwar mit aufsteckseitigen Halteschenkeln 23. Auch die Halteschenkel 23 können über einen Schwächungsbereich 17 mit einem nutbodenseitigen Basisabschnitt 18 verbunden sein, um beim Aufstecken des Trägerprofils 2 um ein gewisses Maß elastisch auszuweichen, jedoch noch das erforderliche Widerlager für die Verankerungsschenkel 5 in der Verankerungsstellung bieten zu können.

In beiden in Fig. 1 und 2 dargestellten Ausführungsbeispielen tragen die Halteschenkel 23 auf ihren einander zugewandten Seiten eine Zahnung 19, in welche ein nicht dargestellter Gewindebolzen eingeschraubt werden kann. Auf diese Weise wird die Trägerschiene 1 mit dem Einschrauben von Gewindebolzen noch zuverlässiger in der Nut 3 festgelegt, da sich die Verankerung der Verankerungsvorsprünge 7 aus den Seitenwänden der Nut 3 nicht mehr lösen können. Ein Ausweichen der Verankerungsschenkel 5 nach innen ist auf diese Weise nämlich verhindert. Um die Einführung von Gewindebolzen zu erleichtern, weisen die Halteschenkel 23 an ihrem aufsteckseitigen Ende innen-seitig Einführungsschrägen 20 auf. Auch die Verankerungsschenkel 5 können außenseitig an ihren freien Enden Einführungsschrägen 22 aufweisen,

um das Einführen der Trägerschiene 1 alleine oder der Einheit aus Trägerschiene 1 und Halteschiene 8 in die Nut 3 zu erleichtern.

Bei den in den Fig. 1 und 2 veranschaulichten beiden Ausführungsformen weisen die Verbindungsabschnitte 13 des Trägerprofils 2 ferner über die Verbindungsstellen der Verankerungsschenkel 5 seitlich hinausragende Abdeckflansche 21 auf, welche damit unregelmäßige oder beschädigte Nutränder überdecken. Am jeweiligen inneren Übergang vom Abdeckflansch 21 zum Verankerungsschenkel 5 ist ferner eine Auskehlung 25 zur Aufnahme von überschüssigem Nutkantenmaterial vorgesehen, so daß das Trägerprofil 2 jeweils einen gleichmäßig tiefen Sitz an der Oberfläche des Möbelteils 4 findet.

Bezugszeichenliste:

1	Trägerschiene
2	Trägerprofil
3	Nut
4	Möbelteil
5	Verankerungsschenkel
6	Nutseitenflächen
7	Verankerungsvorsprünge
8	Halteprofile
9	Rastmittel
11	Schwächungszone
12	Befestigungslöcher
13	Verbindungsabschnitt
14	Öffnung
15	Einführungsschrägen
16	Einführungsschrägen
17	Schwächungsbereich
18	Basisabschnitt
19	Zahnung
20	Einführungsschrägen
21	Abdeckflansche
22	Einführungsschrägen
23	Halteschenkel
24	Vertiefungen
25	Auskehlung

Patentansprüche

1. Trägerschiene für Möbel, insbesondere gelochte Bodenträgerschiene für Büromöbel, mit einem im wesentlichen U-förmigen Trägerprofil (2), welches in eine Nut (3) eines Möbelteils (4) einsetzbar und mit Hilfe von an Verankerungsschenkeln (5) des Trägerprofils (2) vorgesehenen, den Nutseitenflächen (6) zugewandten Verankerungsvorsprüngen (7) in der Nut (3) verankerbar ist, dadurch gekennzeichnet, daß das Trägerprofil (2) mit seinen Verankerungsschenkeln (5) auf ein in der Nut (3) anor-

denbares schmaleres Halteprofil (8), dieses übergreifend, unter Aufspreizung der Verankerungsschenkel (5) aufsteckbar ist.

2. Trägerschiene nach Anspruch 1, dadurch gekennzeichnet, daß die Verankerungsschenkel (5) auf ihren einander zugewandten Seiten Rastmittel (9) für ein Zusammenwirken mit Gegenrastmitteln (10) an nach außen weisenden Seiten des Halteprofils (8) in einer Vorraststellung zwischen Trägerprofil (3) und Halteprofil (8) aufweisen.
3. Trägerschiene nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Verankerungsschenkel (5) über eine Schwächungszone (11) mit einem, ggf. Befestigungslöcher (12) im Rasterabstand aufweisenden Verbindungsabschnitt (13) des Trägerprofils (2) verbunden sind.
4. Trägerschiene nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Verankerungsschenkel (5) auf ihren einander zugewandten Seiten oder das Halteprofil (8) auf seinen voneinander abgewandten Seiten Vertiefungen (22) für die Aufnahme der als Rastvorsprünge ausgebildeten Rastmittel (9) der aufeinander abgewandten Seiten des Halteprofils (8) oder an den Verankerungsschenkeln (5) des Trägerprofils (2) in der relativen Endstellung von Trägerprofil (2) und Halteprofil (8) aufweisen.
5. Trägerschiene nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die einander zugewandten Seiten der Verankerungsschenkel (5) des Trägerprofils (2) zumindest in ihrem an die Öffnung (14) des Trägerprofils (2) angrenzenden Bereich sich zur Öffnung (14) hin konisch aufweitend zueinander geneigt verlaufen.
6. Trägerschiene nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß die nach außen weisenden Seiten des Halteprofils (8) zumindest in mit den Verankerungsschenkeln (5) des Trägerprofils (2) zusammenwirkenden Bereichen sich zur Aufsteckseite hin konisch verjüngend zueinander geneigt verlaufen.
7. Trägerschiene nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Verankerungsschenkel (5) an ihren Enden innenseitige Einführungsschrägen (15) aufweisen.

8. Trägerschiene nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß das Halteprofil (8) an den auf der Aufsteckseite liegenden Ende außenseitige Einführungsschrägen (16) aufweist. 5
9. Trägerschiene nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß die nach außen weisenden Seiten des Halteprofils (8) von der Aufsteckseite aus gesehen zunächst in einem mittleren Bereich unter geringerer Schräge verlaufen als in einem nutgrundseitigen Endbereich. 10
10. Trägerschiene nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß das Halteprofil (8) als U-Profil ausgebildet ist mit aufsteckseitigen Halteschenkeln (16). 15
11. Trägerschiene nach Anspruch 10, dadurch gekennzeichnet, daß die Halteschenkel (16) über einen Schwächungsbereich (17) mit einem nutbodenseitigen Basisabschnitt (18) verbunden sind. 20
12. Trägerschiene nach Anspruch 10 oder 11, dadurch gekennzeichnet, daß die einander zugewandten Seiten der Halteschenkel (16) des Halteelements (8) mit einer Zahnung (19) für die Aufnahme eines Gewindebolzens ausgestattet sind. 25
13. Trägerschiene nach einem der Ansprüche 10 bis 12, dadurch gekennzeichnet, daß die Halteschenkel (16) an ihrem aufsteckseitigen Ende innenseitige Einführungsschrägen (20) aufweisen. 30
14. Trägerschiene nach einem der Ansprüche 1 bis 13, dadurch gekennzeichnet, daß der Verbindungsabschnitt (13) des Trägerprofils (2) über die Verbindungsstellen der Verankerungsschenkel (5) seitlich hinausragende Abdeckflansche (21) aufweist. 40

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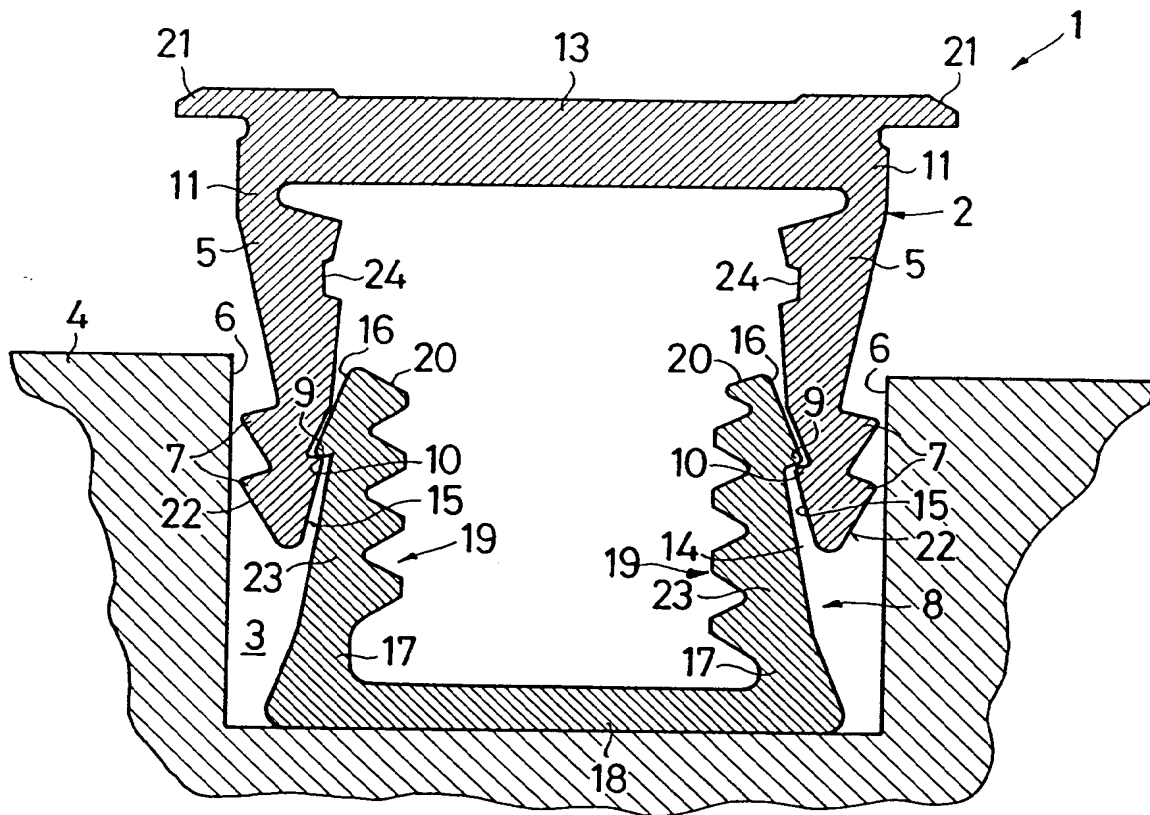


FIG. 1

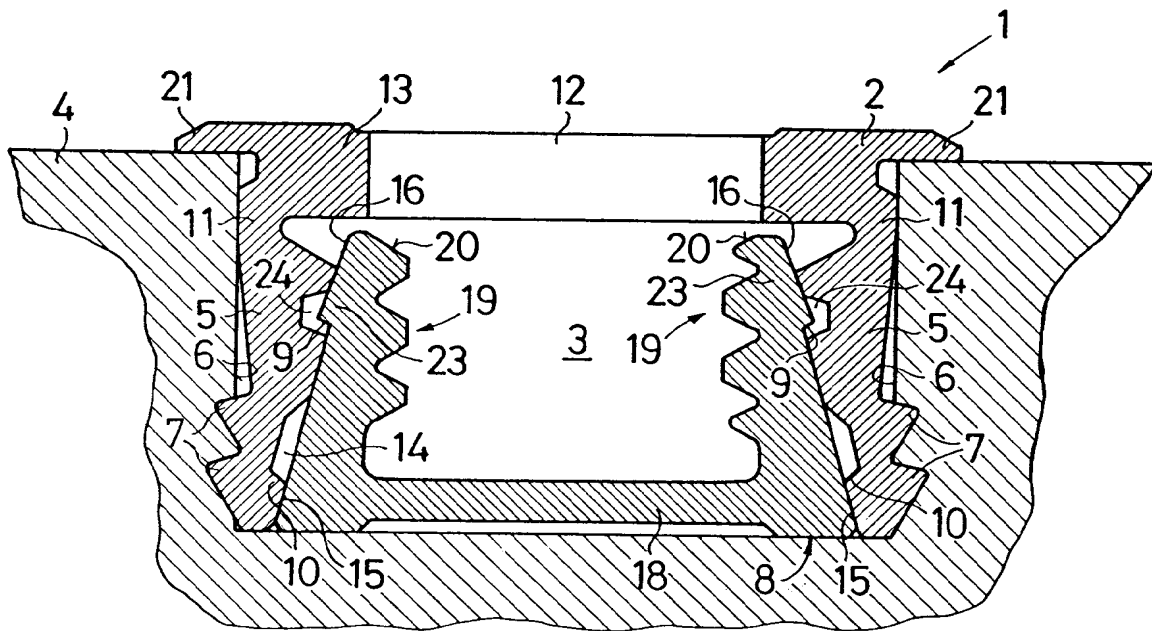


FIG. 2



EINSCHLÄGIGE DOKUMENTE			
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int. Cl.5)
A	FR-A-2 263 410 (MONIN) * Seite 1 - Seite 2; Abbildungen ** - - -	1	A 47 B 96/14 F 16 B 12/20 F 16 B 5/06
A	US-A-3 760 547 (BRENNEMAN) * Abbildungen 18,21 ** - - -	1	
A	DE-A-1 654 593 (KELLER) - - - - -		
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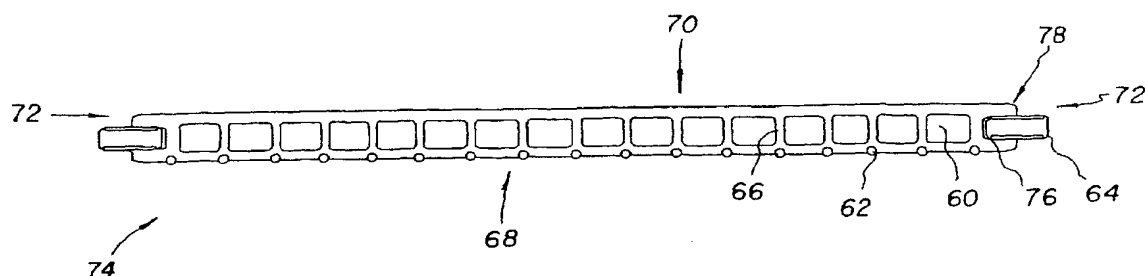
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(54) Title: CONNECTING SYSTEM FOR SURFACE COVERINGS



(57) Abstract: A spline, tongue, connector, or snap connector is described and useful for connecting a variety of surface covering products together. In one embodiment the spline is a polymeric material having an elongated shape and dimensions such that the spline has a sufficient width to fit into and extend outside of a groove in a side edge of a first plank and to fit into a respective groove in a side edge of a second plank. The spline may be concealed from view when the first plank and the second plank are connected together by the spline. A surface covering system for connecting two or more planks together is also described as well as methods to connect two or more planks together using the splines of the present invention.

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CONNECTING SYSTEM FOR SURFACE COVERINGS**BACKGROUND OF THE INVENTION**

Commercially available laminate flooring (using high or medium density fiberboard or particle board as the core layer) has gained overwhelming success in the flooring market.

5 The growth rate of the laminate flooring has remained in the double digits since the product was introduced in the United States market. The success of this product is credited to certain properties such as stain resistance, wear resistance, fire resistance, good cleanability, and the ability to use just about any type of printed design. In addition, the overall emission of organic compound vapor is low and the laminate flooring is considered color stable and
10 environmentally friendly over other competing flooring products.

The biggest concern with commercially available laminate flooring is the moisture resistance of the finished product and the sensitivity of the raw materials (high or medium density fiberboard, paper, and particle board) to moisture during the manufacturing process. In some instances, the moisture can lead to some serious quality control issues and
15 application restraints. For instance, and just to name a few, the higher moisture content in the product, such as in the particle board or fiberboard, can cause blistering and adhesion failure of the melamine surface to the core. Also, higher moisture contents can lead to dimensional instability of the finished product, which then results in the cupping or doming of the product, which is extremely undesirable, especially when installers are laying down
20 the flooring. Also, excessive moisture contents can create edge peaking due to the swelling of the product and such edge peaking can result in edge chip-off or premature wear-out or can soil more quickly. The susceptibility to moisture content also leads to some installers not wishing to place such laminate flooring in areas which are subject to having water on the surface of the floor, such as in the kitchen and bathroom areas.

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The suppliers of such laminate flooring have appreciated the problems associated with their products and have attempted to overcome these problems by developing laminate flooring having better moisture resistance by using melamine, phenolic, or isocyanate binders to partially replace urea resins present in the laminate flooring. While this improvement has made the product more moisture resistant, the current commercially available laminate floorings are still prone to moisture damage. For instance, the thickness swelling of laminate flooring can increase by 10% and water absorbency can exceed more than 15% according to the 24 hours water absorption test. Another attempted solution at reducing the moisture resistance weaknesses of current laminate flooring has led some manufactures to apply a water-repellant material on the upper edges of the tongue and groove areas which further serve to resist any moisture penetration through joints. Still another attempted solution involves applying silicone caulk to seal the edges and voids of the laminate perimeter where the laminate flooring meets the wall. However, if very stringent installation instructions are not followed, the laminate flooring will still be subjected to moisture damage.

Accordingly, there is a need to develop flooring systems which overcome the above weaknesses and disadvantages of current commercially available laminate flooring.

SUMMARY OF THE INVENTION

A feature of the present invention is to provide a spline, tongue, connector, snap connector, or other joining system element, herein referred to as a spline, which can be used in a surface covering system and which preferably provides improved moisture resistance and is not susceptible to damage caused by moisture.

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Another feature of the present invention is to provide a spline for laminate planks and other surface coverings which is economically feasible and permits easy installation and flexibility.

Still another feature of the present invention is to provide a surface covering system
5 which has significant improvements with respect to ease of installation and includes a fool-proof installation design and technique.

Another feature of the present invention is to provide a surface covering system which avoids the use of a wet adhesive application method.

Another feature of the present invention is to provide a flooring system that has
10 great flexibility so as to make various shapes, sizes, and bevel edges.

Another feature of the present invention is to provide a flooring system that can alleviate the requirement of installing the plank in a given orientation.

Also, a feature of the present invention is to provide a surface covering system which has the ability to tolerate some imperfections in the sub-floor or substrate and thus
15 avoid telegraphing the imperfections on the surface covering itself.

A further feature of the present invention is to provide a surface covering system which has improved damaged resistance properties, such as improved impact strength and the like, especially in the joint areas.

Additional features and advantages of the present invention will be set forth in the
20 description which follows, and in part will be apparent from the description, or may be learned by practice of the present invention. The features and other advantages of the present invention will be realized and attained by means of the elements and combinations particularly pointed out in the written description and appended claims.

To achieve these and other advantages and in accordance with the purposes of the
25 present invention, as embodied and broadly described herein, the present invention relates

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to a spline, tongue, connector, or snap connector for connecting two or more planks together. The spline is preferably made from a polymeric material and has a shape and dimensions such that the spline has a sufficient width to fit into and extend outside of a groove on a side edge of a first plank and also to fit into a respective groove on a side edge of a second plank. The spline may also be shaped such that when the first plank and the second plank are connected together by the spline, the spline is concealed from view.

The present invention further relates to a surface covering system for connecting two or more planks together. The surface covering system involves two or more planks and at least one spline. The planks each have a groove on at least one side edge and the spline is a polymeric material having a shape and dimensions such that the spline has a sufficient width to fit into and extend outside of a groove on a side edge of a first plank and to fit into a respective groove on a side edge of a second plank. The spline may be concealed from view when the first plank and the second plank are connected together by the spline or may be wide enough to show when the first and second planks are connected together.

The present invention further relates to a plurality of planks connected together by one or more splines. Each plank has a groove on at least one side edge thereof and the spline is a polymeric material having a shape and dimensions such that the spline has a sufficient width to fit into and extend outside of a groove located on the side edge of a first plank and to fit into a respective groove located on a side edge of a second plank. The spline, as described above, may be concealed from view when the first plank and the second plank are connected together by one or more splines.

Finally, the present invention also relates to a method to connect two or more planks together and involves inserting one edge of a spline into a groove in one plank and inserting the opposite edge of the spline into a groove on a second plank. The spline is a polymeric material having a shape and dimensions such that the spline has a sufficient width to fit into

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and extend outside a groove located on a side edge of a first plank and to fit into a respective groove located on a side edge of a second plank. The spline may be concealed from view when the first plank and the second plank are connected together by the spline, or may show through between the planks.

5 It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are intended to provide further explanation of the present invention, as claimed.

The accompanying drawings, which are incorporated in and constitute a part of this application, illustrate several embodiments of the present invention and together with the
10 description serve to explain the principles of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 is a schematic diagram showing one embodiment of a spline of the present invention.

15 Figure 2 is a schematic diagram showing a side view of a spline design of the present invention which can be used to connect planks together.

Figure 3 is a schematic diagram of a sectional view showing another embodiment of a spline of the present invention.

Figure 4 is a schematic diagram illustrating a groove design on a side of a plank
20 according to an embodiment of the present invention showing the groove that locks with a spline of the present invention.

Figures 5 and 6 are schematic diagrams showing additional embodiments of splines of the present invention.

Fig. 7 is an end view of a plank having a spline in each of opposing edge grooves of
25 the plank.

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Fig. 8 is an end view of a substantially rectangular-shaped spline according to an embodiment of the present invention showing various dimensions of the spline in inches (").

Fig. 9 is an end view of a substantially rectangular-shaped spline according to another embodiment of the present invention showing various dimensions of the spline in inches (") and showing angled teeth on the top (right-side) and bottom (left-side) surfaces of the spline.

Fig. 10 is an end view of a substantially rectangular-shaped spline according to another embodiment of the present invention showing various dimensions of the spline in inches (") and protruding beads that extend in the direction of elongation of the spline on both the top and bottom surfaces of the spline.

Fig. 11 is an end view of a substantially rectangular-shaped spline according to another embodiment of the present invention showing various dimensions of the spline in inches (") and showing a recessed portion of the core which accommodates toothed-protrusions.

Fig. 12 is an end view of a substantially rectangular-shaped spline according to yet another embodiment of the present invention showing various dimensions of the spline in inches (") and showing a protruding bead on an otherwise flat top surface of the spline and a protruding bead along with teeth on the bottom surface of the spline.

DETAILED DESCRIPTION OF THE PRESENT INVENTION:

In general, the present invention relates to a spline, tongue, connector, or snap connector for connecting two or more planks together to form a surface covering. Preferably, the surface covering is for flooring surfaces. The spline of the present invention and the surface covering system of the present invention can be used in a variety of

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applications including, but not limited to, wall panels, ceiling panels, decks, patios, furniture surfaces, shelving, and other surface coverings or parts thereof.

The spline of the present invention can be used to connect a variety of surface covering products. Any surface covering product having the ability to be formed or manufactured such that grooves can be created to receive the spline of the present invention can be used as part of this invention to form surface coverings. For instance, laminate floor products can be connected by the spline of the present invention. Other floor products that can be connected together by the spline of the present invention include, but are not limited to: plastic-containing products such as hard surface products where the groove can be formed by extrusion molding, injection molding, and the like; and cellulosic-type products wherein a groove can be machined into the part to receive the spline. Products of dissimilar materials can also be joined using the spline of the present invention.

Besides floor coverings, other surface covering products that can be connected together by the spline of the present invention include, but are not limited to, ceiling tiles, wall paneling, deck paneling, fascia, partition panels, horizontal surfaces, table tops, chest tops, and counter tops.

The surface covering products that are connected together by the spline of the present invention preferably have at least one side edge of the surface covering product having a groove to receive the spline of the present invention. A second surface covering product should also have at least one side that has a groove on the side edge to receive the other edge of the spline in order to connect two or more surface covering products together.

The spline of the present invention preferably is a polymeric material. The polymeric material that the spline is made from is preferably a thermoplastic material although other types of polymers can be used. Examples of polymeric materials that can be used to form the spline include, but are not limited to, polyvinyl chloride, polyvinyl

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chloride/rubber blends, acrylonitrilebutadiene styrene (ABS), polyethyleneterephthalate (PET), polybutyleneterephthalate (PBT), other polyesters, polyolefins, and the like. The spline can be formed by any technique, such as extrusion techniques. A die having the shape of the spline can be extruded through an extruder such as one from American Maplan Corporation, e.g., Model TS-88, which has the ability to process rigid PVC profiles with a maximum output capacity of about 900 pounds/hour, based on a compound bulk density of 37 lb/ft³. The TS-88 is a twin screw extruder which has a barrel heating section as well as a vacuum section. In this preferred extruder, there are 12 temperature zones with 6 for cooling and a temperature control system.

The spline of the present invention can also be formed by other molding techniques or other conventional technology used to form polymeric materials having desired shapes and forms.

The spline is shaped such that it can connect two or more planks together. In particular, the spline has a shape and dimensions such that the spline has a sufficient width to fit into and extend outside of a groove on a side edge of a first plank and to fit into a respective groove on the side edge of a second plank. The spline may be shaped such that the spline is concealed from view when the first and second planks are connected together by the spline, or it may have a wider width such that the spline can be seen when the planks are connected. The spline is preferably rectangular-shaped. The sides of the spline that fit into the grooves of the plank are preferably flanged, toothed, flat, or include a combination of such designs. These types of design on the edges of the spline serve to provide a snug or tight fit within the grooves of the planks, for example, the grooves exemplified in the drawings. Each plank preferably has a groove in two or more side edges of the plank.

According to an exemplary system of the present invention, a system is provided whereby the planks of the system have a flanged or toothed groove on at least one side edge

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thereof. Preferably, the system includes a spline having a flat surface on at least one side edge thereof, and a plank with a groove having teeth that engage the flat surface of the spline.

The spline can optionally have tooth-shaped notches on the top and bottom surfaces that engage the top and bottom surfaces of the grooves in the plank in order to also create a snug and tight fit. The spline can have a combination of toothed, flanged, protruding, beaded, and/or flat portions on the top and/or bottom surfaces. The width of the spline and thickness of the spline are based on the depth and height of the grooves in the planks for which the spline is used to connect two or more planks together. Depending on the product that the spline is connecting, the spline can be made to match the grooves for a snug and tight fit. For instance, the spline can have a thickness of from about 0.1 inch to about 0.2 inch and a width of from about 0.4 inch to about 0.6 inch in order to fit into a groove in the side of a plank having a depth of from about 0.2 inch to about 0.3 inch and a groove height of from about 0.1 inch to about 0.2 inch. More specifically, the spline can have a thickness of from about 0.153 inch to about 0.156 inch and a width of from about 0.485 inch to about 0.490 inch in order to fit into a groove in the side of a plank having a depth of from about 0.250 inch to about 0.280 inch and a groove height of from about 0.145 inch to about 0.151 inch.

As stated above, the spline preferably has a sufficient width such that the spline is able to adequately connect two or more planks together by inserting the spline into a groove of one plank and then into a groove of a second plank. When the two planks are connected together, the spline is preferably and entirely concealed from the visual surface of the surface covering. Tolerance considerations should be taken into account such that preferably the maximum contact between the groove and the top and bottom spline surfaces is maintained but preferably narrow enough to be less than the combined groove depth of

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adjacent planks grooves to be joined together so that the top surfaces of the planks will hide the spline. According to an alternative embodiment of the present invention, the combined depth of the adjacent planks is not sufficient to conceal the entire spline such that some of the spline can be seen when the planks are connected together.

5 In a preferred embodiment, the spline is preferably a co-extruded material and more preferably is a co-extruded material made from a rigid thermoplastic material in the central portion of the spline and a soft thermoplastic material at the top and bottom surfaces of the spline, wherein the softer material engages the grooves of two or more planks. The soft thermoplastic material is preferably polyvinyl chloride or a blend of polyvinyl chloride and
10 nitrile rubber. This soft thermoplastic material has the ability to be more flexible and thus create a tighter fit when engaging the grooves of the planks, and allows a higher tolerance to fit. In the case of appropriately soft teeth, a spline thickness of from about 3 mil to about 38 mil greater than the groove height can be tolerated. A rigid central portion of the spline is preferably provided and enables rigidity and strength needed in order for the spline to be
15 handled and inserted into the grooves of the planks.

The spline can be any length such as from about 4 feet to about 9 feet, for example, from about 55 inches to about 75 inches, and more preferably from about 6 feet to about 8 feet long. Preferably, the length of the spline exceeds the length of the planks to be joined. For example, a plurality of splines, each having a length of about 7 feet, is preferably used
20 to join a plurality of planks, each having a length of about 6 feet.

In addition, while not necessary, the spline can further have an adhesive or bonding agent applied to the surfaces that engage the grooves of the planks in order to create an even stronger connection between the planks and splines. Such adhesives that can be used include, but are not limited to, solvent welds which fuse the spline/plank interface by
25 partially dissolving and swelling the spline and plank at their interface, epoxies, urethanes,

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and other cross-linking adhesives. Preferably, the adhesive or adhesive system provides a water-impervious bond, and preferable adhesives of this type include solvent welding or crosslinkable adhesives.

For purposes of the present invention, the term "plank" is used throughout and includes, but is not limited to, flooring planks, laminate flooring planks, floor tiles, laminate floor tiles, deck paneling, fascia, partition panels, horizontal surfaces, table tops, chest tops, and counter tops.

The remaining sides of the planks can also have grooves. For instance, the planks can have a groove on two or more sides of the edges of the plank, wherein the sides or edges are opposite to each other. The plank preferably has grooves on at least one side edge thereof and preferably on at least opposing sides. The remaining edges or sides of the plank can also have grooves or they may include tongues or can have no grooves or tongues whatsoever.

Though not necessary, the ends of the plank as well as the tongue and/or groove can have a bonding agent applied to these locations in order to seal or bond the planks together.

In the present invention, while each of the laminate planks can be affixed to the sub-floor or substrate, the laminate planks using the connecting system of the present invention can be attached only to each other through the groove and splines such that a floating floor system is provided. This promotes fast and easy laying of the floor system.

With the use of the connecting system of the present invention, the present invention achieves many benefits and advantages, such as moisture resistance.

Also, in the preferred embodiment of the present invention, the installation method used as a result of the splines of the present invention, preferably eliminates the glue needed for tongue and groove connections.

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A full-spread adhesive can be applied between the underside of the planks and the sub-floor surface. This provides the advantages of added dimensional stabilization and sound deadening. Both of these properties would be beneficial in commercial applications.

In addition, the excellent moisture resistance of this surface covering system can
5 eliminate the need for underpadding, though the use of underpadding is an option.

With reference to Fig. 1, Fig. 1 represents a schematic diagram of an end view of one embodiment of the plank with a spline. Fig. 1 is a perspective view looking at the front edge of the plank wherein the groove 76 would run along each longitudinal edge 72 of the plank. The spline 64 is inserted along the length of each groove 76. The plank edge 72 has
10 the groove 76. Also labeled are the plank bottom surface 68 and top surface 70.

Referring to Fig. 2, Fig. 2 is a representation of a type of spline 64 that can be used in an embodiment of the present invention. As can be seen in Fig. 2, a preferably soft material 82 such as flexible PVC is located on the top and bottom surface of the spline in order to ensure a tight fit with the groove of the plank. Preferably, the plank is a
15 thermoplastic plank. The spline design preferably has a thickness that is from about 3 mils to about 5 mils thicker than the groove of the plank in this embodiment. Depending upon the design of the spline, the ease of insertion into the groove can vary. For example, teeth or barbs can be formed on the top and/or bottom surfaces of the spline core. These teeth or barbs can be aimed in such a direction that insertion can be very easy, yet the spline is very
20 difficult to remove from the groove of the plank. For example, the teeth can point in a direction substantially opposite to the direction of insertion of the spline into the groove. An exemplary angle for the teeth is from about 95° to about 170°, for example, about 135°, with respect to the direction of insertion. This relationship between the teeth and groove provides a strong plank-to-plank connection. If the spline is too thick, it can open the groove
25 and cause edge peaking, and can be difficult to install. If the spline is too thin, it does not

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effectively engage with the teeth in the groove and can result in a weak connection. The edges of the spline or tongue 64 are tapered or beveled as shown at 80 in order to ensure that the tongue can readily be inserted into the groove.

In the embodiment shown in Fig. 2, the overall width of the spline or tongue 64 (from left to right) is 0.500 inch and the overall height is 0.155 inch. The thickness of the soft material 82 shown on the top and bottom of the spline or tongue is 0.023 inch. For example, over a seven foot length, for each of the top and bottom surfaces of the spline, the respective surface is made up of 0.064 square inch of a ridged polyvinylchloride (PVC) material and 0.019 square inch of a soft polyvinylchloride material. The angled corners of the spline or tongue 64 are each angled about 30° with respect of the flat top and bottom respective adjacent surface of the spline or tongue 64

Fig. 3 makes reference to a spline 64 which has teeth 90 on its surfaces which engage the grooves 76 of the planks. Further, as can be seen in Fig. 3, in a preferred embodiment, the top surfaces of the plank can form a V shape valley 88 and the top edges of the adjacent planks touch each other whereas the bottom edge portions of each respective plank are cut in order to have a slightly shorter length and thus form a gap 86 which ensures that the top ends 88 touch each other and do not leave any gaps on the walking surface of the planks. Reference numeral 84 shows a plank top layer, such as a print layer, a composite print layer, or the like.

In the embodiment shown in Fig. 3, the width dimension of the gap 86 (from left to right) is 0.030 inch. The thickness of the top layer 84 shown in Fig. 3 is 0.015 inch. The two connected planks shown in Fig. 3, each have dimensions of about 7.0 inches in width and about 72 inches in length, and each can be provided with 13 feet or strips 62. A protruding bead 91 is provided along the midline of the top surface of the spline 93 and rests between the adjacent side edges of the joined planks.

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Referring to Fig. 4, Fig. 4 is a depiction of a groove 76 which has receiving teeth 92 for a spline or tongue of the design shown at 90 in Fig. 3. In the embodiment shown in Fig. 4, the foot 62 has a width of 0.075 inch, a height of 0.075 inch, and is housed in a corresponding groove or hole that extends 0.050 inch into the bottom surface of the flooring plank. The beveled or tapered edge 78 shown in Fig. 4 is angled in an amount of 17° relative to the flat top surface of the plank. The beveled or tapered bottom edge opposite edge 78 is angled in an amount of 30° relative to the flat bottom surface of the plank. The receiving teeth 92 are each 0.040 inch wide (from left to right) and each has a flat top surface at its point that has a width of 0.008 inch. The gap between opposing top and bottom teeth is 0.150 inch. The depth of the groove 76, from the edge of the plank to the deepest part of groove 76 (from left to right) is 0.270 inch and the depth from the left edge of the plank to and including the last tooth within the groove is 0.201 inch. The beveled or tapered edge 78 intersects with the flat top surface of the plank 0.125 inch from the edge of the plank.

Figs. 5 and 6 represent various different widths of the plank but generally show the same features as shown in Fig. 1 and the reference numerals in Figs. 5 and 6 represent the same features as the corresponding numerals represented in Fig. 1.

The embodiment shown in Fig. 5 are substantially identical to the dimensions shown in Fig. 1 with the exception that the overall width of the plank shown in Fig. 5 is 3.000 inches as opposed to 7.000 inches for the width of the plank shown in Fig. 1. In addition, the two vertical side walls adjacent each respective gap 76, herein referred to as the two outermost side walls, are 0.075 inch in width as opposed to 0.116 inch in width for the corresponding outermost side walls of the embodiment shown in Fig. 1. The overall height of the plank shown in Fig. 5, from the flat top surface to the flat bottom surface (excluding

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the feet or strips 62 is 0.355 inch for the embodiment shown in Fig. 5, and from about 0.370 inch to about 0.375 inch including laminate adhesive.

For the embodiment shown in Fig. 6, the dimensions are substantially identical to those dimensions shown in the embodiment of Fig. 5, with the exception that the plank
5 shown in Fig. 6 has an overall width of 5.000 inches.

Fig. 7 shows yet another embodiment of a plank and spline system of the present invention. The plank includes U-shaped or Π -shaped recesses in the bottom surface 94 thereof. The top surface 92 of the plank is flat. A pin 98 and a hole 100 are provided at each end of the plank for aligning the hole and pin of one plank with a respective pin and hole of
10 an adjacent plank.

Fig. 8 is an end view of a substantially rectangular-shaped spline according to an embodiment of the present invention showing various dimensions of the spline in inches ("). A core 110 is at least partially covered with a softer, more flexible, more resilient and/or more elastic surface material 112. The material useful for forming the core 110 can be a
15 resinous material such as hard homopolymeric polyvinylchloride (PVC) material. An exemplary homopolymeric PVC material for the core material is GEON 8700 or 8700A available from BF Goodrich of Cleveland, Ohio, which has a density of 1.38 g/cc per ASTM D-792, and a hardness durometer of D=78 as per ASTM D-2240. An exemplary softer material for the surface material is an extrudable vinyl elastomer, for example,
20 NOROPLAZ 8602 available from North American Plastics, Inc. of Aberdeen, Mississippi, which has a density of 1.23 g/cc per ASTM D-792 and a hardness durometer of D=59 as per ASTM D-2240.

Fig. 9 is an end view of a substantially rectangular-shaped spline 122 according to another embodiment of the present invention showing various dimensions of the spline 122
25 in inches (") and showing angled teeth on the top (right-side) and bottom (left-side) surfaces

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(116, 118) of the spline. A core 120 is at least partially covered with a softer, more flexible, more resilient and/or more elastic surface material 124. The surface material includes teeth 114 on both the top surface 116 and on the bottom surface 118 of the spline 122. The material useful for forming the core 120 can be a resinous material such as hard homopolymeric polyvinylchloride (PVC) material. An exemplary homopolymeric PVC material for the core material is GEON 8700 or 8700A. An exemplary softer material for the surface material is an extrudable vinyl elastomer, for example, NOROPLAZ 8602.

Fig. 10 is an end view of a substantially rectangular-shaped spline 130 according to another embodiment of the present invention showing various dimensions of the spline 130 in inches (") and raised relief elements or protruding beads 132, 134 that extend in the direction of elongation of the spline 130 on the respective top surface 146 and bottom surface 148 of the spline. A core 140 is at least partially covered with a softer, more flexible, more resilient and/or more elastic surface material 142. The surface material includes teeth 144 on both the top surface 146 and on the bottom surface 148 of the spline 130. The material useful for forming the core 140 can be a resinous material such as hard homopolymeric polyvinylchloride (PVC) material. An exemplary homopolymeric PVC material for the core material is GEON 8700 or 8700A. An exemplary softer material for the surface material 142 is an extrudable vinyl elastomer, for example, NOROPLAZ 8571 available from North American Plastics, Inc. of Aberdeen, Mississippi, which has a density of 1.23 g/cc per ASTM D-792 and a hardness durometer of D=59 as per ASTM D-2240.

Fig. 11 is an end view of a substantially rectangular-shaped spline 150 according to another embodiment of the present invention showing various dimensions of the spline 150 in inches (") and showing a recessed portion 161 of the core 160 that accommodates toothed-protrusions. The spline is provided with angled teeth on the top surface 154 (right-side) and bottom surface 156 (left-side) of the spline. A core 160 is at least partially covered

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with a softer, more flexible, more resilient and/or more elastic surface material 162. The material useful for forming the core 160 can be a resinous material such as hard homopolymeric polyvinylchloride (PVC) material. An exemplary homopolymeric PVC material for the core material is GEON 8700 or 8700A. An exemplary softer material for the surface material 162 is an extrudable vinyl elastomer, for example, NOROPLAZ 8602.

Fig. 12 is an end view of a substantially rectangular-shaped spline 170 according to yet another embodiment of the present invention showing various dimensions of the spline 170 in inches (") and showing a protruding bead 172 on an otherwise flat top surface 174 of the spline 170. Also shown are a protruding bead 176 along with teeth 178 on the bottom surface 180 of the spline 170. The protruding beads run along the midlines of the respective top and bottom surfaces. The material useful for forming the core 190 can be a resinous material such as hard homopolymeric polyvinylchloride (PVC) material. An exemplary homopolymeric PVC material for the core material is GEON 8700 or 8700A. An exemplary softer material for the surface material 182 is an extrudable vinyl elastomer, for example, NOROPLAZ 8571.

The surface covering system of the present invention can be used in a variety of applications including, but not limited to, wall panels, ceiling panels, flooring surfaces, decks, patios, furniture surfaces, shelving, deck paneling, fascia, partition panels, horizontal surfaces, table tops, chest tops, and counter tops, and other surface coverings or parts thereof.

Other embodiments of the present invention will be apparent to those skilled in the art from consideration of the specification and practice of the present invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope and spirit of the present invention being indicated by the following claims.

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IN THE CLAIMS:

1. A spline for connecting two or more surface covering planks together, said spline comprising a polymeric material having an elongated shape and a width and height that are perpendicular to a direction of elongation of the spline, wherein said width is sufficient to fit into and extend outside of a groove in a side edge of a first plank and fit into
5 a respective groove in a side edge of a second plank.

2. The spline of claim 1, wherein said spline is concealed from view when said first plank and said second plank are connected together by said spline.

3. The spline of claim 1, wherein said spline is rectangular-shaped.

10 4. The spline of claim 1, wherein said spline is rectangular-shaped and each side edge that fits into a groove of a plank is beveled.

5. The spline of claim 1, wherein said spline has a top surface, a bottom surface, and tooth-shaped notches on both said top and bottom surfaces, wherein said notches fit into grooves of a first plank and an adjacent second plank.

15 6. The spline of claim 1, wherein said spline has a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces, wherein the other of said top and bottom surfaces is flat.

7. The spline of claim 1, wherein said spline has a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces and wherein the
20 other of said top and bottom surfaces is flat except for the presence of a raised relief element along a midline of the flat surface, said midline elongated in the direction of elongation of said spline.

8. The spline of claim 1, wherein said spline comprises an extruded polymeric material.

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9. The spline of claim 1, wherein said spline comprises an extruded thermoplastic material.

10. The spline of claim 1, wherein said spline comprises a co-extruded material.

11. The spline of claim 1, wherein said spline comprises a co-extruded material
5 made from rigid thermoplastic material in a central portion of the spline and a soft thermoplastic material at the top and bottom surfaces of the spline.

12. A surface covering system for connecting two or more planks together, said system comprising two or more planks including a first plank and a second plank, and at least one spline that is elongated in a direction of elongation, wherein each plank has a
10 groove on at least one side thereof, and said spline comprises a polymeric material having a shape such that said spline has a sufficient width to fit into and extend outside of a groove in the side edge of the first plank and to fit into a respective groove in a side edge of the second plank.

13. The surface covering system of claim 12, wherein said spline is concealed
15 from view when said first plank and said second plank are connected together by said spline.

14. The surface covering system of claim 12, wherein said surface covering is a floor or floor covering.

15. The surface covering system of claim 12, wherein said surface covering is a
20 laminate floor.

16. The surface covering system of claim 12, wherein said at least one spline has a top surface, a bottom surface, and tooth-shaped notches on both said top and bottom surfaces, wherein said notches fit into the respective grooves of the first plank and the second plank.

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17. The surface covering system of claim 12, wherein said at least one spline has a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces, wherein the other of said top and bottom surfaces is flat.

18. The surface covering system of claim 12, wherein said at least one spline has
5 a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces, and wherein the other of said top and bottom surfaces is flat except for the presence of a raised relief element along a midline of the flat surface, wherein the midline extends along the spline in the direction of elongation of the spline.

19. The surface covering system of claim 12, wherein each said groove in the at
10 least one side of each of the first and second planks has teeth that engage at least one of said top and bottom surfaces of said spline.

20. The surface covering system of claim 19, wherein said spline has at least one flat surface that engages the teeth in each of said grooves.

21. A plurality of planks connected together by one or more splines, wherein
15 each plank has a groove on at least one side thereof, and each said spline is elongated in a direction of elongation and comprises a polymeric material having a shape such that said spline has a sufficient width to fit into and extend outside of a groove in a side edge of a first plank and to fit into a respective groove in a side edge of a second plank.

22. The plurality of planks of claim 21, wherein said one or more splines is
20 concealed from view when the plurality of planks are connected together with said one or more splines.

23. The plurality of planks of claim 21, wherein said one or more splines each has a top surface, a bottom surface, and tooth-shaped notches on both said top and bottom surfaces, wherein said notches fit into the grooves of the plurality of planks.

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24. The plurality of planks of claim 21, wherein said one or more splines each has a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces, wherein the other of said top and bottom surfaces is flat.

25. The plurality of planks of claim 21, wherein said one or more splines each
5 has a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces, and wherein the other of said top and bottom surfaces is flat except for the presence of a raised relief element along a midline of the flat surface, said midline elongated in the direction of elongation of said spline.

26. The plurality of planks of claim 21, wherein each said groove in the at least
10 one side edge of each of the first and second planks has teeth that engage at least one of said top and bottom surfaces of said one or more splines.

27. The plurality of planks of claim 26, wherein said one or more splines has at least one flat surface that engages the teeth in each of said grooves.

28. A method to connect two or more planks together comprising inserting one
15 edge of an elongated spline into a groove in a side edge of one plank and inserting the opposite edge of the spline into a groove in a side edge of a second plank, said spline comprising a polymeric material having a shape and dimensions such that said spline has a sufficient width to fit into and extend outside of the groove in the side edge of the first plank and to fit into the groove in the side edge of the second plank.

29. The method of claim 28, wherein said spline is concealed from view when
20 said first plank and said second plank are connected together with said spline.

30. The method of claim 29, wherein said spline has a top surface, a bottom surface, and tooth-shaped notches on both said top and bottom surfaces, wherein said notches fit into the grooves of the first plank and the second plank.

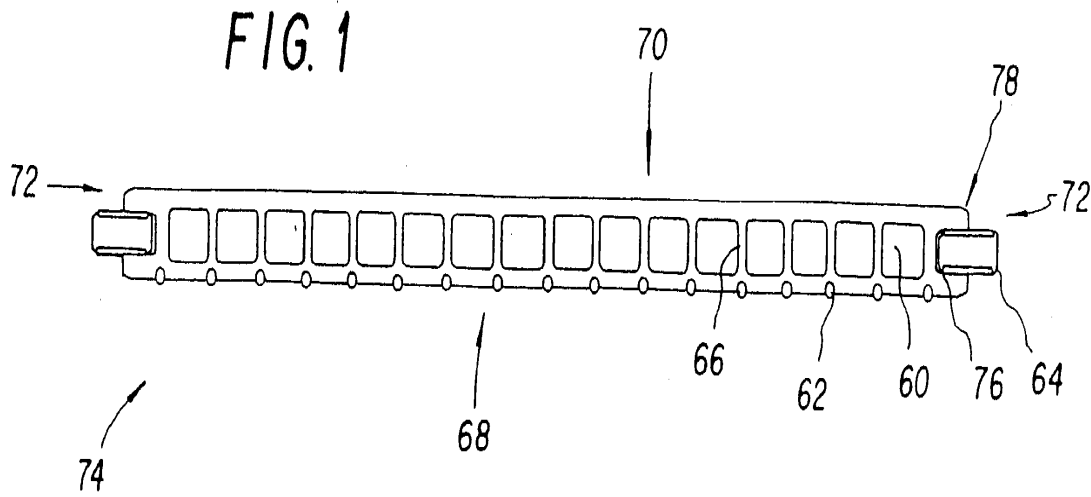
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31. The method of claim 29, wherein said spline has a top surface, a bottom surface, and tooth-shaped notches on one of said top and bottom surfaces, wherein the other of said top and bottom surfaces is flat.

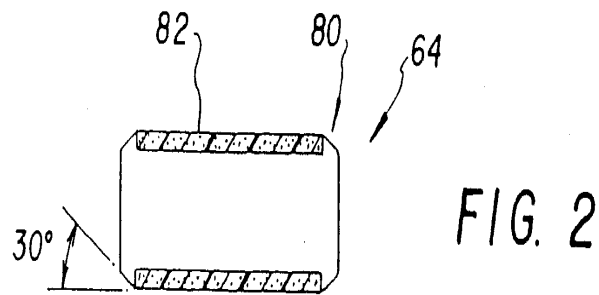
32. The method of claim 29, wherein said spline has a top surface, a bottom
5 surface, and tooth-shaped notches on one of said top and bottom surfaces, and wherein the other of said top and bottom surfaces is flat except for the presence of a raised relief element along a midline of the flat surface, said midline extending along the spline in the direction of elongation of the spline.

33. The method of claim 29, wherein each said groove in the at least one side of
10 each of the first and second planks has teeth that engage at least one of said top and bottom surfaces of said spline.

34. The method of claim 33, wherein said spline has at least one flat surface that engages the teeth in each of said grooves.



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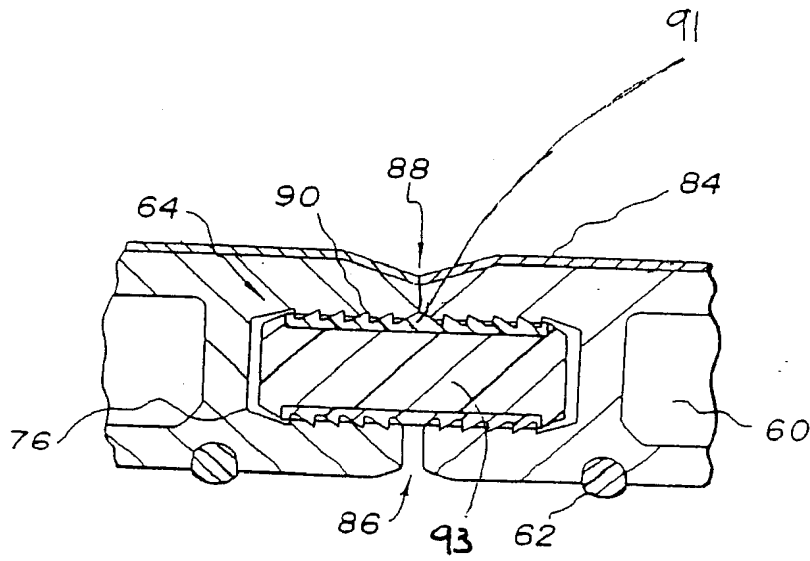


FIG. 3

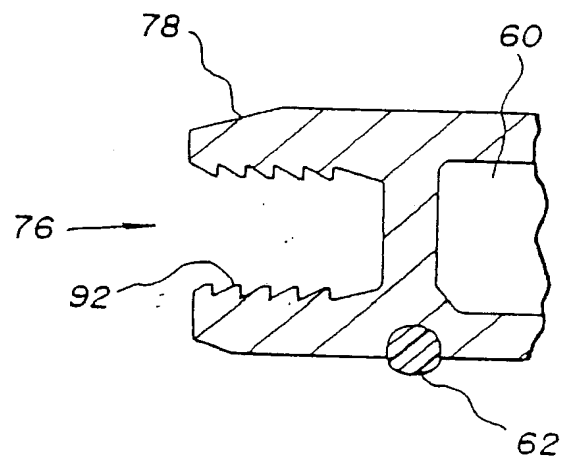


FIG. 4

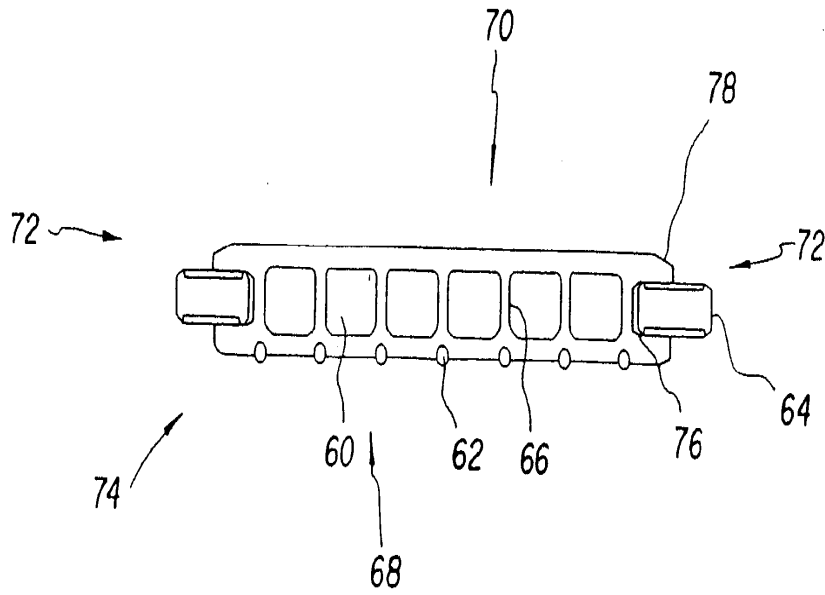


FIG. 5

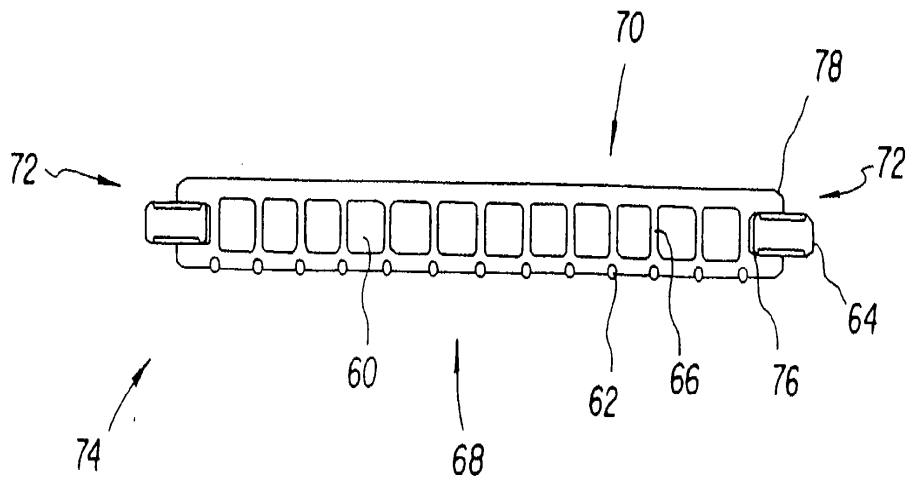


FIG. 6

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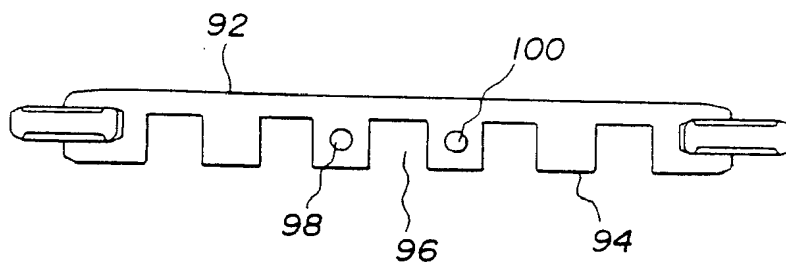


FIG. 7

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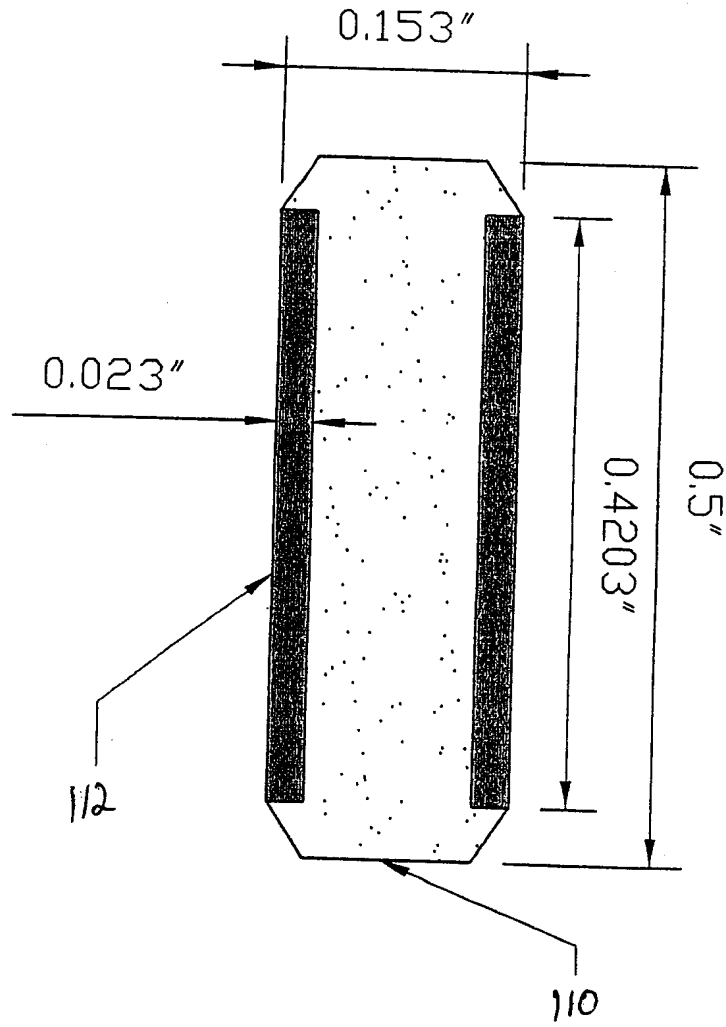


Fig. 8

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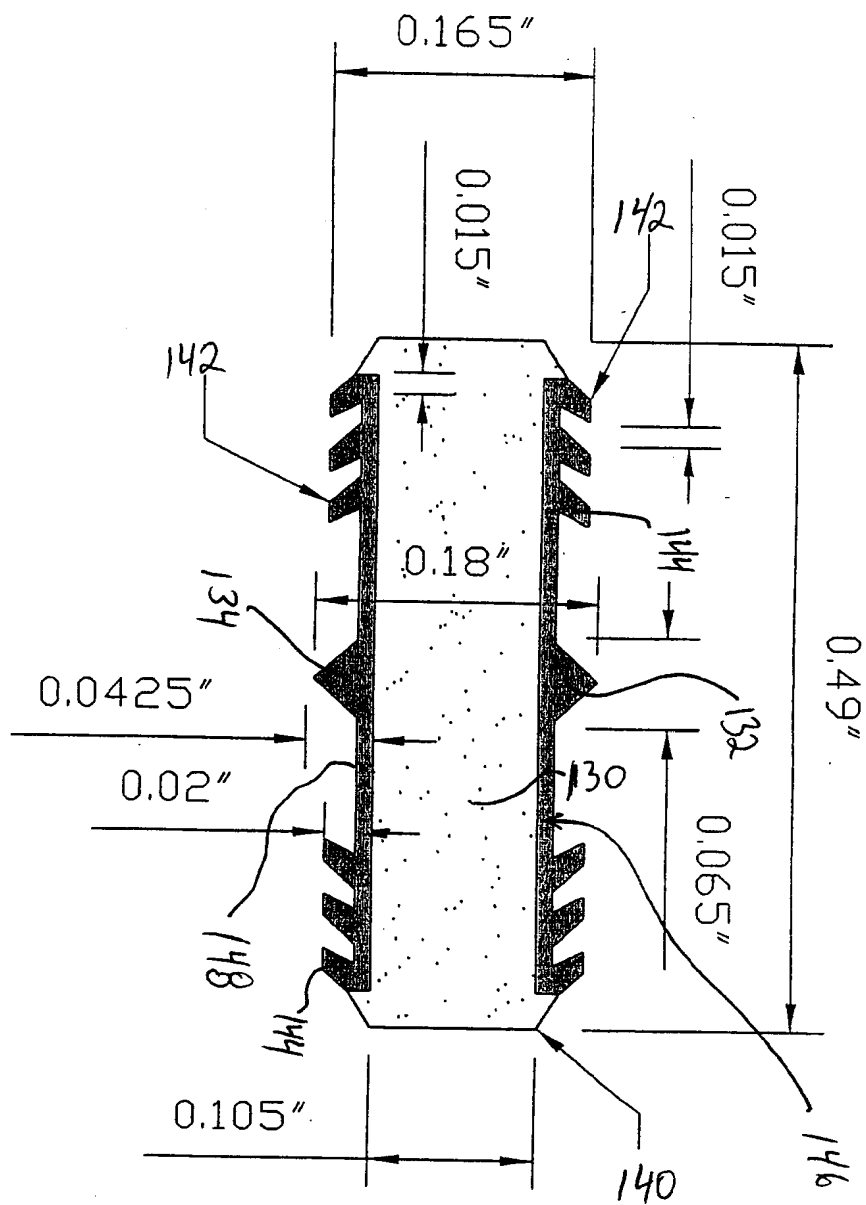
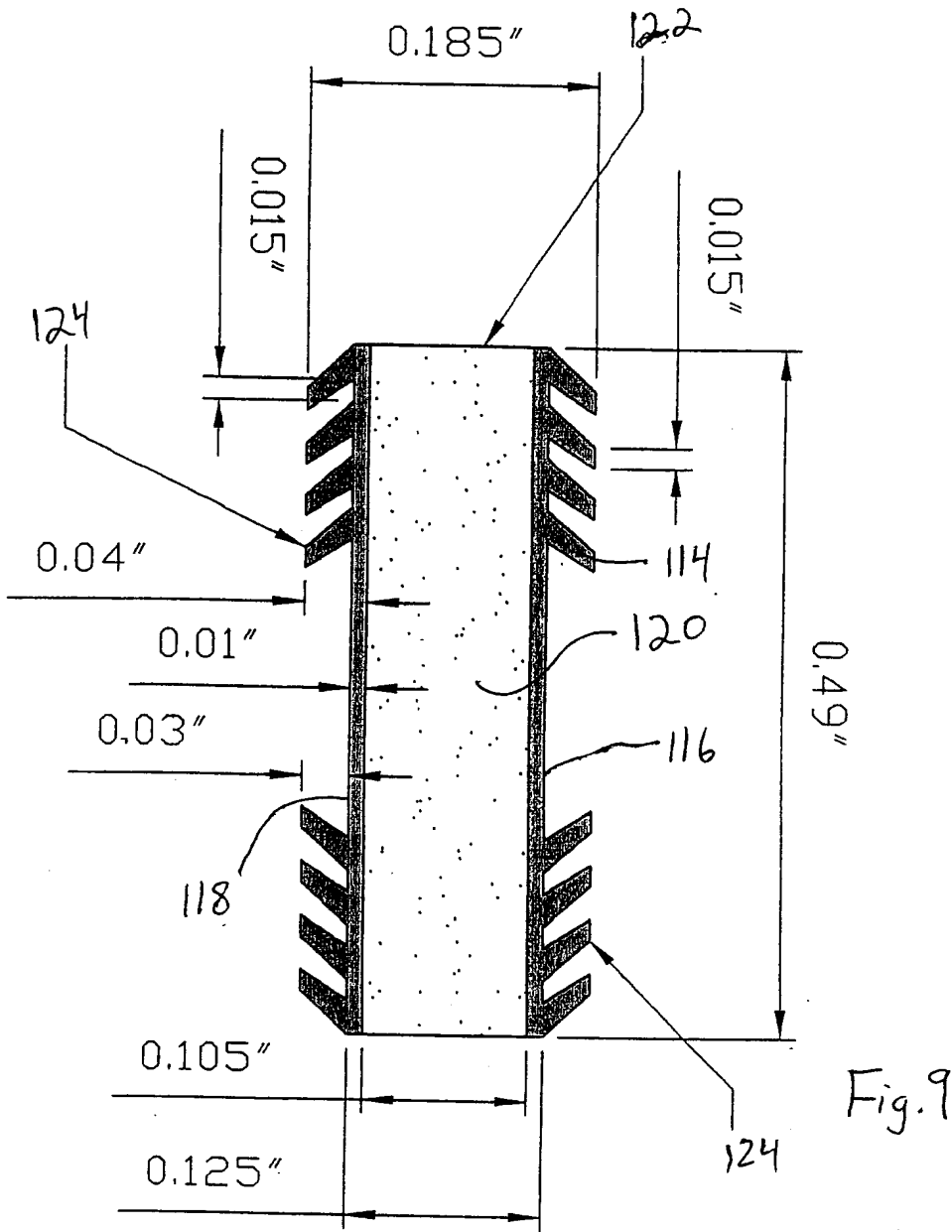
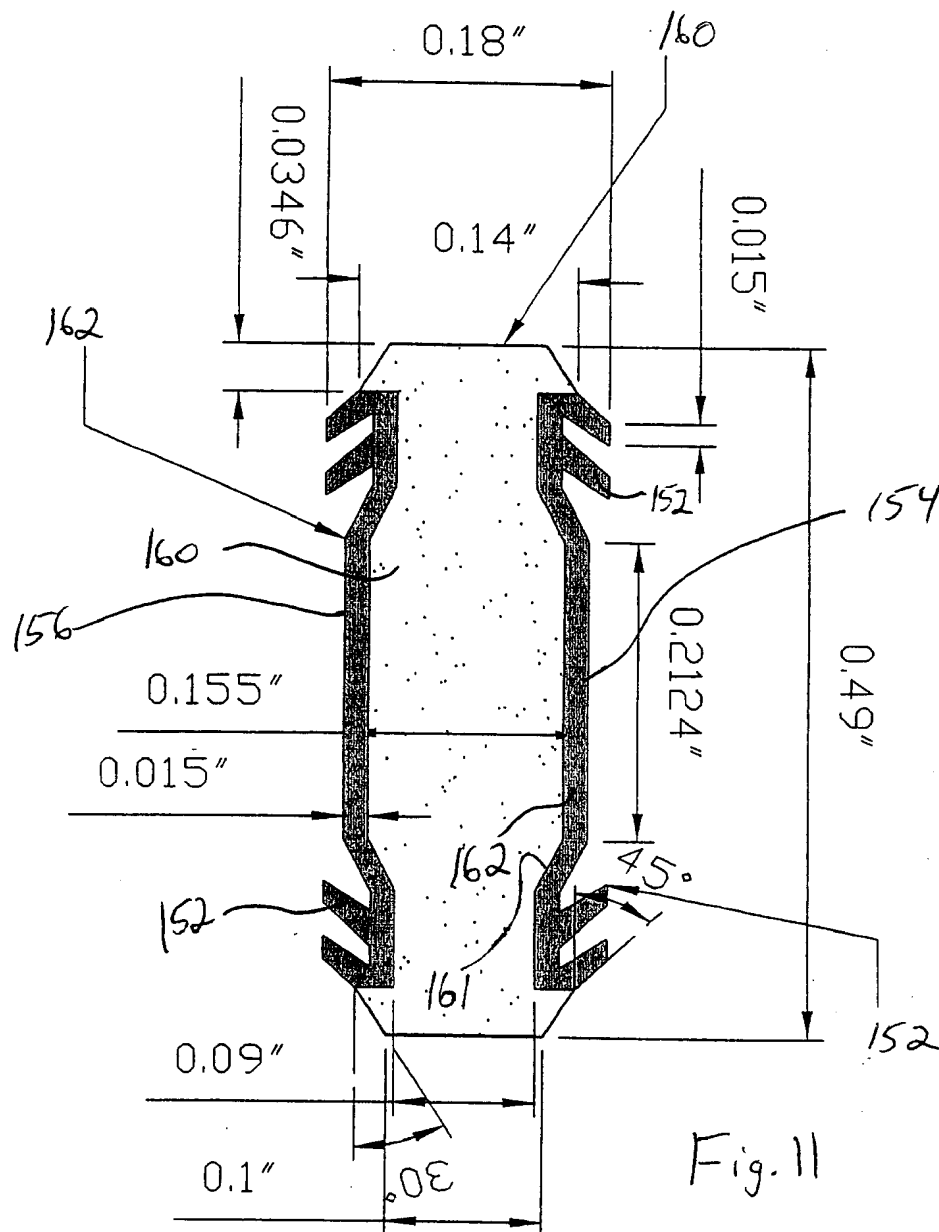


Fig. 10

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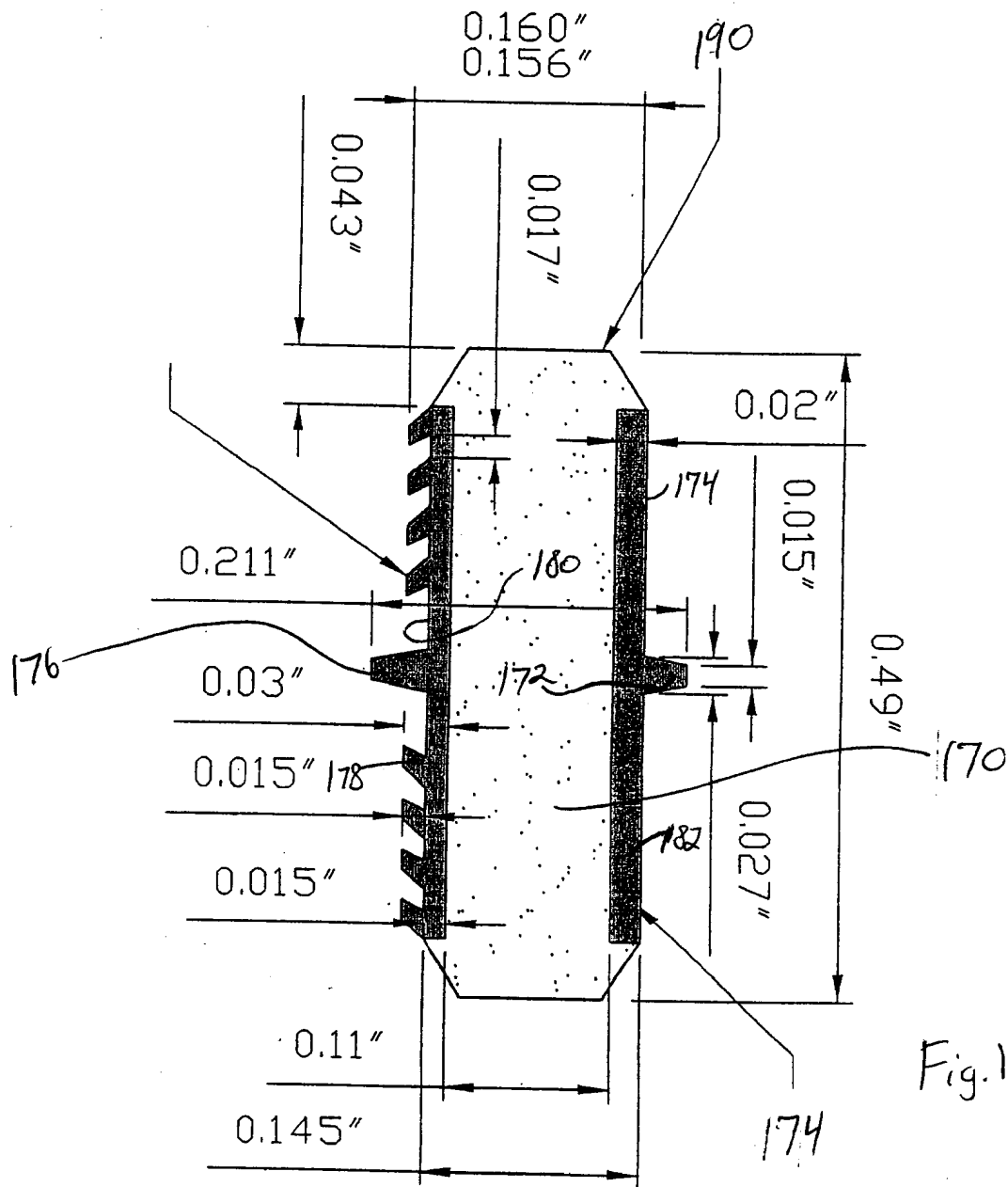


Fig. 12

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ABSTRACT EP3150083

The invention relates to a device for angular connection and locking two plates (1, 2), in particular furniture panels consisting of a coated wood-based panel, in particular chipboard, the two opposite flat sides (10, 20) and four at an angle to the flat sides (10, 20). extending narrow sides (15, 25), wherein one of the plates (1) in at least one of the narrow sides (15) and the other plate (2) in at least one of the flat sides (20) has a groove (11, 21), in the in each case an insert element (3) is inserted, which in each case has at least one undercut (38), and each undercut (38) interacts with a spring lip (42) of a locking element (4) which can be snapped into the insert elements (3).



Espacenet

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DEVICE FOR ANGULARLY CONNECTING AND LOCKING TWO PANELS, IN PARTICULAR FURNITURE PANELS

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Abstract of EP3150083 (A1)

Die Erfindung betrifft eine Einrichtung zum winkligen Verbinden und Verriegeln zweier Platten (1, 2), insbesondere Möbelplatten bestehend aus einer beschichteten Holzwerkstoffplatte, insbesondere Spanplatte, die zwei gegenüberliegende Flachseiten (10, 20) und vier im Winkel zu den Flachseiten (10, 20) verlaufende Schmalseiten (15, 25) aufweisen, wobei eine der Platten (1) mindestens in einer der Schmalseiten (15) und die andere Platte (2) in mindestens einer der Flachseiten (20) eine Nut (11, 21) aufweist, in die jeweils ein Einsetzelement (3) eingesetzt ist, das jeweils mindestens eine Hinterschneidung (38) aufweist, und jede Hinterschneidung (38) mit einer Federlippe (42) eines Verriegelungselementes (4) zusammenwirkt, das in die Einsetzelemente (3) einschnappbar ausgebildet ist.



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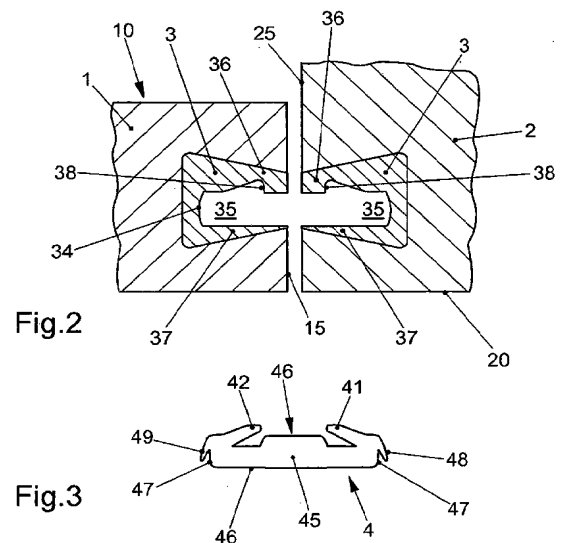
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(54) **EINRICHTUNG ZUM WINKLIGEN VERBINDEN UND VERRIEGELN ZWEIER PLATTEN, INSBESONDERE MÖBELPLATTEN**

(57) Die Erfindung betrifft eine Einrichtung zum winkligen Verbinden und Verriegeln zweier Platten (1, 2), insbesondere Möbelplatten bestehend aus einer beschichteten Holzwerkstoffplatte, insbesondere Spanplatte, die zwei gegenüberliegende Flachseiten (10, 20) und vier im Winkel zu den Flachseiten (10, 20) verlaufende Schmalseiten (15, 25) aufweisen, wobei eine der Platten (1) mindestens in einer der Schmalseiten (15) und die andere Platte (2) in mindestens einer der Flachseiten (20) eine Nut (11, 21) aufweist, in die jeweils ein Einselelement (3) eingesetzt ist, das jeweils mindestens eine Hinterschneidung (38) aufweist, und jede Hinterschneidung (38) mit einer Federlippe (42) eines Verriegelungselementes (4) zusammenwirkt, das in die Einselelemente (3) einschnappbar ausgebildet ist.



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Beschreibung

[0001] Die Erfindung betrifft eine Einrichtung zum winkligen, insbesondere rechtwinkligen, Verbinden und Verriegeln zweier Platten, insbesondere Möbelplatten bestehend aus einer beschichteten Holzwerkstoffplatte, insbesondere Spanplatte, die zwei gegenüberliegende Flachseiten und vier in einem Winkel, vorzugsweise im rechten Winkel, zu den Flachseiten verlaufende Schmalseiten aufweisen.

[0002] Eine solche Einrichtung ist beispielsweise aus der WO 2011/151758 A2 bekannt, um ein Regal ohne Schraub- oder Klebverbindungen aus einzelnen Platten zusammen zu bauen. An zwei gegenüberliegenden Schmalseiten der Platten, die die Seitenwände bilden ist aus dem Material der Platte eine geschlitzte Feder ausgefräst, die an einer ihrer Seiten mit einem Vorsprung versehen ist. Die innenliegenden Flachseiten der den Boden und den Deckel ausbildenden Platten sind in ihrem äußerem Bereich auf der Innenseite jeweils mit einer Nut versehen, in der eine Hinterschneidung ausgebildet ist, der mit dem Vorsprung an der Feder zusammenwirkt. Zum Verbinden der Platten werden die Federn in die Nuten geschoben. Durch die geschlitzte Feder drückt sich diese zusammen und wenn der Vorsprung der Feder die Hinterschneidung in der Nut umgreift, federt diese wieder zurück, so dass die Klickverbindung hergestellt wird und die Platten miteinander verbunden und zueinander verrastet sind.

[0003] Aus der WO 2012/154113 A1 ist ebenfalls eine Einrichtung zum rechtwinkligen Verbinden und Verriegeln zweier Platten bekannt. In die Flachseite der ersten Platte ist eine Rechtecknut eingebracht, die in ihrer Breite der Plattenstärke der zweiten Platten entspricht. In einer oder beiden Seitenwänden der Nut ist in einem Winkel zur Flachseite eine weitere Nut eingebracht, in der ein Federelement angeordnet ist. In der entsprechenden Flachseite der zweiten Platte ist eine Vertiefung eingefräst, in die das Federelement einschnappen kann, wenn die zweite Platte in die Nut eingeschoben wird. Die zweite Platte ist dann gegenüber der ersten Platte verriegelt.

[0004] Die EP 1 671 562 A1 offenbart ein aus mindestens zwei Möbelteilen bestehendes Möbel, bei dem ein Möbelteil eine erste Verbindungsfläche aufweist, die mit einer zweiten Verbindungsfläche eines weiteren Möbelteils verbunden werden kann, und die erste Verbindungsfläche ein erstes Verriegelungselement und die zweite Verriegelungsfläche ein zweites Verriegelungselement für eine mechanische Verriegelung aufweist. Das erste Verriegelungselement ist eine Nut und das zweite Verriegelungselement eine zu der Nut kongruent ausgestaltete Feder, die durch ineinanderstecken miteinander verrasten können. Bei dieser Verriegelungstechnik handelt es sich um eine Feder/Nut-Verbindung, wie sie bei leimlos zu verlegenden Fußbodenpaneelen bekannt sind, die im allgemeinen Sprachgebrauch als Klick-Paneele bezeichnet werden.

[0005] Die WO 2004/0857765 A1 und die DE 203 04 761 A1 beschreiben eine Einrichtung zum Verbinden und Verriegeln von Bauplatten, insbesondere Bodenpaneelen, bei der die Platten an den miteinander zu verbindenden Kanten mit einer Nut versehen sind, in der jeweils eine Hinterschneidung vorgesehen ist. Durch Einsetzen eines Kunststoffeinsetzes als Verriegelungselement in einer der Nut kann die andere Platte durch horizontales Verschieben mit dem Verriegelungselement verbunden werden, bis das Verriegelungselement mit der Hinterschneidung in der Nut verrastet, so dass die beiden Bauplatten zueinander verriegelt sind. Fußbodenpaneele und Möbelplatten sind in aller Regel Holzwerkstoffplatten, deren Oberflächen beschichtet sind (Laminatplatten). Bodenpaneele unterliegen wesentlich höheren Belastungen als Möbel. Die Trägerplatte eines Laminatpaneels besteht deshalb in aller Regel aus einer MDF- oder HDF-Platte, während für Möbelplatten eine wesentlich preiswertere herzustellende Spanplatte als Trägerplatte verwendet wird. Die Zugfestigkeit einer Spanplatte ist gegenüber einer MDF- oder HDF-Platte deutlich reduziert. Bodenpaneele werden nur sehr selten nach dem Verlegen wieder auseinander genommen in aller Regel nur zu Reparaturzwecken. Bei einem Umzug verbleiben sie vielfach im Raum. Möbel hingegen werden bei jedem Umzug zerlegt. Die Verbindung der Möbelplatten wird dabei stark beansprucht. Gerade junge Menschen, zum Beispiel Studenten, vertrauen auf preiswerte Möbel, wechseln aber relativ häufiger ihre Wohnung. Nach wenigen Umzügen kann ein Möbelstück, das mit einer Klickverbindung versehen ist, unbrauchbar sein.

[0006] Hiervon ausgehend liegt der Erfindung die Aufgabe zugrunde, eine Einrichtung zum winkligen Verbinden und Verriegeln zweier Platten, insbesondere Möbelplatten bestehend aus einer beschichteten Spanplatte, so zu verbessern, dass eine hohe Festigkeit in der Verbindung entsteht, die mehrfach lösbar ist und die es gestattet, auch eine preiswerte Spanplatte als Trägerplatte zu verwenden.

[0007] Zur Problemlösung zeichnet sich eine gattungsgemäße Einrichtung dadurch aus, dass eine der Platten in mindestens einer der Schmalseiten und die andere Platte in mindestens einer der Flachseiten eine Nut aufweist, in die jeweils ein Einselement eingesetzt ist, das jeweils mindestens eine Hinterschneidung aufweist, und jede Hinterschneidung mit einer Federlippe eines Verriegelungselementes zusammenwirkt, das in die Einselemente einschnappbar ausgebildet ist.

[0008] Die Platten können rechtwinklig oder schräg miteinander verbunden werden, wenn beispielsweise eine Dachschräge zu berücksichtigen ist. Anstatt einer Spanplatte kann auch eine MDF-/HDF-Platte Verwendung finden.

[0009] Durch diese Ausgestaltung können die Einselemente und das Verriegelungselement aus einem hochwertigen Werkstoff hergestellt werden, der gegenüber einer Spanplatte höhere Zug- und Biegefestigkeiten aufweist. Die Verbindung und Verriegelung der Platten zueinander übernehmen das Verriegelungselement und die Einselemente.

Da die Einsatzelemente großflächig in der Nut Halt finden, sind die Ausreißkräfte entsprechend hoch. Die Einsatzelemente können werkseitig in der Nut verklebt werden. Durch den hochwertigen Werkstoff, der durchaus Kunststoff sein kann und dadurch eine preiswerte Herstellung im Spritzguss, Extrusionsverfahren oder im 3D-Druck möglich ist, können die Möbel mehrfach auseinander- und wieder zusammengebaut werden, ohne dass die Verbindungseinrichtung Schaden nimmt. Die Lebensdauer auch preiswerter Möbel wird dadurch deutlich erhöht.

[0010] Vorzugsweise weist das Einsatzelement mindestens zwei sich gegenüberliegende Hinterschnidungen und/oder mindestens zwei hintereinander angeordnete Hinterschnidungen auf, wodurch die Haltekräfte zwischen Einsatzelement und Verriegelungselement entsprechend erhöht werden.

[0011] Um die Herstellung der Nuten zu rationalisieren, können diese vorzugsweise über die volle Länge der Flachseite und der Schmalseite ausgebildet sein. Die Nuten können dann im Durchlauf gefräst werden. Die Einsatzelemente und das Verriegelungselement können genauso lang ausgebildet sein wie die Nuten. Die Verriegelung der Platten erfolgt dann über ihre volle Länge. Es können aber auch einzelne Einsatzelement und Verriegelungselemente parallel zueinander beabstandet in die Nuten eingesetzt werden, so dass nur über Teilbereiche eine Verriegelung erfolgt, wenn dies im Einzelfall ausreichend ist. Dazu sollten dann aber mindestens zwei Einsatzelemente und zwei Verriegelungselemente vorgesehen werden.

[0012] Wenn die Nuten im Querschnitt trapezförmig, insbesondere gleichschenkelig trapezförmig ausgebildet sind, können die Einsatzelemente, die hierzu vorzugsweise im Querschnitt kongruent ausgebildet sind, leimlos eingesetzt werden, indem sie seitlich in die Nut eingeschoben werden und sind verliersicher darin aufgehoben.

[0013] Die Einsatzelemente sind vorzugsweise mit einer Längsnut versehen, die zwei sich gegenüberliegende Verriegelungslippen ausbildet, wobei an mindestens einer der Verriegelungslippen eine Hinterschnidung ausgeformt ist. Vorzugsweise ist an beiden Verriegelungslippen eine Hinterschnidung ausgeformt, um dadurch die Auszugskräfte zu erhöhen.

[0014] Wenn die Einsatzelemente zweiteilig ausgebildet sind und die beiden Teile gelenkig miteinander verbunden sind, ist es möglich, das Einsatzelement von vorn über die gesamte Länge der Nut gleichzeitig in diese einzusetzen, so dass das seitliche Einschieben entfällt, was die automatische Fertigung erleichtert.

[0015] Vorzugsweise ist an jedem der gelenkig miteinander verbundenen Teile eine der Verriegelungslippen ausgebildet.

[0016] Das Verriegelungselement kann aus einem Grundkörper mit zwei sich gegenüberliegenden Oberseiten und zwei sich gegenüberliegenden Längsseiten bestehen, an dem die Federlippen in Richtung der Oberseite federnd ausgebildet sind. Ein solches Verriegelungselement ist prinzipiell aus der DE 10 2004 040 723 A1 oder der DE 103 37 352 B3 für Bauplatten, insbesondere Bodenpaneele bekannt.

[0017] Die Federlippen können zu derselben Oberseite des Grundkörpers oder zu je einer der gegenüberliegenden Oberseiten federnd angeordnet sein.

[0018] Wenn die Einsatzelemente mit mehreren sich gegenüberliegenden oder hintereinander angeordneten Hinterschnidungen versehen sind, ist es vorteilhaft, an dem Verriegelungselement auch entsprechend mehr als zwei Federlippen anzuordnen.

[0019] Bei einem bevorzugten Ausführungsbeispiel kann auch mindestens eine der Verriegelungslippen des Einsatzelementes federnd ausgebildet sein. Die Federlippe des Verriegelungselementes ist dann im Wesentlichen unnachgiebig auszubilden, so dass das Verriegelungselement ein im Grunde genommen starres Verriegelungselement ist, das in die Nuten eingeklickt wird. Dabei ist die Federlippe dann integraler Bestandteil eines Grundkörpers des Verriegelungselementes. Für die integrale Ausbildung der Federlippe ist der Grundkörper dann im Querschnitt vorzugsweise gestuft ausgebildet.

[0020] Wenn an den Längsseiten des Verriegelungselementes mindestens je eine Querfederlippe in Richtung der Längsseite federnd angeordnet ist, stützt sich diese Querfeder im verriegelten Zustand der beiden Platten am Nutgrund ab und bringt in die Verbindungsstelle eine Spannkraft ein, die die Federlippen fest an die für sie vorgesehenen Hinterschnidungen andrückt.

[0021] Die Querfederlippen können sich in dieselbe oder in entgegen gerichtete Richtungen erstrecken. Damit ist gemeint, dass ihre freien Enden in entgegen gesetzte Richtungen weisen.

[0022] Um die Positionierung der miteinander zu verbindenden Holzwerkstoffplatten zu vereinfachen kann zusätzlich zu den Nuten jede Platte eine Bohrung aufweisen und die sich gegenüberliegenden Bohrungen können mit einem einzigen Dübel verschlossen werden. Zusätzlich zur Verbesserung der Positionierung kann der Dübel, der vorzugsweise ein Holzdübel ist, Lasten abfangen. Die Bohrung kann unterhalb der Nuten angeordnet werden. Ist die Nut nicht durchgängig, sondern wenn eine Mehrzahl kürzerer Nuten parallel nebeneinander vorgesehen sind, können die Bohrungen auch zwischen den Nuten vorgesehen sein.

[0023] Mit Hilfe einer Zeichnung sollen Ausführungsbeispiele der Erfindung nachfolgend näher beschrieben werden. Es zeigen:

Figur 1.1 - eine schematische Seitenansicht eines ersten Paneels;

- Figur 1.2 - eine schematische Ansicht eines zweiten Paneels;
 Figur 2 - zwei aneinander angrenzende Paneele im Teilquerschnitt;
 Figur 3 - das Verriegelungselement für die Verbindung nach Figur 2;
 Figur 4 - zwei aneinander angrenzende Paneele im Teilquerschnitt, in einem zweiten Ausführungsbeispiel;
 5 Figur 5 - das Verriegelungselement für die Verbindung nach Figur 4;
 Figur 6.1 - die Ansicht eines Einsatzelementes in einer dritten Ausführungsform;
 Figur 6.2 - das Einsatzelement nach Figur 6.1 in einer anderen Funktionsstellung;
 Figur 6.3 - eine Einbausituation für das Einsatzelement nach Figur 6.2;
 Figur 6.4 - eine perspektivische Explosionsdarstellung des Einsatzelementes nach Figur 6.1;
 10 Figur 6.5 - eine perspektivische Darstellung des Einsatzelementes nach Figur 6.1;
 Figur 7.1 - ein viertes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.2 - ein fünftes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.3 - ein sechstes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.4 - ein siebtes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 15 Figur 7.5 - ein achttes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.6 - ein neuntes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.7 - ein zehntes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.8 - ein elftes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 Figur 7.9 - ein zwölftes Ausführungsbeispiel eines Verriegelungselementes mit zugehörigem Einsatzelement;
 20 Figur 8.1 - zwei aneinandergrenzende Paneele in einer weiteren Ausführungsform;
 Figur 8.2 - die Paneele nach Figur 8.1 in verbundenem, nicht verriegeltem Zustand;
 Figur 9 - die Teildarstellung eines weiteren Paneels;
 Figur 10 - die Teildarstellung eines weiteren Paneels;
 Figur 11.1 - ein Kraft-Dehnungs-Diagramm;
 25 Figur 11.2 - ein Kraft-Dehnungs-Diagramm;
 Figur 12.1 - ein Kraft-Dehnungs-Diagramm;
 Figur 12.2 - ein Kraft-Dehnungs-Diagramm;
 Figur 12.3 - die Darstellung einer Häufigkeitsverteilung;
 Figur 12.4 - die Darstellung der Maximalkraft;
 30 Figur 13.1 - ein Kraft-Dehnungs-Diagramm;
 Figur 13.2 - ein Kraft-Dehnungs-Diagramm;
 Figur 14.1 - ein Kraft-Dehnungs-Diagramm;
 Figur 14.2 - ein Kraft-Dehnungs-Diagramm;
 Figur 14.3 - die Darstellung einer Häufigkeitsverteilung;
 35 Figur 14.4 - die Darstellung der Maximalkraft;

Figur 15 - die maximale Auszugskraft für verschiedene Verriegelungselemente.

[0024] Die beiden in Figuren 1.1 und 1.2 dargestellten Möbelplatten 1, 2 bestehen aus einer Spanplatte als Trägerplatte und sind an ihren Flachseiten 10, 20 und ihren in einem Winkel zu den Flachseiten 10, 20 verlaufenden Schmalseiten 15, 25 mit einer Beschichtung, beispielsweise einem Holzdekor versehen. Die Schmalseiten 15, 25 verlaufen vorzugsweise im rechten Winkel zu den Flachseiten 10, 20, sie können aber auch auf Gehrung geschnitten sein. Das erste Paneel 1 ist an mindestens einer Schmalseite 15 mit einer im Querschnitt regelmäßig trapezförmig ausgestalteten Nut 11 versehen, die über die ganze Länge L verläuft. Das zweite Paneel 2 ist in mindestens einer seiner Flachseiten 20 mit einer ebenfalls im Querschnitt regelmäßig trapezförmigen Nut 21 versehen. In diese Nuten 11, 21 kann ein Einsatzelement 3 eingesetzt werden, dass im Querschnitt zu der Nut 11, 21 kongruent trapezförmig ausgestaltet ist. Das Einsatzelement 3 besteht vorzugsweise aus Kunststoff und kann im Spritzguss oder im Extrusionsverfahren hergestellt werden. Auch ist eine Herstellung mittels eines 3D-Druckers denkbar. Der breite, untere Teil der Nut 11, 21 (Nutgrund 34) ist vorzugsweise 10 mm breit, der obere und schmalere Teil 6 mm. Die Tiefe der Nut 11, 21 beträgt 10 mm. Die Breite der Nut 11, 21 muss so gewählt werden, dass die Verbindung in der Mittelschicht der Spanplatte liegt, um optimal die auftretenden Belastungen abzufangen. Selbverständlich sind auch andere Abmessungen der Nuten 11, 21 und Einsatzelemente 3 möglich. Der Fachmann wird eine dem Einsatzzweck geeignete Dimensionierung finden. Wenn die Nut 11, 21 40 mm lang ist, wird auch das Einsatzelement 3 40 mm lang gewählt werden. In diesem Beispiel ist es dann 16,3 mm breit und 4,4 mm hoch.

[0025] Das in Figur 2 dargestellte Einsatzelement 3 ist mit einer Längsnut 35 versehen, die zwei sich gegenüber liegende Verriegelungslippen 36, 37 ausbildet. In der Verriegelungslippe 36 ist eine Hinterschneidung 38 vorgesehen. Das zu diesem Einsatzelement passende Verriegelungselement 4 ist in Figur 3 dargestellt. Es besteht aus dem Grundkörper 45 mit zwei gegenüber liegenden Oberseiten 46, von denen sich zwei Federlippen 41, 42 zur Mitte des Grund-

körpers 45 hin erstrecken. Die Federlippen 41, 42 sind in Richtung der Oberseite 46 federnd ausgebildet. An den gegenüberliegenden Längsseiten 47 des Grundkörpers 45 ist je eine Querfederlippe 48, 49 angeordnet, die auf den Grundkörper 45 zufedert. Zum Verbinden der beiden Platten 1, 2 wird das Federelement 4 zum Beispiel in die Nut 35 des Einsatzelementes 3 in der Platte 1 eingeschoben, wodurch die Federlippe 42 zusammengedrückt wird, bis sie in Übereindeckung mit der Hinterschneidung 38 gelangt und dort ausfedernd mit dem Einsatzelement 3 verrastet. Die Querfederlippe 49 stößt auf den Nutgrund 34 und erzeugt eine Druckkraft, die die Federlippe 42 gegen die Anlagefläche an die Hinterschneidung 38 presst, so dass das Verriegelungselement 4 fest in der Nut 35 aufgenommen und damit spielfrei mit dem Einsatzelement 3 verbunden wird. Anschließend wird die zweite Platte 2 rechtwinklig zu der ersten Platte auf das Verriegelungselement 4 aufgesetzt, bis die Federlippe 41 hinter die Hinterschneidung 38 eingreift und über die Querfederlippe 48 auch hier eine spielfreie Verbindung zwischen dem Verriegelungselement 4 und dem Einsatz 3 eingestellt wird. Die beiden Möbelplatten 1, 2 sind dann miteinander verbunden und verriegelt.

[0026] Bei dem in Figur 4 dargestellten Ausführungsbeispiel ist die Nut 35 im Querschnitt auch regelmäßig trapezförmig ausgestaltet und bildet zwei spiegelsymmetrische Verriegelungslippen 36, 37 aus, an denen jeweils eine Hinterschneidung 38 vorgesehen ist. Figur 5 zeigt das zu diesem Ausführungsbeispiel des Einsatzelementes 3 gehörende Verriegelungselement 4, das ebenfalls aus einem Grundkörper 45 besteht, von dem sich Federlippen 41 und 42 erstrecken, wobei sich dieses Verriegelungselement 4 gegenüber dem in Figur 3 gezeigten Verriegelungselement im Wesentlichen nur dadurch unterscheidet, dass vier Verriegelungslippen 41, 42, 43, 44 vorgesehen sind, die sich auf beiden Oberseiten 46 des Grundkörpers 45 erstrecken. Die Verbindung und spielfreie Verriegelung der Möbelplatten 1, 2 erfolgt wie zu dem in den Figuren 2 und 3 beschriebenen Ausführungsbeispiel.

[0027] Das Einsatzelement 3 muss von der am Ende offenen Seite 12, 22 der Nut 11, 21 eingeschoben werden. Je nachdem, wie groß die Länge L der Nut 11, 21 ist, ist hierzu durchaus ein nicht unerheblicher Kraftaufwand notwendig, um die Reibung zu überwinden.

[0028] Das in Figuren 6.1 bis 6.4 dargestellte Einsatzelement 3 ist zweiteilig aufgebaut, wobei der erste Teil 3.1 eine mit einer Hinterschneidung 38 versehene Federlippe 36 und der zweite Teil 3.2 die Federlippe 37 ausbildet, die optional auch mit einer Hinterschneidung 38 versehen sein kann. Die beiden Teile 3.1 und 3.2 sind über ein Gelenk 30 zueinander verschwenkbar verbunden. Wie Figur 6.2 zeigt, kann die Verriegelungslippe 37 gegen die Verriegelungslippe 38 verschwenkt werden. In dieser Position kann das Einsatzelement 3 von der Öffnung der Nut 11, 21 in der Schmalseite 15, 25 bzw. der Flachseite 10, 20 in die Nut 11 eingesetzt werden. Hierzu ist kein Kraftaufwand nötig. Wird der zweite Teil 3.2 zurückgeschwenkt, liegen beide Federlippen 36, 37 an den Wandungen der Nut 11 an. Wird wie zuvor beschrieben ein zu der Querschnittform der durch das zweiteilige Einsatzelement 3 gebildeten Nut 35 passendes Verriegelungselement 4 eingeschoben, werden die beiden Teile 3.1, 3.2 aufgespreizt und können nicht mehr zueinander verschwenken, so dass das zweiteilige Einsatzelement 3 ebenfalls spielfrei in der Nut 11, 21 aufgenommen wird und eine entsprechende feste und spielfreie Verbindung zwischen den Möbelplatten 1 und 2 hergestellt wird.

[0029] Figuren 7.1 bis 7.9 zeigen verschiedene Ausführungsbeispiele von Einsatzelementen 3 und zugehörigen Verriegelungselementen 4. Deren Funktion identisch zu den vorbeschriebenen Bauteilen ist. Bei der in Figur 7.1 dargestellten Ausführungsform sind im Einsatzelement 3 mehrere hintereinander angeordnete Hinterschneidungen 38 vorgesehen, die federnd an der Verriegelungslippe 36 angeordnet sind. Vom Grundkörper 45 des Verriegelungselementes 4 stehen Zacken ab, die in die Hinterschneidungen 38 eingreifen. Die Zacken sind starr. Bei dem in Figuren 7.3, 7.6 und 7.8 gezeigten Ausführungsbeispielen wird die Art der Verriegelung kinematisch umgekehrt. Die Hinterschneidungen 38 sind in der starr ausgebildeten Verriegelungslippe 36 vorgesehen, während die Zacken elastisch sind und somit Federlippen 41, 42 ausbilden. Bei dem in Figur 7.5 und 7.9 dargestellten Ausführungsbeispiel ist die Hinterschneidung 38 an der elastisch ausgebildeten Verriegelungslippe 35 des Einsatzelementes 3 ausgebildet. Die Federlippe 42 ist integraler Bestandteil des Grundkörpers 45 des Verriegelungselementes 4 und im Wesentlichen unnachgiebig. Der Grundkörper 45 ist hierzu gestuft ausgebildet.

[0030] Allen Ausführungsbeispielen gemeinsam ist, dass an den Längsseiten 47 des Verriegelungselementes 4 Querfederlippen 48, 49 vorgesehen sind, die sich in dieselbe Richtung (vgl. 7.1) oder in entgegen gesetzte Richtungen (vgl. Figur 7.7) erstrecken können. Außerdem Stützen sich die Verriegelungslippen 35, 36 auf den gegenüberliegenden Oberseiten 46 des Grundkörpers 45 ab. Vorteilhaft ist es, wenn das Einsatzelement 3 mit einer Sollbruchstelle S versehen ist. Bei dem in Figur 7.4 gezeigten Ausführungsbeispiel ist die Sollbruchstelle S an der Verriegelungslippe 36 vorgesehen. Durch eine solche Ausgestaltung wird verhindert, dass im Falle von Auszugskräften, die die Festigkeit einer Spanplatte überschreiten, das Einsatzelement 3 bricht, und damit ein Aufbrechen der Spanplatte ausgeschlossen wird, denn dadurch würde das Möbel unbrauchbar werden.

[0031] Bei dem in den Figuren 8 und 9 gezeigten Ausführungsbeispiel ist in den Möbelplatten 1, 2 unterhalb der Nut 11, 12 eine Bohrung 12, 22 vorgesehen. Diese Bohrungen 12, 22 fluchten zueinander, wenn die Platten 1, 2 aneinandergelegt werden. Über einen einzigen Dübel 5 werden die Bohrungen 12, 22 verschlossen. Der Dübel 5 erleichtert die Positionierung der Möbelplatten 1, 2 zueinander. Figur 8.2 zeigt zwei miteinander verbundene Möbelplatten 1, 2 ohne Verriegelungselement 4. Die Platten 1, 2 sind zwar miteinander verbunden aber noch nicht zueinander verriegelt. Ein Verriegelungselement 4 könnte nun von vorne, das heißt in die Zeichenebene hinein in die Einsatzelemente 3 hinein-

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geschoben werden, es könnte aber auch wie zuvor beschrieben in einen der Einsatzelemente 3 eingesetzt und dann in das andere Einsatzelement eingeklickt werden. Der Dübel 5 erleichtert nicht nur die Positionierung der Möbelplatten 1, 2 zueinander, sondern er kann auch zusätzliche Lasten abfangen.

[0032] Bei dem in Figur 10 gezeigten Ausführungsbeispiel ist die Nut 11.1 an einer Wandung 11.2 gestuft ausgebildet. Die gegenüberliegende Wandung verläuft schräg. Das Einsatzelement 3 stützt sich mit seinem hinteren Bereich auf dem oberen Teil der gestuften Wandung 11.2 ab. Es ist nur eine Verriegelungslippe 36 vorhanden.

[0033] Anhand der Figuren 11 bis 15 sollen Zugversuche erläutert werden, die mit verschiedenen Verriegelungselementen 4 durchgeführt wurden.

Versuch I

[0034] Zunächst wurden Versuche mit dem Verriegelungselement 4 nach Figur 5 durchgeführt in einem Einsatzelement 3, das in die Nut 11 einer Spanplatte eingesetzt war. Die nachfolgende Tabelle 11 zeigt die maximal aufgebrachte Kraft bis die Spanplatte zerbrach.

Tabelle 11

Nr	Proben-Nr.	Datum	Uhrzeit	$F_{\max}$ N	dL bei $F_{\max}$ mm	F_{Bruch} N	dL bei Bruch mm	$t_{\text{Prüfung}}$ s
1	1	12.01.2015	10:44:39	206	3,4	-	-	38,64
2	2	12.01.2015	10:46:17	209	6,2	-	-	52,02
3	3	12.01.2015	10:48:17	179	2,8	-	-	39,20
4	4	12.01.2015	10:49:50	141	1,6	-	-	38,78
5	5	12.01.2015	10:52:17	160	1,8	-	-	48,46
6	6	12.01.2015	10:54:05	183	3,6	-	-	38,62
7	7	12.01.2015	10:55:51	199	4,3	-	-	50,74
8	8	12.01.2015	10:57:37	188	2,9	-	-	38,34
9	9	12.01.2015	10:59:33	134	1,9	-	-	38,18
10	10	12.01.2015	11:00:50	155	5,8	-	-	51,74
11	11	12.01.2015	11:02:43	183	2,5	-	-	38,52
12	12	12.01.2015	11:04:37	204	4,7	-	-	54,18
13	13	12.01.2015	11:06:37	193	3,8	-	-	41,02
14	14	12.01.2015	11:08:32	150	3,4	-	-	40,68
15	15	12.01.2015	11:10:17	159	2,1	-	-	39,10

[0035] Figuren 11.1 und 11.2 zeigen das Kraft-Dehnungs-Diagramm zu den Proben 12 und 9. Der zweifach verankerte Klickmechanismus zeigt ein gewisses Setzungsverhalten am Anfang der Prüfung, welches aber wohl auch den Versuchsaufbau zurückzuführen war. Alle 15 Prüfungen zeigen einen beinahe linearen Anstieg von 130 N bis 140 N und danach entsteht eine starke Streuung der gemessenen Werte. Dies ist auf den Aufbau der Spanplatte zurückzuführen.

Versuch II

[0036] Derselbe Zugversuch wurde anschließend in Sperrholz durchgeführt. Tabelle 12 zeigt die dabei gemessenen maximalen Kräfte.

Tabelle 12

Nr	Proben-Nr.	Datum	Uhrzeit	$F_{\max}$ N	dL bei $F_{\max}$ mm	F_{Bruch} N	dL bei Bruch mm	$t_{\text{Prüfung}}$ s
1	1	12.01.2015	13:21:23	1050	5,6	1050	5,6	34,58
2	2	12.01.2015	13:25:00	1020	2,9	1020	2,9	18,40
5	3	12.01.2015	13:29:14	888	1,9	888	1,9	12,56
6	4	12.01.2015	13:31:28	975	2,7	812	3,4	21,48

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(fortgesetzt)

Nr	Proben-Nr.	Datum	Uhrzeit	F _{max} N	dL bei F _{max} mm	F _{Bruch} N	dL bei Bruch mm	t _{Prüfung} s
7	5	12.01.2015	13:33:48	1140	3,2	1130	3,2	20,40
9	6	12.01.2015	13:37:14	1030	3,0	1030	3,0	18,90
10	7	12.01.2015	13:39:46	1250	3,3	749	3,8	23,66
11	8	12.01.2015	13:42:07	1180	3,3	744	3,9	24,30
13	9	12.01.2015	13:45:33	1220	2,8	-12,2	3,2	20,12
14	10	12.01.2015	13:48:04	1080	4,1	685	4,2	26,06
15	11	12.01.2015	13:50:13	1180	3,5	730	3,6	22,72
17	12	12.01.2015	13:52:39	1120	3,3	5,23	3,6	22,82
19	13	12.01.2015	13:55:07	1150	4,0	1150	4,0	24,94
20	14	12.01.2015	13:57:23	1160	3,7	-6,97	3,7	23,52
21	15	12.01.2015	13:59:44	1120	3,8	1120	3,8	23,90

[0037] Figuren 12.1 und 12.2 zeigen das Kraft-Dehnungs-Diagramm für die Proben 13 und 5. Erkennbar ist, dass nach einem linearen Kraftanstieg zunächst der Bruch auf einer Seite des Nutteils erfolgt, was aber deshalb geschah, weil das Verriegelungselement 4 aus dem Verbund herausgezogen wurde und nicht mehr allseits von einem Werkstoff gestützt ist. Die Kraft fällt für einen Augenblick ab. Dies ist darauf zurückzuführen, dass eine der Verriegelungslippen 36, 37 des Einsetzelementes 3 weggebrochen ist und die komplett auftretende Kraft nur noch auf die verbleibende Verriegelungslippe 36 verteilt wird. Schließlich bricht auch diese weg und die Verbindung ist zerstört.

[0038] Um die numerischen Maximalkräfte von Tabelle 12 zu organisieren und zu veranschaulichen, wurden die Werte in dem in Figur 12.3 gezeigten Histogramm zusammengefasst und über die einzelnen Werte eine Normalverteilungskurve angelegt. Dabei betrug:

Mittelwert aller Prüfungen	1109,92614
Standardabweichung	97,1998549
untere Toleranzgrenze	888
obere Toleranzgrenze	1250
Toleranzbreite	362
Wahrscheinlichkeit einer Unterschreitung	1,12%
Wahrscheinlichkeit einer Überschreitung	7,48%

[0039] Die maximal aufgetretene Kraft beträgt 1150 N und ist in Figur 12.4 dargestellt.

Versuch III

[0040] Anschließend wurden Versuche mit dem Verriegelungselement 4 nach Figur 3 durchgeführt, wobei die gemessenen Kräfte der nachfolgenden Tabelle 13 entnehmbar sind.

Tabelle 13

Nr	Proben-Nr.	Datum	Uhrzeit	F _{max} N	dL bei F _{max} mm	F _{Bruch} N	dL bei Bruch mm	t _{Prüfung} s
1	1	12.01.2015	09:47:03	199	3,5	-	-	51,32
3	2	12.01.2015	09:57:42	148	5,9	-	-	65,62
4	3	12.01.2015	10:00:22	160	3,2	-	-	36,74
5	4	12.01.2015	10:03:34	169	8,1	-	-	64,94
6	5	12.01.2015	10:15:13	171	5,8	-	-	52,40

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(fortgesetzt)

Nr	Proben-Nr.	Datum	Uhrzeit	F _{max} N	dL bei F _{max} mm	F _{Bruch} N	dL bei Bruch mm	t _{Prüfung} s
5	7	6	12.01.2015	10:17:28	155	4,3	-	47,42
8	7	12.01.2015	10:19:17	131	4,8	-	-	37,86
9	8	12.01.2015	10:21:16	103	1,9	-	-	41,56
10	9	12.01.2015	10:23:13	195	7,1	-	-	51,28
11	10	12.01.2015	10:25:49	172	4,4	-	-	51,14
12	11	12.01.2015	10:27:49	185	4,6	-	-	50,36
13	12	12.01.2015	10:30:05	134	3,2	-	-	49,56
14	13	12.01.2015	10:31:58	150	7,0	-	-	61,60
15	14	12.01.2015	10:33:59	169	7,6	-	-	50,90

[0041] Für die Proben 1 und 8 ist in den Figuren 13.1 und 13.2 das Kraft-Dehnungs-Diagramm dargestellt. Erkennbar ist, dass das Verriegelungselement 4 einen linearen Kraftanstieg von bis zu 300 N bei unter 2% Dehnung aufweist. Gefolgt wird der Kraftanstieg von einem Abfall der Kurve, der auf das Brechen der Spanplatte hinweist. Ein abrupter Kraftabfall wäre typisch für den Bruch des Verriegelungselementes 4. Die Stelle, an der das Einsatzelement 3 bricht, ist immer die gleiche. Aufgrund der plastischen Verformung der Spanplatte sowie deren Eigenschaften und Produktionsmerkmale ist diese Streuung auf den Verbund des Plattenwerkstoffes zurückzuführen.

[0042] Derselbe Versuch in einer Möbelplatte aus Sperrholz ist in der nachfolgenden Tabelle 14 dokumentiert:

Tabelle 14

Nr	Proben-Nr.	Datum	Uhrzeit	F _{max} N	dL bei F _{max} mm	F _{Bruch} N	dL bei Bruch mm	t _{Prüfung} s
1	1	12.01.2015	12:13:29	930	4,6	928	4,6	28,68
2	2	12.01.2015	12:48:29	820	4,7	820	4,7	29,28
3	3	12.01.2015	12:52:23	827	4,7	827	4,7	29,26
4	4	12.01.2015	12:54:55	758	6,5	758	6,5	40,02
5	5	12.01.2015	12:57:37	871	7,3	871	7,3	44,60
6	6	12.01.2015	13:00:01	836	4,5	-22,6	4,6	28,42
7	7	12.01.2015	13:02:29	834	3,3	-17,4	3,3	21,16
8	8	12.01.2015	13:05:49	859	4,5	85,4	4,5	28,24
9	9	12.01.2015	13:07:02	798	3,4	796	3,4	21,42
10	10	12.01.2015	13:08:52	744	3,7	744	3,7	23,10
11	11	12.01.2015	13:10:15	810	4,0	810	4,0	25,04
12	12	12.01.2015	13:11:19	888	3,9	887	3,9	24,72
13	13	12.01.2015	13:12:51	845	4,1	0,000	4,1	25,66
14	14	12.01.2015	13:14:20	866	4,0	859	4,0	24,94
15	15	12.01.2015	13:15:56	901	3,8	71,4	3,8	23,78
16	16	12.01.2015	13:16:57	801	3,4	1,74	3,5	21,84

[0043] In Figuren 14.1 und 14.2 ist das Kraft-Dehnungs-Diagramm für die Proben 1 und 10 dargestellt. Erkennbar ist, dass die Kurve sofort ansteigt und bei anderen der Kurvenverlauf mit einer längeren Setzung der Teile beginnt. Dies ist auf den Aufbau der Prüfvorrichtung zurückzuführen, da es nicht immer möglich war, die Teile unter Spannung in der Prüfmaschine zu platzieren. Nachdem sich alle Teile gesetzt haben, ist der lineare und konstant gleiche Anstieg aller 16 Proben gut erkennbar. Nach dem Ansteigen der Kurve erfolgt ein sauberer Bruch bei durchschnittlich 837 N (F_{Max}). Bis auf zwei Messungen lagen alle Kurven recht nah beieinander, was für die Verlässlichkeit des Verriegelungselementes

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4 nach Figur 3 spricht.

[0044] Um die numerischen Maximalkräfte F_{Max} nach Tabelle 14 zu organisieren und zu veranschaulichen wurden die Werte in ein Histogramm zusammenfassend überführt, das in Figur 14.3 dargestellt ist. Die sich dabei ergebenden Werte betragen:

Mittelwert aller Prüfungen	837,408127
Standardabweichung	48,3029346
untere Toleranzgrenze	753
obere Toleranzgrenze	930
Toleranzbreite	17
Wahrscheinlichkeit einer Unterschreitung	4,03%
Wahrscheinlichkeit einer Überschreitung	2,76%

[0045] Die durchschnittliche Maximalkraft, die in Figur 14.4 dargestellt ist, betrug 837,41 N.

[0046] Figur 15 zeigt visualisiert die Maximalkraft für die verschiedenen Geometrien der Verbindungselemente.

Bezugszeichenliste

[0047]

- 1 Möbelplatte
- 10 Oberseite
- 11 Nut
- 11.1 Nut
- 11.2 Wandung
- 12 Bohrung
- 15 Schmalseite
- 2 Möbelplatte
- 20 Oberseite
- 21 Nut
- 22 Bohrung
- 25 Schmalseite
- 3 Einsatzelement
- 3.1 Teil
- 3.2 Teil
- 30 Gelenk
- 34 Nutgrund
- 35 Nut
- 36 Verriegelungslippe
- 37 Verriegelungslippe
- 38 Hinterschneidung
- 4 Verriegelungselement
- 41 Federlippe
- 42 Federlippe
- 43 Feder
- 44 Feder
- 45 Grundkörper
- 46 Oberseite
- 47 Längsseite
- 48 Querfederlippe
- 49. Querfederlippe
- S Sollbruchstelle
- L Länge

Patentansprüche

- 5 1. Einrichtung zum winkligen Verbinden und Verriegeln zweier Platten (1, 2), insbesondere Möbelplatten bestehend aus einer beschichteten Holzwerkstoffplatte, insbesondere Spanplatte, die zwei gegenüberliegende Flachseiten (10, 20) und vier im Winkel zu den Flachseiten (10, 20) verlaufende Schmalseiten (15, 25) aufweisen, **dadurch gekennzeichnet, dass** eine der Platten (1) mindestens in einer der Schmalseiten (15) und die andere Platte (2) in mindestens einer der Flachseiten (20) eine Nut (11, 21) aufweist, in die jeweils ein Einsatzelement (3) eingesetzt ist, das jeweils mindestens eine Hinterschneidung (38) aufweist, und jede Hinterschneidung (38) mit einer Federlippe (42) eines Verriegelungselementes (4) zusammenwirkt, das in die Einsatzelemente (3) einschnappbar ausgebildet ist.
- 10 2. Einrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Einsatzelement (3) mindestens zwei sich gegenüberliegende Hinterschneidungen (38) aufweist.
- 15 3. Einrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Einsatzelement (3) mindestens zwei hintereinander angeordnete Hinterschneidungen (38) aufweist.
- 20 4. Einsatz nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Nuten (11, 21) über die volle Länge der Flachseite (10 oder 20) und der Schmalseite (15 oder 25) ausgebildet ist.
- 25 5. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Nuten (11, 21) im Querschnitt trapezförmig, insbesondere gleichschenklige trapezförmig ausgebildet sind.
6. Einrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) im Querschnitt trapezförmig, insbesondere gleichschenklige trapezförmig ausgebildet sind.
- 30 7. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) mit einer Nut (35) versehen sind, die zwei sich gegenüberliegende Verriegelungslippen (36, 37) ausbildet, und mindestens an einer der Verriegelungslippen (36, 37) eine Hinterschneidung (38) ausgeformt ist.
- 35 8. Einrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** an beiden Verriegelungslippen (36, 37) eine Hinterschneidung (38) ausgeformt ist.
9. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) und/oder das Verriegelungselement (4) aus Kunststoff bestehen.
- 40 10. Einrichtung nach Anspruch 6 oder 8, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) zweiteilig ausgebildet sind und die beiden Teile (3.1, 3.2) gelenkig miteinander verbunden sind.
- 45 11. Einrichtung nach Anspruch 10, **dadurch gekennzeichnet, dass** an jedem Teil (3.1, 3.2) eine der Verriegelungslippen (36, 37) ausgebildet ist.
12. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** das Verriegelungselement (4) aus einem Grundkörper (45) mit zwei sich gegenüberliegenden Oberseiten (46) und zwei sich gegenüberliegenden Längsseiten (47) besteht, an dem die Federlippen (41, 42) in Richtung der Oberseite (46) federnd angeordnet sind.
- 50 13. Einrichtung nach Anspruch 12, **dadurch gekennzeichnet, dass** die Federlippen (41, 42) zu derselben Oberseite (45) federnd angeordnet sind.
- 55 14. Einrichtung nach Anspruch 12, **dadurch gekennzeichnet, dass** die Federlippen (41, 42) zu je einer der gegenüberliegenden Oberseiten (46) angeordnet sind.
15. Einrichtung nach Anspruch 13 oder 14, **dadurch gekennzeichnet, dass** mehr als zwei Federlippen (41, 43, 42, 44) angeordnet sind.
16. Einrichtung nach einem der Ansprüche 7 bis 11, **dadurch gekennzeichnet, dass** mindestens eine der Verriegelungslippen (36, 37) des Einsatzelementes (3) federnd ausgebildet ist.

17. Einrichtung nach Anspruch 16, **dadurch gekennzeichnet, dass** die Federlippe (41, 42) des Verriegelungselementes (4) im Wesentlichen unnachgiebig ausgebildet ist.
18. Einrichtung nach Anspruch 17, **dadurch gekennzeichnet, dass** die Federlippe (41, 42) integraler Bestandteil eines Grundkörpers (45) des Verriegelungselementes (4) ist.
19. Einrichtung nach Anspruch 17, **dadurch gekennzeichnet, dass** der Grundkörper (45) im Querschnitt gestuft ausgebildet ist.
20. Einrichtung nach einem der Ansprüche 12 bis 19, **dadurch gekennzeichnet, dass** an den Längsseiten (47) mindestens je eine Querfederlippe (48, 49) in Richtung der Längsseite (47) federnd angeordnet ist.
21. Einrichtung nach Anspruch 20, **dadurch gekennzeichnet, dass** die Querfederlippen (48, 49) sich in dieselbe Richtung erstrecken.
22. Einrichtung nach Anspruch 20, **dadurch gekennzeichnet, dass** die Querfederlippen (48, 49) sich in entgegengesetzten Richtungen erstrecken.
23. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** zusätzlich zu den Nuten (11, 21) jede Platte (1, 2) eine Bohrung (12, 22) aufweist und die sich gegenüberliegenden Bohrungen (12, 22) mit einem einzigen Dübel (5) verschlossen sind.

Geänderte Patentansprüche gemäss Regel 137(2) EPÜ.

1. Einrichtung mit der zwei Platten (1, 2), insbesondere Möbelplatten bestehend aus einer beschichteten Holzwerkstoffplatte, insbesondere Spanplatte, winklig verbunden und verriegelt werden, wobei die Platten (1, 2) die zwei gegenüberliegende Flachseiten (10, 20) und vier im Winkel zu den Flachseiten (10, 20) verlaufende Schmalseiten (15, 25) aufweisen, und eine der Platten (1) mindestens in einer der Schmalseiten (15) und die andere Platte (2) in mindestens einer der Flachseiten (20) eine Nut (11, 21) aufweist, in die jeweils ein Einsatzelement (3) eingesetzt ist, das jeweils mindestens eine Hinterschneidung (38) aufweist, und jede Hinterschneidung (38) mit einer Federlippe (42) eines Verriegelungselementes (4) zusammenwirkt, das in die Einsatzelemente (3) einschnappbar ausgebildet ist, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) im Querschnitt trapezförmig, insbesondere gleichschenkelig trapezförmig und zweiteilig ausgebildet sind und die beiden Teile (3.1, 3.2) gelenkig miteinander verbunden sind.
2. Einrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Einsatzelement (3) mindestens zwei sich gegenüberliegende Hinterschneidungen (38) aufweist.
3. Einrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Einsatzelement (3) mindestens zwei hintereinander angeordnete Hinterschneidungen (38) aufweist.
4. Einsatz nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Nuten (11, 21) über die volle Länge der Flachseite (10 oder 20) und der Schmalseite (15 oder 25) ausgebildet ist.
5. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Nuten (11, 21) im Querschnitt trapezförmig, insbesondere gleichschenkelig trapezförmig ausgebildet sind.
6. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) mit einer Nut (35) versehen sind, die zwei sich gegenüberliegende Verriegelungslippen (36, 37) ausbildet, und mindestens an einer der Verriegelungslippen (36, 37) eine Hinterschneidung (38) ausgeformt ist.
7. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** an beiden Verriegelungslippen (36, 37) eine Hinterschneidung (38) ausgeformt ist.
8. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einsatzelemente (3) und/oder das Verriegelungselement (4) aus Kunststoff bestehen.

9. Einrichtung nach Anspruch 1 oder 7, **dadurch gekennzeichnet, dass** an jedem Teil (3.1, 3.2) eine der Verriegelungslippen (36, 37) ausgebildet ist.
- 5 10. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** das Verriegelungselement (4) aus einem Grundkörper (45) mit zwei sich gegenüberliegenden Oberseiten (46) und zwei sich gegenüberliegenden Längsseiten (47) besteht, an dem die Federlippen (41, 42) in Richtung der Oberseite (46) federnd angeordnet sind.
- 10 11. Einrichtung nach Anspruch 10, **dadurch gekennzeichnet, dass** die Federlippen (41, 42) zu derselben Oberseite (45) federnd angeordnet sind.
12. Einrichtung nach Anspruch 10, **dadurch gekennzeichnet, dass** die Federlippen (41, 42) zu je einer der gegenüberliegenden Oberseiten (46) angeordnet sind.
- 15 13. Einrichtung nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** mehr als zwei Federlippen (41, 43, 42, 44) angeordnet sind.
14. Einrichtung nach einem der Ansprüche 6 bis 9, **dadurch gekennzeichnet, dass** mindestens eine der Verriegelungslippen (36, 37) des Einsatzelementes (3) federnd ausgebildet ist.
- 20 15. Einrichtung nach Anspruch 14, **dadurch gekennzeichnet, dass** die Federlippe (41, 42) des Verriegelungselementes (4) im Wesentlichen unnachgiebig ausgebildet ist.
- 25 16. Einrichtung nach Anspruch 15, **dadurch gekennzeichnet, dass** die Federlippe (41, 42) integraler Bestandteil eines Grundkörpers (45) des Verriegelungselementes (4) ist.
17. Einrichtung nach Anspruch 15, **dadurch gekennzeichnet, dass** der Grundkörper (45) im Querschnitt gestuft ausgebildet ist.
- 30 18. Einrichtung nach einem der Ansprüche 10 bis 17, **dadurch gekennzeichnet, dass** an den Längsseiten (47) mindestens je eine Querfederlippe (48, 49) in Richtung der Längsseite (47) federnd angeordnet ist.
19. Einrichtung nach Anspruch 18, **dadurch gekennzeichnet, dass** die Querfederlippen (48, 49) sich in dieselbe Richtung erstrecken.
- 35 20. Einrichtung nach Anspruch 18, **dadurch gekennzeichnet, dass** die Querfederlippen (48, 49) sich in entgegengesetzten Richtungen erstrecken.
- 40 21. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** zusätzlich zu den Nuten (11, 21) jede Platte (1, 2) eine Bohrung (12, 22) aufweist und die sich gegenüberliegenden Bohrungen (12, 22) mit einem einzigen Dübel (5) verschlossen sind.

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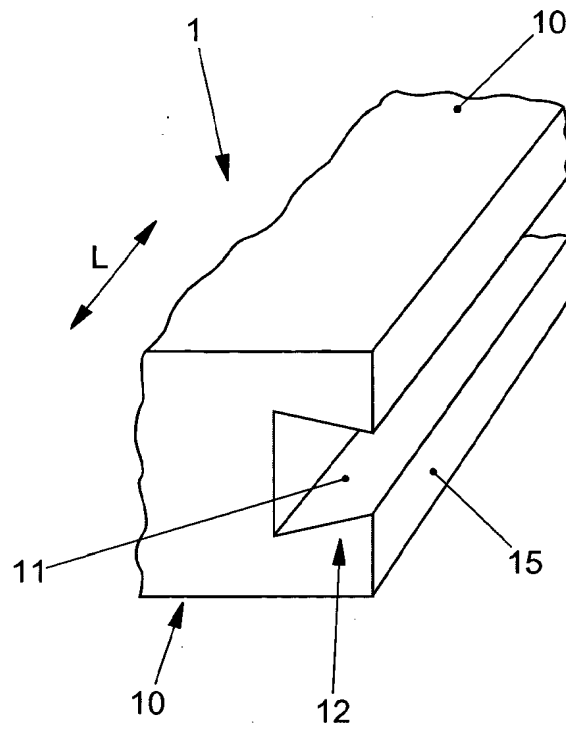


Fig.1.1

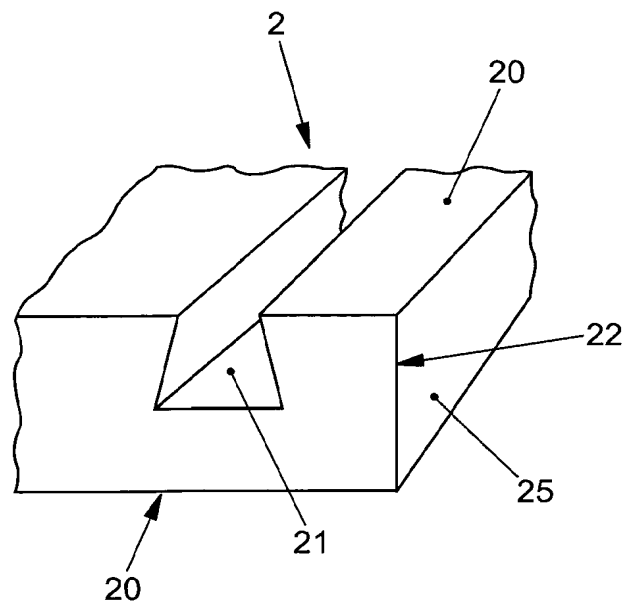


Fig.1.2

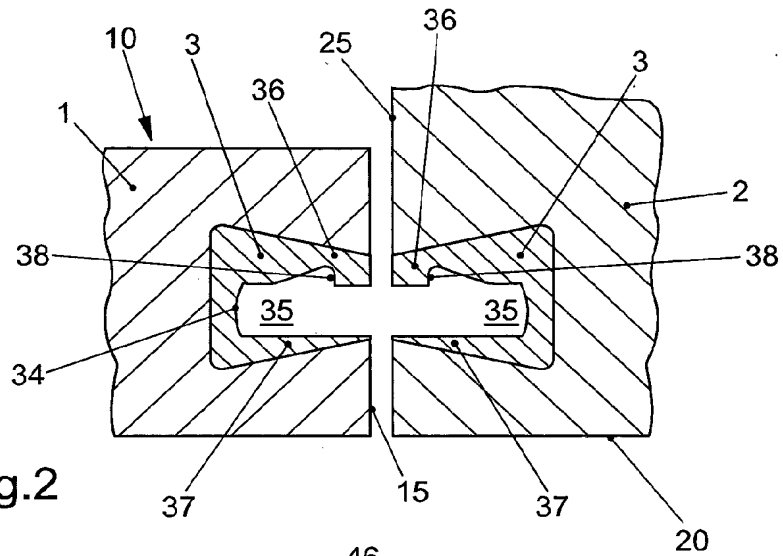


Fig.2

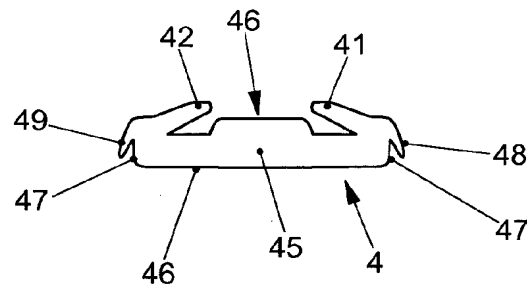


Fig.3

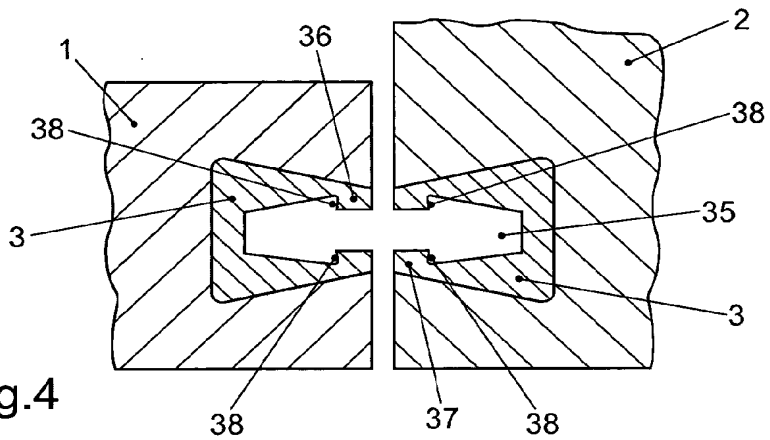


Fig.4

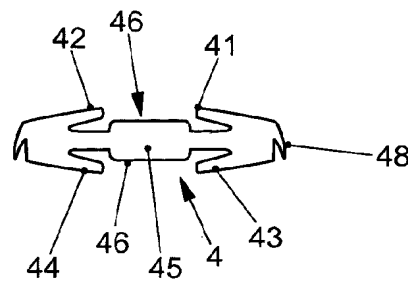


Fig.5

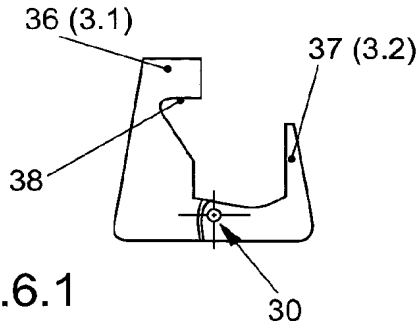


Fig. 6.1

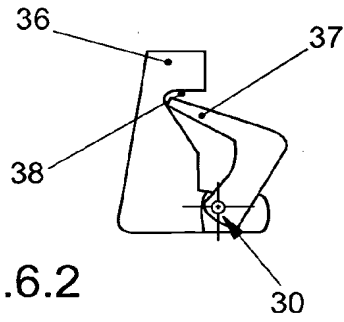


Fig. 6.2

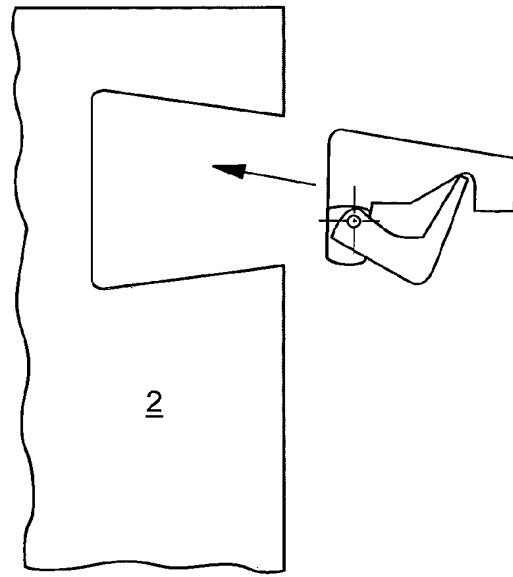


Fig. 6.5

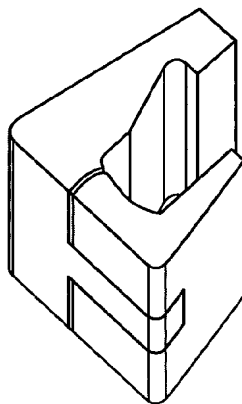


Fig. 6.3

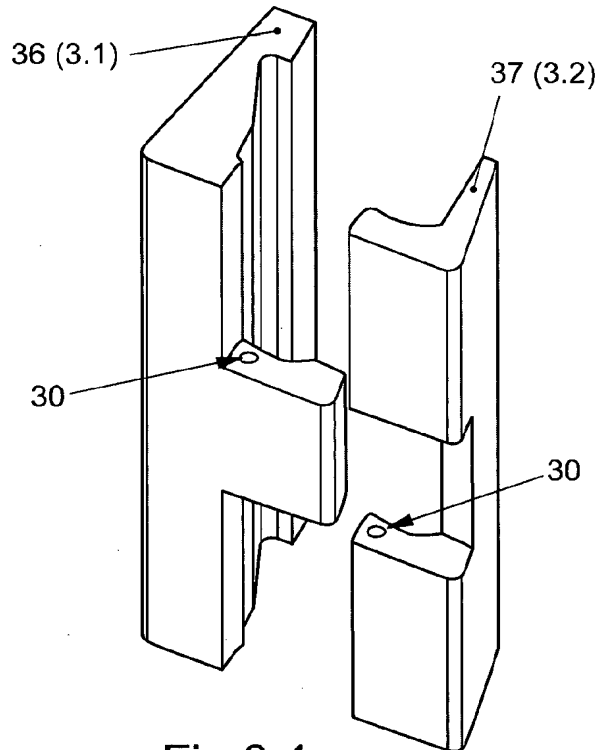
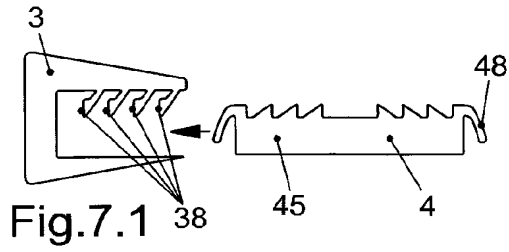
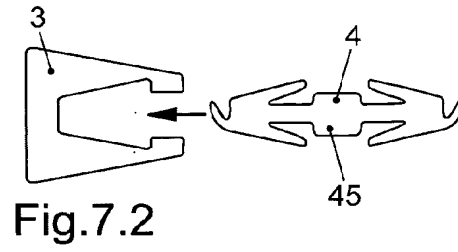
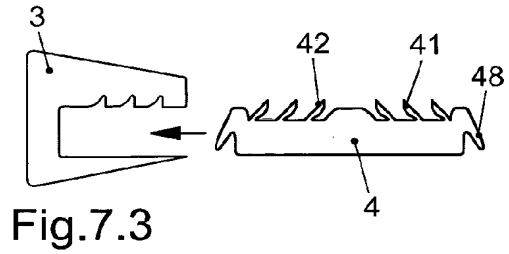
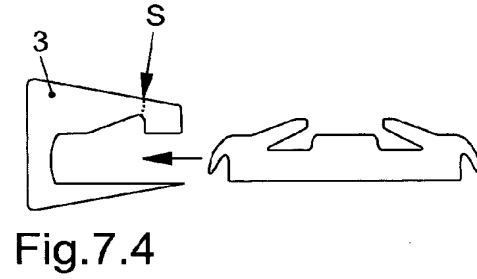
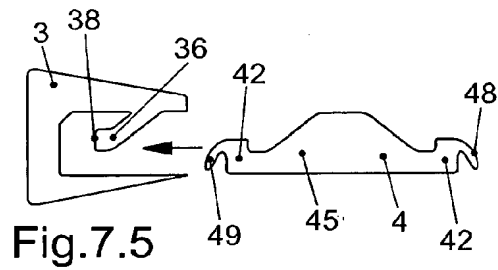
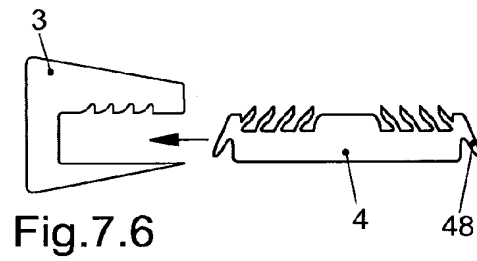
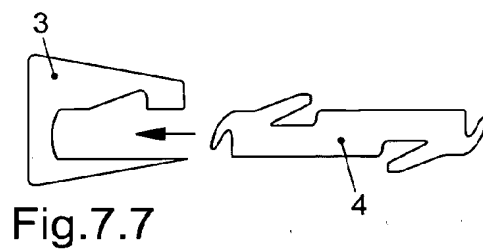
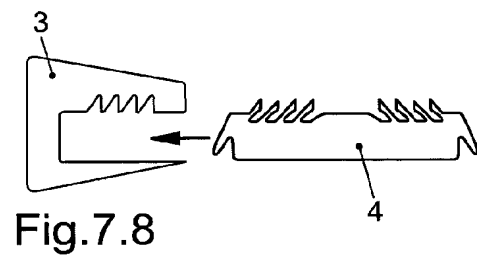
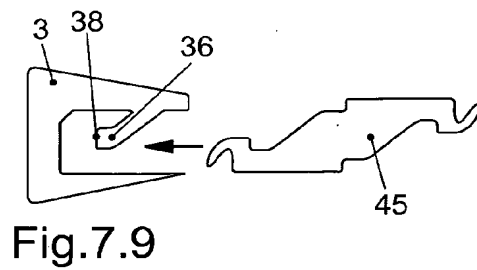
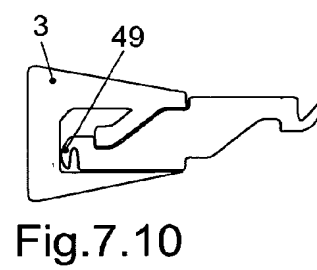


Fig. 6.4



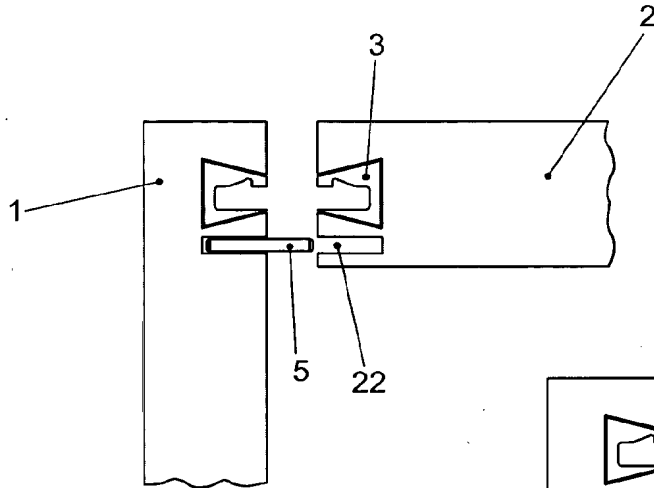


Fig. 8.1

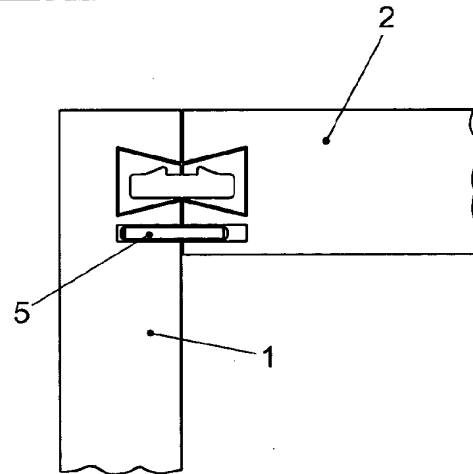


Fig. 8.2

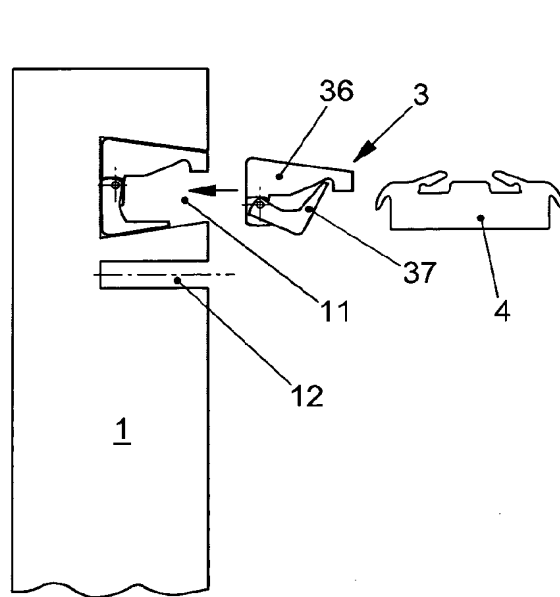


Fig. 9

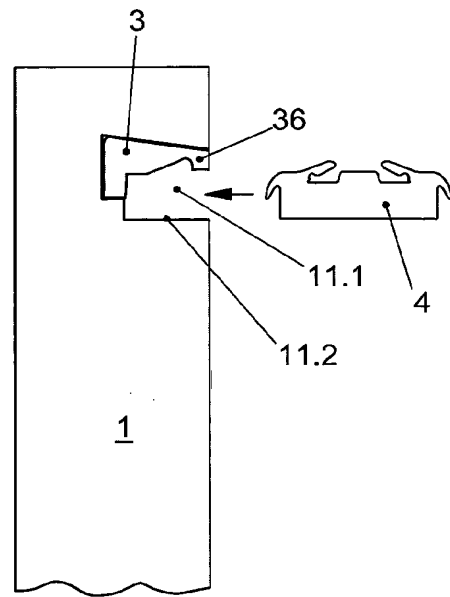


Fig. 10

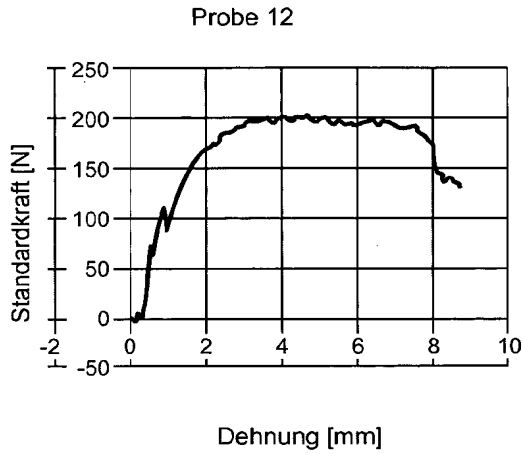


Fig.11.1

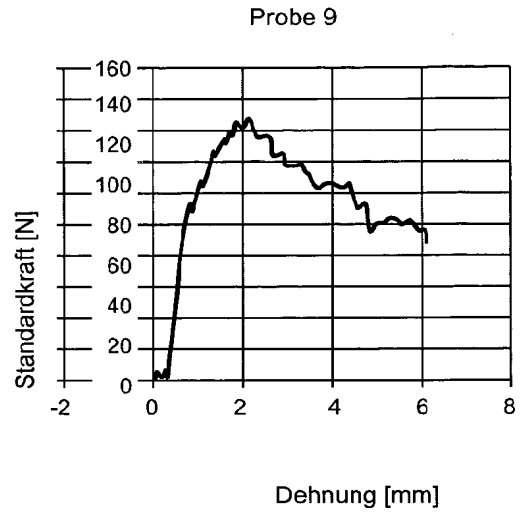


Fig.11.2

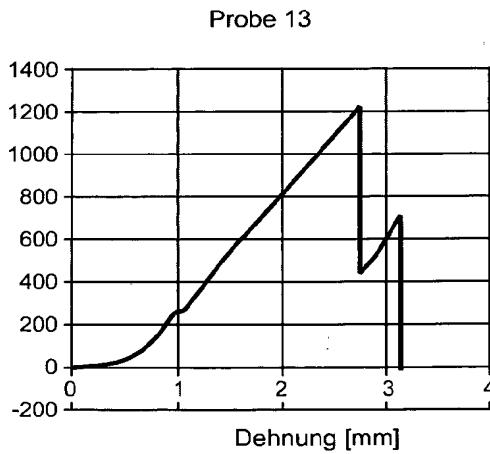


Fig.12.1

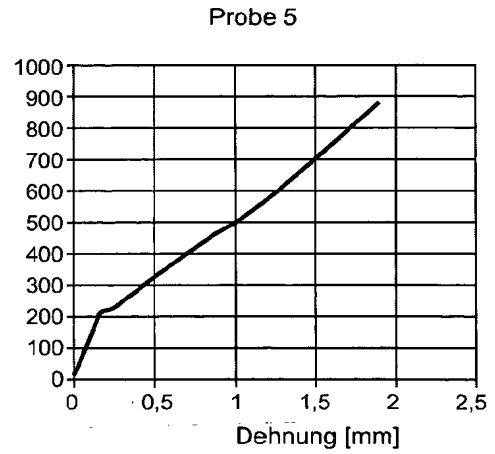


Fig.12.2

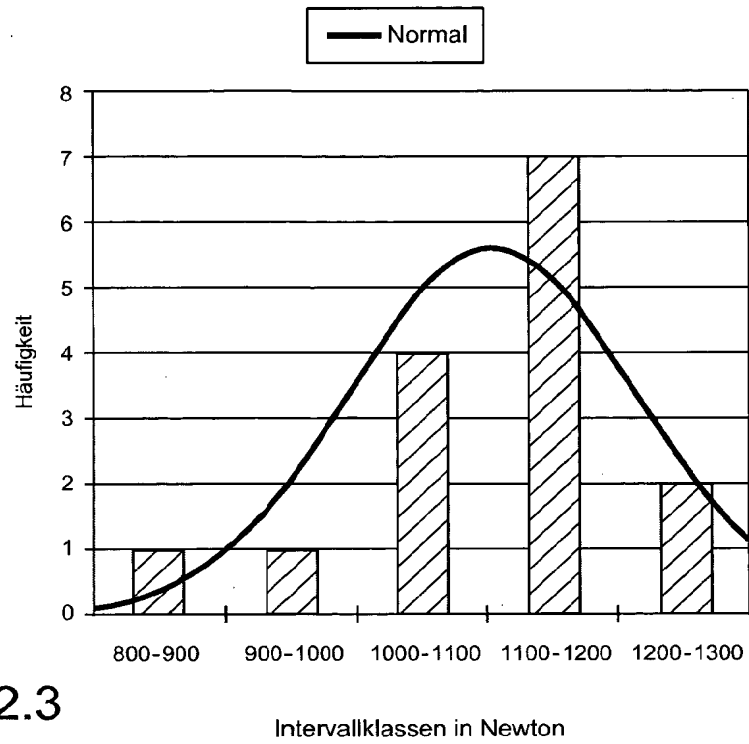


Fig.12.3

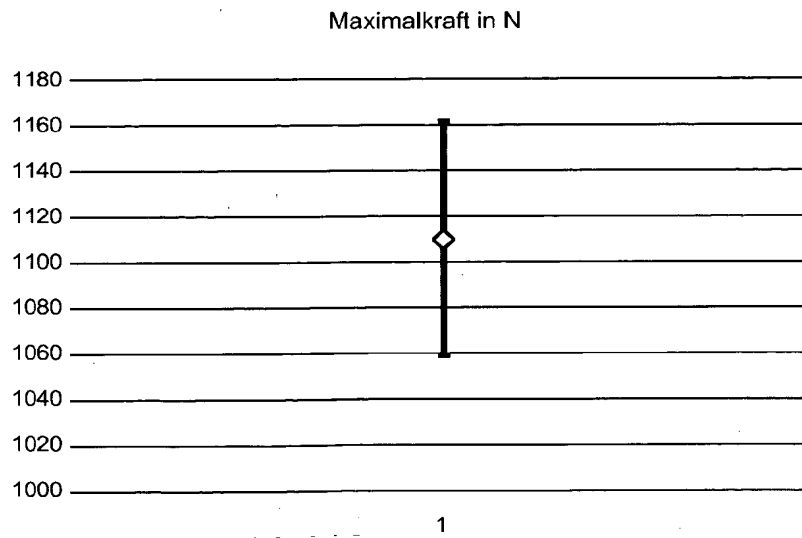


Fig.12.4

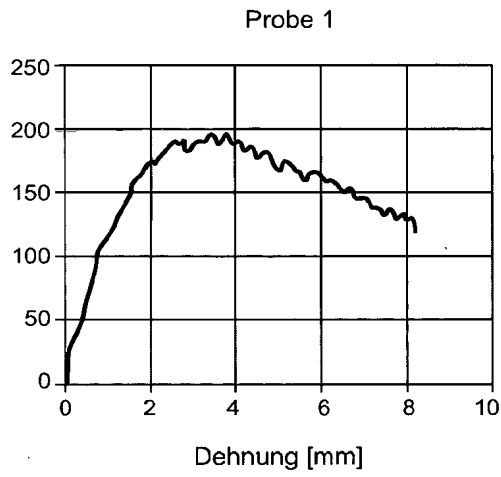


Fig.13.1

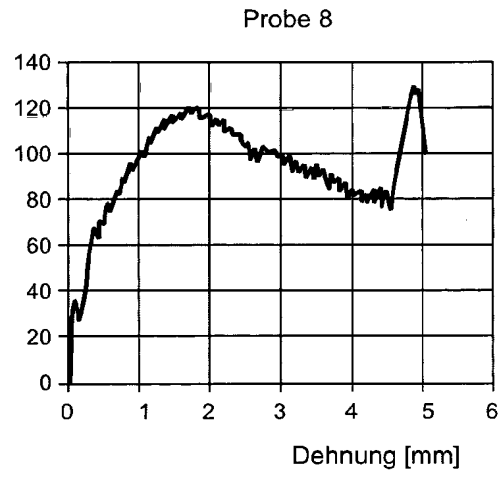


Fig.13.2

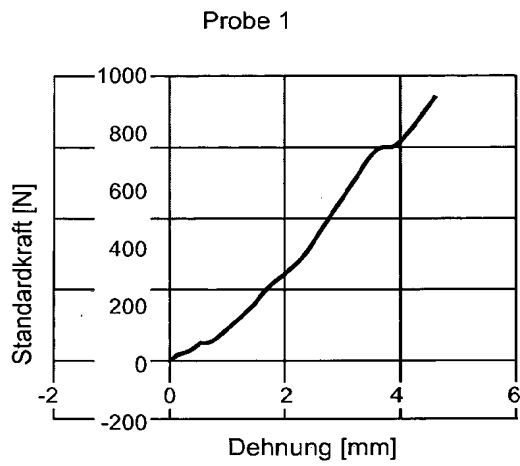


Fig.14.1

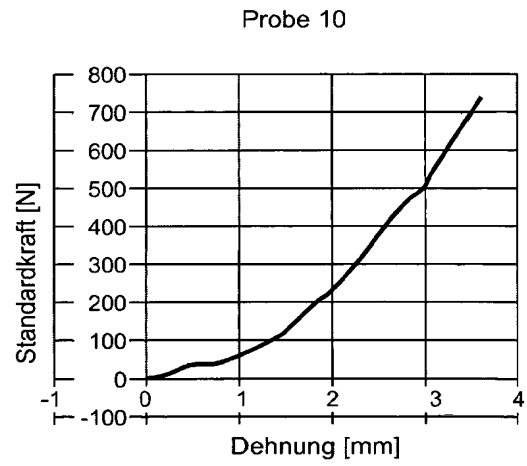


Fig.14.2

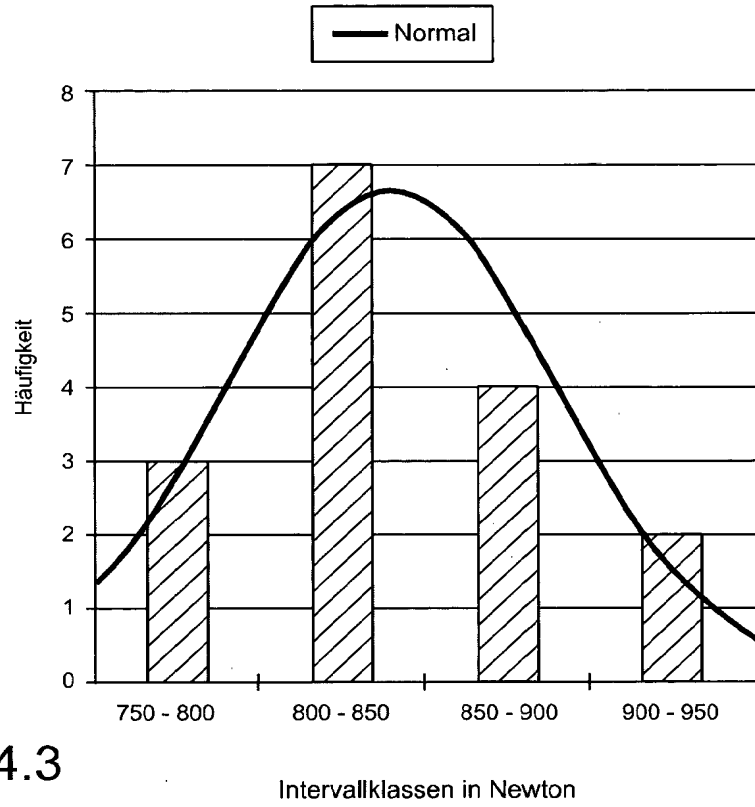


Fig.14.3

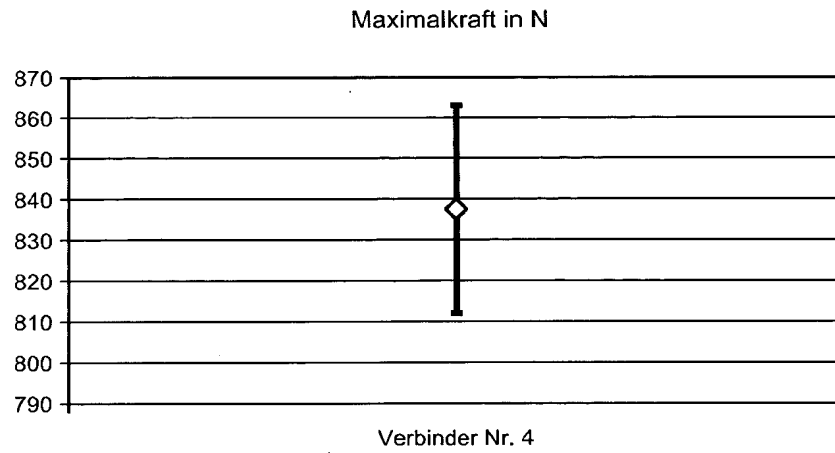


Fig.14.4

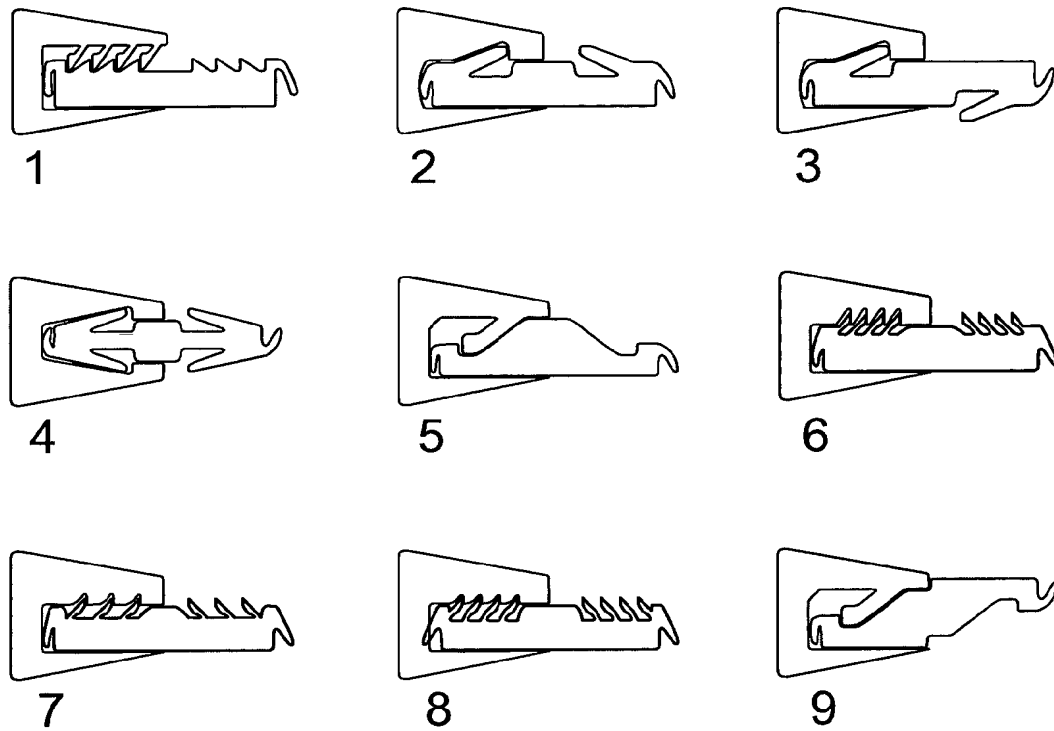
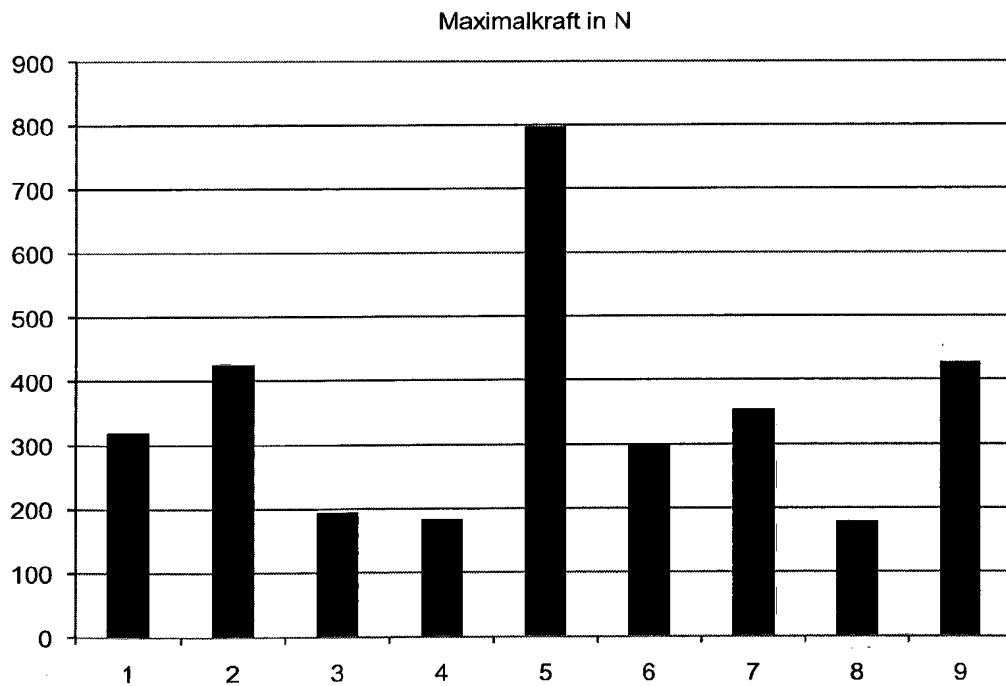


Fig.15



EUROPÄISCHER RECHERCHENBERICHT

 Nummer der Anmeldung
EP 15 00 2827

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EINSCHLÄGIGE DOKUMENTE			
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Y	* Abbildungen 2,6,7,10,12 * * Seite 6, Zeilen 33-38 * * Seiten 6-7, Zeilen 40-3 *	3-5,9, 14,20-22	F16B12/26 F16B12/46
X	US 3 760 547 A (BRENNEMAN J) 25. September 1973 (1973-09-25)	1,3,4,14	
Y	* Abbildungen 3,10 *	3,4,14, 20-22	
Y,D	WO 2004/085765 A1 (KRONOTEC AG [CH]; GRAFENAUER THOMAS [FR]; LEWARK MATTHIAS [DE]) 7. Oktober 2004 (2004-10-07) * Abbildung 7 * * Seite 3, Zeilen 5-10 *	5,9	
			RECHERCHIERTE SACHGEBIETE (IPC)
			F16B A47B
Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt			
Recherchenort Den Haag		Abschlußdatum der Recherche 21. März 2016	Prüfer de Cornulier, P
KATEGORIE DER GENANNTEN DOKUMENTE X : von besonderer Bedeutung allein betrachtet Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie A : technologischer Hintergrund O : mündliche Offenbarung P : Zwischenliteratur		T : der Erfindung zugrunde liegende Theorien oder Grundsätze E : älteres Patentedokument, das jedoch erst am oder nach dem Anmeldedatum veröffentlicht worden ist D : in der Anmeldung angeführtes Dokument L : aus anderen Gründen angeführtes Dokument & : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument	

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EPO FORM 1503 03.82 (P04C03)

**ANHANG ZUM EUROPÄISCHEN RECHERCHENBERICHT
 ÜBER DIE EUROPÄISCHE PATENTANMELDUNG NR.**

EP 15 00 2827

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In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten europäischen Recherchenbericht angeführten Patentdokumente angegeben.
 Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am
 Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

21-03-2016

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EPO FORM P0481

Für nähere Einzelheiten zu diesem Anhang : siehe Amtsblatt des Europäischen Patentamts, Nr.12/82

IN DER BESCHREIBUNG AUFGEFÜHRTE DOKUMENTE

Diese Liste der vom Anmelder aufgeführten Dokumente wurde ausschließlich zur Information des Lesers aufgenommen und ist nicht Bestandteil des europäischen Patentdokumentes. Sie wurde mit größter Sorgfalt zusammengestellt; das EPA übernimmt jedoch keinerlei Haftung für etwaige Fehler oder Auslassungen.

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Espacenet

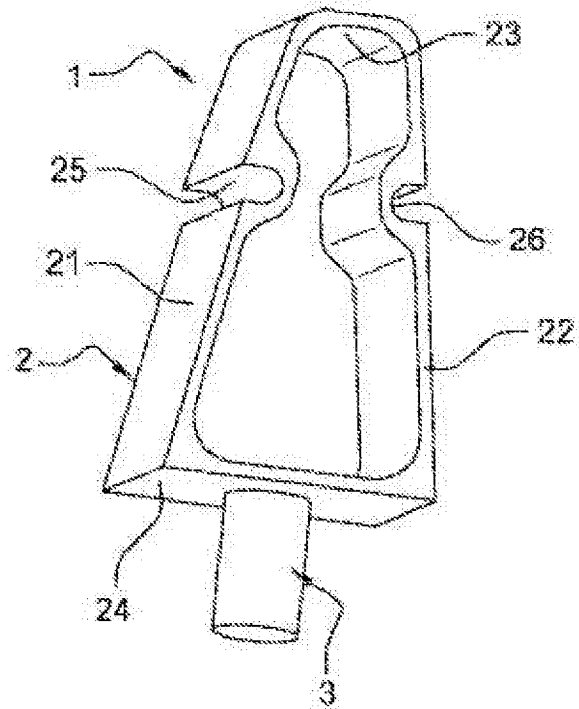
Bibliographic data: FR2968366 (A1) — 2012-06-08

Elastic fixing clip for assembling e.g. two structures of motor vehicle, has elastically deformable attaching part comprising side walls with relief parts to cooperate orifice of structure for reception and for blocking clip in orifice

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Applicant(s): PEUGEOT CITROEN AUTOMOBILES SA [FR] ± (PEUGEOT CITROEN AUTOMOBILES SA)
Classification: - **international:** *B62D65/02; F16B13/00; F16B2/22*
- **cooperative:** F16B21/086
Application number: FR20100060001 20101202
Priority number (s): FR20100060001 20101202
Also published as: FR2968366 (B1)

Abstract of FR2968366 (A1)

The clip (1) has an elastically deformable attaching part (2) formed in shape of a closed loop and comprising two side walls (21, 22) whose upper ends are joined by an upper wall (23) and lower ends are joined by a lower wall (24), respectively. The side walls include relief parts to cooperate with a mounting orifice of a structure for reception and for blocking the clip in the mounting orifice. The relief parts are provided with notches (25, 26) projecting toward inside the closed loop. The walls of the attaching part have same width and thickness. An independent claim is also included for a method for assembling a structure with a mounting orifice on another structure.



①② **DEMANDE DE BREVET D'INVENTION**

A1

②② Date de dépôt : 02.12.10.

③⑦ Priorité :

④③ Date de mise à la disposition du public de la
demande : 08.06.12 Bulletin 12/23.

⑤⑥ Liste des documents cités dans le rapport de
recherche préliminaire : *Se reporter à la fin du
présent fascicule*

⑥⑦ Références à d'autres documents nationaux
apparentés :

⑦① Demandeur(s) : *PEUGEOT CITROEN AUTOMOBILES
SA Société anonyme — FR.*

⑦② Inventeur(s) : *TRICHARD DOMINIQUE.*

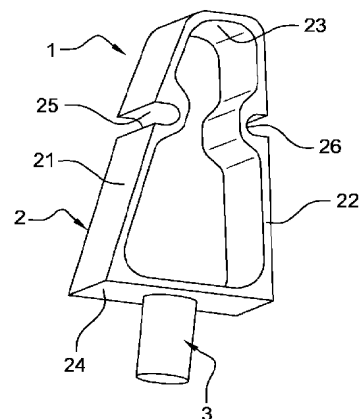
⑦③ Titulaire(s) : *PEUGEOT CITROEN AUTOMOBILES
SA Société anonyme.*

⑦④ Mandataire(s) : *PEUGEOT CITROEN AUTOMOBILES
SA.*

⑤④ **CLIP DE FIXATION ELASTIQUE.**

⑤⑦ L'invention concerne un clip de fixation élastique (1) comprenant une pièce de fixation (2) élastiquement déformable présentant une forme générale de boucle fermée et comportant deux parois latérales (21, 22) jointes, d'une part, à leurs extrémités supérieures par une paroi supérieure (23) et, d'autre part, à leurs extrémités inférieures par une paroi inférieure (24), où les parois latérales (21, 22) présentent chacune une partie en relief (25; 26) apte à coopérer avec un orifice de montage d'une structure pour la réception et le blocage dudit clip de fixation élastique (1) dans ledit orifice de montage.

La présente invention trouve une application dans le domaine automobile.



FR 2 968 366 - A1



CLIP DE FIXATION ELASTIQUE

La présente invention se rapporte à un clip de fixation élastique, à un assemblage de structure utilisant un tel clip et à un procédé d'assemblage
5 associé.

Dans le domaine automobile, il est classique d'employer des clips de fixation élastique pour assembler entre elles deux structures.

Il est connu, notamment du document FR 2 941 505 A1, d'employer des clips de fixation du type harpon, c'est-à-dire présentant un pied
10 central présentant une extrémité inférieure solidaire d'une structure et une extrémité supérieure de laquelle fait saillie des ailettes latérales élastiquement déformables. Les ailettes latérales de ces clips harpons n'ont pas de jonction avec le pied central en partie basse.

Le montage d'un clip harpon dans un orifice de montage d'une
15 autre structure se fait avec un effet de rétractation ou fléchissement des ailettes latérales lors de la poussée du clip harpon dans l'orifice de montage qui présente des dimensions réduites par rapport au clip harpon.

Pour le démontage du clip harpon hors de l'orifice de montage, il est classique d'employer un outil de démontage, tel qu'un tournevis à tête
20 plate, afin d'agir sur chacune des ailettes latérales du clip harpon pour les replier sur le pied central de manière à permettre aux ailettes latérales de repasser les dimensions réduites de l'orifice de montage et ainsi libérer l'assemblage. Lors de ce démontage, l'opérateur replie une ailette latérale, puis fait basculer le clip harpon après passage de cette ailette latérale avant de
25 passer à une autre ailette latérale.

Cependant, la Demanderesse a constaté que les ailettes latérales perdent une partie de leur effet ressort, c'est-à-dire leur capacité intrinsèque à recouvrir leur position de repos, après un premier montage et démontage et, en conséquence, les clips harpons perdent leurs qualités mécaniques
30 d'assemblage après quelques montages et démontages.

Dans un véhicule automobile, les structures assemblées avec les clips harpons subissent beaucoup de vibrations du fait du roulage du véhicule, et alors les structures assemblées entrent en mouvement car, comme décrit ci-dessus, les clips harpons n'offrent plus une jonction suffisamment robuste
35 après quelques montages et démontages. Pour pallier ce problème, il est connu d'intercaler entre les deux structures une couche de mousse qui va

s'affranchir du problème temporairement car, lorsque cette couche mousse aura perdu de son effet par l'attrition naturelle, le défaut initial revient naturellement.

La présente invention a pour but de résoudre en tout ou partie ces problèmes en proposant un clip de fixation élastique permettant de réaliser
5 plusieurs séries de montage et de démontage sans pour autant nuire aux qualités mécaniques d'assemblage du clip, et permettant de simplifier et accélérer les démarches de montage et de démontage du clip.

A cet effet, elle propose un clip de fixation élastique comprenant
10 une pièce de fixation élastiquement déformable présentant une forme générale de boucle fermée et comportant deux parois latérales jointes, d'une part, à leurs extrémités supérieures par une paroi supérieure et, d'autre part, à leurs extrémités inférieures par une paroi inférieure, où les parois latérales présentent chacune une partie en relief apte à coopérer avec un orifice de
15 montage d'une structure pour la réception et le blocage dudit clip de fixation élastique dans ledit orifice de montage.

Ainsi, le clip conforme à l'invention ne présente pas de pied central s'étendant sur toute la hauteur du clip, mais présente une pièce de fixation constituée de quatre parois (latérales, supérieure et inférieure) formant
20 ensemble une boucle fermée qui lui confère une souplesse et un effet dit élastique avec mémoire de forme qui contribuent à obtenir un clip utilisable de multiples fois sans perte de qualités mécaniques.

Le clip conforme à l'invention permet de réaliser un montage et un démontage par le biais de la déformation géométrique et élastique avec retour
25 à la forme initiale de la boucle fermée ; ce retour à la forme initiale étant plus ou moins obtenu suivant le type de matériau élastiquement déformable utilisé pour la pièce de fixation.

C'est la géométrie en boucle fermée de la pièce de fixation qui permet de réaliser un effet type élastique, par le fait d'une configuration creuse
30 qui contribue à obtenir un effet type poche.

Selon une caractéristique, les parties en relief des parois latérales sont constituées d'encoches saillantes vers l'intérieur de la boucle fermée. Ces encoches sont particulièrement avantageuses pour venir se bloquer sur la paroi de pourtour de l'orifice de montage de la structure à assembler.

35 Selon une autre caractéristique, les parois supérieure, inférieure et latérales de la pièce de fixation présentent sensiblement la même largeur,

garantissant ainsi une tenue mécanique équilibrée dans toute la pièce de fixation.

Dans une réalisation particulière, les parois supérieure, inférieure et latérales de la pièce de fixation présentent sensiblement la même épaisseur, permettant ainsi d'obtenir une bonne répartition des efforts dans toute la pièce de fixation.

Avantageusement, la paroi inférieure présente une longueur supérieure à celle de la paroi supérieure de sorte que la pièce de fixation se termine substantiellement en pointe. Il est bien entendu que cette terminaison substantielle en pointe signifie que les parois latérales convergent l'une vers l'autre en direction de la paroi supérieure, permettant ainsi de faciliter l'introduction de la pièce de fixation dans l'orifice de montage de la structure.

Dans un mode de réalisation particulier, le clip comprend en outre un organe d'embase, notamment du type plot ou pion, faisant saillie de la paroi inférieure vers l'extérieur de la boucle fermée. Cet organe d'embase sert à la fixation sur l'autre structure à assembler.

Selon une possibilité de l'invention, la pièce de fixation est réalisée d'un seul tenant dans une matière plastique.

L'invention se rapporte également à un assemblage d'une première structure présentant au moins un orifice de montage sur une seconde structure, ledit assemblage comportant au moins un clip de fixation élastique conforme à l'invention, dans lequel la paroi inférieure de la pièce de fixation dudit clip de fixation élastique est fixée sur la seconde structure et ladite pièce de fixation est réceptionnée dans l'orifice de montage de la première structure avec les parties en relief des parois latérales qui coopèrent avec ledit orifice de montage pour bloquer la pièce de fixation dans ledit orifice de montage.

L'invention concerne aussi un procédé d'assemblage d'une première structure présentant au moins un orifice de montage sur une seconde structure, ledit procédé consistant à utiliser au moins un clip de fixation élastique conforme à l'invention selon les étapes suivantes :

- fixation de la paroi inférieure de la pièce de fixation dudit clip de fixation élastique sur la seconde structure ; et
- réception de ladite pièce de fixation dans l'orifice de montage de la première structure avec les parties en relief des parois latérales qui coopèrent avec ledit orifice de montage pour bloquer la pièce de fixation dans ledit orifice de montage.

D'autres caractéristiques et avantages de la présente invention apparaîtront à la lecture de la description détaillée ci-après, d'un exemple de mise en œuvre non limitatif, faite en référence aux figures annexées dans lesquelles :

- 5 - la figure 1 est une vue schématique en perspective d'un clip de fixation élastique conforme à l'invention ;
- la figure 2a est une vue schématique de face du clip de la figure 1 ;
- la figure 2b est une vue schématique de côté du clip de la figure 1 ;
- la figure 2c est une vue schématique de dessus du clip de la figure 1 ;
- 10 - la figure 3a est une vue schématique en perspective de dessus du clip de la figure 1 réceptionné et bloqué dans un orifice de montage d'une structure à assembler ;
- la figure 3b est une vue schématique en perspective de dessous du clip de la figure 1 réceptionné et bloqué dans un orifice de montage
- 15 d'une structure à assembler.

- En référence aux figures 1 à 2c, un clip 1 de fixation élastique conforme à l'invention comporte une pièce de fixation 2 réalisée dans un matériau élastiquement déformable et formant une boucle fermée constituée de quatre parois 21, 22, 23, 24 sensiblement plates (c'est-à-dire présentant
- 20 une épaisseur réduite comparativement à leur longueur et à leur largeur) dont :
- deux parois latérales 21, 22 présentant chacune une encoche 25, 26 saillante vers l'intérieur de la boucle fermée ;
 - une paroi supérieure 23 joignant entre elles les extrémités supérieures des parois latérales 21, 22 ; et
 - 25 - une paroi inférieure 24 joignant entre elles les extrémités inférieures des parois latérales 21, 22.

La pièce de fixation 2 présente une forme générale trapézoïdale avec les quatre parois 21, 22, 23, 24 qui définissent les cotés du trapèze, avec la paroi inférieure 24 qui est parallèle à la paroi supérieure 23, la paroi

30 inférieure 24 qui présente une longueur supérieure à celle de la paroi supérieure 23 et les parois latérales 21, 22 qui convergent l'une vers l'autre en direction de la paroi supérieure 23 de sorte que la pièce de fixation 2 se termine substantiellement en pointe en partie supérieure.

Les parois 21, 22, 23, 24 de la pièce de fixation 2 présentent

35 sensiblement la même largeur et la même épaisseur, sauf au niveau des coins qui présentent des surépaisseurs pour renforcer la pièce de fixation 2.

Le clip 1 comprend en outre un organe d'embase 3, notamment du type plot ou pion, faisant saillie de la paroi inférieure 24 de la pièce de fixation 2 vers l'extérieur de la boucle fermée.

Le clip 1 peut être constitué d'un seul tenant dans un matériau
5 plastique (par exemple par moulage d'une matière plastique) ou métallique.

En référence aux figures 3a et 3b, l'assemblage d'une première structure 4 sur une seconde structure (non illustrée) se fait comme suit, avec la première structure 4 qui présente un orifice de montage 40 destiné à
10 réceptionner la pièce de fixation 2 du clip 1.

Dans un premier temps, l'organe d'embase 3 est fixé sur la seconde structure, notamment par collage (pour un clip en matériau plastique ou métallique) ou par soudage (pour un clip en matériau métallique) tel que le soudage par ultrason.

Le clip 1 peut se passer de l'organe d'embase 3, de sorte que c'est
15 la paroi inférieure 24, de préférence lisse, de la pièce de fixation 2 qui est fixée sur la seconde structure, notamment par collage (pour un clip en matériau plastique ou métallique) ou par soudage (pour un clip en matériau métallique) tel que le soudage par ultrason.

Il est bien évident que d'autres moyens de fixation ou de
20 solidarisation du clip 1 sur la seconde structure peuvent être envisagés, comme par exemple prévoir que le clip 1 vienne de matière avec la seconde structure ou prévoir une solution par vissage.

Dans un second temps, la seconde structure est rapprochée de la première structure 4 afin que la pièce de fixation 2 du clip 1 s'engage dans
25 l'orifice de montage 40. Lors de cet engagement ou insertion, sous l'effet de la poussée exercée par la paroi de pourtour de cet orifice de montage 40, les parois latérales 21, 22 de la pièce de fixation 2 se déforment et fléchissent vers l'intérieur de la boucle fermée ; plus précisément la pièce de fixation 2 dans son ensemble se déforme élastiquement à la manière d'une poche compressée, les parois supérieure 23 et inférieure 24 pouvant également se
30 déformer.

Dans un troisième temps, les encoches 25, 26 se trouvent au niveau de la paroi de pourtour de l'orifice de montage 40, et alors la pièce de fixation 2 recouvre naturellement sa forme initiale de repos et les encoches 25,
35 26 s'engagent autour de la paroi de pourtour de l'orifice de montage 40 pour bloquer la pièce de fixation 2 et le clip 1 à l'intérieur de cet orifice de montage

40, assurant ainsi l'assemblage de la seconde structure sur la première structure 4.

5 A titre d'exemple non limitatif, les deux structures à assembler peuvent être constituées d'un réservoir de carburant et d'un déflecteur, d'un carter moteur et d'un flasque latéral, d'une pièce de carrosserie et d'une pièce d'habillage, de garniture ou de décoration.

10 Bien entendu l'exemple de mise en œuvre évoqué ci-dessus ne présente aucun caractère limitatif et d'autres améliorations et détails peuvent être apportés au clip selon l'invention, sans pour autant sortir du cadre de l'invention où d'autres formes en boucle fermée peuvent par exemple être réalisées pour la pièce de fixation.

REVENDEICATIONS

1. Clip de fixation élastique (1) comprenant une pièce de fixation (2)
5 élastiquement déformable présentant une forme générale de boucle fermée
et comportant deux parois latérales (21, 22) jointes, d'une part, à leurs
extrémités supérieures par une paroi supérieure (23) et, d'autre part, à leurs
extrémités inférieures par une paroi inférieure (24), où les parois latérales
10 (21, 22) présentent chacune une partie en relief (25 ; 26) apte à coopérer
avec un orifice de montage (40) d'une structure (4) pour la réception et le
blocage dudit clip de fixation élastique (1) dans ledit orifice de montage (40).

2. Clip de fixation élastique (1) selon la revendication 1, dans lequel les
parties en relief des parois latérales (21, 22) sont constituées d'encoches
15 (25, 26) saillantes vers l'intérieur de la boucle fermée.

3. Clip de fixation élastique (1) selon les revendications 1 ou 2, dans
lequel les parois supérieure (23), inférieure (24) et latérales (21, 22) de la
pièce de fixation (2) présentent sensiblement la même largeur.
20

4. Clip de fixation élastique (1) selon l'une quelconque des
revendications 1 à 3, dans lequel les parois supérieure (23), inférieure (24)
et latérales (21, 22) de la pièce de fixation (2) présentent sensiblement la
même épaisseur.
25

5. Clip de fixation élastique (1) selon l'une quelconque des
revendications 1 à 4, dans lequel la paroi inférieure (24) présente une
longueur supérieure à celle de la paroi supérieure (23) de sorte que la pièce
de fixation (2) se termine substantiellement en pointe.
30

6. Clip de fixation élastique (1) selon l'une quelconque des
revendications 1 à 5, comprenant en outre un organe d'embase (3),
notamment du type plot ou pion, faisant saillie de la paroi inférieure (24) de
la pièce de fixation (2) vers l'extérieur de la boucle fermée.
35

7. Clip de fixation élastique (1) selon l'une quelconque des revendications 1 à 6, dans lequel la pièce de fixation (2) est réalisée d'un seul tenant dans une matière plastique ou métallique.

5 8. Assemblage d'une première structure (4) présentant au moins un
orifice de montage (40) sur une seconde structure, ledit assemblage
comportant au moins un clip de fixation élastique (1) conforme à l'une
quelconque des revendications 1 à 7, dans lequel la paroi inférieure (24) de
la pièce de fixation (2) dudit clip de fixation élastique (1) est fixée sur la
10 la seconde structure et ladite pièce de fixation (2) est réceptionnée dans
l'orifice de montage (40) de la première structure (4) avec les parties en
relief (25, 26) des parois latérales (21, 22) qui coopèrent avec ledit orifice de
montage (40) pour bloquer la pièce de fixation (2) dans ledit orifice de
montage (40).

15 9. Procédé d'assemblage d'une première structure (4) présentant au
moins un orifice de montage (40) sur une seconde structure, ledit procédé
consistant à utiliser au moins un clip de fixation élastique (1) conforme à
l'une quelconque des revendications 1 à 7 selon les étapes suivantes :
20 - fixation de la paroi inférieure (24) de la pièce de fixation (2) dudit clip de
fixation élastique (1) sur la seconde structure ; et
- réception de ladite pièce de fixation (2) dans l'orifice de montage (40) de
la première structure (4) avec les parties en relief (25, 26) des parois
latérales (21, 22) qui coopèrent avec ledit orifice de montage (40) pour
25 bloquer la pièce de fixation (2) dans ledit orifice de montage (40).

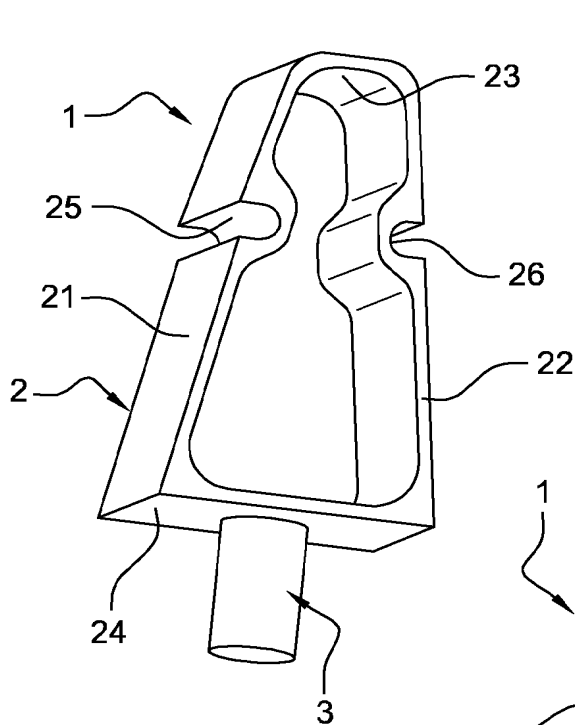


Fig. 1

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Fig. 2c

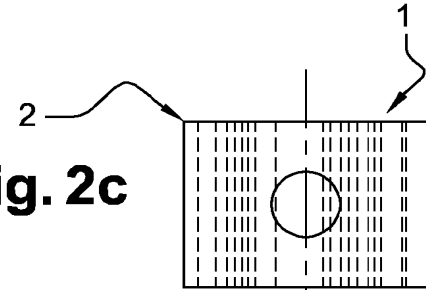


Fig. 2b

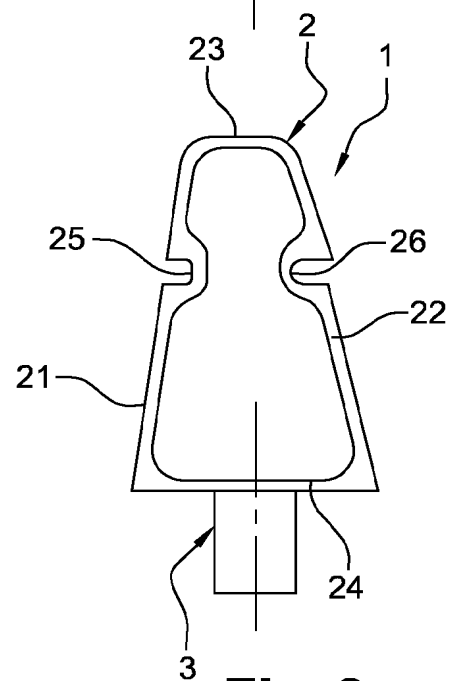


Fig. 2a

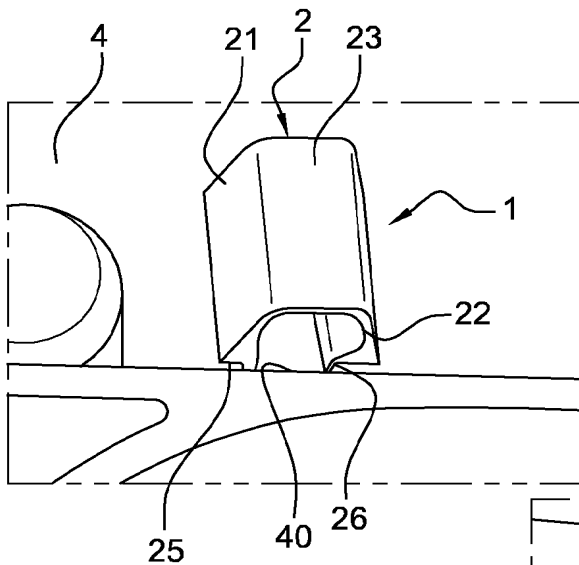
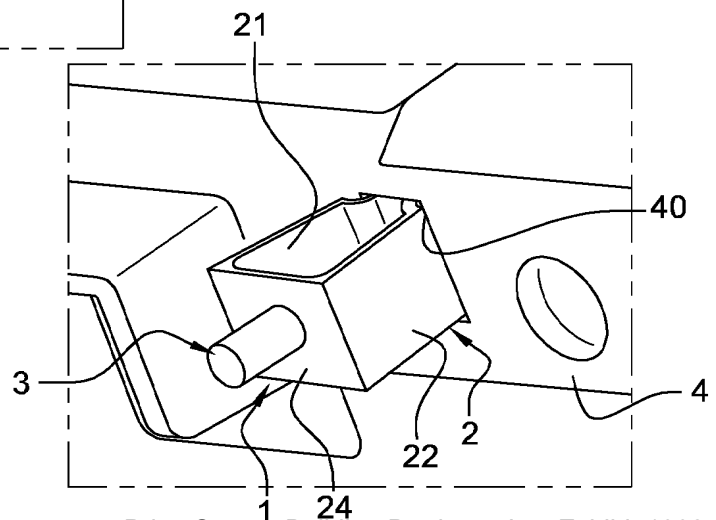


Fig. 3a

Fig. 3b





RAPPORT DE RECHERCHE PRÉLIMINAIRE

établi sur la base des dernières revendications
déposées avant le commencement de la recherche

N° d'enregistrement
national

FA 744864
FR 1060001

DOCUMENTS CONSIDÉRÉS COMME PERTINENTS		Revendication(s) concernée(s)	Classement attribué à l'invention par l'INPI
Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes		
X	JP H05 73307 U (TOYOTA AUTO BODY CO., LTD.) 8 octobre 1993 (1993-10-08) * figures *	1-9	F16B2/22 F16B13/00 B62D65/02
X	JP 55 086913 A (INOUE GOMU KOGYO KK) 1 juillet 1980 (1980-07-01) * figures *	1-9	
X	US 3 760 547 A (BRENNEMAN J) 25 septembre 1973 (1973-09-25) * colonne 4, ligne 23-40; figures 1,11 *	1-9	
X	GB 1 237 651 A (ILLINOIS TOOL WORKS [US]) 30 juin 1971 (1971-06-30) * page 2, ligne 110 - page 3, ligne 3; figure 10 *	1-9	
X	US 2008/298925 A1 (SHINOZAKI NOBUYA [JP]) 4 décembre 2008 (2008-12-04) * abrégé; figure 21 *	1-9	
X	US 3 621 751 A (FIORENTINO ARTHUR A) 23 novembre 1971 (1971-11-23) * colonne 2, ligne 43-69; figure 1 *	1-9	DOMAINES TECHNIQUES RECHERCHÉS (IPC) F16B
X	EP 1 596 076 A1 (LISI AUTOMOTIVE RAPID [FR]) 16 novembre 2005 (2005-11-16) * abrégé; figures 2-3 *	1-9	
X	DE 296 09 198 U1 (CAMLOC GMBH [DE]) 12 septembre 1996 (1996-09-12) * page 6, alinéa 2; figures 1a-3 *	1-9	
Date d'achèvement de la recherche		Examineur	
19 juillet 2011		Pöll, Andreas	
<p>CATÉGORIE DES DOCUMENTS CITÉS</p> <p>X : particulièrement pertinent à lui seul Y : particulièrement pertinent en combinaison avec un autre document de la même catégorie A : arrière-plan technologique O : divulgation non-écrite P : document intersalaire</p> <p>T : théorie ou principe à la base de l'invention E : document de brevet bénéficiant d'une date antérieure à la date de dépôt et qui n'a été publié qu'à cette date de dépôt ou qu'à une date postérieure. D : cité dans la demande L : cité pour d'autres raisons & : membre de la même famille, document correspondant</p>			

1

EPO FORM 1503 12.99 (P04C14)

**ANNEXE AU RAPPORT DE RECHERCHE PRÉLIMINAIRE
RELATIF A LA DEMANDE DE BREVET FRANÇAIS NO. FR 1060001 FA 744864**

La présente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche préliminaire visé ci-dessus.

Les dits membres sont contenus au fichier informatique de l'Office européen des brevets à la date du **19-07-2011**

Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office européen des brevets, ni de l'Administration française

Document brevet cité au rapport de recherche		Date de publication	Membre(s) de la famille de brevet(s)	Date de publication
JP H0573307	U	08-10-1993	AUCUN	
JP 55086913	A	01-07-1980	JP 1384348 C JP 61051163 B	26-06-1987 07-11-1986
US 3760547	A	25-09-1973	AUCUN	
GB 1237651	A	30-06-1971	DE 1924074 A1 FR 2008420 A1 NL 6907373 A SE 360908 B US 3485133 A	04-12-1969 23-01-1970 17-11-1969 08-10-1973 23-12-1969
US 2008298925	A1	04-12-2008	AUCUN	
US 3621751	A	23-11-1971	AUCUN	
EP 1596076	A1	16-11-2005	AUCUN	
DE 29609198	U1	12-09-1996	AUCUN	

EPO FORM P0465

Pour tout renseignement concernant cette annexe : voir Journal Officiel de l'Office européen des brevets, No.12/82

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE			
First Named Inventor/Applicant Name:	ROGER A. VANDENBERG			
Filer:	Gregory P. Bondarenko/Annette Thompson			
Attorney Docket Number:	061470.179271-US			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	1	230	230
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1015

Electronic Acknowledgement Receipt

EFS ID:	32923574
Application Number:	16011213
International Application Number:	
Confirmation Number:	1023
Title of Invention:	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE
First Named Inventor/Applicant Name:	ROGER A. VANDENBERG
Customer Number:	24335
Filer:	Gregory P. Bondarenko/Annette Thompson
Filer Authorized By:	Gregory P. Bondarenko
Attorney Docket Number:	061470.179271-US
Receipt Date:	18-JUN-2018
Filing Date:	
Time Stamp:	17:00:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	\$ 1015
RAM confirmation Number	061918INTEFSW17005700
Deposit Account	
Authorized User	

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

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1384202	no	9
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Information:					
2		Specification.pdf	254970	yes	62
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	Specification		1	53	
	Claims		54	61	
	Abstract		62	62	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	179271Drawings.pdf	520051	no	16
			52a3a578a78a28287a191c2fb910bf374a045f1f		
Warnings:					
Information:					
4	Oath or Declaration filed	SignedDeclaration.pdf	112676	no	1
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Warnings:					
Information:					
5	Power of Attorney	SignedPOA.pdf	105264	no	1
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PrimeSource Building Products, Inc. Exhibit 1002					

Warnings:					
Information:					
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PrimeSource Building Products, Inc. Exhibit 1002					

13	Foreign Reference	FR2968366.pdf	608448	no	14
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Information:					
Total Files Size (in bytes):			10824881		

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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.

Electronic Acknowledgement Receipt

EFS ID:	32923574
Application Number:	16011213
International Application Number:	
Confirmation Number:	1023
Title of Invention:	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE
First Named Inventor/Applicant Name:	ROGER A. VANDENBERG
Customer Number:	24335
Filer:	Gregory P. Bondarenko/Annette Thompson
Filer Authorized By:	Gregory P. Bondarenko
Attorney Docket Number:	061470.179271-US
Receipt Date:	18-JUN-2018
Filing Date:	
Time Stamp:	17:00:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	\$ 1015
RAM confirmation Number	061918INTEFSW17005700
Deposit Account	
Authorized User	

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

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1384202	no	9
			8ba364201f4b2cfba5381052ce62e7ac1d3517f9		
Warnings:					
Information:					
2		Specification.pdf	254970	yes	62
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	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	53	
	Claims		54	61	
	Abstract		62	62	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	179271Drawings.pdf	520051	no	16
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Information:					
4	Oath or Declaration filed	SignedDeclaration.pdf	112676	no	1
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Warnings:					
Information:					
5	Power of Attorney	SignedPOA.pdf	105264	no	1
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PrimeSource Building Products, Inc. Exhibit 1002					

Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	1321680	no	13
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12	Foreign Reference	EP3150083.pdf	1100055	no	27
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PrimeSource Building Products, Inc. Exhibit 1002					

13	Foreign Reference	FR2968366.pdf	608448	no	14
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Warnings:					
Information:					
17	Fee Worksheet (SB06)	fee-info.pdf	36889	no	2
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Warnings:					
Information:					
Total Files Size (in bytes):			10824881		

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New International Application Filed with the USPTO as a Receiving Office

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

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

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

Inventor Information:

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Roger	A.	Vandenberg			
Residence Information (Select One) • ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Hudsonville	State/Province	MI	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	3032 - 24th Avenue					
Address 2						
City	Hudsonville	State/Province	MI			
Postal Code	49426	Country	US			
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	24335		
Email Address	patents@wnj.com	Add Email	Remove Email

Application Information:

Title of the Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		
Attorney Docket Number	061470.179271	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	16	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	24335		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

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

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62674247	2018-05-21

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62635745	2018-02-27
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62545709	2017-08-15
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation in part of	29648131	2018-05-18
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation in part of	29649771	2018-06-01
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

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

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	061470.179271
		Application Number	
Title of Invention	HIDDEN FASTENER UNIT AND RELATED METHOD OF USE		

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HIDDEN FASTENER UNIT AND RELATED METHOD OF USE

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a fastener unit configured to fasten workpieces, such as boards, to support structures, such as joists, and more particularly to a fastener unit that engages a groove in the side of a board to secure the board to a support structure.

[0002] There are a variety of structures, such as decks, platforms and flooring, that include horizontal floors supported by an underlying support structure. The structures typically include boards that are placed side-by-side one another. The boards typically are arranged to extend cross support structures, such as joists, disposed under the boards at an angle, sometimes at a right angle. The boards usually are fastened to the joists using fasteners, such as nails or screws. The nails or screws can frequently become discolored over time, or can work themselves loose from the board and project upward from the board surface. Not only are these results aesthetically displeasing, they can present safety hazards.

[0003] Some manufacturers have developed hidden fastener systems that fit loosely within grooves of adjacent boards. These hidden fasteners typically include a biscuit-shaped upper plate having two horizontal flanges that fit into the grooves defined by the sides of adjacent deck boards, a single center hole through which a fastener extends to secure to the underlying joist, and a base that extends downward from the upper plate to an underlying joist. While the horizontal flanges can engage the grooves, these elements typically do not engage those grooves forcibly enough to tack the boards to the underlying joist and prevent them from moving during expansion and

contraction under changing temperatures. These systems typically also require a user to manually hold the plate in alignment with one or more grooves of the boards as the fastener is advanced, which can be cumbersome. Depending on the height of the base and the distance of the groove from the board lower surface, sometimes these items can be mismatched so that the flanges do not fit well in or align with the grooves. In addition, the flanges are of a fixed thickness so that if that thickness is mismatched relative to a groove, the plate cannot fit in the groove, let alone secure the board to the underlying joist. Further, where a support structure includes a double or triple joist, with two or more joists positioned immediately adjacent one another, the foregoing fastener systems might not be properly sized to conceal those joists or fit within the associated confined spaces.

[0004] Accordingly, there remains room for improvement in the field of fastener units that are configured to secure grooved boards to underlying support structures.

SUMMARY OF THE INVENTION

[0005] A fastener unit and related method to secure a board to a support is provided. The fastener unit includes a spacer block, a grip element extending from the spacer block and configured to fit in and engage a groove of the board, and at least one element extending from the spacer block, configured to secure the spacer block adjacent the groove to establish a gap between the board and another board.

[0006] In one embodiment, the element can be a resilient compression element that is vertically compressible so that portions of it can be compressed from an open mode to a compressed mode. In the compressed mode, the resilient compression

element is sized and dimensioned smaller than a width of the groove so that the element can fit within the groove. After placement in the groove, the portions can expand within the groove to forcibly engage the groove, thereby securing the resilient compression element and the joined spacer block adjacent the groove and a side surface of the board.

[0007] In a further embodiment, the resilient compression element extends laterally from the spacer body, and in the same direction as a portion of the grip element. Optionally, the grip element and resilient compression element can extend rearwardly, from a rearward face of the spacer body, an equal amount or distance. Further optionally, the resilient compression element can include a front edge that does not extend forwardly, from a forward face of the spacer body, while the grip element can extend forwardly another distance from the forward face of the spacer body.

[0008] In another embodiment, the spacer body is of a thickness extending from a forward face and a rearward face. The thickness can be optionally less than 0.200 inches, further optionally less than 0.250 inches, and even further optionally less than 0.500 inches to provide a corresponding gap between adjacent boards.

[0009] In still another embodiment, the resilient compression element includes first and second portions, optionally in the form of wings, plates, rounded sections, ellipsoids, polygonal elements, and the like, any of which can be referred to as wings herein, that function similar to resilient springs. These portions can be pinched toward one another, to convert the resilient compression element from an open mode to a compressed mode. In the compressed mode, the portions can be located in the groove of the board, which optionally can be 1/8 inch to 3/8 inch wide or other dimensions

depending on the application. When the portions are released, they can forcibly engage the groove to hold the fastener unit centered in the groove.

[0010] In even another embodiment, the resilient compression element can be joined with the spacer body at a fracturable joint. This fracturable joint can include a zone of weakness, such as a thinned region, a region with perforations or holes, an area with a brittle material, or some other weakening portion so that a user can manually break off the resilient compression element from the spacer body and fit the fastener unit in a particular location, for example, a confined space.

[0011] In yet another embodiment, the grip element can be in the form of a channel. Optionally, the channel can be a c-channel that is turned upside down so that its opening faces downward. Associated protrusions of the channel can be configured to engage a lower interior surface of the board groove and effectively bite into that surface when the fastener is tightened down, to pull the grip element and its protrusions into that surface. In turn, this provides enhanced securement of the board to the underlying support structure, such as a joist.

[0012] In a further embodiment, the fastener unit can be equipped with an additional resilient compression element, projecting from the spacer body on opposite lateral sides of the spacer body. The first and second resilient compression elements can cooperate to forcibly hold the spacer body and fastener unit in place adjacent the groove during installation of the fastener. In turn, because the unit is self-supported, a user can use both hands to manipulate a tool, such as a power drill, to install the fastener. Also, because the unit is self-supported, a user can place multiple fastener

units, place an adjacent board, and later come back to fasten down one or more boards with the fastener units.

[0013] In still a further embodiment, the spacer body defines a fastener hole that can include an upper portion and a lower portion. These upper and lower portions can have different diameters or dimensions to accommodate different screw types. In some cases the lower portion can include a diameter that is less than a diameter of the upper portion so that the tip of the screw can fit within the lower portion, while threads above that tip can fit within the upper portion. Optionally, the screw can be partially threaded into engagement with the spacer body, and in particular the interior surfaces of a first fastener hole defined by the spacer body.

[0014] In still yet a further embodiment, the grip element can be constructed from a first material, such as a metal and/or composite, while the spacer body, resilient compression element and other features can be constructed from a polymeric material. The polymeric material can be overmolded to the grip element to secure the grip element thereto, with the grip element at least partially entrapped in the spacer body.

[0015] In even a further embodiment, a fastener unit can include a spacer body defining a first fastener hole having first and second different internal dimensions, a threaded fastener supported by the spacer body within the first fastener hole, a grip element joined with the spacer body and configured to fit within and engage a groove of a board, and first and second joist legs extending downward from the spacer body and configured to straddle and clampingly engage sides of an underlying joist.

[0016] In yet a further embodiment, the fastener unit can be constructed so that one or more joist legs are joined with the spacer body at a fracturable joint so that the

leg can be selectively manually removed, depending on the placement of the fastener unit relative to one or more joists or within other confining spaces.

[0017] In still yet a further embodiment, the fastener unit can include a spacer block and a grip element disposed transversely relative to the spacer block, extending from forward and rearward surfaces of the spacer block. A first joist leg can extend from a first lateral side of the spacer block and a second joist leg can extend from a second lateral side of the spacer block. The first and second joist legs extend outwardly and downwardly from the spacer block. One or both of the joist legs includes a stabilizer bar extending from the joist leg a predetermined distance. The stabilizer bar can be mounted below the spacer block and selectively positioned so that it can engage a bottom surface and/or side surface of a board, below a groove of the board, placed adjacent the fastener unit. In combination, the stabilizer bar, joist legs and/or the spacer body can engage one or more boards, adjacent which the spacer unit is placed, in multiple locations to thereby provide multiple points of contact with the spacer unit and those boards, and thereby stabilize the fastener unit in a particular orientation, optionally holding the fastener associated with the spacer unit in an upright, vertical orientation, ready for engagement by a tool.

[0018] In even a further embodiment, the fastener unit can include a spacer block and a grip element disposed transversely relative to the spacer block, extending from forward and rearward surfaces of the spacer block. A first joist leg can extend from a first lateral side of the spacer block and a second joist leg can extend from a second lateral side of the spacer block. The first and second joist legs extend outwardly and downwardly from the spacer block. The grip element can include one or more pressure

distribution feet at opposing ends of the grip element. When a fastener of the unit is tightened down, such a pressure distribution foot can ensure most of the force is distributed at one or more of the opposing ends of the grip element, rather than near the spacer body. With certain types of grooved boards having a chamfer under the groove along a board bottom surface, this force distribution, deep within the groove, can impair or prevent tipping of the board caused by the tightening down of the fastener unit.

[0019] In yet another embodiment, the fastener unit can include a spacer block and a grip element disposed transversely relative to the spacer block, extending from forward and rearward surfaces of the spacer block. A first joist leg can extend from a first lateral side of the spacer block and a second joist leg can extend from a second lateral side of the spacer block. The first and second joist legs extend outwardly and downwardly from the spacer block. The spacer block can be a timing spacer block that is of a predetermined height set so that the spacer block engages an underlying joist or other support, optionally while a fastener of the unit is being tightened down to draw the fastener unit toward the joist or other support. With this timing spacer block, the fastener unit does not engage the grip element against the interior surfaces of the groove in such a way so as to pull the groove downward with too much force, which may cause tipping of the board in some circumstances.

[0020] The current embodiments of the fastener unit and related methods of use provide benefits in hidden fasteners that previously have been unachievable. For example, where the fastener unit includes a multi-dimensioned fastener hole defined by the spacer body, the spacer body can be configured to hold a fastener therein, yet not split or become damaged when the fastener is advanced through the spacer body.

Where the fastener includes one or more fracturable joints between the spacer body and one or more of the resilient compression elements, those elements can be easily removed and discarded from the unit to fit a particular joist combination or confined space. Where the unit includes the resilient compression element, that element can secure and hold the fastener unit in place adjacent the groove, without the need for additional hands to hold the unit. This can enable a user to place multiple fastener units along a board groove, install another board adjacent those units, and then come back and secure all the fastener units so that the boards are held in a fixed manner relative to the underlying support structure. Where the grip element is included having one or more downward protrusions or cleats, those elements can forcibly engage the groove to prevent the board from creeping or moving during expansion and contraction thereof during and under different temperatures. Where the spacer body is of diminished thickness, the entire fastener unit can be well concealed between adjacent boards, yet provide firm securement of those boards to underlying support structure, and provide a gap large enough to accommodate a fastener head passing between the boards.

[0021] These and other objects, advantages, and features of the invention will be more fully understood and appreciated by reference to the description of the current embodiment and the drawings.

[0022] Before the embodiments of the invention are explained in detail, it is to be understood that the invention is not limited to the details of operation or to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention may be implemented in various other embodiments and of being practiced or being carried out in alternative ways not

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BRIEF DESCRIPTION OF THE DRAWINGS

[0023] Fig. 1 is a perspective view of a current embodiment of the fastener unit with a fastener associated with the unit;

[0024] Fig. 2 is another perspective view of the fastener unit about to be installed in a first groove of a first board;

[0025] Fig. 3 is a front view of the fastener unit;

[0026] Fig. 4 is a side view of the fastener unit;

[0027] Fig. 5 is a front view of the fastener unit with the resilient compression elements being converted from an open mode to a compression mode;

[0028] Fig. 6 is a perspective view of the resilient compression elements installed in a groove and holding the fastener unit adjacent the board;

[0029] Fig. 7 is a side sectional view of the fastener unit installed within grooves of adjacent boards and establishing a gap with a spacer body between those adjacent boards;

[0030] Fig. 8 is a perspective view of a first alternative embodiment of the fastener unit;

[0031] Fig. 9 is a front view of the first alternative embodiment of the fastener unit;

[0032] Fig. 10 is a perspective view of the first alternative embodiment of the fastener unit being installed relative to a groove of a board and an underlying support;

[0033] Fig. 11 is a side sectional view of the first alternative embodiment of the fastener unit installed within grooves of adjacent boards and establishing a gap with a spacer body between those adjacent boards;

[0034] Fig. 12 is a perspective view of a second alternative embodiment of the fastener unit including one or more stabilizer bars;

[0035] Fig. 13 is a side sectional view of the second alternative embodiment of the fastener unit installed with a grip element in groups of adjacent boards, and with the one or more stabilizer bars engaging a lower surface of a board to provide further stabilization of the fastener unit

[0036] Fig. 14 is a perspective view of a third alternative embodiment of the fastener unit including a grip element with one or more pressure feet and a timing spacer block;

[0037] Fig. 15 is a perspective view of the third alternative embodiment of the fastener unit installed on an underlying joist and at least partially installed in a groove of a board; and

[0038] Fig. 16 is a side sectional view of the third alternative embodiment of the fastener unit installed within grooves of a boards and the fastener installed to apply force well within the grooves via the one or more pressure feet, and the timing spacer block bottomed out against the underlying joist.

DESCRIPTION OF THE CURRENT EMBODIMENTS

[0039] A current embodiment of the fastener unit is illustrated in Figs. 1–7, and generally designated 10. The fastener unit 10 can generally include a spacer body 20, a grip element 30 protruding forwardly and rearwardly from the spacer body, and one or more resilient compression elements, such as a first resilient compression element 41 and a second resilient compression element 42. These compression elements can be joined with the spacer body optionally via respective fracturable joints 48 and 49. A fastener 90 can be at least partially disposed through the spacer body 20 and/or the grip element 30 when the unit is in an uninstalled state as shown in Fig. 1.

[0040] The current embodiments of the fastener unit 10 are well suited for a variety of building and construction projects, such as commercial, residential and other construction projects. The fastener units, however, can be modified for use in other applications, such as automotive, marine, industrial and/or consumer products. As described herein, the fastener units can be used in the application of grooved boards or lap boards that are fastened to an underlying support structure. The boards can be

constructed from wood, plastic, composites, metal, ceramic, tile, masonry or other materials depending on the application.

[0041] As shown in Figs. 2 and 6, the boards 101, 102 can include respective grooves 103 and 104. These grooves can include a groove depth GD of optionally 1/16 inch, further optionally 1/8 inch, even further optionally 1/4 inch, yet further optionally 1/2 inch or other depths depending on the particular application. Further, as shown in Fig. 2, the groove can be bounded by upper 105 and lower 107 lobes or projections that transition to the upper and lower surfaces of the board 101. Although shown as a continuous groove, each of the respective grooves 103 and 104 can be intermittent and/or discontinuous, depending on the particular application and board construction. Each groove 103 also can include a lower wall 109L, a rearward wall 109R and an upper wall 109U. These walls can be radiused and can transition smoothly or cleanly to one another as shown. Alternatively, they can be joined at right angles, depending on the application.

[0042] The fastener unit 10 of the current embodiment will be described generally in connection with joining boards 101, 102 to an underlying joist 106, where the deck boards lay across an upper surface 106U of the joist. The joist 106 of course can be any support structure or element and can be constructed from any type of material, such as wood, plastic, composites, metal, ceramic, tile, masonry or other materials depending on the application. Further, it will be appreciated that the fastener unit can be used in conjunction with any type of decking, flooring, covering, roofing or other components.

[0043] Turning now to the fastener unit 10, each of the respective components, such as the spacer block 20, resilient compression elements 41, 42, grip element 30

and fastener 90 will now be described in more detail. Referring to Figs. 1–4, the spacer block 20 includes a front surface 21 and an opposing rear surface 22. These surfaces are on opposite sides of the vertical axis VA of the spacer body 20. This vertical axis VA can correspond to a longitudinal axis of the fastener 90. As described further below, a first fastener hole FF1 is aligned with this vertical axis VA. The spacer body 20 can include a first side surface 23 and an opposing second side surface 24.

[0044] The spacer block can define a thickness T1 that extends between the front surface 21 and the second opposing rear surface 22. This thickness corresponds to a preselected gap G (Fig. 7) that to be located between adjacently placed boards 101, 102. This gap and thickness can be optionally at least 0.180 inches, further optionally at least 0.200 inches, further optionally at least 0.250 inches, even further optionally at least 0.300 inches, yet further optionally at least 0.350 inches, further optionally at least 0.400 inches, yet further optionally at least 0.450 inches, even further optionally at least 0.500 inches, or wider or increments thereof, depending on the application and the desired spacing between adjacent deck boards. Alternatively, the gap and thickness can be optionally less than 0.180 inches, further optionally less than 0.200 inches, still further optionally less than 0.250 inches, even further optionally less than 0.300 inches, yet further optionally less than 0.350 inches, further optionally less than 0.400 inches, yet further optionally less than 0.450 inches, even further optionally less than 0.500 inches, or narrower or increments thereof, depending on the application and the desired spacing between adjacent deck boards. Optionally, the thickness T1 and corresponding gap G set by the spacer body can be equal to and/or greater than the diameter DF of

the fastener head 90H. In this manner, the fastener head can fit between and not excessively mar board surfaces that are placed adjacent the spacer body.

[0045] The spacer body 20 can set this gap G by way of the front surface 21 engaging in adjacent board, for example, board 102 in Fig. 7, and the rearward opposing face 22 engaging the board 101 as shown in Fig. 7. With this spacer body being disposed generally between the upper and lower lobes or projections 105, 107 that straddle the respective grooves 103 and 104, the spacer body effectively prevents those boards 101 and 102 from being placed any closer to one another than the gap G due to the thickness T1 of the spacer body 20 there between. As illustrated, the spacer body front surface 21 can engage the upper lobe 105 of a board above the groove 104. A lower portion of the spacer body 26 can engage the lower lobe 107 of the board, generally below the groove. Optionally, the spacer body can engage portions of the side surface of the board in the regions of the lobes 105 and 107 above and below the groove 103.

[0046] As shown in Figs. 1 and 3, the spacer body upper portion 27 can include or define a recess 27R that extends from an upper most surface 27U, to a location adjacent the grip element 30. This recess 27R can be flanked by opposing ramped surfaces 27S. These ramped surfaces 27S can facilitate insertion of the fastener 90 into the first fastener hole FF1 as described further below.

[0047] As shown in Figs. 1 and 3, the lower portion 26 can include a lower surface 26L that can be generally flat. The distance D2 between the lowermost portion of the grip element 30 and the lower surface 26L of the lower portion 26 can be less than the distance D3 between the lower wall 109L of the groove 103 as shown in Fig. 5.

With this distance D2 less than D3, the spacer block 20 optionally will not interfere with the grip element 30 being brought into contact and engagement with the lower surface 109L of the groove. For example, if the distance D2 was optionally greater than D3, this might interfere with the engagement of the grip element 30 with the components of the groove 103. Of course, this alternative construction can be implemented for different applications where grip element engagement is irrelevant.

[0048] As shown in Figs. 3 and 5, the spacer body 20 also can define a grip element recess 28. This grip element recess can extend generally through the spacer body, from the forward surface 21 to the opposing rearward surface 22. This grip element recess can be of a corresponding shape relative to the shape of the grip element 30. The recess 28 can be in the form of an inverted U- or C-shaped channel that opens downward toward a joist 106. This recess 28 can be sized to enable the grip element 30 to be inserted through the spacer body and in some cases, friction fit and held in place relative to the spacer body. Of course, there can be some gaps between the sides of the recess and the grip element 30 so that the spacer body does not hold that grip element well. In such constructions, the fastener 90, extending through a grip element aperture, also called a second fastener hole SFH defined by the grip element 30 and into the first fastener hole FF1 of the spacer body 20. Due to the engagement of the threads 90T of the fastener with the first fastener hole FF1, the fastener can secure the grip element in place relative to the spacer body. Optionally, the grip element 30 can be overmolded or 3-D printed over with material that forms the spacer body. In such a case, the grip element can be at least partially encapsulated by the spacer body and held in place accordingly.

[0049] As shown in Fig. 3, the first fastener hole FF1 can include an upper portion FF1U and a lower portion FF1L. The upper portion and lower portion can be of similar geometric shapes. For example, the upper and lower portions can both be cylindrical. In some cases, however, one can be frustoconical and the other can be cylindrical. In yet other applications, the shape can be rectangular, square, polygonal, ellipsoid, rounded or other geometric shapes. These respective portions can have different diameters or dimensions. For example, the upper portion can include a diameter DU and the lower portion can include a diameter DL. The lower portion diameter DL can be less than the upper portion diameter DU. This can enable the tip 90T of the fastener 90, which can be pointed or frustoconical to be inserted into and have its threads partially bite into the lower portion FF1L. This in turn, can enable the fastener 90 to be slightly threaded into the spacer body so that it is secured thereto via those threads and the interaction of the threads with the first fastener hole FF1. It will be noted that although referred to herein as a diameter, that phrase encompasses any dimension of the first fastener hole, regardless of whether the respective portions of the hole are circular, elliptical, rounded or instead are polygonal.

[0050] Turning to Figs. 1–5, the grip element 30 can be in the form of a C-, V- or U-shaped channel. The grip element can be joined with the spacer body and optionally disposed within a spacer grip element recess or aperture 28. The grip element can include a base 33 and optional first 31 and second 32 downwardly extending protrusions, cleats or gussets. These cleats can optionally be integrally formed with the base 33. The cleats can be spaced a distance from one another and relative to the second fastener hole SFH, and thus the fastener 90 and the fastener head 90H. In

particular, the cleats can be spaced so that when the head 90H is tightened and engages the grip element, first and second portions on opposite sides or ends of the head or its diameter respectively can exert forces downward directly over and on the first and second cleats 31, 32, without bending the grip element. The cleats can function as reinforcing members to the base in this manner, particularly when the fastener head 90H is pressing down on the base, to optionally prevent buckling of that base. Optionally, as shown in Fig. 2, the cleats 31, 32 can be spaced so their interior facing surfaces are a distance D8 of optionally less than 0.500 inches from one another, further optionally less than 0.250 inches from one another, even further optionally less than 0.200 inches from one another, yet further optionally less than 0.180 inches from one another, and still further optionally about 0.208 from one another. The diameter DF of the fastener can be equal to, less than or greater than this distance D8. Optionally, the diameter DF can be equal to or slightly greater than the distance D8. In turn, this can maintain the cleats under or immediately adjacent the lower portions of the head 90F when those portions engage the grip element. Again, this can add rigidity and support closer to the fastener as it is tightened so the base and grip element in general do not deform, bend or buckle due to the downward force exerted by the fastener in the middle of the grip element.

[0051] These cleats can be configured to engage the grooves 103 and 104 of the respective boards with which the fastener unit 10 is used. As shown, the cleats can include flat lower edges, however these edges can be sharpened so that they are angled and come to points. Although not shown, the cleat lower edges can be serrated

and/or include teeth to better bite into the groove of the board when the fastener unit is secured in place with the fastener 90.

[0052] As mentioned above, the grip element 30 includes a grip element aperture or second fastener hole SFH. This fastener hole can be aligned with the first fastener hole FF1 of the spacer body 20 so that the fastener can fit through both simultaneously. This second fastener hole SFH can be disposed in the center of the base 33, and optionally centered halfway between the forward edge 36 and rearward edge 37 of the grip element 30 as shown in Fig. 2.

[0053] Optionally, the second fastener hole SFH can be a circular hole drilled through the base 33. In other cases, the second fastener hole SFH can be a recess ground through the base and one or more of the cleats 31 or 32, but only from a single side. This can enable the grip element to retain enough material so that the head 90H of the fastener 90 will engage the grip element and pull it toward the underlying joist 106. The second fastener hole can be large enough to accept the threads of a fastener therethrough, but smaller than the diameter of the fastener head so that the head engages and pulls the grip element when tightened.

[0054] The grip element can also include a forwardly extending portion 38 that extends forwardly of the forward surface 21 of the spacer body 20. The grip element can also include a rearward portion 37 that extends rearwardly of the rearward face 22 of the spacer body. The forward portion and rearward portions of the grip element can be of lengths L1 and L2, which can be equal extending from the respective forward and rearward faces of the spacer body. Of course, in some applications the distances and lengths can vary.

[0055] The grip element 30 can be constructed from a variety of materials, such as metal, composites, polymers, ceramics, reinforced composites, polymers and the like. The grip element can be strong enough so that it does not buckle or collapse when the fastener head 90H engages it and pulls the grip element 30 into the lower surface 109L of the board groove 103. In this manner, the fastener 90 pulls the grip element 30 into tight engagement with that lower surface 109L or other components of the groove 103. This in turn, clamps the board 101 down to the underlying support structure 106. Due to this clamping, the board 101 effectively can be prevented from moving upon expansion and contraction of that board when subjected to different environmental conditions, such as heating and cooling. This can prevent the board from creeping in one direction or the other or generally becoming uneven.

[0056] Optionally, although shown as an inverted channel, the grip element can be in the form of a small tube with corresponding teeth, a single flat piece of high-strength steel, optionally with serrations or knurling on its lower surface, or other forms, depending on the application and the materials from which the boards are constructed and/or as well as the desired holding strength.

[0057] As mentioned above, the fastener unit 10 can include first 41 and second 42 resilient compression elements. These resilient compression elements can be similar in structure and therefore only one will be described in detail here. It also will be appreciated that one of the resilient compression elements can be eliminated from the design in certain applications. In further applications, that area of the fastener unit can be occupied by a simple flange or leg that extends outwardly from the side surface of

the spacer body 20, where that component is not compressible or movable from an open mode to a compressed mode as with a resilient compression element.

[0058] The first resilient compression element 41 can extend outwardly from the first side surface 23 of the spacer body 20. The second resilient compression element 42 can extend outwardly from the second side surface 24 of the spacer body, which is opposite the side 23. Thus, the resilient compression elements optionally can be symmetric about the vertical axis VA as shown in Fig. 3. Generally, the resilient compression elements 41 and 42 can be joined on opposite sides of the vertical axis VA. In this manner, they can engage the groove distal from one another to provide two or four points of engagement and contact between the fastener unit and the groove, not counting the engagement by the grip element 30.

[0059] The first resilient compression element can include a vertically compressible upper wing 41UW and a vertically compressible lower wing 41LW. These wings can be joined at a junction 41J. The wings as illustrated are generally in the form of flat plates angled relative to another and joined at apex at the junction 41J. Of course, in other applications these wings can be curved, rounded, or of other shapes. These upper and lower wings can be designed to be vertically compressed in direction VC as shown in Figs. 3 and 5. By vertically compressible, it is meant that the a wing or component or portion of the resilient compression element can be moved in direction of the arrows VC, generally toward a plane P1 that is orthogonal to or otherwise transverse to the vertical axis VA of the spacer body 20. Due to their resilient nature, however, these portions resiliently deform and are urged to expand and re-attain their previous configuration in an open mode of those elements as shown in Figs. 1 and 3.

After application of forces F to move the wings toward one another and/or generally toward the plane $P1$, due to the resilient nature of the wings, those wings are self-urged to open back up to the configuration shown in Figs. 1 and 3.

[0060] The resilient compression elements 41, 42 are operable in an open mode, as shown in Fig. 3 and a compressed mode as shown in Figs. 5–7. In the open mode, the fastener unit 10 is not yet installed relative to a groove of a board. In that configuration, the ends or outermost portions of the wings, farthest from the spacer body 20, are disposed a distance $D5$ from one another. This distance $D5$ in the open mode can be less than the height GH of the groove. Because of the vertically compressible nature of the resilient wings 42UW and 42LW of the resilient compression element 42, these wings can be moved toward one another or generally toward a spacer body horizontal reference plane, that is, the first plane $P1$. Optionally, this plane $P1$ can pass through the grip element recess 28 and/or the portions of the grip element 30. When these wings are vertically compressed under a vertical compression force F , the distance $D6$ between them decreases. This distance $D6$ can be less than the groove height GH . Optionally, the compression elements upper and lower portions can be separated by a variable distance. This distance can be varied so that the resilient compression elements can fit within a particular groove of a board.

[0061] Referring to Fig. 3, the outer ends 41EE of the wings, and generally the resilient compression element 41, are free ends that extended the space. That is, they are not connected to one another. Optionally, in some applications, these elements and the ends can be connected to one another, provided that the connection allows vertical compression in direction VC . As an example, the upper and lower wings can be joined

with corresponding wings, in the shape of “V”, that extend outwardly from the ends 41EE. In turn, this allows these components to be compressed. In other constructions, the vertically compressible wings can be in the form of elongated elliptical or circular shapes that are structured to enable them to be compressed and reduce their overall vertical dimension, optionally to some dimension that is less than the groove height GH of the groove 103.

[0062] With reference to Fig. 5, in operation, a user can manually apply a force F to vertically compress the wings 41 and 42 in direction VC toward the plane P1 and/or generally toward one another. This converts the wings from the open mode shown in broken lines to a compressed mode as shown in solid lines. The resilient wings or portions of the compression elements bend, flex or otherwise move toward one another so that the distance between them is reduced from the distance D5 to the distance D6. This reduction in distance can be approximately 5%, 10%, 15%, 25%, 30%, 35%, 40%, 50% or more, depending on the application and amount of vertical compression. Generally, the first wing and second wing or other portions of the resilient compression element are resiliently moveable toward one another and/or the first plane P1 such that the vertical distance between the wings decreases upon the application of a compressive force by a user.

[0063] With the resilient compression elements in the compressed mode, a user can install those elements 41 and 42 into the groove 103. Because the distance D6 is less than the groove height GH, these elements will now fit within the groove. When the user releases or reduces the force F applied in the compressed mode to the respective portions of the resilient compression element, those wings want to go back to the

configuration of the open mode. Due to the upper 109U and lower 109L surfaces of the groove, engagement of those wings with the resilient compression elements and the respective wings or other portions thereof, exert forces F1 and F2 on the board 101 in the groove, and against the upper and lower surfaces of the groove. These forces can optionally be at least 0.0001 pounds, further optionally at least 0.001 pounds, even further optionally at least 0.05 pounds, yet further optionally between 0.0001 pounds and 0.5 pounds. Of course, other forces can be exerted by the compression elements against the surfaces of the groove depending on the application and configuration of the resilient compression elements.

[0064] Due to the forcible expansion of the resilient compression elements within the groove, the resilient compression elements secure the spacer block in a position adjacent the first groove. In this manner, the spacer block can be disposed in and effectively form the gap G between the side surfaces of the boards 101 and 102 when the second board is installed, as shown in Fig. 7.

[0065] The resilient compression elements 41, 42 can include respective front edges 41F, 42F and rear edges 41R, 42R. The rear edges 41 are configured to fit within the groove 103 of the board 101. In some cases, the rear edges can be disposed entirely within the groove and located adjacent the rear wall 109R. The front edges, however, can extend outward from the groove, and beyond the side surface of the board, and in particular the lobes 105 and 107.

[0066] Optionally, the front edge and rear edge are separated by a compression element width CEW. This compression element width CEW can be greater than the thickness T1 of the spacer block 20. Put another way, the thickness T1 of the spacer

block 20 can be less than the compression element width CEW. Thus, the resilient compression elements can extend forward and/or rearward from the front and rear surfaces of the spacer block. As illustrated, the front edge 42F can lay within a common plane with the front surface 21 of the spacer block 20. The rearward edges 41R, 42R can extend beyond and outwardly from the spacer block rear surface 22 a distance D7 as shown in Fig. 1.

[0067] In some cases, there can be spatial relationships between the grip element, spacer block and resilient compression elements. For example, the grip element can have a grip element length L3 that extends from the front edge to the rear edge of the grip element 30. As mentioned, above the spacer block 20 can include a spacer block thickness T1 and the resilient compression elements can each include compressible element widths CEW. As illustrated, the grip element length L3 can be greater than the compressible element width CEW. The resilient compression element width CEW can be greater than the spacer block thickness T1. In some cases, both the grip element length L3 and the compression element width CEW can be greater than the thickness T1. This can enable the respective grip element and resilient compression elements to fit within the groove of one board yet not interfere with fitment of another board adjacent the first board. Indeed, the compression element width CEW can be less than the sum of the groove depth GD plus the thickness T1 of the spacer block. This can enable the resilient compression elements to be disposed within the groove to hold the spacer block in place, yet not extend beyond the spacer block to interfere with the setting of a gap between adjacent boards. With this decreased width, the resilient compression elements also might not interfere with or engage another groove 104 of an

adjacent board 102. Instead, only the grip element 30 optionally extends into and is engaged against that groove 104 to secure the boards to another.

[0068] The resilient compression elements 41, 42 can be joined with the spacer body 21 at respective fracture of all joints 48 and 49. As shown in Figs. 3 and 5, these fractional joints can be effective zones of weakness where the material joining the spacer body and the resilient compression elements is thinned so that those resilient compression elements can be bent in direction B and effectively break off at that joint. This is illustrated in Fig. 3 where the joint 49 has been fractured. In some cases, the fractional joint can be a portion of plastic that has perforations or holes extending therethrough. With this fracture of a joint, a user can selectively and manually remove one of the resilient compression elements 41, 42 to fit in a particular confined space or over a combination of abutting underlying support joists.

[0069] A related method of using the fastener unit 10 of the current embodiment will now be described. In general, the fastener unit can be provided including its spacer body 20, grip element 30, and resilient compression elements 41 and 42. The fastener 90 can be installed therein or can be installed by the user generally extending through the fastener holes as described above and engaging different portions of those holes as also described above. A user can apply a force F as shown in Fig. 3 to vertically compress in direction VC the wings of the resilient compression element toward one another and/or generally toward a plane P1. This in turn, changes the distance between the ends of the wings from a distance D5 to a lesser distance D6. When so compressed, the fastener unit transforms from an open mode, shown in broken lines, to a compressed mode, shown in solid lines, in Fig. 5. The wings of the resilient

compression elements as well as the rearward portion 37 of the grip element 30 can be inserted into the groove 103 as shown in Fig. 6. These elements can be pushed in direction R as shown in Fig. 2 into the groove. The wings can be released to remove the manually applied compressive force F on the wings. In turn, the wings resiliently deform back toward their configuration in the open mode from the compressed mode. This in turn, exerts forces F1 and F2 by the resilient compression elements against the upper and lower surfaces of the groove. This fixes the fastener unit in place adjacent that groove. The spacer body 20 is thus held adjacent the first side surface 101S of the board 101 that is adjacent the groove 103.

[0070] As mentioned above, in some cases, two joists may be immediately adjacent one another. To center the fasteners and associated grip elements over each of the joists, one resilient compression element can be broken off each of the adjacent fastener units. This can be achieved by the user manually bending in direction B one of the resilient compression elements 41 to snap that component off from the spacer body as shown in Fig. 3.

[0071] With the fastener unit properly installed relative to the first board 101, a second board 102, as shown in Fig. 7, can be placed immediately adjacent the first board 101, but separated by a gap G established by the thickness of the spacer body 20 of the fastener unit 10. Due to the grip element 30 extending outwardly from the forward face 21 of the spacer block, that grip element can be installed in the second groove 104 of the second board 102. With the boards so installed on the joist 106, the fastener 90 can be rotated in direction A. As a result, the fastener advances through the spacer body 20, the grip element 30 and into the underlying support or joist 106. As it

does so, the head 90H eventually engages the grip element 30. This in turn pulls the grip element downward toward the joist 106. As a result, the grip element and, for example, its cleats or protrusions bite into the lower surfaces of the respective grooves of the boards. This in turn provides enhanced holding force of the boards against the joist 106. With the fastener unit of the current embodiments, the overall length of the unit from end to end is generally sufficient to cover all of the top of the joist 106 that may otherwise be exposed through the gap G established between the boards.

[0072] A first alternative embodiment of the fastener unit is illustrated in Figs. 8–11 and generally designated 110. The fastener unit of this embodiment is similar in structure, function and operation to the embodiment described above with several exceptions. For example, this unit 110 includes a fastener 190 similar to the fastener 90 above. It also includes a grip element 130 that is disposed in a recess 128 defined by a spacer body 120. The spacer body can have a spacer body width SW. The grip element can have a grip element width GW. The grip element width can be less than the spacer body width. For example the grip element width can be optionally less than $\frac{3}{4}$ the spacer body width, further optionally less than $\frac{1}{2}$ the spacer body width.

[0073] The spacer body can be configured to establish a gap between adjacent boards, and sized with a thickness T2 similar to the thickness T1 described in the embodiment above. The grip element 130 can define a second fastener hole SFH' that is aligned with a first fastener hole FFH' of the spacer body 120 similar to that described above. The first fastener hole FFH' also can include upper and lower portions FF1U' and FF1L' that have different diameters, the lower one having a diameter less than the upper one's diameter. The grip element 130 optionally can extend from the forward 121

and rearward 122 surfaces of the spacer body 120 by equal distances D10 and D11. Of course, in some applications, these distances can vary.

[0074] In this embodiment, the unit 110 can include first and second compression elements which are in the form of first and second joist legs 141 and 142 that extend downward and outward from the spacer body 120. These first and second joist legs are configured to straddle and clampingly engage a joist. The joist legs are similar in construction, so only the first joist leg 141 will be described here. The joist leg 141 includes an outwardly extending portion 143 that extends outward from a side of the spacer body 120. That outwardly extending portion 143 transitions to a rounded or curved portion 145 that extends downwardly, away from a bottom 126L of the spacer body 120. The curved portion 145 is generally concave, opening toward the vertical axis VA. That curved portion 145 extends to a lower engagement portion 146. This lower engagement portion is generally convex relative to the vertical axis VA and opens away from that vertical axis VA. The engagement portion includes an inner engagement surface 146S which is configured to engage and slide over a portion of the outer walls 106W of the joist 106. This surface 146S again is generally curved and convex away from the vertical axis to facilitate sliding of this portion over the walls 106W.

[0075] Optionally, each of the joist legs 141 and 142 can be joined with the spacer body 120 at fracturable joints 148, 149 similar to those described above. In this manner, at least one of the first and second joint legs can be manually broken off from the spacer body to accommodate double joists or other confined spaces.

[0076] A method of installing the fastener unit 110 will now be described in connection with Figs. 9–11. The fastener unit 110 can be disposed adjacent a joist 106

and board 101 as illustrated in Fig. 10. In particular, the joist legs 141 and 142 can be resiliently deformed outward by sliding the engagement surfaces 146S into engagement with the walls 106W of the joist 106. Due to the rounded nature, the joist legs can be resiliently flexed or moved outward and can slide over those walls. Before the lower surface 126L of the spacer body engages the upper surface 106U of the joist 106, the grip element 130 can be inserted into the groove 103 and engage the groove lower surface 109L. Due to the spatial relationship of the spacer body, its lower surface 126L and the lower surface 109L of the groove, the lower surface of the spacer body can be placed at a level lower than a lower surface of the first groove, for example, the lower surface 126L of the spacer body can be below the lower surface 109L of the groove.

[0077] As illustrated, the joist legs can exert a compressive or clamping force F4 on the joist 106 to hold the grip element 130 at the elevation above the joist shown in Fig. 10, generally protruding into the groove 103. With the grip element in this location, as shown in Fig. 11, a second board 102 can be moved in place adjacent the fastener unit 110. Due to the thickness T2 of the spacer body 120 separating the two boards, a gap G' can be established between those boards. The grip element 130 also extends into both of the respective gaps of the two boards. With the grip element so placed, and the gap G' established, a user can advance the fastener 90 into the underlying joist. In turn, this causes the grip element 130 and its corresponding cleats to bite into the respective grooves, thereby securing the board in a fixed location over the joist 106.

[0078] Optionally, in confined spaces, with reference to Fig. 9, one of the joist legs 141 can be bent in direction B to resiliently break off that leg at the fracturable joint 149.

[0079] A second alternative embodiment of the fastener unit is illustrated in Figs. 12-13 and generally designated 210. The fastener unit of this embodiment is similar in structure, function and operation to the embodiments described above with several exceptions. For example, this unit 210 can include a fastener 290 similar to the fasteners 90 and 190 above. It also can include a grip element 230 that is disposed in a recess 228 defined by a spacer body 220. The grip element 230 optionally can extend from and beyond the forward 221 and rearward 222 surfaces of the spacer body 220. As above, the spacer body can be configured to establish a gap between adjacent boards, and sized with a thickness T3 similar to the thicknesses T1 and T2 described in the embodiments above.

[0080] In this embodiment, the unit 210 includes first and second joist legs 241 and 242, also referred to as resilient compression element in some cases, that extend downward and outward from the spacer body 220. These first and second joist legs are configured to straddle and clampingly engage a joist. The joist legs are similar in construction, so only the first joist leg 241 will be described here. The joist leg 241 includes an outwardly extending portion 243 that extends outward from a side of the spacer body 220. That outwardly extending portion 243 transitions to a rounded or curved portion 245 that extends downwardly, away from a bottom 226L of the spacer body 220. The curved portion 245 is generally concave, opening toward the vertical axis VA of the spacer body 220, which can be coincident and/or parallel to the longitudinal axis LA of the fastener 290. That curved portion 245 extends to a lower engagement portion 246. This lower engagement portion 246 can be convex relative to the vertical axis VA and can open away from that vertical axis VA. The engagement portion can

include an inner engagement surface 246S configured to engage and slide over a portion of the outer walls 106W of the joist 106. This surface 246S can be curved and convex away from the vertical axis VA to facilitate sliding of this portion over the walls 106W. Of course, in other constructions, that surface 246S can be flat, planar, rough, ridged, triangular, or can have other geometric configurations depending on the configuration of the joist or the workpiece against which the leg is to be engaged.

[0081] As shown in Fig. 12, the first joist leg 241 can extend from a first lateral side L1 of the spacer block 220 on a first side of the vertical axis VA, and the second joist leg 242 can extend from a second lateral side L2 of the spacer block 220. The first and second joist legs can extend outwardly and downwardly from the spacer block. Each of the joist legs can include a forward surface and a rearward surface, and one or more of the joist legs can include a stabilizer bar extending from the joist leg a predetermined distance. In general, the opposing stabilizer bars 251, 252 on the opposing joist legs 241 and 242 can be disposed at a common level L4 relative to one another and relative to another level L3 of the bottom or lower surface 230L of the grip element 230. Due to the similarities of the legs and the stabilizer bars in the embodiment illustrated, only the first joist leg 241 and its corresponding stabilizer bar 251 will be described here.

[0082] The first joist leg 241 can include a front surface 241F and a rear surface 241R. The rear surface optionally can be planar and/or rounded. The rear surface can further include the stabilizer bar 251 projecting rearward from it in a direction opposite the front surface 241F of the joist leg 241. As illustrated, the stabilizer bar 251 can be integrally formed and joined with the leg at a transition location between the curved

portion 245 and the lower engagement portion 246 of the joist leg. The stabilizer bar can project from the rear surface 241R a distance D13. This distance D13 can be equal to a distance D14 from which an end 230E of the grip element 230 extends away from the rearward surface 241R of the leg and/or of the rear surface 222 of the spacer body. The distance D13 optionally can be 1/32 inches, further optionally 1/8 inches, further optionally 1/4 inch, yet further optionally 1/2 inch, even further optionally 3/4 inches, or other distances depending on the application. In some cases, D13 can be greater than, less than or equal to D14. In cases where a bottom of the board with which the fastener unit 210 is utilized, the distance D13 is greater than the distance D14 by at least 10% to 25%, such that the stabilizer bar 251 can adequately extend beyond a curved lower corner of the board and engage the under surface or bottom surface of the board as described below.

[0083] Referring to Fig. 12, the stabilizer bar 251 can include an upper surface 251U and a lower surface 251L. The upper surface 251U and lower surface 251L optionally can be part of a continuous cylindrical wall 254 where the stabilizer bar 251 is of a cylindrical shape. Of course, where the stabilizer bar 251 is of another geometric shape, for example, a square shape, a polygonal shape an ellipsoid shape, or some other rounded or irregular shape, the upper and lower surfaces can be formed by different portions of a wall or different walls altogether.

[0084] The wall 254 can extend to the rear surface 241R of the leg 241. In some cases, the stabilizer bar can alternatively extend also from the forward surface 241F of the joist leg. It may extend the distance D13, or some lesser or greater distance, depending on the application and the type of board utilized with the fastener unit. The

stabilizer bar also can be configured such that the stabilizer bar 251 terminates at a free end 251E that projects out into space, in which case the stabilizer bar is cantilevered. This end 251E can include a ramped portion 255 and a flattened end portion 256. The ramped portion 255 can be a frustoconical shape or angled or rounded. In some cases, the ramp 255 and end 256 can be merged into a hemispherical or otherwise rounded end. The end can be rounded or ramped as shown so that that end easily traverses past a corner or other side surface or bottom of a board when the fastener unit is installed. The ramp and/or rounded surface easily rides over the corner of the board and/or the bottom surface of the board for rapid installation.

[0085] As further shown in Fig. 12, the stabilizer bar can be disposed a distance D12 below the lower surface 230L of the gripping element 230. For example, the lower surface 230L can be disposed at a level L3, while the upper surface 251U of the stabilizer bar 251 can be disposed at a second level L4. The distance D12 between these different levels can be equal to a distance between a bottom of a groove, and a bottom surface of that same board. In this manner, the board can be pinched or clamped between the bottom surface 230L of the gripping element 230 and the upper surface 251U of the stabilizer bar. Optionally, the portion of the board between the bottom of a groove of the board and the bottom surface of the board can be pinched or clamped between the gripping element 230 and the stabilizer bar 251 on the joist leg 241. Via this interaction with the board, as described further below, the fastener unit 210 can be secured to and joined temporarily with the board optionally to maintain the fastener 290 longitudinal axis LA in a vertical, upright position before installation of the fastener 290 into an underlying joist.

[0086] Although shown as a generally cylindrical bar, the stabilizer bar 251 also can have other shapes. In some cases, the stabilizer bar 251 can be a portion of the joist leg 241 below the curved portion 245 at a distance D12, where that leg becomes a greater thickness (not shown) from its rear surface 241R to its front surface 241F. For example, above the stabilizer bar, the thickness T4 of the joist leg 241 can be approximately ¼ inch. Starting at the upper surface 251U of the stabilizer bar (although not shown) the leg can be of a substantially greater thickness T5 such that the leg is 2, 3, 4, 5 or more times as thick as the thickness T4. This greater thickness T5 can extend all the way to the tip of the engagement portion 246. In other cases (although not shown) the stabilizer bar can extend in this manner to taper from the thickness T5 back toward the thickness T4 or some other thickness of the joist leg 241 toward the tip of the joist leg.

[0087] A method of installing the fastener unit 210 will now be described in connection with Fig. 13. The fastener unit 210 can be disposed adjacent a joist 106 and board 101 as illustrated in Fig. 13. In particular, the joist legs 241 and 242 can be resiliently deformed outward by sliding the engagement portions 246, and their respective surfaces 246S into engagement within and along the opposing walls 106W of the joist 106. Due to the rounded nature, the joist legs can be resiliently flexed or moved outward and can slide over those walls. Before the lower surface 226L of the spacer body engages the upper surface 106U of the joist 106, the grip element 230 can be inserted into the board groove 103 and engage the groove lower surface 109L. The joist legs 241, 242 can exert a compressive or clamping force F4 on the joist 106 to hold the

grip element 230 at the elevation above the joist 106 shown in Fig. 13, with the element protruding into the groove 103.

[0088] In addition, as shown in FIG 13, the stabilizer bar 251 can be disposed below the bottom surface 101B of the board 101. In particular, the upper surface 251U of the stabilizer bar 251 can engage the bottom surface 101B adjacent the corner 101C of the board. The end 251E of the stabilizer bar optionally projects a distance that is greater than the depth GD of the groove 103 inward from the side surface 101S of the board 101. This distance can be the distance D13 shown in Fig. 12. Thus, the distance D13 can be greater than groove depth GD, and optionally greater than the distance D14 by which the grip element 230 extends from the rear surface of the fastener unit.

[0089] The lower surface 230L of the grip element as mentioned above can be a distance D12 from the upper surface 251U of the stabilizer bar 251. This distance can be less than the distance D15 below the groove lower surface 109L, between the groove lower surface 109 and the bottom surface 101B of the board. Accordingly, the grip element 230, in cooperation with the stabilizer bar 251, can exert a force F15 on the board with the grip element 230 exerting the force F15 on the lower surface 109L of the groove, and the upper surface of the stabilizer bar exerting the force F15 on the bottom surface 101B of the board 101. This in turn exerts a slight clamping or pinching force on the board within that region. Accordingly, the stabilizer bar can assist in further holding and maintaining the vertical axis VA of the fastener unit and the longitudinal axis LA of the fastener 290 in a generally vertical, upright orientation. This vertical, upright orientation can refer to an orientation that optionally is perpendicular to the plane P10 of the board 101, in particular, its upper surface 101U, which optionally can lay in a

horizontal plane. The upright vertical orientation can be perfectly vertical, or can be slightly offset from vertical by up to 5° or up to 10°, depending on the application.

[0090] With the stabilizer bar cooperating with the grip element 230, the fastener unit exerts both a force on the board 101 and another force on the joist 106, the latter, by virtue of the forces exerted by the legs 241 and 242 against opposing sides of the joist. Thus, the joist legs exert clamping force F4 on the joist, and the stabilizer bars exert another force F15 on the board, between the groove and the bottom surface of the board. Optionally, the force F15 is a vertical force, while the force F4 exerted by the joist legs is a substantially horizontal force. Of course, depending on the orientation of the joist in the board, the directions of the forces can change relative to horizontal and vertical planes.

[0091] The fastener unit 210 so installed can provide multiple points of contact between the fastener unit and the board, and thereby stabilize the fastener unit in a particular orientation, optionally holding the fastener associated with the unit in an upright, vertical orientation, ready for engagement by a tool. Optionally, the fastener unit 210 can engage the board 101, and the joist 106 to prevent forward and aft tilting T7, generally in a direction toward or away from the side surface 101S of the board. The fastener unit also can prevent teetering in directions T8 which are generally into and out of the plane of Fig. 13, such that the fastener and fastener unit do not slide along the side surface 101S of the board when in position. Thus, the fastener unit can provide multidirectional stability and support for the fastener 290, optionally holding it in an upright, vertical orientation as shown.

[0092] With the fastener unit oriented as shown in Fig. 13, a second board 102 can be moved in place adjacent the fastener unit 210. Due to the stabilization and forces exerted by the joist legs, the grip element and the stabilizer bars of the fastener unit 210, the fastener unit can remain in position, with the other end of the grip element 230 sliding into the groove 102G of board 102, and the fastener 290 staying in a generally upright and vertical orientation. With the grip element in position in the opposing gaps of the boards, and the appropriate gap set by the spacer body, the user can advance the fastener 290 into the underlying joist. In turn, this causes the grip element 230 and its corresponding cleats to bite into the respective grooves, thereby securing the board in a fixed location over the joist 106.

[0093] A third alternative embodiment of the fastener unit is illustrated in Figs. 14-15 and generally designated 310. The fastener unit of this embodiment is similar in structure, function and operation to the embodiments described above with several exceptions. For example, this unit 310 can include a fastener 390 similar to the fasteners 90, 190 and 290 above. It also can include a grip element 330 that is disposed in a recess 328 defined by a spacer body 320. The grip element 330 optionally can extend from and beyond the forward 321 and rearward 322 surfaces of the spacer body 320. As above, the spacer body can be configured to establish a gap between adjacent boards, and sized with a thickness T4 similar to the thicknesses T1, T2 and T3 described in the embodiments above.

[0094] In this embodiment, the unit 310 includes first and second joist legs 341 and 342, also referred to as resilient compression element in some cases, that extend downward and outward from the spacer body 320. These first and second joist legs are

configured to straddle and clampingly engage a joist. The joist legs are similar in construction, so only the first joist leg 341 will be described here. The joist leg 341 includes an outwardly extending portion 343 that extends outward from a side of the spacer body 320. That outwardly extending portion 343 transitions to a rounded or curved portion 345 that extends downwardly, away from a bottom 326L of the spacer body 320. The curved portion 345 is generally concave, opening toward the vertical axis VA of the spacer body 320, which can be coincident and/or parallel to the longitudinal axis LA of the fastener 390. That curved portion 345 extends to a lower engagement portion 346. This lower engagement portion 346 can be convex relative to the vertical axis VA and can open away from that vertical axis VA. The engagement portion can include an inner engagement surface 346S configured to engage and slide over a portion of the outer walls 106W of the joist 106. This surface 346S can be curved and convex away from the vertical axis VA to facilitate sliding of this portion over the walls 106W. Of course, in other constructions, that surface 346S can be flat, planar, rough, ridged, triangular, or can have other geometric configurations depending on the configuration of the joist or the work piece against which the leg is to be engaged.

[0095] As shown in Fig. 14, the first joist leg 341 can extend from a first lateral side L1 of the spacer block 320 on a first side of the vertical axis VA, and the second joist leg 342 can extend from a second lateral side L2 of the spacer block 320. The spacer block 320 itself can be formed as a timing spacer block such that the lower surface 326L of the spacer block of this embodiment engages the upper surface 106U of the joist as the fastener 390 is tightened to install the fastener unit 310. This lower surface 326L can be disposed below the lower surface 330L of the grip element,

optionally at least $\frac{1}{4}$ inch below, further optionally at least $\frac{1}{2}$ inch below that surface. Optionally, the lower surface 326L can engage the upper surface 106U of the joist 106 when the grip element 330 engages the groove 103, for example the lower wall 109L of the groove 103 upon the application of a force F16 as described below.

[0096] With reference to Figs. 15-16, the timing spacer block 320 can be configured so that it has a relationship relative to a thickness T9 between the lower surface 109L of the groove and the bottom surface 101B of the board 101, or other boards, such as board 102 on the opposite side of the fastener unit 310. This thickness T9 can be optionally $\frac{1}{4}$ inch, further optionally $\frac{1}{2}$ inch, or other dimensions depending on the particular board. The fastener unit 310 can be configured so that the bottom 326L of the timing spacer body is spaced a distance D16 from the lowermost surface 330 L of the grip element 330, whether or not that grip element has one or more pressure feet 330P. This distance D16 can be equal to or less than the thickness T9 mentioned above. In some applications, the distance D16 relative to the thickness T9 can be expressed in a ratio, for example optionally 1:1, further optionally 0.99:1, yet further optionally less than 1:1, even further optionally between 0.9:1 and 1:1, inclusive.

[0097] These ratios and the general relationship between the thickness T9 and D16 can be established so that the spacer block 320 (and in particular its lower surface 326L) is “timed” to engage the upper surface 106U of the joist 106 when the predetermined force F16 is applied by a pressure foot 330 against the board 101, and in general against the lower surface 109L of the groove 103. Optionally, the lower surface 326L of the timing spacer block 320 can engage the upper surface 106U of the joist 106 after or at the same time as the pressure foot 330P engages the lower surface 106L of

the groove. This can enable the fastener unit 310 to apply a predetermined force F16 through the pressure foot 330P and the grip element 330 in general. When the spacer body, however, bottoms out against the upper surface of the joist, the amount of additional force added to the predetermined force F16 can be limited and/or cut off completely because the spacer body prevents the fastener from being tightened further, and thus prevents the fastener from advancing farther, which otherwise would increase or otherwise add to the predetermined force F16 applied to the board via the feet in the groove. In this manner, the timing spacer block 320 can be constructed to assist in limiting or otherwise controlling the predetermined force F16 that is applied to the boards 101 and 102 when and as the fastener unit 310 is secured in place. Also, it will be appreciated that although only a force F16 is illustrated in the groove 103 of board 101, another force, substantially equal to force F16 is being applied in the groove 103' of the other board 102 via the feet at the other end 332 of the grip element 330.

[0098] Optionally, the portion of the board 101 between the lower surface 109L of the groove and the bottom 101B of the board can be pinched or clamped between the bottom surface 330L of the gripping element 330 and the upper surface 106U of the joist with the predetermined force F16 as the fastener unit 310 is tightened, that is when the fastener 390 is advanced into the joist 106 and the head 390H of the fastener 390 engages the gripping element 330 to pull the gripping element downward, upon the application of the predetermined force F16 through the gripping element 330. Again, this predetermined force F16 can be limited by way of the lower surface 326L of the timing spacer block 320 engaging the upper surface 106U of the joist 106 to prevent and/or

impair the fastener 390 from further advancing into the joist 106, which would thus pull the gripping element 330 farther toward the joist and produce more clamping force F16.

[0099] Further optionally, it will be appreciated that when the timing spacer block 320 engages the upper surface 106U of the joist 106, and the fastener 390 is further advanced in direction FA toward and into the joist 106, the spacer block 320 itself is placed under a compressive force CF between the upper surface of the joist and the gripping element 330, when the gripping element is engaged by the head 390H of the fastener 390. This compressive force CF can be greater than, equal to or less than the force F16. In many cases, the compressive force can be greater than the force F16.

[00100] In the embodiment illustrated in Figs. 14–16, the fastener unit 310 also can be outfitted with a gripping element 330 that is similar to the gripping elements 30, 130 and 230, with several exceptions. For example, this gripping element 330 can be constructed for use with a particular type of board 101, 102. As one example, this board can be a TIMBERTECH or other composite deck board commercially available from AZEK Building Products of Skokie, Illinois. Such a board 101 can be constructed to include a groove 103 that is defined inward from side surface 101S. In such a board, this groove also can be duplicated and defined on both opposing sides of the same board 101 (although the second opposing groove is not shown). The groove 103 can transition inward from the side surface 101S. The groove can include an upper surface 109U that transitions to a rear wall 109R which further transitions to a lower wall 109L. The upper and lower walls of the groove are opposite one another and can be generally planar. The lower wall 109L can transition out to the side surface 101S.

[00101] In some constructions, below the lower wall 109L, the side surface 101S can transition to a slanted wall 101A. This slanted wall 101A differs from the portion of the side surface 101S above the upper wall 109U of the groove 103, in that the slanted wall 101A angles back toward the plane P3 within which the rear wall 109R can at least partially lay. The slanted wall 101A can transition to the bottom surface 101B of the board 101 a preselected distance D17 from the plane P3. The slanted wall 101A can be disposed at an angle A1 relative to the bottom wall 101B. This angle A1 can be an obtuse angle, optionally greater than 90°. This slanted wall 101A can be rounded or slightly curvilinear, rather than linear as illustrated. The slanted wall 101A can transition to the bottom wall 101B at a transition region 101T, which can form part of the angle A1. This transition region 101T can be disposed the distance D17, closer to the side surface 101S than the rear wall 109R of the groove 103. The region 101P between the transition region 101T and the plane P3 within which the rear wall 109R of the groove lays can be configured to transfer the force F16 applied by the grip element 330 in particular the predetermined force F16 when this force is applied through the pressure foot 330P as described below. Optionally, the slanted wall 101A can be disposed between the side surface 101S and the transition 101T. The slanted wall can extend a distance D19 from the side surface 101S horizontally away from that surface. This distance D19 can be less than the depth of the groove, that is the distance from the side surface 101S to the rear wall 109R of the groove 103.

[00102] The grip element 330 can be similar to the grip elements 30, 130 and 230 described above, with several exceptions. For example, the grip element 330 optionally can be in the form of a C- or U-shaped channel, with the channel opening downward

relative to the vertical axis VA or longitudinal axis LA. The grip element can be disposed in a recess defined by the spacer body 71 similar to force noted above. The grip element can be constructed to include downwardly extending cleats, which optionally can be portions of the channel or an elongated metal or composite bar. The grip element can include one or more feet or teeth, formed as part of the channel, the cleats or as additional protrusions extending from the grip element. As an example, the grip element 330 can include one or more pressure feet 330P. These pressure feet 330P can be disposed at the first 331 and second 332 ends of the grip element. These pressure feet can each form at least a portion of the lower surface 330L of the grip element 330. The pressure feet also can come in pairs, for example a pair of pressure feet 331P1 and 331P2 can be disposed at the first end 331. The second end 332 can include a similar pair of pressure feet.

[00103] The pressure feet can include the lower surface 330L of the grip element, with each of the pair of the pressure feet forming a portion of that lower surface 330L. The pressure feet can extend all the way to the very end 331 of the grip element. Although shown as flat of the lower surface 326L, the feet can be pointed or rounded at that lower surface. The individual ones of the pairs of pressure feet also can form opposing sides of the U-channel that extend downward from the grip element. In this manner, each end can include two opposing pressure feet. Optionally, the pairs can distribute the predetermined force F16 evenly and spread out between those two pressure feet. Optionally, where the grip element is not C or U-shaped, and is in the form of a bar (not shown), there can be single pressure feet located at the opposing

ends. These pressure feet can also include larger lower surfaces of a particular geometric shape to provide more surface contact with the interior of the groove.

[00104] The pressure feet of grip element can be spaced a particular distance from the respective front 321 and rear 322 surfaces of the fastener unit 310. For example, as shown in Fig. 15, the pressure feet 330P of one end 331 of the grip element 330 can be disposed a distance D18 from the front surface 321 of the spacer block 320. Of course, the pressure feet at the second opposing end 332 can be disposed a similar distance from the rear surface 322 of the spacer block. This distance D18 can be greater than the distance D19 mentioned above with regard to the slanted wall 101A. Within this distance D18 away from the spacer block 20, the grip element can be recessed upward from the lower surface 330L. For example, as shown in Figs. 15 and 16, the pressure feet 330P can transition upward to a recessed surface 330R of the grip element. This recessed surface 330R can be disposed at a level above the lower surface 330L of the grip element 330 such that the recessed surface 330R generally does not substantially contact the lower surface 109L of the groove 103 when the fastener unit 310 is installed relative to the grooves and the boards. In this manner, substantially only the lower surface 330L of the grip element associated with the pressure feet 330P engage that lower surface 109L of the groove.

[00105] The pressure feet 330P, when spaced the distance D18 on the spacer block 320, can be configured to enable the predetermined force F16 to be distributed downward into the preselected pressure region 101P. Substantially all of the force F16 can be distributed to this region 101P. Optionally, little to no portion of the force F16 is distributed by the pressure feet 330P to the slanted wall 101A and/or the transition

region 101T. Accordingly, with the force F16 distributed this far from the spacer block 320 and in general the side surface 101S, which can engage the spacer block directly, the force F16 is not distributed in a manner so as to urge the board 101 to rotate in direction N. Thus, the board 101 is prevented from tipping or angling when the fastener unit 310 is advanced to pull the board downward against the joist 106.

[00106] Optionally, the pressure feet 330P can be disposed the distance D18 from the spacer body 320 to ensure that the predetermined force F16 administered through the pressure feet 330P is not administered directly vertically over the slanted wall 101A, but rather in pressure region 101P that is farther away from the side surface 101S than the slanted wall 101A. Where the region 101P forms a portion of the bottom surface 101B of the board 101, the pressure feet and the grip element thus can exert the predetermined force F16 downward, directly to the bottom surface 101B which is in contact and generally parallel to the upper surface 106U of the joist 106. The flat generally planar bottom surface of the board 101B can engage the flat generally planar upper surface 106U of the joist and the two can be pressed together under the predetermined force F16. And as mentioned above, this predetermined force F16 can be limited by the spacer body 320 engaging the joist.

[00107] A method of installing the fastener unit 310 will now be described in connection with Figs. 14 and 16. The fastener unit 310 can be disposed adjacent a joist 106 as illustrated in Fig. 14. In particular, the joist legs 341 and 342 can be resiliently deformed outward by sliding the engagement portions 346, and their respective surfaces 346S into engagement within the and along the opposing walls 106W of the joist 106. Due to the rounded nature, the joist legs can be resiliently flexed or moved

outward and can slide over those walls. The lower surface 326L of the spacer body 320 can be move toward and optionally can engage the upper surface 106U of the joist 106. The joist legs 341, 342 can exert a compressive or clamping force on the joist 106 to hold the grip element 330 at the elevation above the joist 106 shown in Fig. 16, with the element protruding into the groove 103.

[00108] The grip element 330 can be inserted into the board groove 103, for example, into the respective grooves 103 of both of the opposing boards 101 and 102. These boards can be pushed toward one another so that the spacer body 320 and an upper portion 338, above the gripping element, can be contacted by and engaged by the respective side surfaces 101S, 102S of the opposing boards 101 and 102. The grip element can be positioned in the respective groups of the boards 101 and 102 such that the lower surface 330L of the respective pressure feet 330P engage the groove lower surface 109L. When the boards are pushed together, the pressure feet 330P are disposed at the distance D18 from the spacer body 320. Accordingly, the pressure feet are disposed over the pressure region 101P that corresponds to the bottom, generally planar surface 101B of the board. The pressure feet also can be positioned at a location within the distance D17 between the rear wall 109R and the transition 101T. Optionally, the pressure feet are not disposed directly vertically above the slanted wall 101A. Further optionally, the pressure feet 330P can be disposed farther into the groove, closer to the rear wall 109R than to the side surface 101S of the board. As a further example, the pressure feet can be disposed at or greater than the distance D19 away from the side surface of the board. The pressure feet that the opposing end 332 can be disposed in the groove 103' and oriented relative to its surfaces in a similar manner.

[00109] The lower surface 330L of the grip element, and in particular the pressure feet, as mentioned above can be a distance D18 from the spacer body. This distance can place the pressure feet 330P directly over the pressure region 101P. When the fastener unit is installed relative to the boards 101 and 102 as shown in Fig. 16, the fastener 390 can be advanced in direction FA, through the spacer body and the grip element, advancing into the underlying joist 106. Upon this advancement, the head 390H of fastener 390 eventually engages the upper surface of the grip element 330. The fastener continues to be advanced into the joist 106. If the lower surface 326L was not in direct engagement with the upper surface 106U of the joist 106, it can begin to be so engaged as the fastener is advanced. As the advancement of the fastener 390 continues, the head 390H pulls the grip element 330 downward. This engages the pressure feet 330P and the lower surface 330L of the grip element 330 against the lower surfaces 109L of the grooves 103. This exerts the force F16 directly downward onto to the pressure region 101P along the bottom surface 101B of the board. Due to the recessed surface 330R not engaging the remainder of that lower surface, closer to the side surface, the force F16 is not distributed toward or through the slanted wall 101A. Accordingly, the board 101 does not tip in direction N due to the force F16 creating a moment about the transition region 101T.

[00110] As the fastener continues to advance, the timing spacer body 320 is placed under a compressive force CF between the head 390H of the fastener and the portion of the fastener pulling the head into the joist 106. When this occurs, the timing spacer body generally bottoms out the fastener and in general the fastener unit 310 so the fastener will not advance farther. As a result, timing spacer body limits the amount

of additional force added to the predetermined force F16 to push the boards 101 and 102 into further contact with the joist 106. This in turn, can prevent the groove from being damaged or otherwise deforming the board 101 near the groove.

[00111] The following additional embodiments are provided, the numbering of which is not to be construed as designating levels of importance.

[00112] Embodiment 1 relates to a fastener unit adapted to secure at least one board to a support, the fastener unit comprising: a spacer body defining a first fastener hole having an upper portion having a first diameter and a lower portion, a threaded fastener disposed within the spacer body in the first fastener hole, the threaded fastener extending within the upper portion and the lower portion; a first joist leg and a second joist leg extending downward from the spacer body and configured to straddle and clamp a joist; and a grip element joined with the spacer body, the grip element defining a second fastener hole aligned with the first fastener hole, the grip element including a lower surface configured to engage a groove of a board.

[00113] Embodiment 2 relates to Embodiment 1, wherein the grip element includes a pressure foot separated a distance from the spacer body by a distance, wherein the distance is configured to inset the pressure foot inward from a side surface of the board, beyond a slanted wall disposed under the groove, whereby a predetermined force can be distributed through the pressure foot to a bottom surface of the board without tipping the board.

[00114] Embodiment 3 relates to Embodiment 1 or 2, wherein a first stabilizer bar extends from the first joist leg a predetermined distance, wherein a second stabilizer bar

extends from the second joist leg the predetermined distance, wherein the first and second stabilizer bars are disposed at a common level, below the spacer body.

[00115] Embodiment 3 relates to any one of the preceding Embodiments, wherein each of the first and second joist legs each include outwardly extending portions that extend away from the spacer body, wherein the first and second stabilizer bars are joined with the respective outwardly extending portions.

[00116] Embodiment 4 relates to any one of the preceding Embodiments, wherein the first stabilizer bar extends from a rear surface of the first joist leg, wherein the first stabilizer bar is generally parallel to the grip element extending from the rear surface of the spacer body, wherein the first stabilizer bar extends a distance that is equal to the distance by which the grip element extends away from the rear surface of the spacer body.

[00117] Embodiment 5 relates to any one of the preceding Embodiments, wherein the spacer body extends downward below the grip element a preselected distance such that when a predetermined force is applied through the at least one pressure foot of the grip element, a lower surface of the spacer body is configured to engage an upper surface of a joist disposed below the spacer body.

[00118] Embodiment 6 relates to any one of the preceding Embodiments, wherein the grip element includes a first end and a second end, wherein the first end projects forward of a front surface of the spacer body, wherein the second end projects rearward of a rear surface of the spacer body, wherein the grip element is a C-shaped channel, wherein the C-shaped channel includes first and second cleats at the first end, wherein the first and second cleats form downwardly extending first and second pressure feet at

the first end, wherein the first and second pressure feet form a lower surface of the grip element, wherein the grip element includes a recessed surface that is disposed above the lower surface between the first and second pressure feet and the spacer body.

[00119] Embodiment 7 relates to any one of the preceding Embodiments, wherein the first joist leg and the second joist leg each include a lower engagement portion disposed below and an outwardly extending portion, wherein the first stabilizer bar is joined with the first joist leg between the respective lower engagement portion and the outwardly extending portion, wherein the second stabilizer bar is joined with the second leg between the respective lower engagement portion and the outwardly extending portion.

[00120] Embodiment 8 relates to a method of using a fastener unit comprising: providing a fastener unit including a fastener, a spacer body defining a first fastener hole therethrough, a longitudinal axis, a grip element joined with the spacer body and projecting outward from the spacer body, with the fastener projecting through at least a portion of the grip element, a first resilient joist leg extending laterally from the spacer body, and a second resilient leg extending laterally from the spacer body, placing the fastener unit over a joist so that the first and second resilient legs move away from one another and downward relative to a first and a second sidewall of the joist; inserting the grip element into a first groove of a first board; and advancing the fastener through the first fastener hole of the spacer body and through the at least a portion of the grip element, wherein a head of the fastener forces the grip element into engagement with the first groove, thereby moving the first board toward the joist.

[00121] Embodiment 9 relates to Embodiment 8, wherein the spacer body includes a lower surface, wherein the lower surface engages an upper surface of the joist during the advancing.

[00122] Embodiment 10 relates to Embodiment 8 or 9, wherein the board includes a side surface below the groove, wherein the side surface transitions to a slanted wall that extends toward a plane in which a rear wall of the groove is disposed, wherein the board includes a bottom surface having a pressure region, wherein the grip element includes at least one pressure foot at an outward end of the grip element, distal from the spacer body, wherein the at least one pressure foot exerts a downward force that is transferred to the pressure region to push the pressure region against an upper surface of the joist, but so as not to tilt the board by pushing downward directly toward the slanted wall.

[00123] Embodiment 11 relates to any of the preceding Embodiments, wherein the spacer body is a timing spacer body that engages an upper surface of the joist during the advancing step, wherein the spacer body is compressed between the grip element and the joist, wherein the spacer body is of a predetermined thickness to thereby limit the amount of force exerted by the grip element against the groove.

[00124] Embodiment 12 relates to any of the preceding Embodiments, wherein the first joist leg includes a rear surface including a first stabilizer bar disposed below the spacer body, wherein the second joist leg includes a rear surface including a second stabilizer bar disposed below the spacer body, wherein the first and second stabilizer bars are each placed below a bottom surface of the board before the advancing step to stabilize the fastener unit relative to the board.

[00125] Directional terms, such as “vertical,” “horizontal,” “top,” “bottom,” “upper,” “lower,” “inner,” “inwardly,” “outer” and “outwardly,” are used to assist in describing the invention based on the orientation of the embodiments shown in the illustrations. The use of directional terms should not be interpreted to limit the invention to any specific orientations.

[00126] The above description is that of current embodiments of the invention. Various alterations and changes can be made without departing from the spirit and broader aspects of the invention as defined in the appended claims, which are to be interpreted in accordance with the principles of patent law including the doctrine of equivalents. This disclosure is presented for illustrative purposes and should not be interpreted as an exhaustive description of all embodiments of the invention or to limit the scope of the claims to the specific elements illustrated or described in connection with these embodiments. For example, and without limitation, any individual element(s) of the described invention may be replaced by alternative elements that provide substantially similar functionality or otherwise provide adequate operation. This includes, for example, presently known alternative elements, such as those that might be currently known to one skilled in the art, and alternative elements that may be developed in the future, such as those that one skilled in the art might, upon development, recognize as an alternative. Further, the disclosed embodiments include a plurality of features that are described in concert and that might cooperatively provide a collection of benefits. The present invention is not limited to only those embodiments that include all of these features or that provide all of the stated benefits, except to the extent otherwise expressly set forth in the issued claims. Any reference to claim

elements in the singular, for example, using the articles “a,” “an,” “the” or “said,” is not to be construed as limiting the element to the singular. Any reference to claim elements as “at least one of X, Y and Z” is meant to include any one of X, Y or Z individually, and any combination of X, Y and Z, for example, X, Y, Z; X, Y; X, Z ; and Y, Z.

CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A fastener unit adapted to secure at least one board to a support, the fastener unit comprising:

a spacer block defining a first fastener hole configured to receive a fastener therein, the spacer block including a front surface, an opposing rear surface, a first side surface and a second side surface opposite the first side surface, the spacer block having a thickness extending from a front surface to a rear surface, the thickness corresponding to a preselected gap between a first board and a second adjacent board;

a grip element joined with the spacer block, the grip element defining a second fastener hole aligned with the first fastener hole of the spacer block, the grip element configured to fit in and engage a first groove defined by the first board, the grip element having at least one downwardly facing projection;

wherein the spacer block includes a first resilient compression element extending outwardly from the first side surface and a second resilient compression element extending outwardly from the second side surface, each of the first and second compression elements having vertically compressible upper and lower wings configured to fit within and forcibly expand within the first groove of the first board, thereby securing the spacer block in a position adjacent the first groove defined by the first board;

wherein at least one of the first resilient compression element and the second resilient compression element is joined with the spacer block a fracturable joint such

that the at least one of the first and second resilient compression elements can be selectively broken off and removed from the spacer block.

2. The fastener unit of claim 1,

wherein the respective vertically compressible upper and lower wings are separated from one another by a first distance in an open mode;

wherein the respective vertically compressible upper and lower wings are configured to move toward one another so that each are separated from one another by a second distance in a compression mode,

wherein the second distance is less than the first distance,

wherein the second distance is less than a height of the groove of the first board.

3. The fastener unit of claim 2,

wherein the first distance is greater than the height of the groove of the first board.

4. The fastener unit of claim 1,

wherein the respective vertically compressible upper and lower wings each include a front edge and a rear edge,

wherein the front edge is coplanar with the front surface of the spacer block,

wherein the grip element extends forward of both the front edge and the front surface.

5. The fastener unit of claim 4,

wherein the rear edge extends outward, beyond the rear surface of the spacer block.

6. The fastener unit of claim 1,
wherein the spacer block defines a spacer block horizontal plane that extends between the respective vertically compressible upper and lower wings,
wherein the respective vertically compressible upper and lower wings are configured to resiliently deform and move toward the spacer block horizontal plane in a compressed mode.
7. The fastener unit of claim 1,
wherein the grip element is constructed from metal and disposed in a correspondingly shaped grip element aperture defined by the spacer body,
wherein the spacer body is constructed from a polymeric material.
8. The fastener unit of claim 1,
wherein the spacer body thickness is configured so that the spacer body can establish a gap between the first board and the second board of at least 0.200 inches,
wherein the gap is equal to or greater than a diameter of a head of the fastener.
9. A fastener unit adapted to secure at least one board to a support, the fastener unit comprising:
a spacer block defining a first fastener hole configured to receive a fastener therein, the spacer block including a front surface, an opposing rear surface, a first side surface and a second side surface opposite the first side surface, the spacer block having a thickness extending from a front surface to a rear surface, the thickness corresponding to a gap between a first board and a second adjacent board, the spacer block including a vertical axis;

a grip element extending from the front surface and the rear surface of the spacer block, the grip element aligned with the first fastener hole of the spacer block, the grip element configured to fit in and engage a first groove defined by the first board;

wherein the spacer block includes a first resilient compression element extending outwardly from the first side surface on a first side of the vertical axis, the first resilient compression element being vertically compressible toward a first plane that is orthogonal to the vertical axis, the first resilient compression element configured to fit in and forcibly expand within the first groove of the first board, thereby securing the spacer block in a position adjacent the first groove defined by the first board,

whereby the spacer block can be disposed in the gap between the first board and the second adjacent board.

10. The fastener unit of claim 9,

wherein the first resilient compression element includes a first front edge and a first rear edge,

wherein the first rear edge is configured to fit within the first groove of the first board.

11. The fastener unit of claim 9,

wherein the first resilient compression element includes a first wing and a second wing joined at a junction,

wherein the first wing and second wing are compressible toward the first plane so that the vertical distance between the first wing and the second wing decrease upon such compression.

12. The fastener unit of claim 11,

wherein the first wing and the second wing are joined at the junction adjacent the spacer block,

wherein the first wing and the second wing are joined with the spacer block via a fracturable joint so that the first resilient compression element can be selectively broken off and removed from the spacer block.

13. The fastener unit of claim 9,

wherein the grip element is a channel that opens toward a lower surface of the spacer block,

wherein the grip element extends forwardly from the front surface and rearwardly from the rear surface of the spacer block.

14. The fastener unit of claim 9,

wherein the front surface and the opposing rear surface of the spacer block are separated by a spacer block thickness,

wherein the first resilient compression element includes a front edge and a rear edge that are separated by a compression element width,

wherein the spacer block thickness is less than the compression element width.

15. The fastener unit of claim 9,

wherein the spacer block includes a second resilient compression element extending outwardly from the second side surface on a second side of the vertical axis, opposite the first side, the second resilient compression element being vertically compressible toward the first plane, the second resilient compression element

configured to fit and forcibly expand within the first groove of the first board, while the first resilient compression element is within the first groove, but distal from the first resilient compression element.

16. The fastener unit of claim 9,

wherein the spacer body and first compressible resilient element are constructed from a polymeric material,

wherein the grip element is in the form of a metal c-channel that is oriented with the c-channel opening downward,

wherein the grip element defines a second fastener hole aligned with the first fastener hole.

17. A fastener unit adapted to secure at least one board to a support, the fastener unit comprising:

a spacer block defining a first fastener hole, the spacer block having a thickness extending from a front surface to a rear surface, the thickness corresponding to a gap between a first board and a second adjacent board, the spacer block including a vertical axis;

a grip element extending from the spacer block, the grip element configured to fit in and engage a first groove defined by the first board, without the spacer block extending into the first groove, the grip element configured to receive a fastener through at least a portion of the grip element;

wherein the spacer block includes a first resilient compression element extending from the spacer block, the first resilient compression element being vertically

compressible toward a first plane that is transverse to the vertical axis, the first resilient compression element configured to compress and fit in, and forcibly expand within the first groove of the first board, thereby securing the spacer block in a position adjacent the first groove defined by the first board, with the spacer block being disposed in the gap between the first board and the second adjacent board.

18. The fastener unit of claim 17,

wherein the first resilient compression element includes first and second portions that are separated from one another by a first distance in an open mode,

wherein the first and second portions are configured to move relative to one another upon application of a force in a compression mode so that the first and second portions are separated from one another by a second distance, the second distance being less than the first distance,

wherein when the first and second portions are in the compression mode, the first and second portions are narrower than a width of the first groove of the first board so that the first and second portions are configured to fit within the first groove.

19. The fastener unit of claim 17,

wherein the grip element includes a grip element length,

wherein the spacer block includes a spacer block thickness,

wherein the first resilient compression element includes a first resilient compression element width extending from a front edge to a rear edge,

wherein the grip element length is greater than the first resilient compression element width,

wherein the first resilient compression element width is greater than the spacer block thickness.

20. A method of using a fastener unit comprising:

providing a fastener unit including a fastener, a spacer body defining a first fastener hole therethrough, a grip element joined with the spacer body and projecting outward from the spacer body, with the fastener projecting through at least a portion of the grip element, and a first resilient compression element extending laterally from the spacer body, the first resilient compression element including first and second portions that are operable in an open mode, and in a compression mode in which the first and second portions are moved toward a first plane that is generally orthogonal relative to a longitudinal axis of the fastener;

converting the first and second portions from the open mode to the compression mode;

inserting the first and second portions into a first groove of a first board;

releasing the first and second portions so that the first and second portions forcibly engage the first groove, thereby holding the spacer body adjacent a first side surface of the first board adjacent the first groove.

ABSTRACT OF THE DISCLOSURE

A fastener unit and related method for securing a board to a support is provided. The fastener unit includes a spacer block, a grip element extending from the spacer block and configured to fit in and engage a groove of the board, and one or more resilient compression elements extending from the spacer block. The one or more resilient compression elements can be a joist leg configured to engage a joist, or it can be vertically compressible toward a first plane that is transverse to a vertical axis of the spacer block so that portions of it can compress from an open mode to a compressed mode and fit within, then forcibly expand within the groove, thereby securing the spacer block in a position adjacent the groove to establish a gap between the board and another board. A related method of use also is provided.

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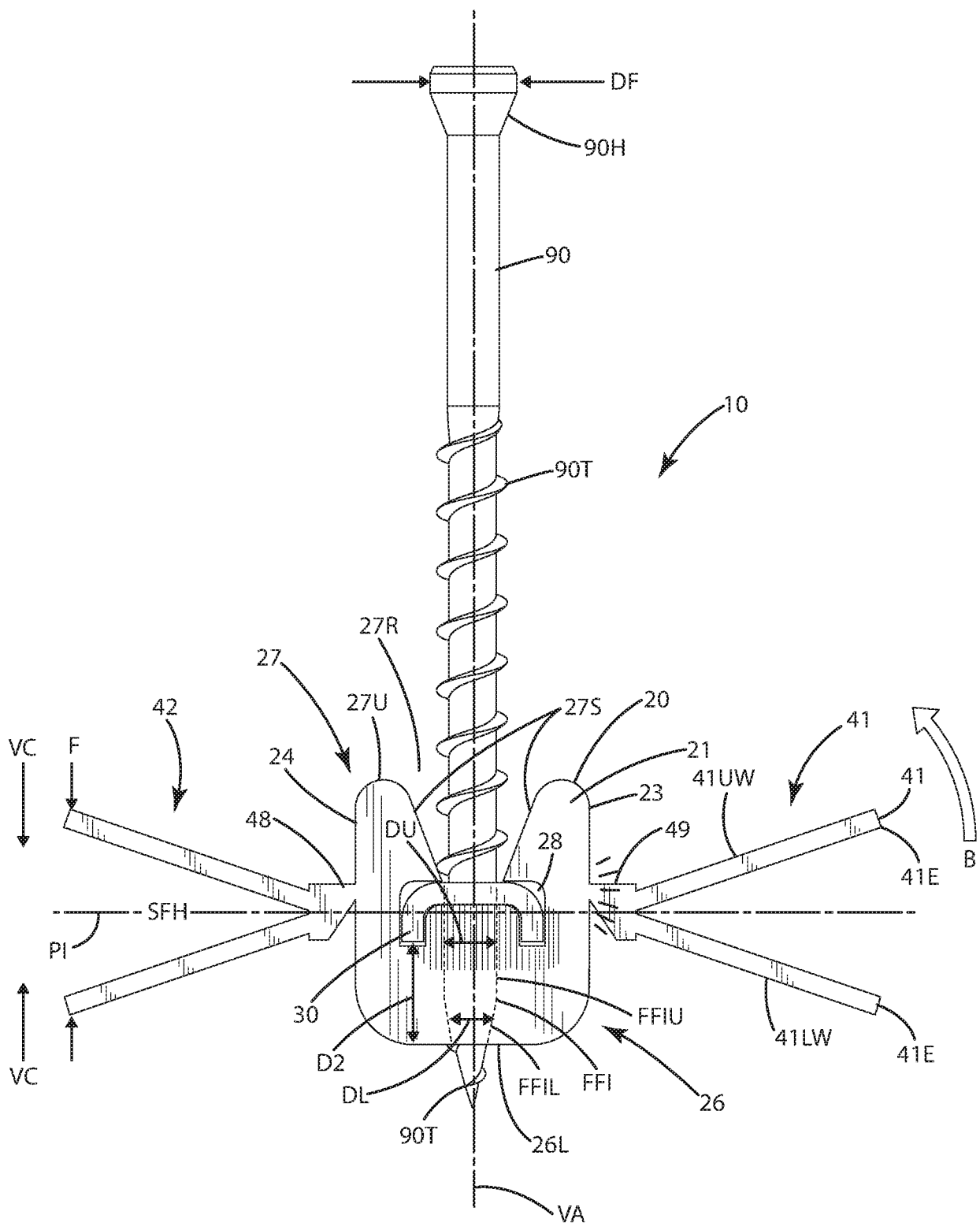


Fig. 3

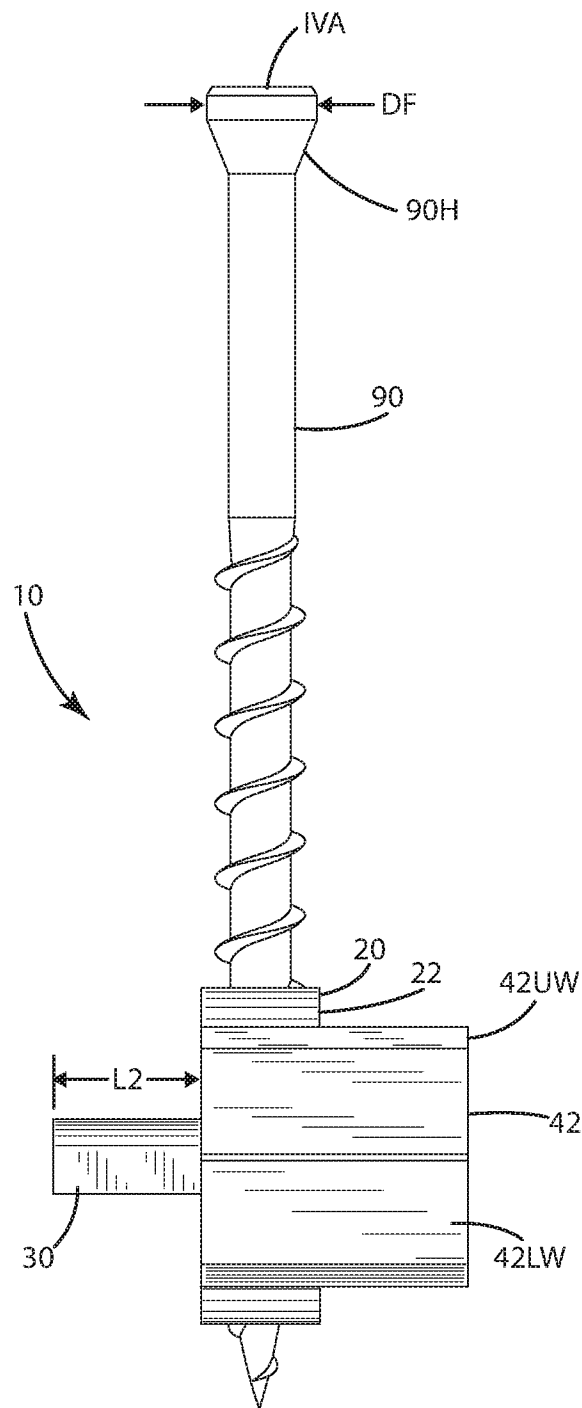


Fig. 4

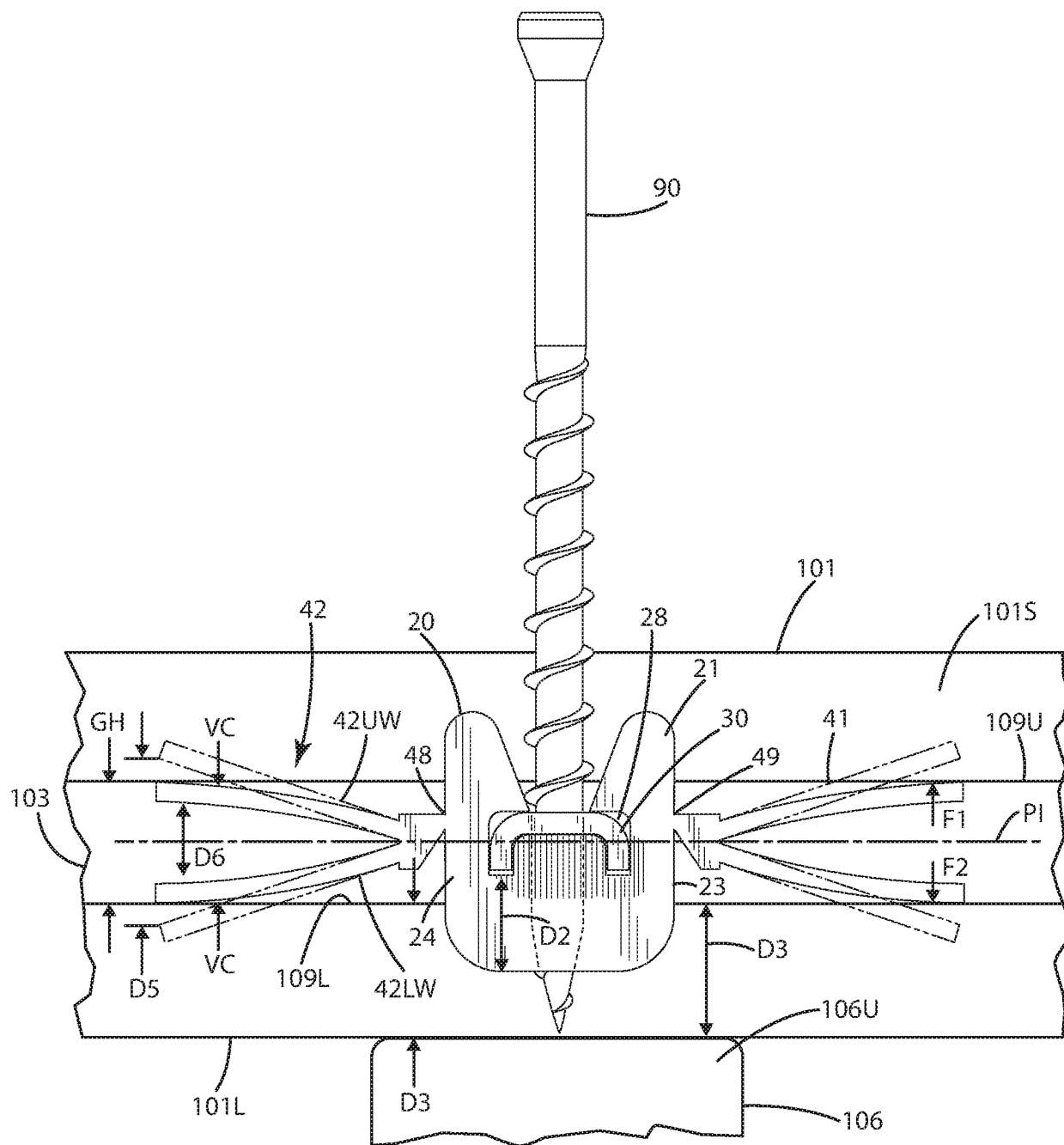


Fig. 5

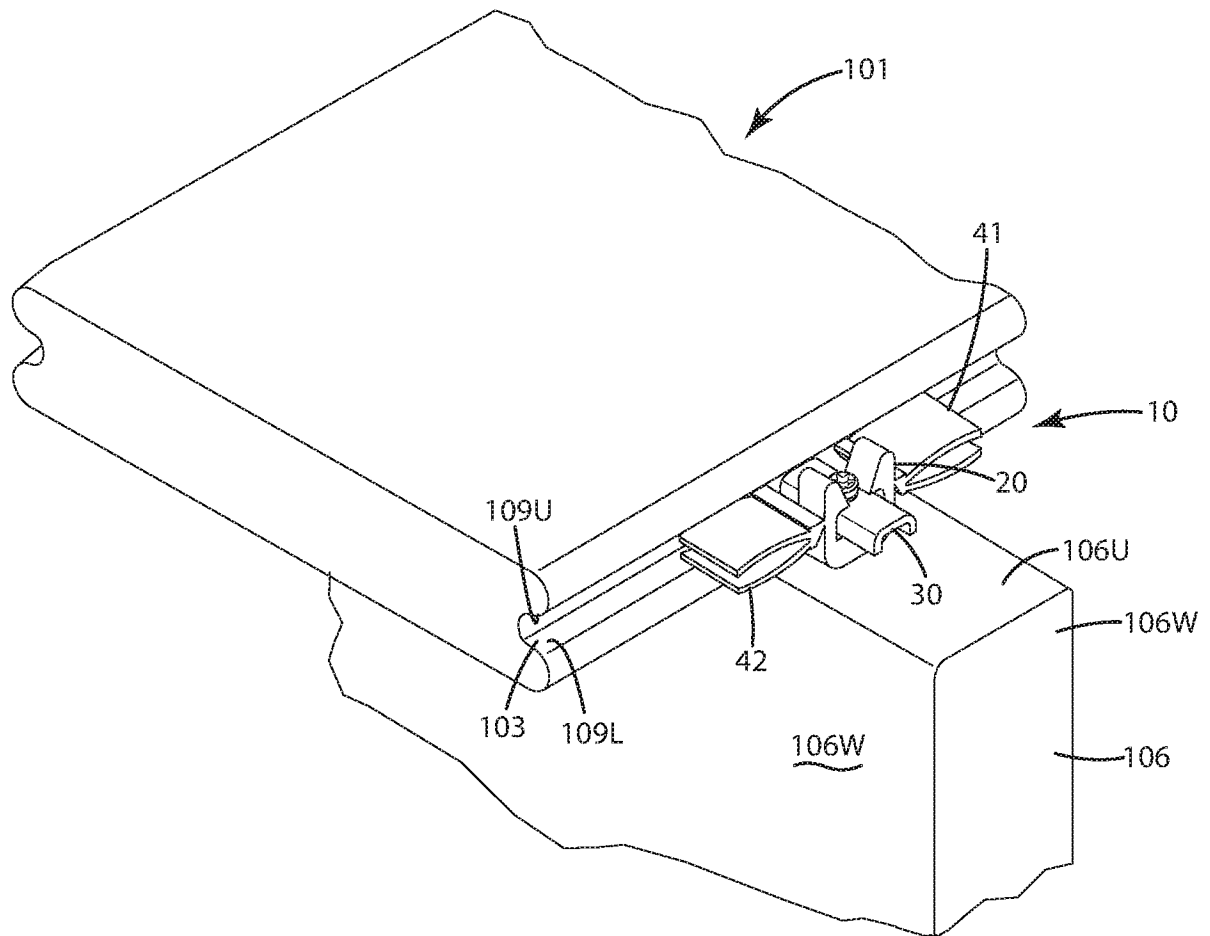


Fig. 6

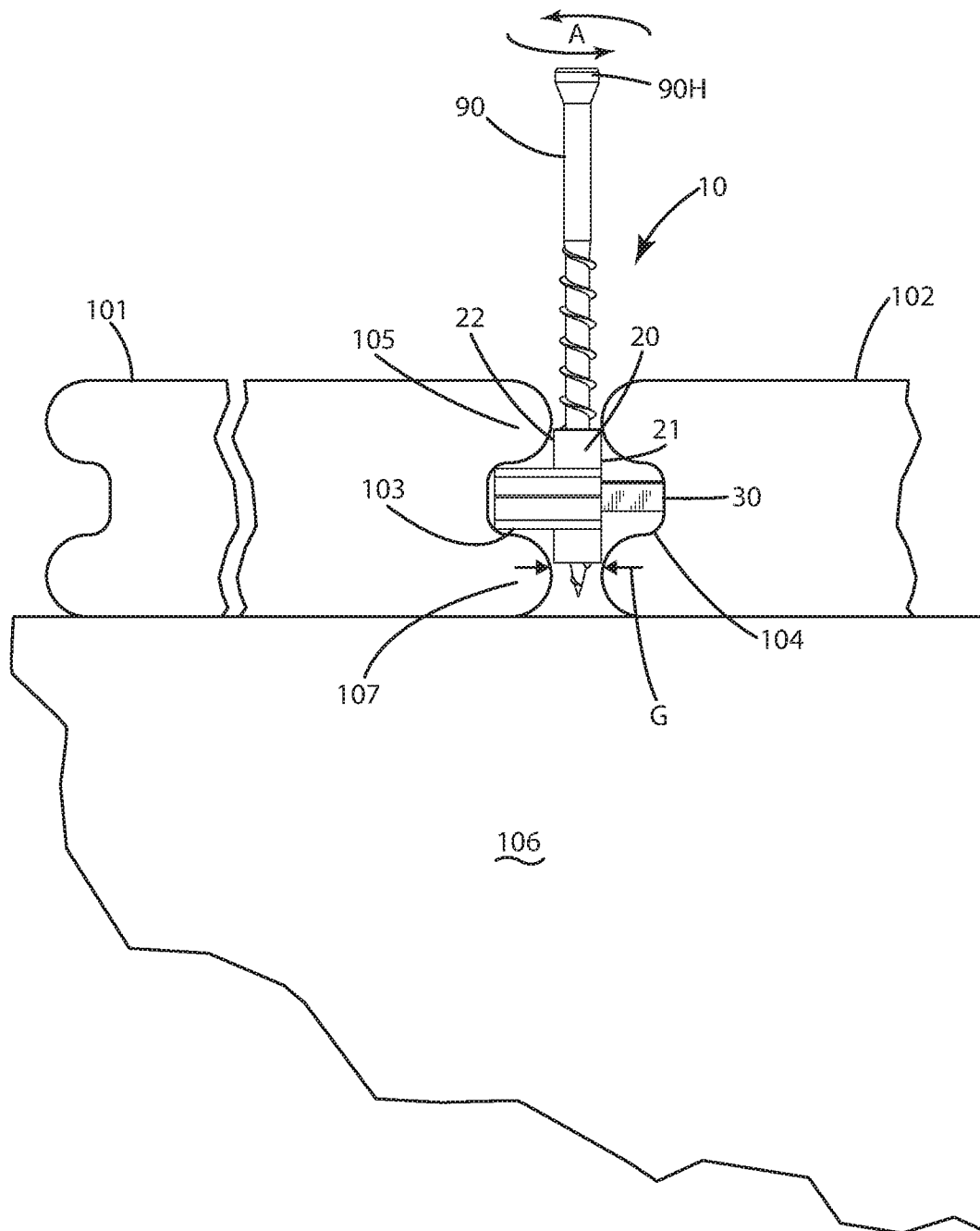


Fig. 7

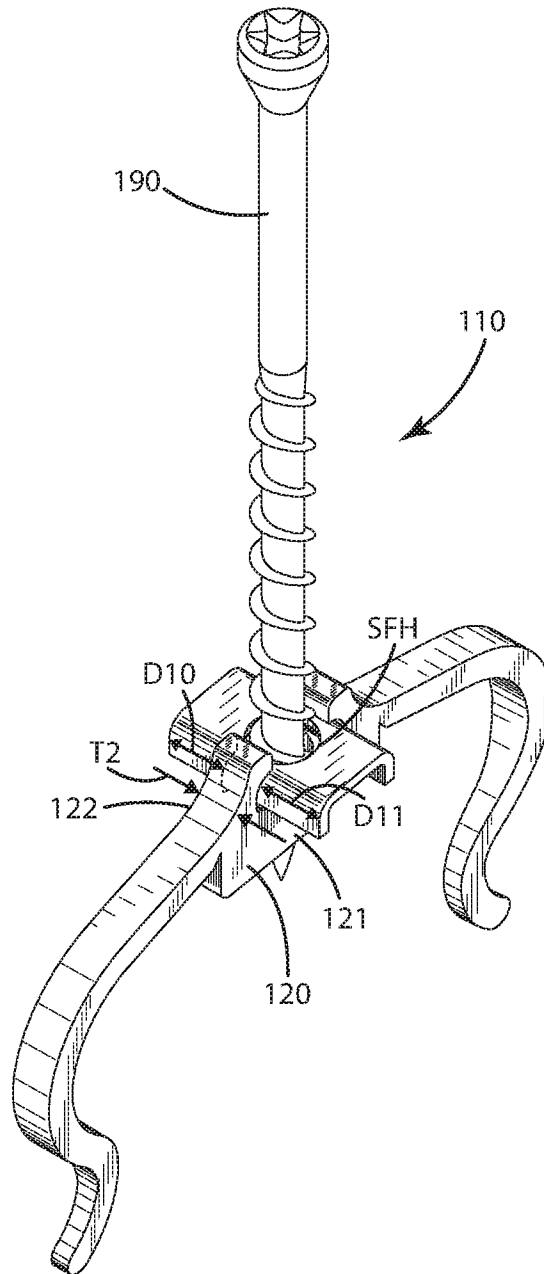


Fig. 8

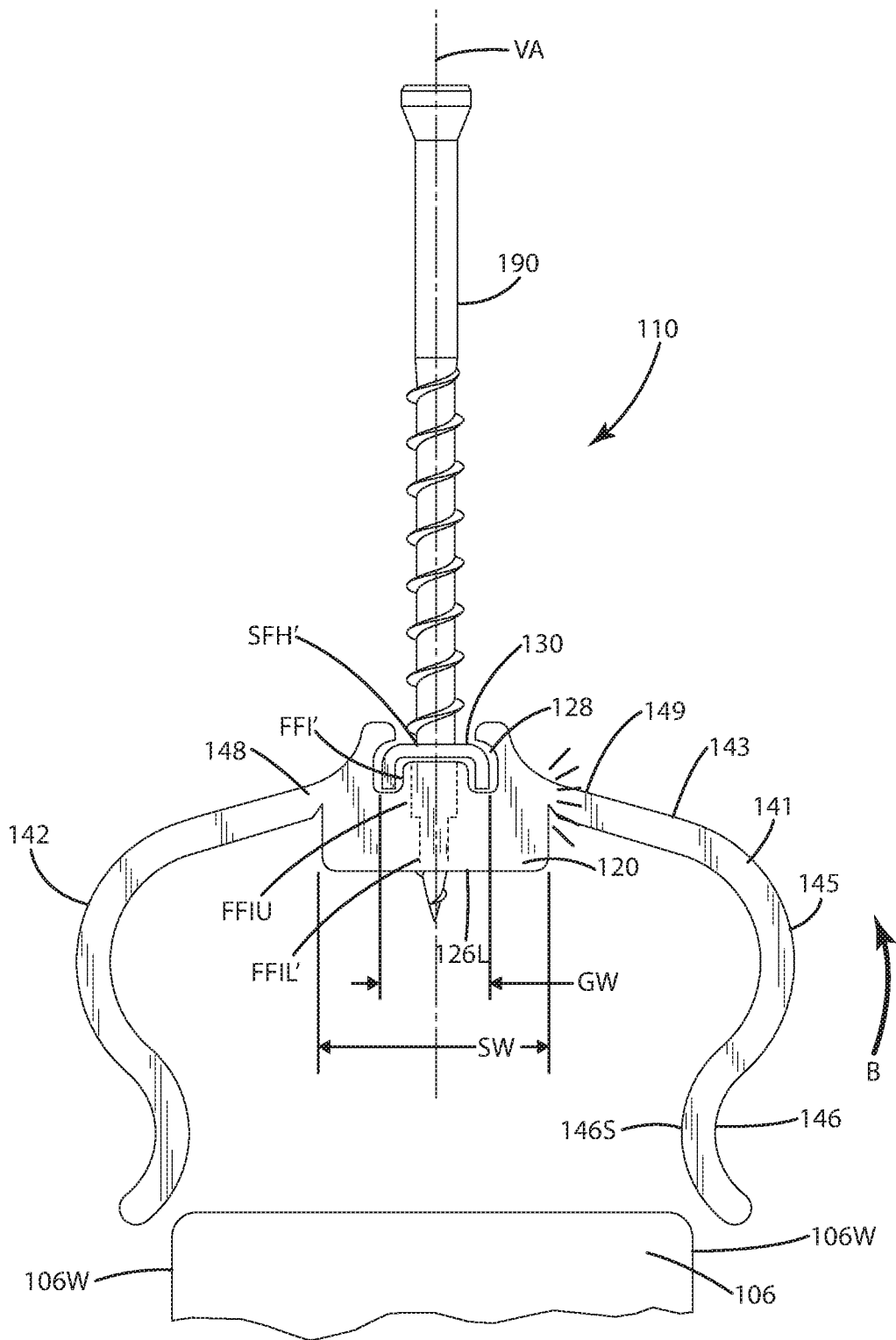


Fig. 9

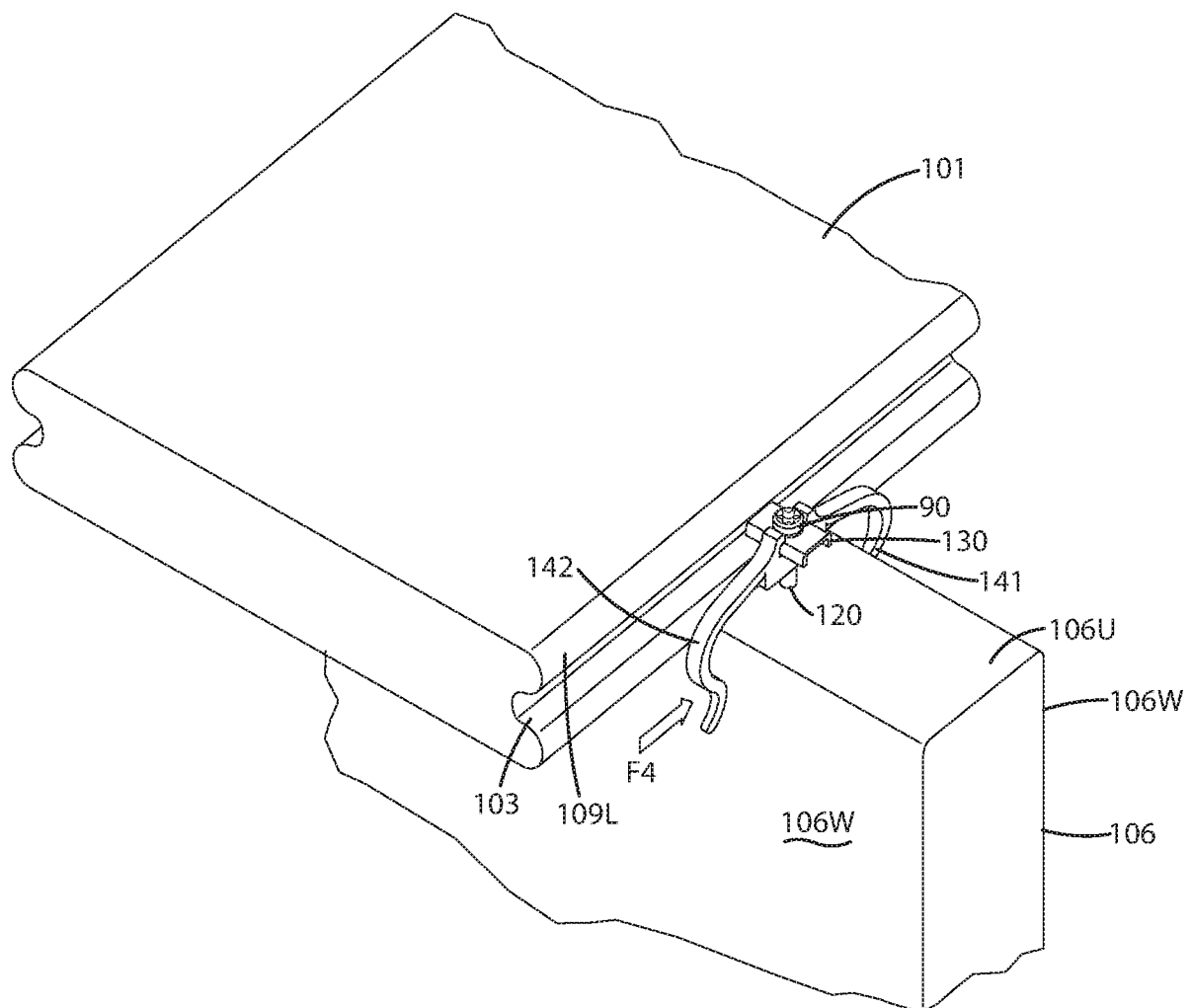


Fig. 10

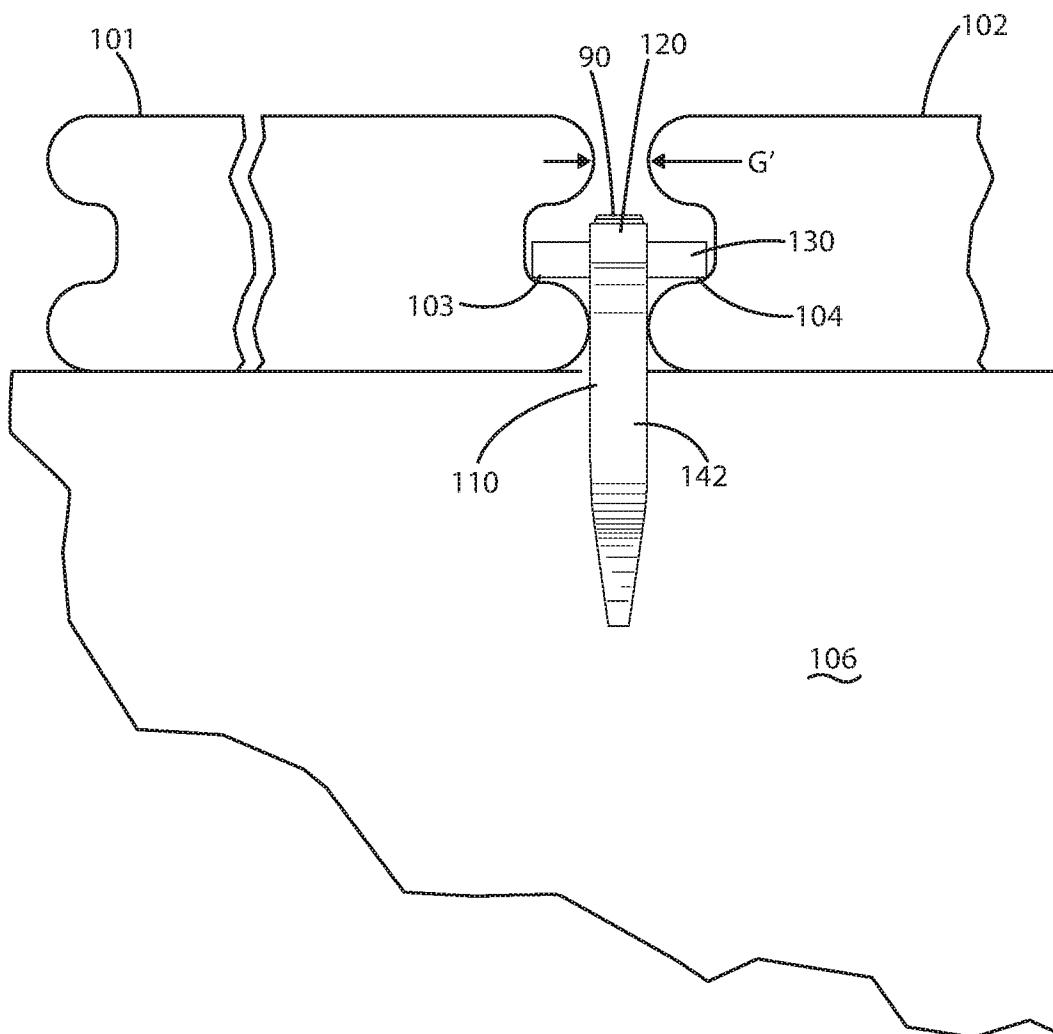


Fig. 11



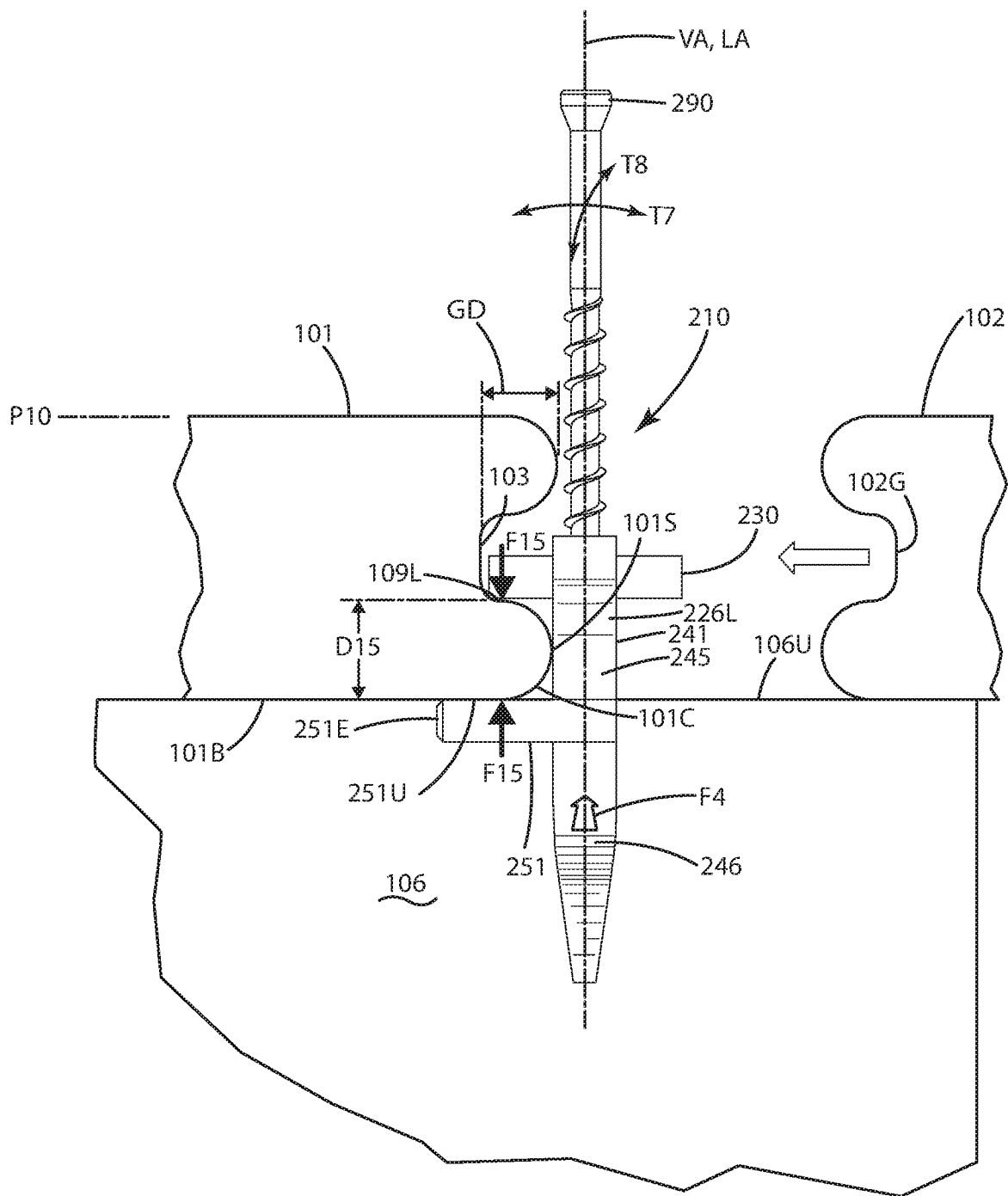
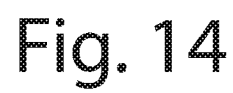


Fig. 13



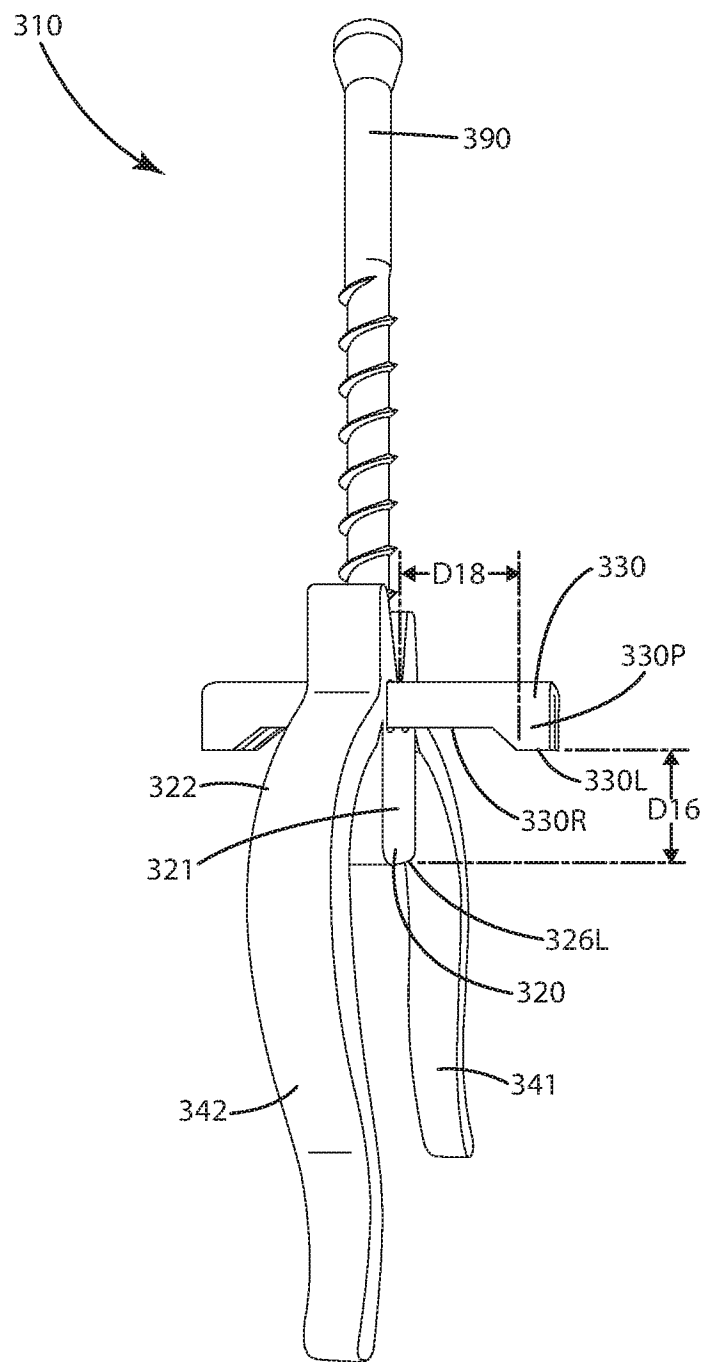


Fig. 15

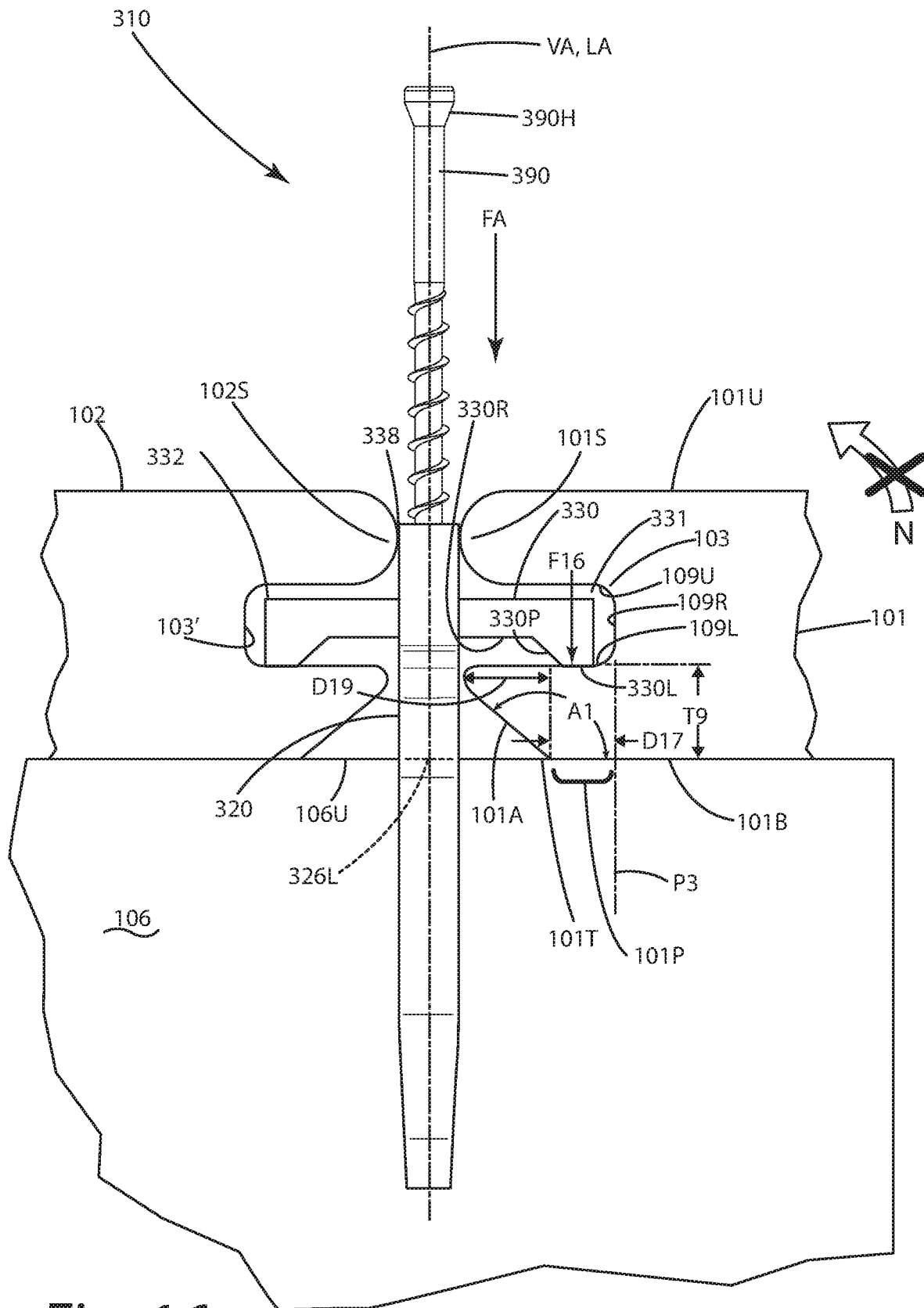


Fig. 16

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)****Title of
Invention****HIDDEN FASTENER UNIT AND RELATED METHOD OF USE**

As the below named inventor, I hereby declare that:

This declaration
is directed to:

The attached application, or



United States application or PCT international application number _____

filed on _____.

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

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

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

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LEGAL NAME OF INVENTORInventor: Roger A. VandenbergDate (Optional): 4/15/2018Signature: Roger A. Vandenberg

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