

DIRECCION DE NUEVAS CREACIONES
SUPERINTENDENCIA DE INDUSTRIA Y
COMERCIO

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 13-301524- -00000-0000

Fecha: 2013-12-27 16:12:34 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 98

EXPEDIENTE-----

TITULO: ENSAMBLE PARA ASEGUA DOS PANELES YUSTAPUESTOS A
UNA ESTRUCTURA PARA PERMITIR LA EXPANSIÓN Y
CONTRACCIÓN TÉRMICAS

SOLICITANTE DAN PAL

13-301524

DOMICILIO UPPER GALILEE, ISRAEL

APODERADO JUAN CARLOS URIBE RESTREPO

FECHA DICIEMBRE 27-2013



Industria y Comercio
SUPERINTENDENCIA

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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DIRECCIÓN DE NUEVAS CREACIONES
SOLICITUD FASE NACIONAL -PCT

1	TIPO DE SOLICITUD	☒ Patente de invención ☐ Capítulo I	☐ Patente de Modelo de Utilidad ☒ Capítulo II
2	DATOS SOLICITUD INTERNACIONAL PCT (86)		
Solicitud Internacional No.		PCT/ IL2012/050215	Fecha 21/06/2012
Publicación Internacional No.		WO 2012/176207 A1	Fecha 27/12/2012
3	TÍTULO DE LA INVENCIÓN (200 caracteres o espacios máximos)		
ENSAMBLE PARA ASEGURAR DOS PANELES YUXTAPUESTOS A UNA ESTRUCTURA PARA PERMITIR LA EXPANSIÓN Y CONTRACCIÓN TÉRMICAS			
4	CLASIFICACIÓN INTERNACIONAL (CIP)		
E04C 2/54 (2006.01) E04D 3/28 (2006.01)			
5	SOLICITANTE (S) ☐ Esta persona también es inventor. Para datos adicionales utilizar hoja de información complementaria		
APELLIDOS O RAZÓN SOCIAL		NOMBRE	IDENTIFICACIÓN
DAN-PAL			
6	DATOS DEL SOLICITANTE		
DIRECCIÓN : KIBBUTZ DAN, MOBILE POST, UPPER GALILEE 12245, ISRAEL		No. TELÉFONO	
CIUDAD UPPER GALILEE		CORREO ELECTRÓNICO	
DEPARTAMENTO/ESTADO		NACIONALIDAD O	
PAÍS DE RESIDENCIA ISRAEL		LUGAR DE CONSTITUCIÓN ISRAEL	
7	INVENTOR (ES) Para datos adicionales utilizar hoja de información complementaria		
APELLIDOS		NOMBRES	NACIONALIDAD
BEN DAVID		MICHA	ISRAEL
DIRECCIÓN DE CORREO ELECTRÓNICO:			
8	DATOS INVENTOR (ES)		
PAÍS RESIDENCIA	DEPARTAMENTO/ESTADO	CIUDAD	DIRECCIÓN
ISRAEL		UPPER GALILEE	KIBBUTZ SDE NEHEMIA, 12245 UPPER GALIL, ISRAEL
OTRO(S) SOLICITANTE(S) Y/O (OTRO(S)) INVENTOR(ES)			
☐ Los demás solicitantes y/o (demás) inventores se indican en una hoja a continuación.			
9	☐ REPRESENTANTE LEGAL ☒ APODERADO		
APELLIDOS		NOMBRES	IDENTIFICACIÓN
URIBE RESTREPO		JUAN CARLOS	C.C. 79.159.313 T.P. 54.493
DIRECCIÓN CALLE 93B No. 12-48, Piso 4o. BOGOTÁ, D.C., COLOMBIA		No. TELÉFONO 6019660	
CIUDAD BOGOTÁ. D.C. COLOMBIA		CORREO ELECTRÓNICO tum@tumnet.com	
PAÍS COLOMBIA		No. RADICACIÓN DE PROTOCOLO DE PODER GENERAL	

10	DECLARACIONES DE PRIORIDAD ☒ SI ☐ NO			
(33) PAÍS DE ORIGEN		CÓDIGO PAÍS	(31) NÚMERO	(32) FECHA (AAAA/MM/DD)
1 ISRAEL		IL	61/489,886	21/06/2011
2				
3				
11	DECLARACIÓN SOBRE USO DE RECURSOS GENÉTICOS O BIOLÓGICOS			
Declaro que el objeto de la presente solicitud de patente fue obtenido a partir de recursos genéticos o biológicos de los que cualquiera de los países miembros de la Comunidad Andina es país de origen.				
☐ SI ☒ NO				
Nota: En caso afirmativo deberá anexar copia del contrato de acceso de recursos genéticos o productos derivados, o certificado o número de registro, expedido por la Autoridad competente.				
12	DECLARACIÓN SOBRE USO DE CONOCIMIENTOS TRADICIONALES			
Declaro que el objeto de la presente solicitud de patente fue obtenido a partir de conocimientos tradicionales de comunidades indígenas, afroamericanas o locales de países miembros de la Comunidad Andina.				
☐ SI ☒ NO				
Nota: En caso afirmativo deberá anexar la licencia o autorización de uso de conocimiento tradicional, o certificado, o número de registro expedido por la Autoridad competente.				
13	REDUCCIÓN DE TASAS			
Declaro que carezco de medios económicos para presentar la solicitud de patente.				
☐ SI ☒ NO				
Nota: En caso de ser persona natural y carecer de medios económicos, y por lo tanto, aplique la reducción de tasas a que se refiere la resolución vigente en tarifas, debe firmar la presente solicitud bajo la gravedad de juramento.				
Micro, pequeñas y medianas empresas ☐				
Universidades públicas o privadas ☐				
Entidades sin ánimo de lucro ☐				
Debe aportar los documentos que se indican en el numeral 17 de anexos				
14	AUTORIZACIÓN DE NOTIFICACIÓN EN LÍNEA ☐ SI ☒ NO			
Manifiesto que he leído y entendido perfectamente los términos y condiciones de uso de medios electrónicos para las notificaciones en línea a través de Internet de los actos administrativos proferidos por la Superintendencia de Industria y Comercio que deben ser notificados personalmente y, en consecuencia, autorizo el servicio de notificación a través de internet.				
15	COMPROBANTE DE PAGO O PAGO ELECTRÓNICO	N°	Fecha	
16	FIRMA DEL SOLICITANTE, DEL APODERADO O DEL REPRESENTANTE LEGAL			
Junto a cada firma, indicar el nombre del firmante y su calidad (si tal calidad no es obvia al leer el petitorio)				
7 - dmy				
17	ANEXOS			
Documentación Técnica		Documentación Jurídica		
Solicitud Internacional en castellano				
1. ☒ Descripción N° de folios:		9. ☒ Poderes, si fuera el caso.		
2. ☒ Reivindicaciones N° Reivindicaciones: 15		10. ☐ Documento que legalmente pruebe la cesión del inventor al solicitante o a su causante.		
3. ☒ Dibujos y/o figuras N° folios:		11. ☐ Copia del contrato de acceso de recursos genéticos o productos derivados, certificado o número de registro, si fuera el caso.		
4. ☒ Resumen.		12. ☐ Copia de la licencia o autorización de Conocimientos Tradicionales, certificado o número de registro, si fuera el caso.		
5. ☐ Certificado de depósito de material biológico si fuera el caso.		13. Reducción de tasas		
6. ☐ Listado de secuencias de nucleótidos y/o aminoácidos en forma digital si fuera el caso.		Micro, pequeñas o medianas empresas		
7. ☒ Arte final 12 x 12.		☐ Copia simple de la declaración de renta del año inmediatamente anterior, o en su defecto prueba documental idónea.		
8. ☐ Anexo formato digital.		☐ Documento de constancia de cumplimiento con lo establecido en la ley 905 de 2004.		
		Universidades públicas o privadas		
		☐ Copia acto de reconocimiento institucional emitido por el Ministerio de Educación		
		Entidades sin ánimo de lucro		
		☐ Copia de registro vigente en Cámara de comercio.		
		☐ Hoja de información complementaria.		
		☐ Otros, especificar		
		14. ☒ Comprobante de pago de la tasa de presentación de la solicitud.		
		15. ☐ Comprobante de pago por reivindicación de prioridad.		

- | | |
|--|---|
| | <p>16. ☐ Comprobante de pago de la tasa por concepto de excedente de palabras en la publicación.</p> <p>17. ☒ Comprobante de pago por reivindicación adicional a 10.</p> |
|--|---|



TRIANA, URIBE & MICHELSEN

REPRESENTATION AND POWER OF ATTORNEY

I (we), the undersigned

ALEX BENSHALOM

in representation of DAN-PAL

domiciled in KIBBUTZ DAN
UPPER GALILI
ISRAEL

in due compliance with the terms of paragraph 1st. of article 543 of the Commercial Code, do hereby appoint **FERNANDO TRIANA**, tpa. No. 45.265 c.c. No. 79.154.036; **LAURA MICHELSEN**, tpa. No. 67.897 c.c. No. 39.783.287; **JUAN CARLOS URIBE**, tpa. No. 54.493 c.c. No. 79.159.313 and **JUAN PABLO TRIANA**, tpa. 63.077 c.c. No. 79.487.222; domiciled at Calle 93 B No. 12-48 P. 4, Bogotá, D.C., Colombia, the first as principal and the others as alternates, in the order of their appointment, as our representatives for all industrial property matters with faculty to receive notifications and to appoint attorneys in and out of Court. The first alternate shall replace the principal in case of his absence or of temporal or definitive impediment. The same rule will apply when the second or third alternate representative is to replace the first or second one, or when the second or third is to replace the principal one. In such cases, the principal representative, shall state his intention not to act as representatives through a declaration given before a Notary Public in Colombia,

REPRESENTACIÓN Y PODER

Yo (nosotros), abajo suscrito(s)

ALEX BENSHALOM

en representación de DAN-PAL

domiciliado(s) en KIBBUTZ DAN
UPPER GALILI
ISRAEL

por el presente nombro (nombramos) a **FERNANDO TRIANA**, tpa. No. 45.265 c.c. No. 79.154.036; **LAURA MICHELSEN**, tpa. No. 67.897 c.c. No. 39.783.287; **JUAN CARLOS URIBE**, tpa. No. 54.493 c.c. No. 79.159.313 y **JUAN PABLO TRIANA**, tpa. 63.077 c.c. No. 79.487.222; domiciliados en la Calle 93 B No. 12-48 P. 4, Bogotá, D.C., Colombia, en obediencia a lo dispuesto en el parágrafo 1ro. del Artículo 543 del Código de Comercio, el primero como principal y los demás como suplentes, en su orden, como mis (nuestros) representantes en todos los asuntos de propiedad industrial con facultad para recibir notificaciones y nombrar apoderados judiciales o extrajudiciales. El primer representante suplente reemplazará al principal en caso de ausencia o impedimento temporal o definitivo de aquel. La misma regla se aplicará cuando el segundo y tercer representantes suplentes hayan de reemplazar al primero, al segundo o al principal. En tales casos, el representante principal, o el primero, o segundo suplente, o tercer suplente en su caso, o todos ellos, declararán su intención de no ejercer la representación mediante declaración autenticada por Notario Público en Colombia,



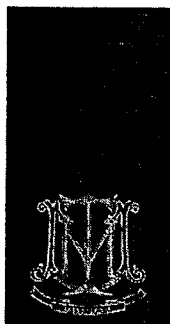
TRIANA, URIBE & MICHELSEN

or before a Notary or another Public Official or a Colombian Consul abroad; and in cases of impediment, the appropriate certificate shall suffice. If any of the appointees were to be definitely absent, the following alternate shall take his place. When the absence or impediment of the principal representative, or of the first or second or third alternate in their turn ceases, the representation can be taken again in their sequence, by the principal, the first or second or third alternate depending on case, and the mere fact or its exercise will suffice. The exercise of the representation by the first or second or third alternates in their turn shall end at such time.

In addition, I (we) grant a Power of Attorney in favor of the above named attorneys-at-law so that they may obtain the protection of my (our) intellectual property and against the unfair competition, for which purpose I (we) authorize the said attorneys to represent me (us) before any authorities or persons, with or without jurisdiction, specially those administrative, administrative contentious and judicial, as well as before national and/or international arbitration tribunals in all matters concerning the following: a) Obtainment of patents, layout-designs of integrated circuits, utility models and industrial designs; the registration of marks and trade slogans; the deposit of commercial names and trade emblems; the obtainment of the declaration and authorization of denominations of origin; renewal, payment of the annuity fees, assignment, license, change of name or domicile, voluntary cancellation; and the registration of commercialization agreements and licenses of use of the above rights; b) Protection of trade secrets; c) Obtainment of plant variety protection; d) Obtainment of functioning licenses, health registrations and sale licenses and any other petition before the sanitary or administrative authorities; e) Actions against protection to the consumers, restrictive commercial practices and competence promotion;

o por Notario u otro Funcionario Público, o Cónsul de Colombia, en el extranjero; y si se tratare de impedimento, con el certificado respectivo. Si alguno de los nombrados faltare definitivamente, el siguiente tomará su lugar. Cuando cesare la ausencia o impedimento del representante principal, o de su primero o segundo o tercer suplente, en su caso, podrán ejercer la representación, en su orden, uno u otros según el caso, asumiéndola por el solo hecho de ejercerla, cesando en ese momento el ejercicio de la representación por el primero o segundo o tercer suplente en su caso.

Además, confiero (conferimos) poder a los abogados arriba nombrados, para obtener la protección de mi (nuestra) propiedad intelectual y contra la competencia desleal, a cuyo efecto autorizo(amos) a los dichos apoderados para que me (nos) representen ante cualesquiera entidades o personas, ejerzan o no jurisdicción, especialmente ante las del orden administrativo, contencioso-administrativo y judicial, así como los tribunales de arbitramento nacionales y/o internacionales en todo lo concerniente a los siguientes asuntos: a) Obtención de patentes de invención, de los esquemas de trazado de circuitos integrados, modelos de utilidad y diseños industriales; el registro de marcas y de lemas comerciales; el depósito de nombres comerciales y enseñas; la obtención de la declaración y de la autorización de denominaciones de origen; su renovación, pago de anualidades de mantenimiento, traspaso, licencia, cambio de nombre o domicilio, cancelación voluntaria; y el registro de acuerdos de comercialización y de licencias de uso de esos derechos; b) Protección de secretos empresariales c) Obtención de la protección para variedades vegetales; d) Obtención y tramitación de todo lo relacionado con licencias de funcionamiento, registros sanitarios, licencias de venta y cualquier otra petición ante las autoridades sanitarias o



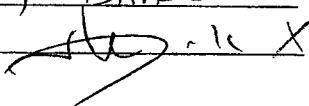
TRIANA, URIBE & MICHELSEN

f) Obtainment of copyright registrations for any type of artistic, literary, scientific, musical, video, films, video games, choreography works, software or any other production in the artistic, scientific or literary fields capable of being reproduced or expressed by any means known now or in the future; Registration of agreements related with the execution or transfer of intellectual property rights; Obtention of reduced postal tariff; g) Registration of domain names; their renewal, assignment, change of name, change of domicile, cancellation and any other acts related with their management. h) Actions of repossession, of opposition, cancellation, nullity, infringement of rights, preventive injunction, custom procedures, writ of mandamus, unfair competition, granting of licenses; and in general the civil, constitutional, criminal and administrative suits relating to all those rights; actions and suits instituted by me (us) or against me (us). And that in all the above matters they may substitute this Power of Attorney, compromise, execute license agreements, settlement agreements, assignment agreements, file extraordinary remedies such as nullification and/or revision and/or supplication of court decisions, conciliate, admit the facts of the case, to bid in public auction and allocate on behalf of an existing credit, desist, cancel, assign, receive, resign, notify and ratify acts done by representatives without a Power of Attorney.

administrativas; e) Acciones por protección al consumidor, por prácticas comerciales restrictivas y promoción de la competencia; f) Obtención del registro del derecho de autor para cualquier tipo de obra artística, literaria, científica, musical, videográfica, cinematográfica, coreográficas, soporte lógico o cualquier otra producción, en el campo artístico, científico, o literario capaz de ser reproducido o expresado por cualquier medio conocido ahora o por conocer en el futuro; Registro de contratos relacionados con la ejecución o transferencia de derechos intelectuales; Obtención de tarifa postal reducida; g) Registro de nombres de dominio, su renovación, traspaso, cambio de nombre, cambio de domicilio, cancelación y demás actos relacionados con su administración. h) Las acciones reivindicatorias, de oposición, de cancelación, de nulidad, de infracción de derechos, de medidas cautelares, de medidas en frontera, de tutela, de competencia desleal, de concesión de licencias y en general los procesos civiles, constitucionales, penales, administrativos o contencioso-administrativos relacionados con todos estos derechos; acciones y procesos que promovamos o se nos promuevan; y para que en todos los asuntos arriba determinados, puedan sustituir este mandato, transigir, suscribir contratos de licencia, contratos de transacción, contratos de cesión, presentar recursos extraordinarios de casación y/o revisión y/o suplica, conciliar, admitir los hechos del proceso, rematar o licitar por cuenta del crédito, desistir, cancelar, ceder, recibir, renunciar, notificarse y ratificar los actos de agentes oficiosos.

Given and Signed this/Dado y firmado hoy NOVEMBER 27, 2013

in/en KIBBUTZ DAN, ISRAEL

Signature/Firma 

Dan Pal

DEED OF ASSIGNMENT

THIS DEED of Assignment is made this 27th day of November, 2013,
BETWEEN

Micha BEN-DAVID
Kibbutz Sde Nehamia, 13145
Upper Galil
ISRAEL

as the "Assignor" of the one part; and

DAN-PAL
Kibbutz Dan
Mobile Post
Upper Galilee 12245
ISRAEL

as the "Assignee" of the other part.

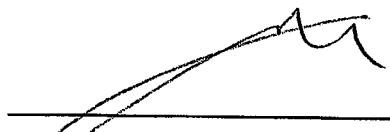
WHEREAS The Assignor is the inventor of the invention whose title is *Assembly for Securing Two Juxtaposed Panels to a Structure so as to Allow Thermal Expansion and Contraction*

hereinafter referred to as the "said invention ".

WHEREAS, the Assignor is desirous of assigning to the Assignee and the Assignee is desirous of acquiring from the Assignor the whole right, title and interest in and to the said invention.

NOW THIS DEED WITNESSES that in consideration of the above premises and for other goods and valuable consideration the receipt of which is hereby acknowledged the Assignor assigns, transfers and sets over unto the Assignee the whole right, title and interest in and to the said invention and the full and exclusive benefit thereof an all rights, privileges and advantages appertaining thereto to hold the same unto the Assignee absolutely.

IN WITNESS WHEREOF, the Assignor and the Assignee have executed this Deed on the date and year first above written.



(Micha BEN-DAVID) THE ASSIGNOR


Dan Pal X

(DAN-PAL) THE ASSIGNEE

**Please note that, according to the laws, it is a requirement to have both parties' signatures (the assignor and the assignee) on the same paper.*

ENSAMBLE PARA ASEGURAR DOS PANELES YUXTAPUESTOS A UNA
ESTRUCTURA PARA PERMITIR LA EXPANSIÓN Y CONTRACCIÓN
TÉRMICAS

5 **CAMPO DE LA INVENCION**

La presente invención se refiere a unidades de panel modular, extruido, para la construcción de paredes, cielo raso, techos, cubiertas y ventanas, particularmente de secciones de pared para transmitir luz. Más particularmente, la presente invención se refiere a ensambles para construcción tal como paredes, cielo raso, techos, cubiertas y ventanas de una pluralidad de unidades mientras permite la expansión térmica de los paneles.

15 **ANTECEDENTES DE LA INVENCION**

EP 949 390 describe dos paneles generalmente co-planares soportados casi borde con borde por una viga intermedia. Un miembro de acoplamiento se sujeta a la viga por formaciones longitudinales de inter-
20 acoplamiento y proporciona un acoplamiento de interbloqueo para los bordes de los paneles. Opuesta al miembro de acoplamiento, la viga sobresale de los paneles y recibe y retiene una tapa que se sella contra los paneles. Las alas dirigidas hacia abajo en la tapa acoplan los canales dirigidos hacia arriba en una base de la misma y evita que las paredes laterales de la tapa se separen.

25 WO 2008/149344 a nombre del Solicitante de la presente describe un ensamble para asegurar a una estructura dos paneles yuxtapuestos, cada uno incluyendo una primera superficie, una segunda superficie opuesta y una brida de unión ubica en o adyacente a, sus bordes

yuxtapuestos respectivos. El ensamble se configura particularmente para evitar la separación de los paneles yuxtapuestos bajo carga y emplea un miembro de retención que se monta de manera fija a la estructura de soporte y a la cual se fija un miembro de sujeción con dos extremidades separadas
5 dependiendo de una malla, cada extremidad se configura para acoplar una superficies expuesta respectiva de una brida de unión adyacente. Se proporciona un medio de fijación para fijar el miembro de retención a un elemento de construcción que inhibe el desplazamiento angular de los paneles cuando se aplica fuerza a cualquiera de sus primeras o segundas
10 superficies.

La patente de E.U.A. No. 6,164,024 describe un panel de acristalamiento de transmisión de luz para construcciones des techos elevados en donde los paneles de acristalamiento se soportan en una estructura e incluyen bridas con líneas de unión verticales para conectar los
15 paneles adyacentes junto con un conector de unión. Las figuras 4 y 13 muestran disposiciones en donde los paneles con bridas que se proyectan hacia arriba en sus bordes de acoplamiento están yuxtapuestos en lados opuestos de las abrazaderas de soporte de aluminio que se sujetan con pernos a la estructura del techo y un miembro de sujeción entonces se coloca
20 en las bridas de proyección para asegurar y sellar la estructura.

Las publicaciones anteriores son típicas de la técnica anterior que describen el montaje de los paneles extruidos a un elemento de construcción. El coeficiente lineal de la expansión térmica (α) del policarbonato a 23°C es $65-70 \times 10^{-6}/^{\circ}\text{C}$, que es aproximadamente tres veces
25 la del aluminio para el cual a 20°C es $23 \times 10^{-6}/^{\circ}\text{C}$. En la medida en que algún tipo de miembro de retención se monte de manera fija al elemento de construcción, debe entenderse que es incapaz de moverse. Pero los paneles de policarbonato montados a la misma se expanden y contraen, sometándose

a fuerzas de tensión y compresión. Específicamente, los paneles adyacentes que se expanden se empujarán uno contra el otro lateralmente, sometiendo así sus montajes respectivos a fuerzas de compresión. Esto da lugar a altas fuerzas de fricción entre los paneles y los montajes, lo que influye contra la expansión térmica de los paneles en la dirección longitudinal, que puede provocar abolladuras u otra distorsión de los paneles.

Normalmente, los miembros de sujeción se forman del mismo material o material diferente a los paneles, por ejemplo, policarbonato, de manera que los miembros de sujeción tiendan a expandirse a la misma velocidad que los paneles. Por lo tanto en las estructuras como las que se muestran en las figuras 7, 8 y 11 de WO 2008/149344 en donde los miembros de sujeción se montan de manera fija a la estructura de soporte, y de este modo se contienen de expandirse, los paneles que se sujetan fuertemente por el miembro de sujeción de igual manera son incapaces de expandirse.

La patente de E.U.A. No. 6,536,175 describe un ensamble del panel y elementos de unión con superficies inclinadas acopladas de forma recíproca que se orientan hacia adentro. La figura 7 de esta patente describe un elemento de unión de policarbonato a una placa metálica en forma de una pista para conexión a estructuras de soporte de carga. Sin embargo, la disposición no se dirige a la necesidad de permitir expansión térmica longitudinal. Además, para asegurar un sello contra agua se proporciona un elemento de presión con una forma cónica en la punta, que se inserta entre dos bridas de unión que se proyectan hacia abajo de los paneles adyacentes para impulsar las bridas lejos y de este modo presionarlas fuertemente contra las paredes internas opuestas del elemento de unión de policarbonato. Es evidente a partir de la figura 7 de la patente que esto también impulsa las paredes del elemento de unión contra la pista metálica incrementando así la

fricción entre la pista y el elemento de unión e influyendo contra el deslizamiento del elemento de unión dentro de la pista metálica.

EP 1 111 153 describe un sistema de acristalamiento que comprende una pluralidad de paneles de acristalamiento de plástico cada uno con por lo menos una región del borde yuxtapuesta con la región del borde del otro panel. Los bordes yuxtapuestos tienen un empalme que se extiende transversalmente del plano de cada panel de acristalamiento. Una estructura de soporte abarca al menos parcialmente los empalmes para frenar la separación de los paneles de acristalamiento de la estructura de soporte.

10 US 2010/132293 describe un parteluz estructural interno para un sistema de panel de junta de plegado saliente: Un ensamble de dos piezas incluye una extrusión principal con una porción enganchada y una extrusión secundaria con una porción enganchada opuesta. Una cavidad se define en la extrusión principal y la extrusión secundaria incluye un pie que tras la inserción en la cavidad forma un punto de apoyo alrededor del cual la extrusión secundaria se puede doblar lejos de la extrusión principal y puede apretarse o aflojarse por medio del apriete o soltura de un tornillo, como un resultado formando una pinza para acoplar paneles del sistema de paneles con presión variable.

20 US 2003/188500 describe un ensamble de pasador de panel para utilizarse con sistemas de paneles de techo o tragaluz y teniendo permiso para movimiento reducido de paneles tanto en forma paralela o perpendicular a la línea de unión formada por los paneles de unión.

25 US 2005/102943 describe un ensamble de pasador para asegurar los paneles de techo o tragaluz con junta de plegado saliente a substratos e incluir un primer miembro de pasador y un segundo miembro de pasador cada uno con un miembro vertical y un miembro de brida superior y un miembro de brida inferior que se extiende desde el mismo. Se forma un

espacio entre el miembro vertical del primer miembro del pasador y el miembro vertical del segundo miembro del pasador y una base permite que se deslice el ensamble.

DE 203 09 516 describe un retén que comprende por lo menos
5 dos placas de policarbonato que forman cámaras y un número de piezas transversales con fijaciones seguras correspondientes.

BREVE DESCRIPCIÓN DE LA INVENCION

10 Por lo tanto, es un objetivo amplio de la presente invención proporcionar un ensamble que consista en unidades de panel modular, extruido y un miembro de unión correspondiente para construir, paredes, techos y similares, que se adapte mejor que las disposiciones propuestas hasta ahora para permitir expansión y contracción térmica de los paneles.

15 De acuerdo con un aspecto de la invención, por tanto se proporciona un ensamble con las características de la reivindicación 1 para asegurar un panel o dos paneles yuxtapuestos a una estructura para permitir deslizamiento mutuo sin obstáculos del panel o paneles con respecto a la estructura.

20

BREVE DESCRIPCIÓN DE LOS DIBUJOS

Con el objeto de comprender la presente invención y observar cómo puede ser puesta en práctica, se describirán ahora las modalidades, a modo de ejemplo no limitante únicamente, haciendo referencia a los dibujos
25 que las acompañan, en los cuales:

Las figuras 1 a 4 son vistas en sección transversal que muestran un ensamble del panel construido de acuerdo con variaciones de una primera modalidad;

Las figuras 5 a 9 son vistas en sección transversal que muestran un ensamble del panel construido de acuerdo con variaciones de una segunda modalidad;

Las figuras 10 y 11 son vistas en sección transversal que muestran un ensamble del panel construido de acuerdo con variaciones de una tercera modalidad;

La figura 12a es una vista en sección transversal que muestra una construcción de brida alternativa para usarse con cualquiera de las modalidades de las figuras 1 a 9;

La figura 12b muestra un detalle de un elemento asegurador integral y miembro de retención utilizados en la modalidad de la figura 12a; y

Las figuras 13 y 14 son vistas en sección transversal que muestran un ensamble del panel construido de acuerdo con variaciones de una cuarta modalidad.

DESCRIPCIÓN DETALLADA DE LA INVENCIÓN

En la siguiente descripción de algunas modalidades, los componentes idénticos que aparecen en más de una figura o que comparten funcionalidad similar se mencionarán por símbolos de referencia idénticos. La invención se puede realizar usando un número de construcciones diferentes y, por lo tanto, la funcionalidad de la invención se describirá primero con referencia a la figura 1, después de lo cual se describirán diferentes modalidades con referencia a las otras figuras.

10 La figura 1 muestra un ensamble 10 para asegurar dos paneles yuxtapuestos 11 y 12 a un elemento de construcción (no se muestra) que constituye una estructura para permitir el deslizamiento mutuo de los paneles con respecto a la estructura. Cada uno de los paneles 11 y 12 incluye una primera superficie 13, una segunda superficie opuesta 14 y una brida de unión 15 montada en asociación con sus bordes yuxtapuestos respectivos. De este modo, como se muestra en la figura 1, las bridas de unión 15 se localizan en los bordes de los paneles respectivos y se nivelan con los mismos. Sin embargo, las bridas no necesitan nivelarse con los bordes de los paneles y en algunas modalidades se pueden proyectar hacia adentro desde los bordes del panel. Las bridas 15 se sujetan por un elemento asegurador 16 que limita la separación lateral de las bridas y se forma de un material con un coeficiente de expansión similar al panel. Normalmente, los paneles 11, 12 y el elemento asegurador 16 se forman de material plástico extruido, tal como policarbonato y en una aplicación particular de la invención los paneles por lo menos transmiten luz.

Normalmente, las bridas de unión 15 se extruyen con los paneles 11, 12, de tal forma que cada brida se forme integralmente a lo largo de un borde 17 del panel y se forme del mismo material. El borde 17 corresponde al

eje de extrusión y define un eje longitudinal 18 de los paneles yuxtapuestos. Ya que los paneles 11, 12 y el elemento asegurador 16 se forman de material que tiene coeficientes similares si no idénticos de expansión térmica de este modo por consecuencia las bridas de unión 15 y el elemento asegurador 16 se expanden y contraen a velocidades similares. Como resultado, el contacto por fricción entre las bridas de unión 15 y el elemento asegurador 16 se mantiene y el deslizamiento mutuo a lo largo del eje de extrusión se obstruye si no es que se evita completamente. En las construcciones hasta ahora propuestas, esto da lugar a los problemas identificados anteriormente, debido a la fijación directa de los paneles a la estructura de soporte, lo que evita que los paneles 11, 12 y el elemento asegurador 16 se muevan juntos sin inducir distorsión longitudinal o transversal de los paneles.

Con el fin de permitir el desplazamiento longitudinal de los paneles unidos con respecto a la estructura de soporte, los paneles no se fijan directamente a la estructura de soporte pero se fijan por medio de uno o más elementos de soporte 20, cada uno configurado para soportar de manera deslizable los paneles con respecto al elemento de soporte en una dirección paralela al eje longitudinal 18 de los paneles. Este requisito se puede cumplir de diferentes maneras, de las cuales se describirán ahora algunos ejemplos.

De este modo, como se muestra en las figuras 1 y 2, el elemento de soporte 20 se encuentra en forma de una abrazadera de montaje adaptada para unirse de manera fija a la estructura y paredes laterales opuestas de soporte 22, 23 que forma un canal 24. La forma de unir el elemento de soporte 20 a la estructura de soporte no es una característica de la invención. Comúnmente, se pueden utilizar los tornillos autorroscantes 25 ya que esto simplifica el ensamble. Pero cualquier otra forma apropiada de unión se puede emplear, tal como tornillos regulares, pernos, remaches, soldaduras y así

sucesivamente. También se debe entender que el elemento de soporte puede ser integral con la estructura o constituirse por la propia estructura.

Las bridas respectivas 15 de un par de paneles yuxtapuestos se mantienen por un miembro de retención generalmente en forma de I 30 que
5 tiene una porción de base 31 que soporta una columna vertical central 32 y una porción superior plana 33 que se extiende paralela a la porción de base 31. La porción base 31 se dimensiona para acomodo por deslizamiento dentro del canal 24 del elemento de soporte 20, que soporta los paneles 11 y 12 en superficies de soporte opuestas 35 y 36. La altura, d, entre la porción de
10 base 31 y la porción superior 33, es ligeramente mayor que la altura combinada de los paneles, bridas de unión y el espesor del material del elemento de soporte 20 que se deben acomodar entre los mismos. Esto deja un espacio de aire 37, que permite la expansión térmica de la porción de base 31 sin obstruir el elemento de soporte 20, manteniendo así la capacidad del
15 miembro de retención 30 para deslizarse dentro del elemento de soporte 20 a pesar de los cambios climáticos.

Una vez ensambladas, las bridas de unión 15 apoyan superficies opuestas de la columna vertical 32 del miembro de retención 30 y se aseguran entre sí y al miembro de retención 30 por medio del elemento asegurador 16,
20 que se muestra como un miembro de sujeción en forma de U o C generalmente invertida que define un orificio axial 41. Las paredes laterales opuestas 42 del elemento asegurador 16 se instan elásticamente contra las superficies exteriores de las bridas, asegurando así el miembro de retención 30 y las bridas 15 dentro del orificio axial 41. Las superficies exteriores de las
25 bridas de unión 15, se pueden ahusar y proporcionarse con muescas 43 por ejemplo, muescas de dientes de sierra o en forma de espigas que acoplan las muescas complementarias 44 (véase figura 5) formadas a lo largo de las paredes laterales opuestas 42 del elemento asegurador 16. Alternativamente,

las bridas se pueden ahusar en una dirección inversa para ser más anchas en la punta que en la base, formando así una junta de cola de milano con un elemento asegurador con un orificio axial de la forma complementaria. De este modo se entenderá que el término "yuxtapuesto" no implica necesariamente
5 que los paneles estén en una relación de empalme, aunque pueden ser como se describe más abajo con referencia a la figura 5.

Las dimensiones del miembro de retención 30 aseguran que, cuando se ensamblan, los paneles 11 y 12 se soportan en el elemento de soporte 20 y las puntas de las bridas 15 apoyan las superficies interiores de la
10 porción superior 33. La barra superior del miembro de retención 30 mantiene los paneles en contacto con la estructura de soporte en caso de fuerza ascendente, por ejemplo por vientos fuertes, que se aplica a las superficies inferiores de los paneles. En esta modalidad, el miembro de retención 30, de este modo coopera con el elemento asegurador 16 para mantener los
15 paneles 11 , 12 y formar un sub-ensamble del panel cuyos componentes se bloquean sustancialmente entre sí y son incapaces de expansión térmica mutua o contracción, mientras permiten la expansión térmica o contracción del sub-ensamble del panel con respecto a la estructura de soporte debido al acomodo por deslizamiento del miembro de retención 30 dentro del elemento
20 de soporte 20.

Además, en dicha disposición, el peso de los paneles 11 y 12 se transmite por las superficies de soporte 35 y 36 del elemento de soporte 20. Como es bien sabido, la fuerza de fricción F generada por un cuerpo que actúa sobre una superficie está dada por:

25

$$F = \mu N$$

en donde: μ es el coeficiente de fricción entre el objeto y la superficie, y

N es el componente vertical de la fuerza del objeto.

En estructuras conocidas como las que se describen en WO
5 2008/149344, además del peso de los paneles que se soportan en el elemento de construcción, el miembro de retención actúa para incrementar la fuerza aplicada sobre los paneles contra la estructura de soporte. Esto incrementa significativamente la fuerza de fricción e influye contra el deslizamiento de los paneles con respecto a la estructura de soporte.

10 En contraste, en la presente invención la única fuerza vertical aplicada por los paneles en la estructura de soporte es su peso, ya que no hay fuerza de sujeción adicional. El coeficiente de fricción del plástico contra el metal es bastante bajo, de manera que la fuerza de fricción no es demasiado alta para evitar el deslizamiento relativo de los paneles en las superficies de
15 soporte 35 y 36 del elemento de soporte 20.

En la modalidad mostrada en la figura 1, el elemento de soporte 20 es una construcción unitaria formada de aluminio extruido y tiene una unidad base 45 que soporta el elemento de soporte 20 y que tiene hacia los bordes opuestos orificios para acomodar los tornillos 25. La figura 2 muestra
20 una variación en donde la unidad base 45 se divide para formar un par de elementos de soporte opuestos 20a, 20b, cuyas unidades base pueden tener opcionalmente huecos opuestos 46, que cooperan para formar una superficie de soporte plana continua.

La figura 3 muestra una variación en donde las superficies de
25 soporte 35 y 36 tienen bordes que dependen hacia abajo 50 que acoplan de manera deslizable los canales complementarios 51 formados en una superficie superior de la porción de base 31 del miembro de retención 30. La figura 4 muestra otra variación similar en principio a la que se muestra en la

figura 1 y que tiene un miembro de retención en forma de T 30 adaptado para acoplamiento por deslizamiento en un elemento de soporte de bajo perfil 20.

La figura 5 muestra una modalidad diferente que opera en un principio un poco diferente en el sentido de que no se requiere un miembro de retención en forma de T. En lugar de ello, los paneles 11, 12 se invierten de manera que las bridas 15 se orienten hacia abajo y se mantengan por el elemento asegurador 16 también en forma de un miembro de sujeción, que se adapta para acomodo por deslizamiento dentro del elemento de soporte 20. Para este fin, el elemento asegurador 16 comprende una porción del cuerpo 55 que se forma integralmente con una porción de base plana 56. La porción del cuerpo 55 tiene un orificio longitudinal 57 configurado para acomodar de manera elástica en el mismo, bridas de unión respectivas de un par de paneles yuxtapuestos. La porción de base 56 soporta hacia afuera rebordes sobresalientes 58 en lados opuestos de los mismos para acomodar por deslizamiento dentro del canal del elemento de soporte 20. En esta modalidad, el elemento asegurador 16 sirve como el miembro de retención 30 de la modalidad anterior porque retiene las bridas de unión 15 y acopla de manera deslizable el elemento de soporte 20.

Ya que en esta modalidad, el elemento de soporte mantiene el elemento asegurador, pero no soporta los paneles directamente, el elemento de soporte 20 puede ser simplemente una abrazadera en forma de U que se asegura a la estructura de soporte y proporciona un canal para acomodar por deslizamiento la porción de base 56 del elemento asegurador 16. El elemento de soporte 20 puede asegurarse utilizando tornillos o cualquier otro sujetador adecuado como se describió anteriormente. En la modalidad mostrada en la figura 5, el elemento de soporte 20 se forma por una primera porción 60 y una segunda porción 61 que se interbloquea con la primera porción. La primera porción 60 es una abrazadera generalmente en forma de U que se adapta

para unirse de manera fija a la estructura y la segunda porción es un canal generalmente en forma de U. De este modo en esta modalidad, el elemento asegurador se adapta para montarse de manera fija a la estructura por medio de un elemento intermedio. Ésta es distinta de otras modalidades en donde se
5 adapta para montarse de manera fija a la estructura directamente. Ya que la cabeza del tornillo sobresale por arriba de la superficie interior del canal, puede contaminar la porción de base de deslizamiento 56 del elemento asegurador 16 si se requiere contacto directo. La construcción de dos partes evita dicho contacto directo ya que la porción de base 56 se acomoda dentro
10 del canal de la segunda porción 61. Tanto las porciones inferiores como las superiores 60, 61 se pueden formar de aluminio extruido que se interbloquea por medio de ganchos complementarios 63 que se abrochan por presión.

También en esta modalidad, la única fuerza vertical aplicada por los paneles en la estructura de soporte es su peso, ya que no hay fuerza de
15 sujeción adicional, lo que permite el deslizamiento relativo del elemento asegurador 16 y paneles unidos dentro del elemento de soporte 20.

La figura 6 muestra una construcción unitaria en donde se forma un hueco 65 en una superficie inferior del elemento asegurador que acopla de manera deslizable un canal ahuecado complementario 66 en el elemento
20 de soporte 20, que acomoda el tornillo 25, evitando así el contacto directo entre la cabeza del tornillo y el miembro de retención 30.

La figura 7 muestra otra construcción de dos partes similar a la que se muestra en la figura 5 pero que tiene rieles que se proyectan hacia adentro 76 que acoplan de manera deslizable canales complementarios 68
25 formados en las paredes laterales opuestas del elemento asegurador 16.

La figura 8 muestra una construcción similar, la única diferencia es la orientación de los ganchos 63.

La figura 9 muestra incluso otra construcción en donde la porción inferior 60 del elemento de soporte 20 es de perfil reducido en comparación con el que se muestra en la figura 8 y que tiene un riel en forma de T que se proyecta hacia arriba 69 en su superficie inferior para acoplar de manera deslizable un canal complementario 70 formado en la superficie inferior del elemento asegurador 16.

En todas las disposiciones hasta el momento descritas, las bridas de unión son perpendiculares a las superficies principales opuestas de los paneles. Las figuras 10 y 11 muestran disposiciones alternativas en donde cada panel tiene una sola brida de unión 15 que sobresale de una superficie lateral del panel y se adapta para acoplamiento por interbloqueo con un hueco complementario 75 formado en una superficie lateral de un panel yuxtapuesto adyacente. En la figura 10 los paneles adyacentes se interbloquean por medio de un miembro de retención 30 formado de un material que tiene un coeficiente de expansión térmica similar al de los paneles y que tiene en las paredes laterales opuestas un hueco respectivo 76 y proyección 77 cada una para acoplar una brida complementaria respectiva 15 y el hueco 75 en paredes laterales de los paneles adyacentes. El miembro de retención 30 se soporta de manera deslizable dentro de un elemento de soporte 20 que se fija a la estructura. El miembro de retención 30 de este modo tanto bloquea los paneles adyacentes que forman un sub-ensamble que comprende los dos paneles yuxtapuestos 11, 12 y el miembro de retención 30 como también permite acoplamiento por deslizamiento del sub-ensamble dentro del elemento de soporte 20.

En la disposición de la figura 11, el miembro de retención 30 sólo sirve para permitir acoplamiento por deslizamiento de dos paneles unidos 11, 12 dentro del elemento de soporte 20. No bloquear los dos paneles juntos, esto se logra a través de juntas tipo espiga y mortaja complementarias que se

pueden adaptar para ajuste por presión de dos paneles o puede requerir que se unan por deslizamiento de la junta macho de proyección de un panel en el hueco hembra del otro panel.

Cabe señalar que, cuando las bridas 15 están montadas en el lado de los paneles 11, 12, como se muestra en las figuras 10 y 11, se forma una línea de unión 78, que es susceptible a las fugas de agua en la estructura. También en la disposición de las figuras 5 a 9 hay una línea de unión expuesta entre los dos paneles yuxtapuestos. Sin embargo, en este caso cualquier filtración de agua se acumulará en el orificio longitudinal 57 del elemento asegurador 16 sin filtrarse en la estructura. En contraposición a esto, no hay una línea de unión en la disposición que se muestra en las figuras 1 a 4, ya que el elemento asegurador 16 cubre la línea de unión entre los dos paneles yuxtapuestos, evitando así filtración de agua en la estructura.

Los paneles 11, 12 se utilizan muy normalmente como estructuras de techo y por lo tanto son particularmente vulnerables a las filtraciones de agua, que obviamente deben evitarse. Por esta razón, se prefiere el uso del elemento asegurador 16 de un tipo que forma una barrera impermeable al agua entre los paneles 11, 12 y la estructura. Dicho elemento asegurador 16 dicta que las bridas 15 sobresalen de una de las superficies grandes 13, 14 del panel en lugar de hacerlo desde una superficie de acoplamiento, como se muestra en las figuras 10 y 11.

La figura 12a muestra una estructura 80 a la cual se aseguran de manera deslizable un par de paneles yuxtapuestos 11, 12 que tienen bridas ahusadas 15 que son más anchas en sus respectivas puntas que en sus bases. Las bridas ahusadas 15 se aseguran dentro de un elemento asegurador 16 que se forma de material que tiene un coeficiente de expansión similar a las bridas de unión 15 y que tienen un orificio longitudinal 57 de forma complementaria a las bridas de unión 15 para formar un junta de cola

de milano. El elemento asegurador 16 se proporciona con ranuras laterales 81 mejor observadas en la figura 12b que acomodan de manera deslizable rieles respectivos 82 de un elemento de soporte 20 asegurado a la estructura 80 por medio de tornillos 25. Se entenderá que dichas bridas 15 podrán ser utilizadas

5 en cualquiera de las modalidades descritas anteriormente con referencia a las figuras 1 a 9 de los dibujos. También en esta modalidad, el elemento asegurador 16 sirve tanto para asegurar las bridas de unión de un par de paneles yuxtapuestos como también para mantener de manera deslizable los paneles dentro del elemento de soporte 20.

10 Las figuras 13 y 14 muestran una estructura 80 a la cual se aseguran de manera deslizable un par de paneles yuxtapuestos 11, 12 que tienen bridas 15 que se pueden ahusar para ser más anchas en sus respectivas puntas que en sus bases. Más en general, e igualmente cierto para todas las modalidades, las bridas son de forma complementaria al hueco

15 del elemento asegurador 16. En donde el elemento asegurador 16 se proporciona con indentaciones, las bridas de igual manera se proporcionan con indentaciones, aunque de nueva cuenta esto no es obligatorio como se puede observar con referencia a las figuras 10, 11 y 12, en donde las bridas no tienen indentaciones pero aún son de forma complementaria al hueco del

20 elemento asegurador 16.

A pesar de las modalidades hasta el momento descritas en donde las bridas de unión de un par de paneles yuxtapuestos son soportadas comúnmente dentro de un solo elemento asegurador, en esta modalidad se proporciona un elemento asegurador separado para cada brida. De este

25 modo, cada una de las bridas 15 se asegura dentro de su elemento asegurador respectivo 16 que se puede formar de material que tiene un coeficiente de expansión similar a las bridas de unión 15 y que tiene un orificio longitudinal 57 de forma complementaria a la brida de unión 15. Cada

elemento asegurador 16 tiene una base que soporta los rebordes opuestos 58 que se montan de manera deslizable dentro de los canales correspondientes 24 de un elemento de soporte 20 asegurado a la estructura 80 por medio de los tornillos 25. De este modo, en su extremo superior el
5 elemento asegurador 16 sirve para asegurar el panel respectivo mientras que en su base también sirve para mantener el panel dentro del elemento de soporte 20.

Cada uno de los elementos de soporte 20 se soporta por una abrazadera de montaje respectiva 91 que se fija a la estructura 80 por medio
10 de tornillos correspondientes 25. Para asegurar el apropiado empalme de los bordes adjuntos de los paneles yuxtapuestos, los paneles de unión 15 se montan hacia adentro de los bordes adjuntos para dejar un voladizo suficiente 93 que permita un espacio suficiente entre los dos miembros de soporte. En la figura 13, las abrazaderas de montaje respectivas 91 de los
15 elementos de soporte adyacentes 20 se separan espacialmente y cada una se fija por separado a la estructura 80. De este modo, durante el ensamble, cada abrazadera se atornilla a la estructura 80 por tornillos autorroscantes 25, los elementos aseguradores 16 entonces se montan de manera deslizable dentro de los canales de los elementos de soporte 20 y los paneles 11, 12 entonces
20 se montan en sus elementos aseguradores respectivos 16.

En la figura 14 las abrazaderas de montaje respectivas 91 de un par de elementos de soporte adjuntos 20 se traslapan y se fijan comúnmente a la estructura 80 por medio de tornillos 25. En este caso, suficiente espacio debe dejarse entre los elementos de soporte respectivos de
25 los paneles adjuntos para proporcionar acceso al tornillo 25. Se enfatiza que todas las figuras son esquemáticas y no se trazan a escala.

También se reitera que en todas las modalidades, los tornillos autorroscantes 25 se pueden utilizar ya que esto simplifica el ensamble. Pero

cualquier otra forma apropiada de unión se puede emplear, tal como tornillos regulares, pernos, remaches, soldaduras y así sucesivamente. De igual manera, en todas las modalidades el elemento de soporte puede ser integral con la estructura o constituirse por la propia estructura.

5 Aunque los dibujos muestran paneles de construcción que tienen dos superficies principales que definen la altura del panel, y cubren los sub-espacios formados en las mismas, tal como se conoce en sí, se enfatiza que la presente invención también es aplicable a otros tipos de paneles similares, tal como paneles sin sub-espacios interiores o paneles en donde
10 las bridas de conexión están dentro de la altura del panel, etc.

 También debe enfatizarse que aunque se ha mostrado un gran número de variaciones de las juntas y elementos de soporte, no se pretende que cada variación se limite a la modalidad específica en relación con la cual se ilustra y describe. De este modo, diferentes variaciones pueden
15 combinarse según sea necesario y todas esas variantes deben ser abarcadas por las reivindicaciones anexas como si fueran ilustradas y descritas por separado.

 Aunque en las modalidades descritas, los paneles y bridas adjuntas y el elemento asegurador se forman de policarbonato u otros
20 materiales de plástico que tienen coeficientes de temperatura de expansión similares, el elemento asegurador 16 se puede formar de metal tal como aluminio que tiene un coeficiente de expansión significativamente más pequeño que las bridas de unión. Esto no importa porque el pandeo de los paneles debido a la expansión longitudinal se evita en virtud del deslizamiento
25 libre de los paneles con respecto a la estructura de soporte.

 Del mismo modo, se entiende que aunque las bridas se muestran como ahusadas, esto no es esencial. Lo que es importante es que las bridas se aseguren por el elemento asegurador en una manera que

asegure que ambas se expanden y contraen a velocidades similares de expansión térmica. De igual manera, en aquellas modalidades con un miembro de retención, esto también debe ser formado de material con el coeficiente de expansión térmica similar a los paneles y elemento asegurador de manera que cuando el miembro de retención se mueve dentro del canal del elemento de soporte, los paneles y elemento asegurador se muevan con el miembro de retención. Esta es la propiedad que asegura que los paneles son capaces de deslizarse libremente con respecto a la estructura de soporte y evita deformaciones u otras distorsiones de los paneles.

10 Será evidente para los expertos en la técnica que la invención no está limitada a los detalles de las modalidades ilustradas anteriores y que la presente invención se puede representar en otras formas específicas sin apartarse del alcance de las reivindicaciones y sus equivalentes.

NOVEDAD DE LA INVENCION

REIVINDICACIONES

5 1.- Un ensamble del panel que comprende: dos paneles
yuxtapuestos (11, 12) cada uno de dichos paneles incluye una primera
superficie (13), una segunda superficie opuesta (14) y una brida de unión (15)
localizadas en asociación con un borde de la misma, dicho borde define un eje
longitudinal del panel, dichas bridas de unión (15) se configuran para sujetarse
10 por medio de al menos un elemento asegurador (16), y un ensamble
asegurador (10) para asegurar dos paneles yuxtapuestos (11, 12) a una
estructura (80) para permitir un deslizamiento mutuo sin obstáculos de los
paneles con respecto a dicha estructura consecuente con una expansión o
contracción longitudinal de los paneles, dicho ensamble asegurador (10)
15 comprende: un elemento de soporte (20) configurado para soportar de
manera deslizable los dos paneles yuxtapuestos (11, 12) con respecto al
elemento de soporte en una dirección paralela a dicho eje longitudinal, dicho
elemento de soporte (20) se adapta para unirse de manera fija directamente o
por medio de un elemento intermedio a la estructura (80); un miembro de
20 retención (30) adaptado para retener las bridas de unión respectivas (15) de
los dos paneles yuxtapuestos (11, 12) y se montan dentro del elemento de
soporte (20) y se configuran para deslizamiento longitudinal con respecto a la
misma; y un elemento asegurador (16) para sujetar juntas las bridas de unión
respectivas (15) de los dos paneles yuxtapuestos (15); y el elemento de
25 soporte (20) soporta las paredes laterales opuestas (22, 23) que forman un
canal (24) que se dimensiona para permitir el libre deslizamiento en el mismo
del miembro de retención asociado (30); el miembro de retención (30) y el
elemento asegurador (16) ambos se forman de material con un coeficiente

de expansión térmica similar a los paneles (11, 12) de manera que cuando el elemento de retención se mueve dentro del canal del elemento de soporte (20) los paneles y el elemento asegurador y el miembro de retención se mueven juntos; y cada panel se sujeta al o un elemento asegurador respectivo
5 sin aplicar presión lateral a las paredes laterales (22, 23) del elemento de soporte (20); caracterizado porque: el elemento de soporte se forma de metal y el miembro de retención se forma de plásticos.

2.- El ensamble del panel de conformidad con la reivindicación 1, caracterizado además porque los coeficientes de expansión térmica
10 respectivos del elemento de soporte y el elemento de retención difieren por un factor de por lo menos dos.

3.- El ensamble del panel de conformidad con la reivindicación 1 o 2, caracterizado además porque dicho al menos un elemento de soporte tiene un coeficiente de expansión térmica inferior al miembro de retención.

15 4.- El ensamble del panel de conformidad con cualquiera de las reivindicaciones 1 a 3, caracterizado además porque el elemento de soporte (20) se forma de aluminio y el miembro de retención (30) se forma de policarbonato.

5.- El ensamble del panel de conformidad con cualquiera de las
20 reivindicaciones 1 a 4, caracterizado además porque el elemento de soporte (20) comprende una unidad base (45) adaptada para unirse de manera fija a la estructura y soportar paredes laterales opuestas (22, 23) que, junto con la unidad base forman un canal (24) que es más ancho que el miembro de retención para acomodar de manera deslizable el miembro de retención (30)
25 en el mismo.

6.- El ensamble del panel de conformidad con cualquiera de las reivindicaciones 1 a 5, caracterizado además porque el elemento de soporte

(20) se forma de una primera porción (20a) y una segunda porción (20b) que se interbloquea con la primera porción.

7.- El ensamble del panel de conformidad con la reivindicación 6, caracterizado además porque la primera porción es una abrazadera
5 generalmente en forma de U que se adapta para unirse de manera fija a la estructura y la segunda porción es un canal generalmente en forma de U.

8.- El ensamble del panel de conformidad con la reivindicación 6 o 7, caracterizado además porque la segunda porción (20b) se proporciona sobre una superficie exterior de la misma con ganchos que sobresalen hacia
10 afuera (63) para acoplar ganchos complementarios (63) en la primera porción.

9.- El ensamble del panel de conformidad con cualquiera de las reivindicaciones 5 a 8, caracterizado además porque: el miembro de retención (30) tiene forma generalmente en I y comprende una porción de base plana
15 (31) y una porción superior plana (33) interconectada por una columna central (32), dicha porción de base se dimensiona para acomodo deslizable dentro del canal (24) del elemento de soporte (20), el elemento de soporte (20) tiene superficies de soporte opuestas (35, 36) cada una para soportar en la misma uno de los paneles yuxtapuestos, y la columna (32) tiene una altura que es
20 ligeramente mayor que la de una altura combinada de los paneles (11, 12), las bridas de unión (15) y el espesor del material del elemento de soporte (20) de manera que cuando las primeras superficies respectivas (13) de los paneles son soportadas en las superficies de soporte (35, 36) del montaje, las puntas respectivas de las bridas de unión se retienen entre la porción de base (31) y
25 la porción superior (33) del miembro de retención; el elemento asegurador (16) se configura para acoplar de manera elástica las bridas de unión para evitar el desplazamiento lateral de las bridas de unión con respecto al miembro de retención por lo cual la porción superior (33) del miembro de

retención (30) mantiene las puntas (31) de las bridas y resiste la rotación de las mismas, anclando así el miembro de retención a los paneles para formar un ensamble de material mixto que es capaz de deslizarse dentro el canal del montaje tras la expansión térmica o contracción de los paneles.

5 10.- El ensamble del panel de conformidad con cualquiera de las reivindicaciones 1 a 9, caracterizado además porque el elemento asegurador (16) forma una barrera impermeable al agua entre los paneles y la estructura (80).

10 11.- El ensamble del panel de conformidad con cualquiera de las reivindicaciones 1 a 10, caracterizado además porque el elemento de soporte (16) es integral con, o es parte de, la estructura (80).

15 12.- Un ensamble del panel (10) que comprende: dos paneles yuxtapuestos (11, 12) cada uno de dichos paneles incluye una primera superficie (13), un segunda superficie opuesta (14) y una brida de unión (15) localizadas en asociación con un borde de la misma, dicho borde define un eje longitudinal del panel, dichas bridas de unión (15) se configuran para sujetarse por un elemento asegurador (16), un ensamble asegurador (10) para asegurar dos paneles yuxtapuestos (11, 12) a una estructura (80) para permitir un deslizamiento mutuo sin obstáculos de los paneles con respecto a
20 dicha estructura consecuente con una expansión o contracción longitudinal de los paneles, dicho ensamble asegurador (10) comprende: un elemento de soporte (20) configurado para soportar de manera deslizable los dos paneles yuxtapuestos (11, 12) con respecto al elemento de soporte en una dirección paralela a dicho eje longitudinal, dicho elemento de soporte (20) se adapta
25 para unirse de manera fija directamente o por medio de un elemento intermedio a la estructura (80); el elemento de soporte (20) soporta las paredes laterales opuestas (22, 23) que forman un canal (24) que se dimensiona para permitir el libre deslizamiento en el mismo del elemento

asegurador (16) en donde: el elemento asegurador (30) se forma de un material con un coeficiente de expansión térmica similar a los paneles (11, 12) de manera que cuando el elemento asegurador se mueve dentro del canal del elemento de soporte (20) los paneles y el elemento asegurador se mueven juntos; y cada panel se sujeta al elemento asegurador sin aplicar presión lateral a las paredes laterales (22, 23) del elemento de soporte (20); caracterizado porque: el elemento de soporte se forma de metal y el miembro de retención se forma de plásticos.

13.- El ensamble del panel de conformidad con la reivindicación 12, caracterizado además porque: el elemento asegurador (30) comprende una porción del cuerpo (55) que se forma integralmente con una porción de base plana (56), dicha porción del cuerpo tiene un orificio longitudinal (41) configurado para acomodar en el mismo de manera elástica bridas de unión respectivas de un par de paneles yuxtapuestos, y dicha porción de base (56) soporta hacia afuera rebordes sobresalientes (58) en lados opuestos de la misma para acomodo deslizable dentro del canal (24) del montaje.

14.- Un ensamble del panel (10) que comprende: dos paneles yuxtapuestos (11, 12) cada uno de dichos paneles incluye una primera superficie (13), una segunda superficie opuesta (14) un primero de los paneles (12) con una brida de unión (15) que sobresale fuera de una superficie de extremo de la misma, y un segundo de los paneles (11) con un hueco (75) en una superficie de extremo del mismo, un ensamble asegurador (10) para asegurar dos paneles yuxtapuestos (11, 12) a una estructura (80) para permitir un deslizamiento mutuo sin obstáculos de los paneles con respecto a dicha estructura consecuente con una expansión o contracción longitudinal de los paneles, dicho ensamble asegurador (10) comprende: un miembro de retención (30) soportado por un par de paneles yuxtapuestos (11, 12), un elemento de soporte (20) configurado para soportar de manera deslizable el

miembro de retención junto con los paneles con respecto al elemento de soporte respectivo en una dirección que permite la expansión o contracción longitudinal de los paneles, en donde: el elemento de soporte (20) se adapta para unirse de manera fija directamente o por medio de un elemento intermedio a la estructura y soporta las paredes laterales opuestas (22, 23) que forman un canal (24) que se dimensiona para permitir el libre deslizamiento en el mismo del miembro de retención (30); el miembro de retención (30) se forma de un material con un coeficiente de expansión térmica similar a los paneles (11, 12) de manera que cuando el miembro de retención se mueve dentro del canal del elemento de soporte (20) los paneles y el miembro de retención se mueven juntos; y cada panel se soporta por el miembro de retención sin aplicar presión lateral a las paredes laterales (22, 23) del elemento de soporte (20); caracterizado porque: el elemento de soporte se forma de metal y el miembro de retención se forma de plásticos.

15

15.- Un ensamble del panel (10) que comprende: dos paneles yuxtapuestos (11, 12) cada uno de dichos paneles incluye una primera superficie (13), una segunda superficie opuesta (14) y una brida de unión (15) localizadas en asociación con un borde de la misma y se monta hacia adentro desde el borde de unión para dejar suficiente voladizo (93) para la instalación del miembro de soporte, un ensamble asegurador (10) para asegurar dos paneles yuxtapuestos (11, 12) a una estructura (80) para permitir un deslizamiento mutuo sin obstáculos de los paneles con respecto a dicha estructura consecuente con una expansión o contracción longitudinal de los paneles, dicho ensamble asegurador (10) comprende: un par de elementos aseguradores (16) cada uno para sujetar una brida de unión respectiva de dos paneles; y para cada elemento asegurador (16) un elemento de soporte respectivo (20) configurado para soportar de manera deslizable el elemento

asegurador junto con uno respectivo de los paneles con respecto al elemento de soporte respectivo en una dirección que permite la expansión o contracción longitudinal de los paneles, en donde cada elemento de soporte (20) se adapta para unirse de manera fija a la estructura y soporta las

5 paredes laterales opuestas (22, 23) que forman un canal (24) que se dimensiona para permitir el libre deslizamiento en el mismo del elemento asegurador respectivo (16); caracterizado porque: el elemento asegurador (16) se forma de material que tiene un coeficiente de expansión térmica similar a los paneles (11, 12) de manera que cuando cada elemento

10 asegurador se mueve dentro del canal del elemento de soporte respectivo (20) los paneles y los elementos aseguradores se mueven juntos; y cada panel se sujeta al elemento asegurador respectivo sin aplicar presión lateral a las paredes laterales (22, 23) del elemento de soporte respectivo (20).

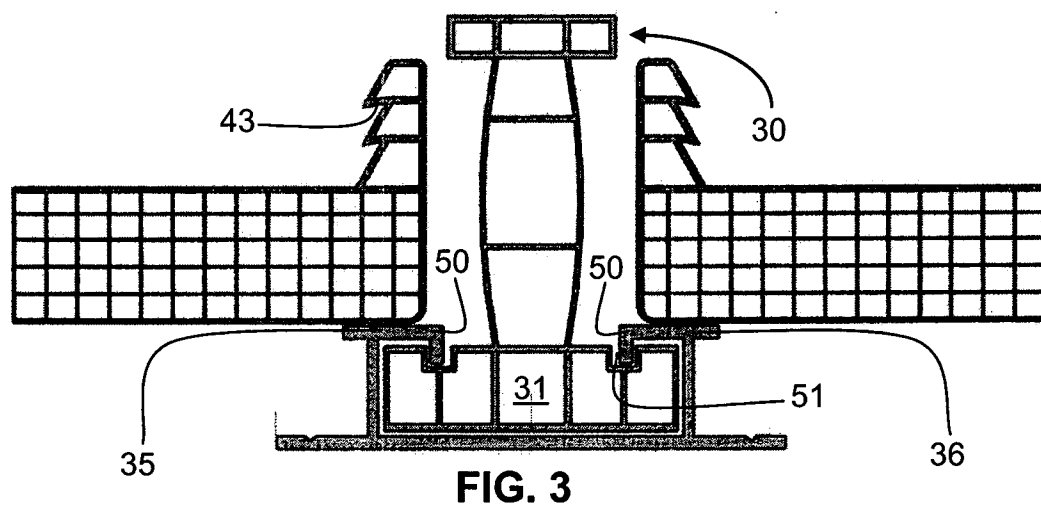
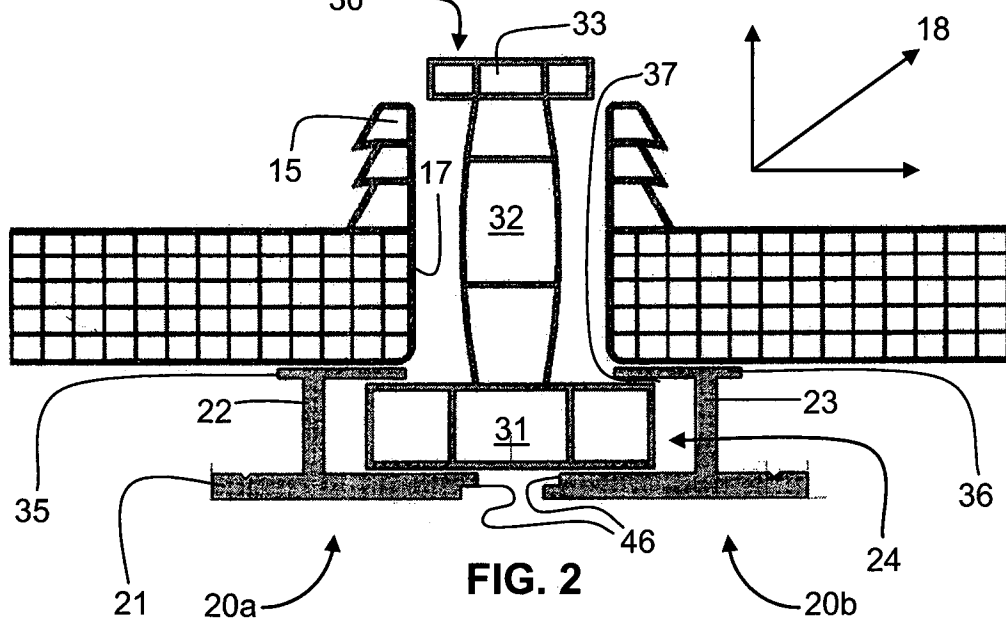
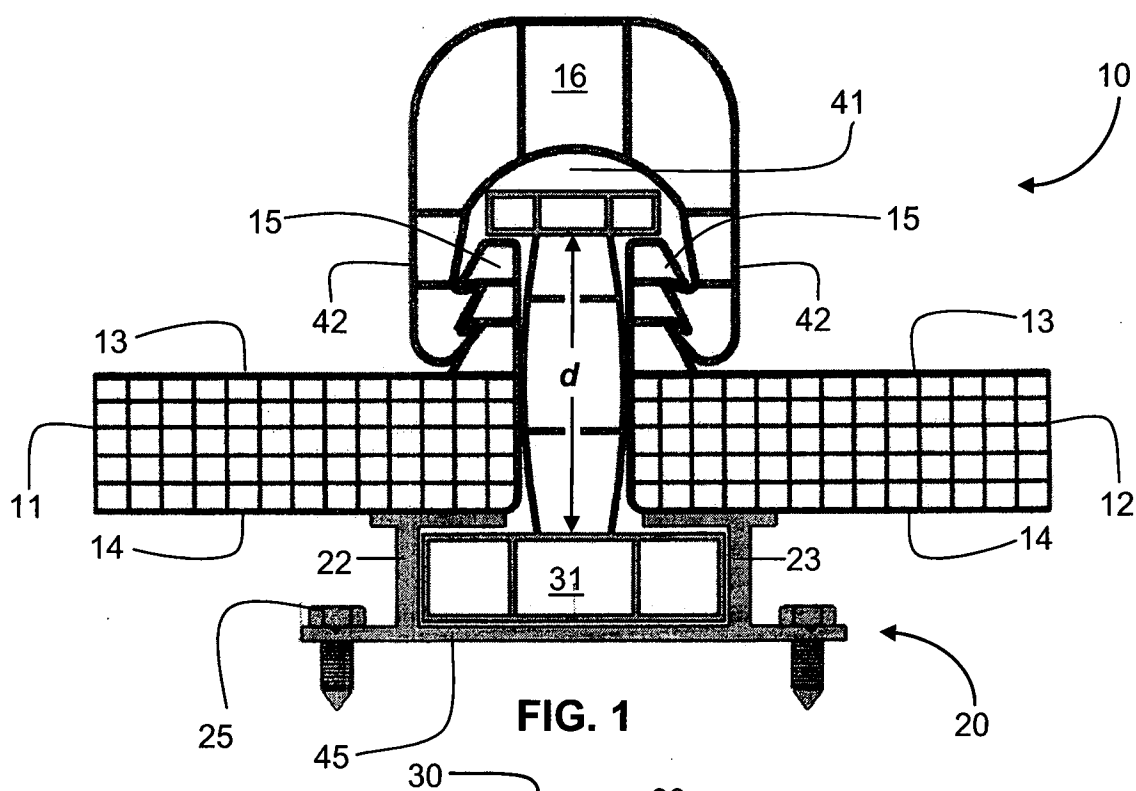
RESUMEN DE LA INVENCION

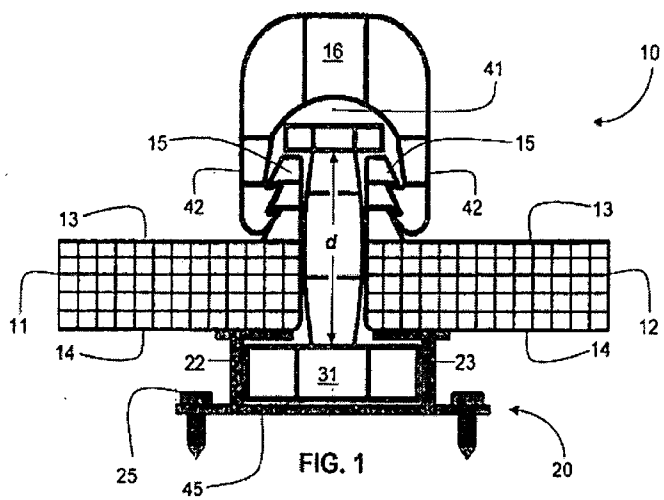
Un ensamble (10) asegura a una estructura (80) un panel o dos paneles yuxtapuestos (11, 12) cada uno con una brida unión (15) en asociación con un borde de la misma que define un eje longitudinal del panel; las bridas de unión se sujetan por al menos un elemento asegurador (16) que puede incluir o tiene asociado con el mismo un miembro de retención respectivo (30); para cada elemento asegurador (16), un elemento de soporte respectivo (20) se monta de manera fija a la estructura y se configura para soportar de manera deslizable los paneles en una dirección paralela a dicho eje longitudinal; cada elemento de soporte (20) soporta paredes laterales opuestas (22, 23) que forman un canal (24) dimensionado para deslizamiento libre en el mismo del elemento asegurador respectivo (16) o miembro de retención asociado, y cada panel se soporta por al menos un elemento asegurador sin aplicar presión lateral a las paredes laterales (22, 23) del elemento de soporte respectivo (20).

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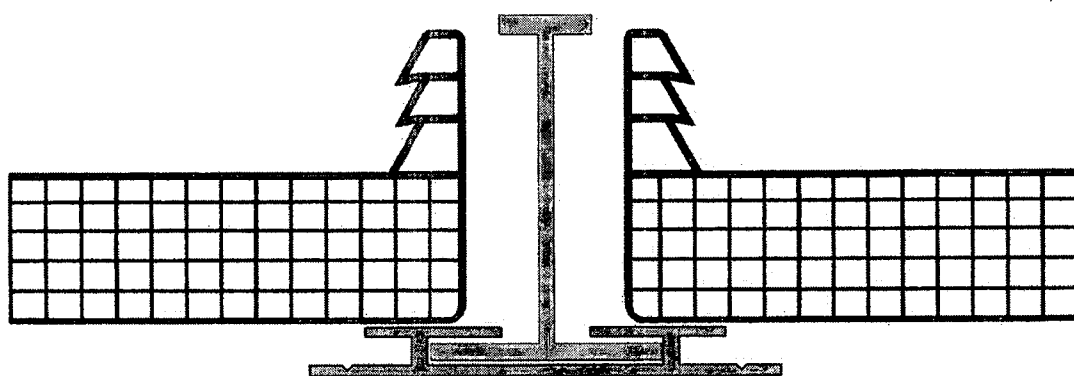


FIG. 4

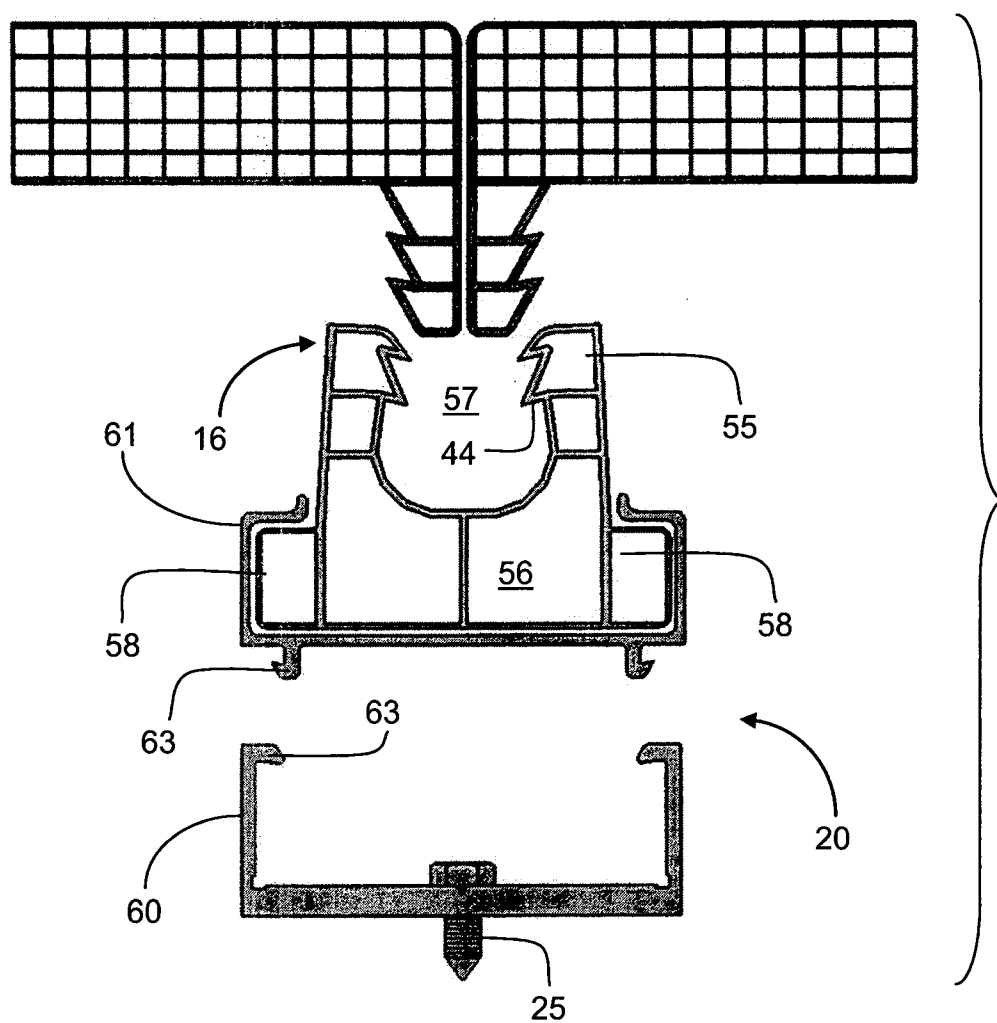


FIG. 5

3/7

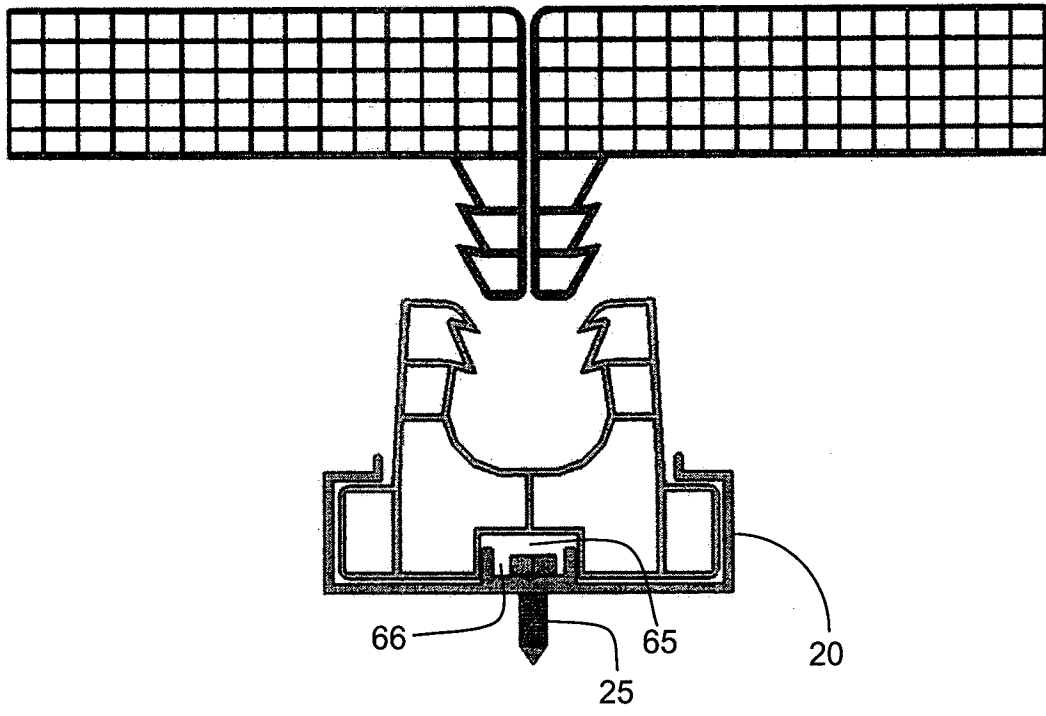


FIG. 6

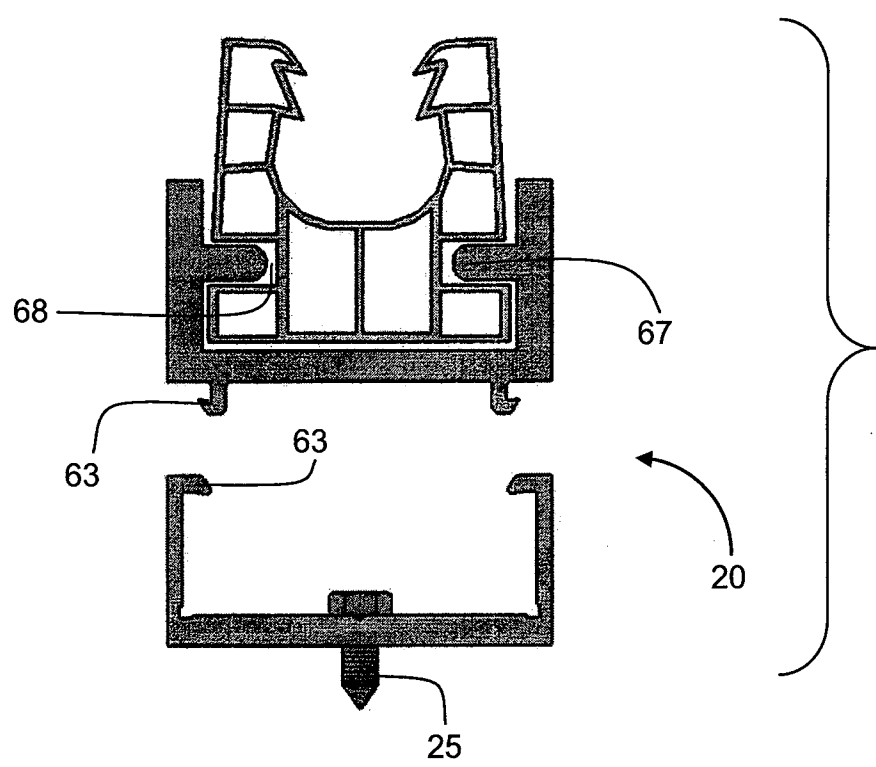


FIG. 7

4/7

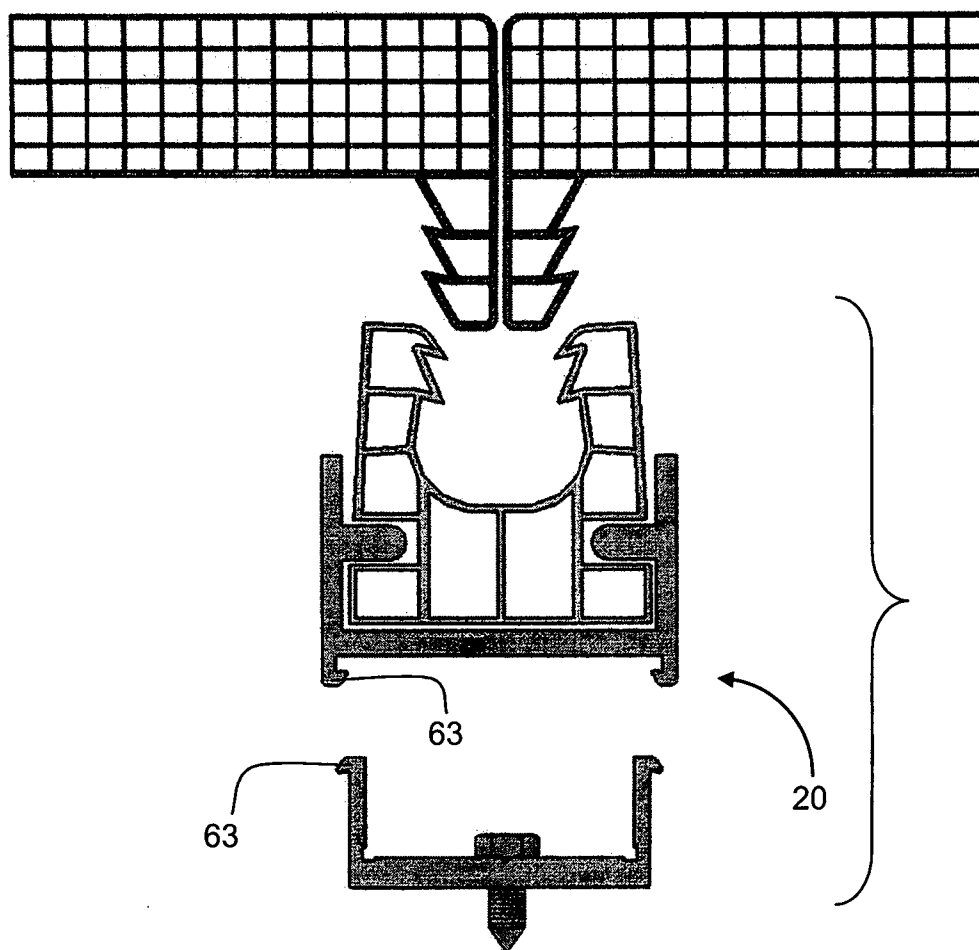


FIG. 8

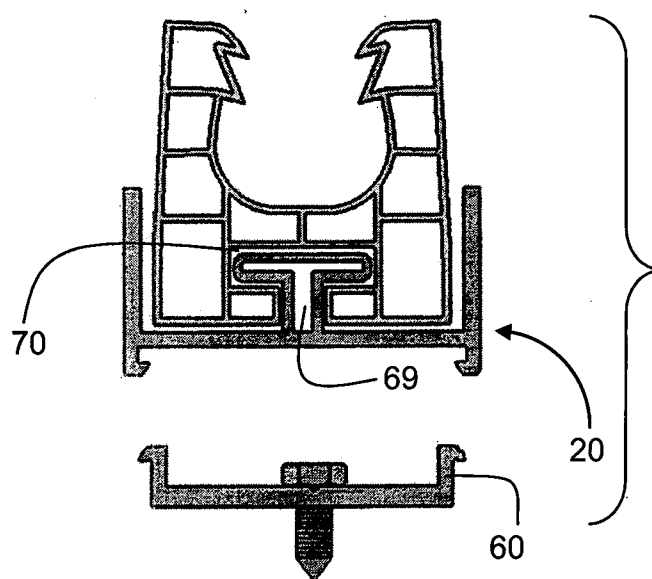


FIG. 9

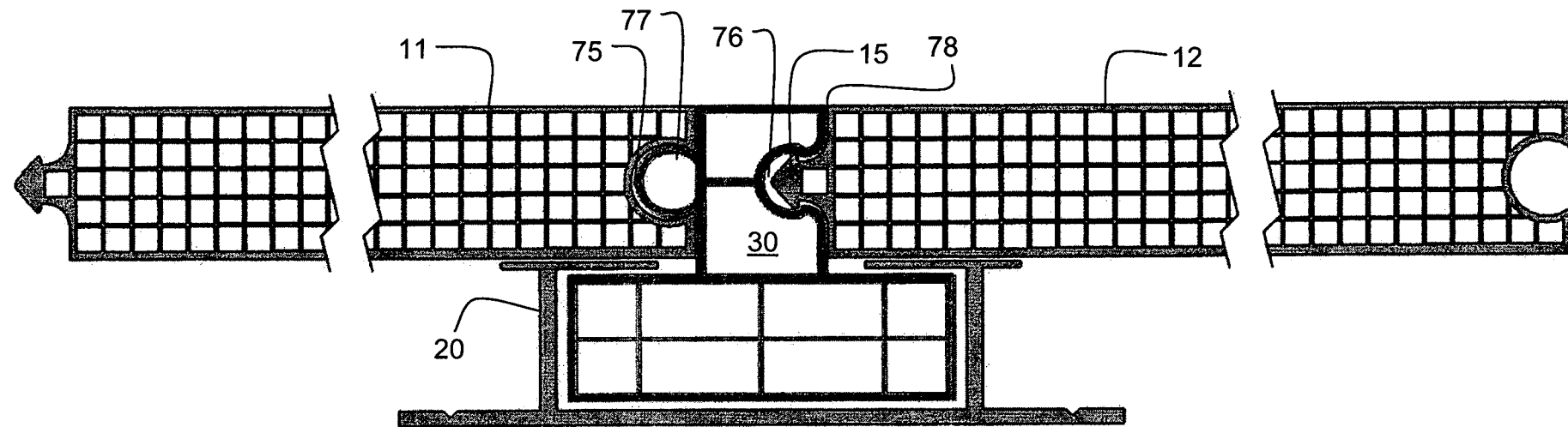


FIG. 10

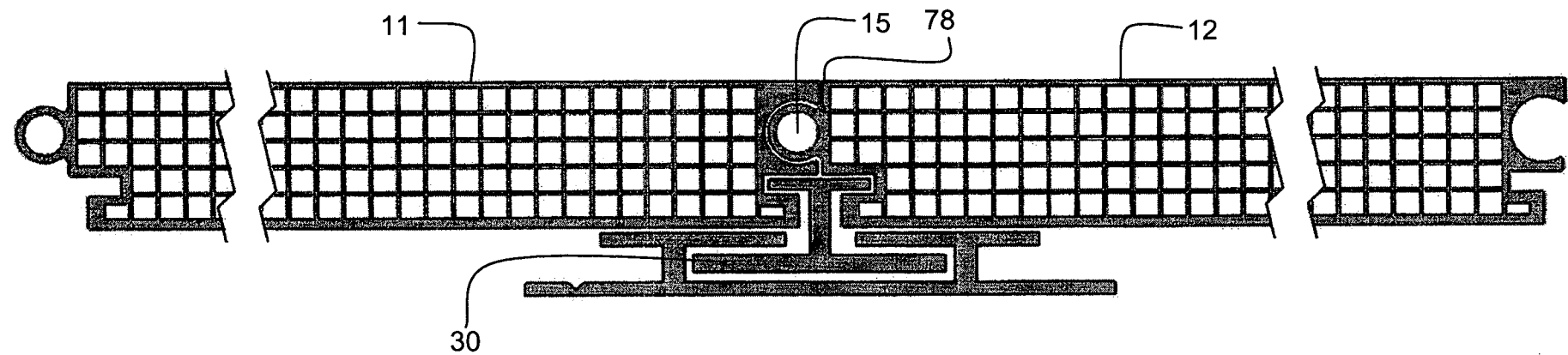


FIG. 11

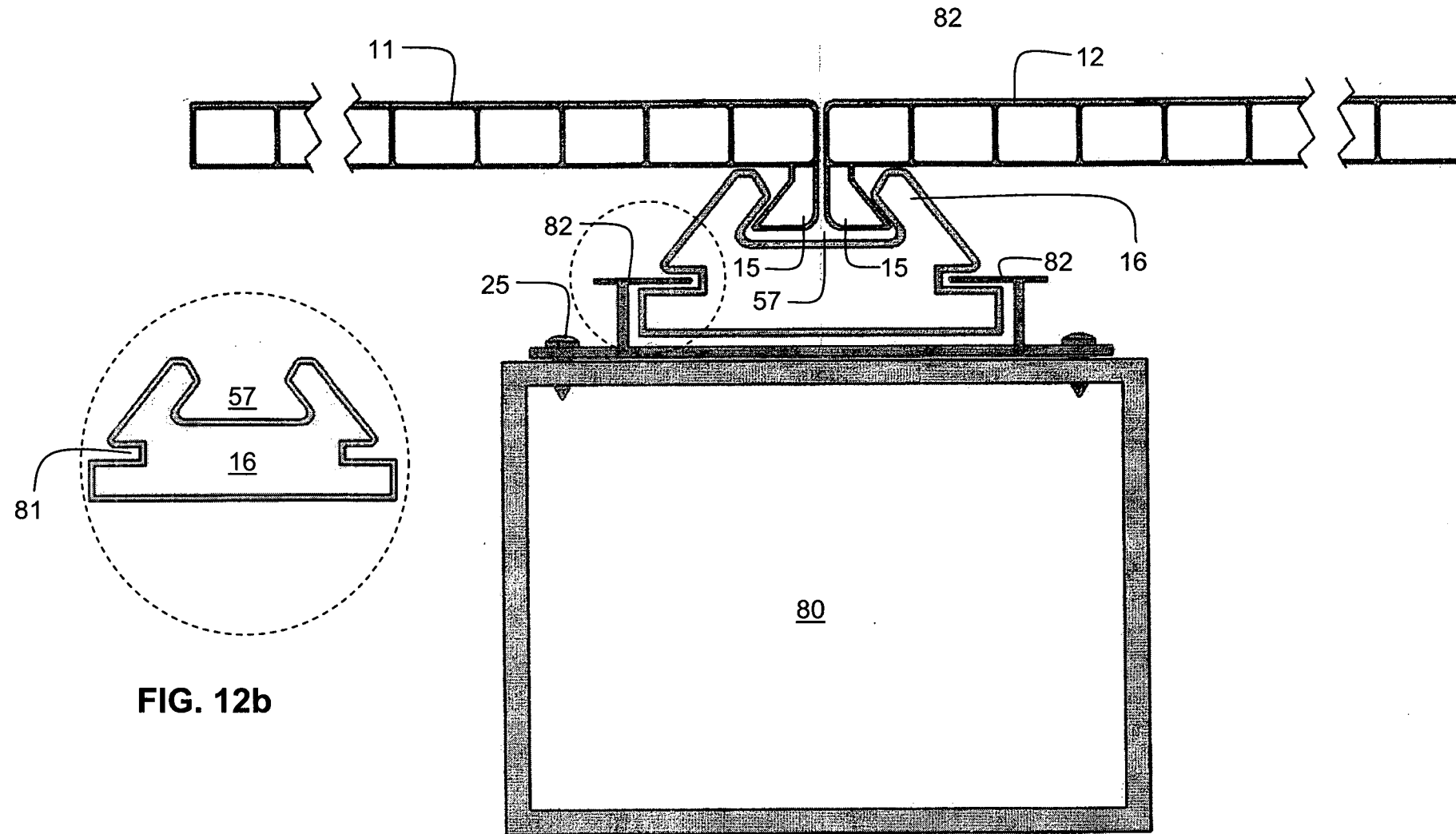


FIG. 12b

FIG. 12a

7/7

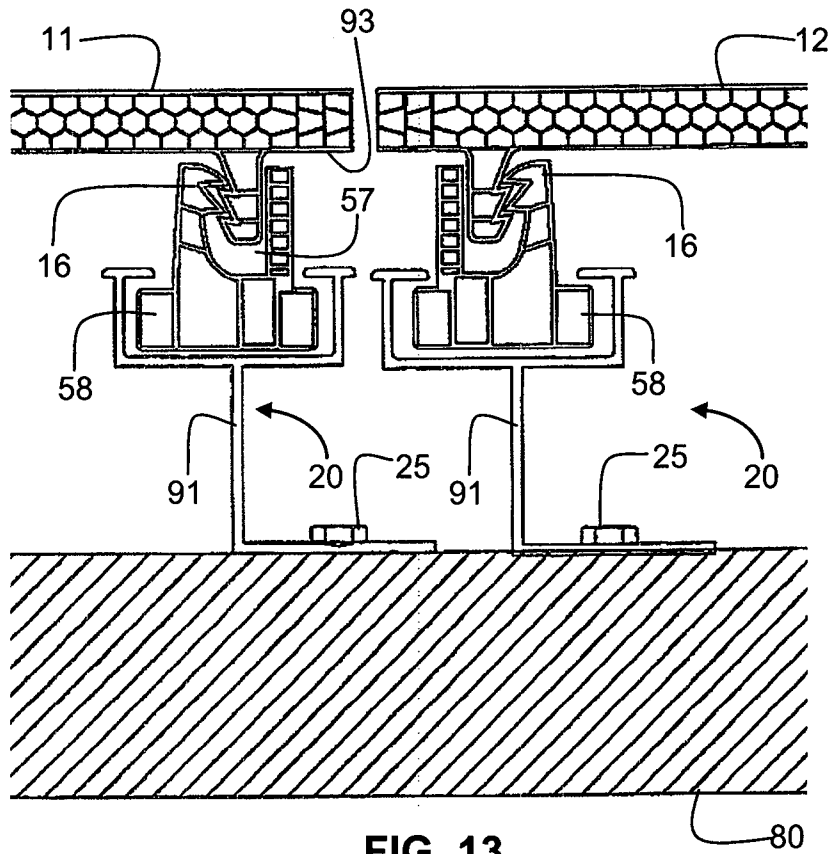


FIG. 13

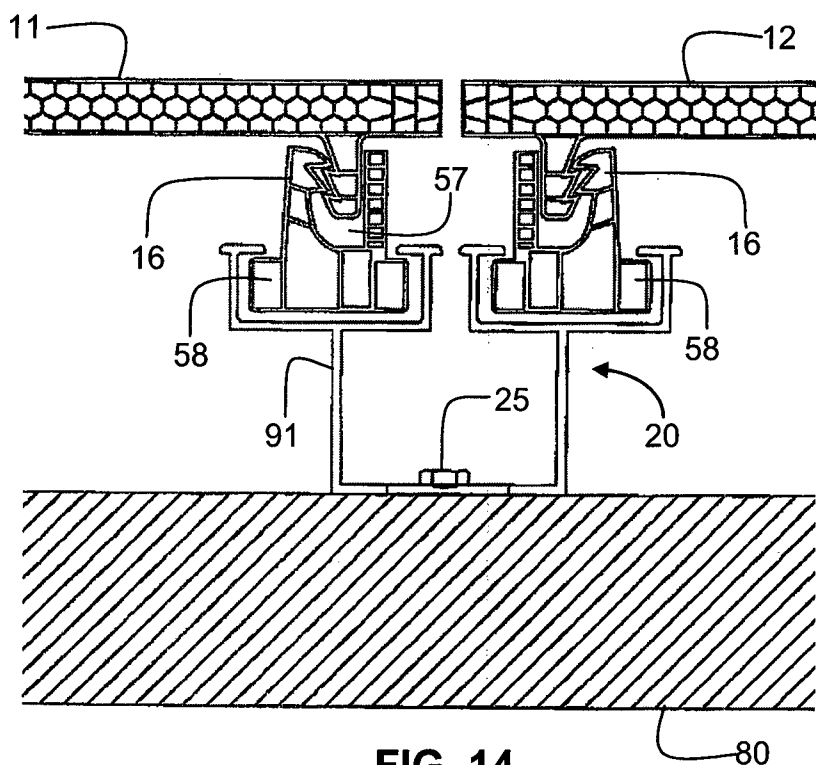


FIG. 14

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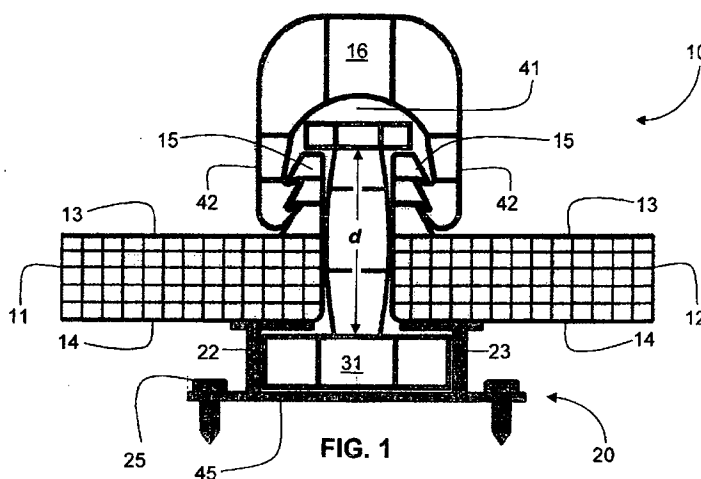
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(54) Title: ASSEMBLY FOR SECURING TWO JUXTAPOSED PANELS TO A STRUCTURE SO AS TO ALLOW THERMAL
EXPANSION AND CONTRACTION



(57) Abstract: An assembly (10) secures to a structure (80) a panel or two juxtaposed panels (11, 12) each having a joining flange (15) in association with an edge thereof defining a longitudinal axis of the panel. The joining flanges are fastened by at least one securing element (16) that may include or have associated therewith a respective retaining member (30). For each securing element (16), a respective support element (20) is fixedly mounted to the structure and configured for slidably supporting the panels in a direction parallel to the longitudinal axis. Each support element (20) supports opposing side walls (22, 23) forming a channel (24) dimensioned for free sliding therein of the respective securing element (16) or associated retaining member, and each panel is supported by the at least one securing element without applying lateral pressure to the side walls (22, 23) of the respective support element (20).

**Assembly for securing two juxtaposed panels to a structure
so as to allow thermal expansion and contraction**

FIELD OF THE INVENTION

The present invention relates to extruded, modular panel units for the construction of walls, ceilings, roofs, canopies and windows, particularly of light-transmitting wall sections. More particularly, the present invention relates to assemblies
5 for constructing such walls, ceilings, roofs, canopies and windows from a plurality of units while allowing for thermal expansion of the panels.

BACKGROUND OF THE INVENTION

EP 949 390 discloses two generally co-planar panels supported almost edge-to-edge by an intermediate beam. A coupling member is captive to the beam by inter-
10 engaging longitudinal formations and provides an interlocking engagement for the edges of the panels. Opposite the coupling member the beam is proud of the panels and receives and retains a cap which seals against the panels. Downwardly directed wings in the cap engage upwardly directed channels in a base thereof and prevent side walls of the cap from splaying apart.

15 WO 2008/149344 in the name of the present Applicant discloses an assembly for securing to a structure two juxtaposed panels, each including a first surface, an opposing second surface and a joining flange located at, or adjacent to, respective juxtaposed edges thereof. The assembly is particularly configured to prevent splaying apart of the juxtaposed panels under load and employs a retaining member that is
20 fixedly mounted to the support structure and to which there is attached a clamping member having two spaced-apart legs depending from a web, each leg being configured to engage a respective exposed surface of an adjacent joining flange. A fastening means is provided for fastening the retaining member to a construction element that inhibits angular displacement of the panels when force is applied to either the first or second
25 surfaces thereof.

- 2 -

US Patent No. 6,164,024 discloses a light transmissive glazing panel system for overhead roof constructions where glazing panels are supported on a framework and include upstanding seam flanges for connecting adjacent panels together with a joining connector. Figs. 4 and 13 show arrangements where panels having upwardly projecting
5 flanges on their mating edges are juxtaposed on opposite sides of aluminum support brackets that are bolted to the roof structure and a clamping member is then disposed on the projecting flanges to secure and seal the structure.

The above publications are typical of prior art that discloses the mounting of extruded panels to a construction element. The linear coefficient of thermal expansion
10 (α) of polycarbonate at 23°C is $65-70 \times 10^{-6}/^{\circ}\text{C}$, which is approximately three times that of aluminum for which α at 20°C is $23 \times 10^{-6}/^{\circ}\text{C}$. To the extent that some kind of retaining member is fixedly mounted to the construction element, it is to be understood that this is incapable of movement. But the polycarbonate panels mounted thereto do expand and contract, thus becoming subject to tensile and compressive forces. Specifi-
15 cally, adjacent panels that expand will push against each other laterally, thus subjecting their respective mounts to compressive forces. This gives rise to high frictional forces between the panels and the mounts, which militates against thermal expansion of the panels in the longitudinal direction, which can cause buckling or other distortion of the panels.

20 Normally the clamping members are formed of the same or similar material to the panels, e.g. polycarbonate, such that the clamping members tend to expand at the same rate as the panels. Therefore in structures such as shown in Figs. 7, 8 and 11 of WO 2008/149344 where the clamping members are fixedly mounted to the support structure, and are thus restrained from expanding, the panels being tightly clamped by
25 the clamping member are likewise unable to expand.

US Patent No. 6,536,175 discloses a panel assembly and joining elements having reciprocally engaged inclined surfaces facing inwards. Fig. 7 of this patent discloses a polycarbonate jointing element fastened to a metal plate in the form of a track for connection to load bearing structures. However, the arrangement is not
30 directed to the need to allow for longitudinal thermal expansion. Moreover, in order to ensure a waterproof seal there is provided a pressing element having a conical shape at the tip, which is inserted between two downwardly projecting joining flanges of adjacent panels so as to urge the flanges apart and thus press them tightly against

- 3 -

opposing internal walls of the polycarbonate jointing element. It is apparent from Fig. 7 of the patent that this also urges the walls of the jointing element against the metal track thereby increasing friction between the track and the jointing element and militating against sliding of the jointing element within the metal track.

5 SUMMARY OF THE INVENTION

It is therefore a broad object of the present invention to provide an assembly consisting of extruded, modular panel units and a matching joining member for constructing walls, roofs and the like, that is better adapted than hitherto-proposed arrangements for allowing thermal expansion and contraction of the panels.

10 In accordance with one aspect of the invention there is therefore provided an assembly having the features of claim 1 for securing a panel or two juxtaposed panels to a structure so as to allow unimpeded mutual sliding of the panel or panels relative to the structure.

BRIEF DESCRIPTION OF THE DRAWINGS

15 In order to understand the invention and to see how it may be carried out in practice, embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Figs. 1 to 4 are cross-sectional views showing a panel assembly constructed according to variations of a first embodiment;

20 **Figs. 5 to 9** are cross-sectional views showing a panel assembly constructed according to variations of a second embodiment;

Figs. 10 and 11 are cross-sectional views showing a panel assembly constructed according to variations of a third embodiment;

25 **Fig. 12a** is a cross-sectional view showing an alternative flange construction for use with any of the embodiments of Figs. 1 to 9;

Fig. 12b shows a detail of an integral securing element and retaining member used in the embodiment of Fig. 12a; and

Figs. 13 and 14 are cross-sectional views showing a panel assembly constructed according to variations of a fourth embodiment.

- 4 -

DETAILED DESCRIPTION OF EMBODIMENTS

In the following description of some embodiments, identical components that appear in more than one figure or that share similar functionality will be referenced by identical reference symbols. The invention may be realized using a number of different constructions and, therefore, the functionality of the invention will first be described with reference to Fig. 1, after which different embodiments will be described with reference to the other figures.

Fig. 1 shows an assembly 10 for securing two juxtaposed panels 11 and 12 to a construction element (not shown) constituting a structure so as to allow mutual sliding of the panels relative to the structure. Each of the panels 11 and 12 includes a first surface 13, an opposing second surface 14 and a joining flange 15 mounted in association with respective juxtaposed edges thereof. Thus, as shown in Fig. 1, the joining flanges 15 are located at the edges of the respective panels and are flush therewith. However, the flanges need not be flush with the edges of the panels and in some embodiments may project inwardly from the panel edges. The flanges 15 are clamped by a securing element 16 that limits lateral separation of the flanges and is formed of a material having a similar coefficient of expansion to the panel. Typically, the panels 11, 12 and the securing element 16 are formed of extruded plastic material, such as polycarbonate and in a particular application of the invention the panels at least are light transmissive.

Typically the joining flanges 15 are extruded with the panels 11, 12, such that each flange is integrally formed along an edge 17 of the panel and is formed of the same material. The edge 17 corresponds to the axis of extrusion and defines a longitudinal axis 18 of the juxtaposed panels. Since the panels 11, 12 and the securing element 16 are formed of material having similar if not identical coefficients of thermal expansion it thus follows that the joining flanges 15 and the securing element 16 expand and contract at similar rates. As a result, frictional contact between the joining flanges 15 and the securing element 16 is maintained and mutual sliding along the axis of extrusion is impeded if not altogether prevented. In hitherto-proposed constructions, this gives rise to the problems identified above owing to the direct fixation of the panels to the support structure, which prevents the panels 11, 12 and the securing element 16 from moving together without inducing longitudinal and transverse distortion of the panels.

- 5 -

In order to allow longitudinal displacement of the joined panels relative to the support structure, the panels are not fixed directly to the support structure but are fixed via one or more support elements 20, each configured for slidably supporting the panels relative to the support element in a direction parallel to the longitudinal axis 18 of the panels. This requirement may be met in different ways, of which some examples will now be described.

Thus, as shown in Figs. 1 and 2, the support element 20 is in the form of a mounting bracket adapted for fixedly attaching to the structure and supporting opposing side walls 22, 23 that form a channel 24. The manner of attaching the support element 20 to the support structure is not a feature of the invention. Commonly, self-tapping screws 25 may be used since this simplifies assembly. But any other suitable form of attachment may be employed, such as regular screws, bolts, rivets, welding and so on. It should also be understood that the support element may be integral with the structure or constituted by the structure itself.

The respective flanges 15 of a pair of juxtaposed panels are retained by a generally I-shaped retaining member 30 having a base portion 31 supporting a central vertical column 32 and a planar top portion 33 that extends parallel to the base portion 31. The base portion 31 is dimensioned for sliding accommodation within the channel 24 of the support element 20, which supports the panels 11 and 12 on opposing support surfaces 35 and 36. The height, d , between the base portion 31 and the top portion 33, is slightly greater than the combined height of the panels, joining flanges and the material thickness of the support element 20 which are to be accommodated therebetween. This leaves an air gap 37 that allows for thermal expansion of the base portion 31 without obstructing the support element 20, thus maintaining the ability of the retaining member 30 to slide within the support element 20 regardless of climatic changes.

When assembled, the joining flanges 15 abut opposing surfaces of the vertical column 32 of the retaining member 30 and are secured to each other and to the retaining member 30 by the securing element 16, which is shown as a generally inverted C- or U-shaped clamping member defining an axial bore 41. Opposing side walls 42 of the securing element 16 are resiliently urged against the outer surfaces of the flanges, thereby securing the retaining member 30 and the flanges 15 within the axial bore 41. The outer surfaces of the joining flanges 15 may be tapered and provided with notches 43 e.g., saw-tooth or barb-shaped notches that engage complementary notches 44 (see

Fig. 5) formed along the opposing side walls 42 of the securing element 16. Alternatively, the flanges may be tapered in a reverse direction so as to be wider at the tip than at the base, thus forming a dovetail joint with a securing element having an axial bore of complementary shape. It will thus be understood that the term “juxtaposed” does not imply necessarily that the panels are in abutting relationship, although they may be as described below with reference to Fig. 5.

The dimensions of the retaining member 30 ensure that, when assembled, the panels 11, 12 are supported on the support element 20 and the tips of the flanges 15 abut inner surfaces of the top portion 33. The upper bar of the retaining member 30 retains the panels in contact with the support structure in the event of upward force, for example by strong winds, applied to the lower surfaces of the panels. In this embodiment, the retaining member 30 thus cooperates with the securing element 16 to retain the panels 11, 12 and form a panel sub-assembly whose components are substantially locked to each other and incapable of mutual thermal expansion or contraction, while permitting thermal expansion or contraction of the panel sub-assembly relative to the support structure owing to the sliding accommodation of the retaining member 30 within the support element 20.

Furthermore, in such an arrangement, the weight of the panels 11 and 12 is borne by the support surfaces 35 and 36 of the support element 20. As is well known, the frictional force F generated by a body acting on a surface is given by:

$$F = \mu N$$

where: μ is the coefficient of friction between the object and the surface, and N is the vertical component of force of the object.

In known structures such as described in WO 2008/149344, in addition to the weight of the panels bearing on the construction element, the retaining member acts to increase the force applied on the panels against the support structure. This significantly increases the frictional force and militates against sliding of the panels relative to the support structure.

In contrast thereto, in the present invention the only vertical force applied by the panels on the support structure is their weight, there being no additional clamping force. The coefficient of friction of plastic against metal is fairly low such that the frictional force is not too high to prevent relative sliding of the panels on the support surfaces 35 and 36 of the support element 20.

- 7 -

In the embodiment shown in Fig. 1, the support element 20 is a unitary construction formed of extruded aluminum and having a base unit 45 supporting the support element 20 and having toward opposing edges holes for accommodating the screws 25. Fig. 2 shows a variation where the base unit 45 is split so as to form a pair of
5 opposing support elements 20a, 20b, whose base units may optionally have opposing recesses 46, which cooperate to form a continuous planar support surface.

Fig. 3 shows a variation where the support surfaces 35 and 36 have downwardly depending edges 50 that slidably engage complementary channels 51 formed in an upper surface of the base portion 31 of the retaining member 30. Fig. 4 shows another
10 variation similar in principle to that shown in Fig. 1 and having a T-shaped retention member 30 adapted for sliding engagement in a low-profile support element 20.

Fig. 5 shows a different embodiment that operates on a slightly different principle in that no T-shaped retaining member is required. Instead, the panels 11, 12 are inverted so that the flanges 15 face downward and are retained by the securing
15 element 16 also in the form of a clamping member, which is adapted for sliding accommodation within the support member 20. To this end, the securing element 16 comprises a body portion 55 integrally formed with a planar base portion 56. The body portion 55 has a longitudinal bore 57 configured for resiliently accommodating therein respective joining flanges of a pair of juxtaposed panels. The base portion 56 supports
20 outwardly protruding ears 58 on opposing sides thereof for slidable accommodation within the channel of the support element 20. In this embodiment, the securing element 16 serves as the retaining member 30 of the previous embodiment since it both retains the joining flanges 15 and slidably engages the support element 20.

Since in this embodiment, the support element retains the securing element but
25 does not support the panels directly, the support element 20 may be simply a U-shaped bracket that is secured to the support structure and provides a channel for slidably accommodating the base portion 56 of the securing element 16. The support element 20 may be secured using screws or any other suitable fastener as described above. In the embodiment shown in Fig. 5, the support element 20 is formed of a first portion 60 and
30 second portion 61 that interlocks with the first portion. The first portion 60 is a generally U-shaped bracket that is adapted for fixedly attaching to the structure and the second portion is a generally U-shaped channel. Thus in this embodiment, the securing element is adapted for fixedly mounting to the structure via an intermediate element.

- 8 -

This is distinct from other embodiments where it is adapted for fixedly mounting to the structure directly. Since the screw head protrudes above the inner surface of the channel, it would foul the sliding base portion 56 of the securing element 16 if direct contact were required. The two-part construction avoids such direct contact since the
5 base portion 56 is accommodated within the channel of the second portion 61. Both the lower and upper portions 60, 61 may be formed of extruded aluminum that interlock via complementary hooks 63 that snap fit together.

Also in this embodiment, the only vertical force applied by the panels on the support structure is their weight, there being no additional clamping force thus
10 permitting relative sliding of the securing element 16 and attached panels within the support element 20.

Fig. 6 shows a unitary construction where a recess 65 is formed in a lower surface of the securing element that slidably engages a complementary recessed channel 66 in the support element 20, which accommodates the screw 25, thus avoiding direct
15 contact between the screw head and the retaining member 30.

Fig. 7 shows another two-part construction similar to that shown in Fig. 5, but having inwardly projecting rails 67 that slidably engage complementary channels 68 formed in opposing side walls of the securing element 16.

Fig. 8 shows a similar construction, the only difference being the orientation of
20 the hooks 63.

Fig. 9 shows yet another construction where the lower portion 60 of the support element 20 is of reduced profile compared with that shown in Fig. 8 and having an upwardly projecting T-shaped rail 69 on its lower inside surface for slidably engaging a complementary channel 70 formed in the lower surface of the securing element 16.

25 In all of the arrangements so far described, the joining flanges are perpendicular to opposing major surfaces of the panels. Figs. 10 and 11 show alternative arrangements where each panel has a single joining flange 15 protruding from a side surface of the panel and adapted for interlocking engagement with a complementary recess 75 formed in a side surface of an adjacent juxtaposed panel. In Fig. 10 adjacent panels are
30 interlocked via a retaining member 30 formed of a material having a similar coefficient of thermal expansion to that of the panels and having on opposite side walls a respective recess 76 and projection 77 each for engaging a respective complementary flange 15 and recess 75 on side walls of adjacent panels. The retaining member 30 is slidably

- 9 -

supported within a support element 20 that is fixed to the structure. The retaining member 30 thus both locks the adjacent panels forming a sub-assembly comprising the two juxtaposed panels 11, 12 and the retaining member 30 as well as allowing for sliding engagement of the sub-assembly within the support element 20.

5 In the arrangement of Fig. 11, the retaining member 30 serves only to allow for sliding engagement of two adjoined panels 11, 12 within the support element 20. It does not lock the two panels together, this being achieved by complementary mortise and tenon-type joints that may be adapted for snap fitting of two panels or may require that they be joined by sliding the projecting male joint of one panel into the female recess of
10 the other panel.

It should be noted that when the flanges 15 are mounted at the side of the panels 11, 12 as shown in Figs. 10 and 11, there is formed a seam 78, which is susceptible to leakage of water into the structure. Also in the arrangement of Figs. 5 to 9 there is an exposed seam between two juxtaposed panels. However, in this case any water seepage
15 will collect in the longitudinal bore 57 of the securing element 16 without seeping into the structure. As opposed to this, there is no exposed seam in the arrangement shown in Figs. 1 to 4, since the securing element 16 covers the seam between two juxtaposed panels thereby preventing water seepage into the structure.

The panels 11, 12 are very typically used as roof structures and are therefore
20 particularly vulnerable to water seepage, which obviously should be avoided. For this reason, the use of the securing element 16 of a type that forms a water impermeable barrier between the panels 11, 12 and the structure is preferable. Such a securing element 16 dictates that the flanges 15 protrude from one of the major surfaces 13, 14 of the panel rather than from a mating surface as shown in Figs. 10 and 11.

25 Fig. 12a shows a structure 80 to which there are slidably secured a pair of juxtaposed panels 11, 12 having tapered flanges 15 that are wider at their respective tips than at their bases. The tapered flanges 15 are secured within a securing element 16 that is formed of material having a similar coefficient of expansion to the joining flanges 15 and which has a longitudinal bore 57 of complementary shape to the joining flanges 15
30 so as to form a dovetail joint. The securing element 16 is provided with lateral slots 81 best seen in Fig. 12b that slidably accommodate respective rails 82 of a support element 20 secured to the structure 80 by means of screws 25. It will be understood that such flanges 15 may be used in any of the embodiments described above with reference to

- 10 -

Figs. 1 to 9 of the drawings. Also in this embodiment, the securing element 16 serves both to secure the adjoining flanges of a pair of juxtaposed panels and also to slidably retain the panels within the support element 20.

Figs. 13 and 14 show a structure 80 to which there are slidably secured a pair of juxtaposed panels 11, 12 having flanges 15 that may tapered so as to be wider at their respective tips than at their bases. More generally, and equally true for all the embodiments, the flanges are of complementary shape to the hollow of the securing element 16. Where the securing element 16 is provided with indents, the flanges are likewise provided with indents, although again this is not mandatory as can be seen with reference to Figs. 10, 11 and 12 where the flanges have no indents but are still of complementary shape to the hollow of securing element 16.

Unlike the embodiments so far described where adjoining flanges of a pair of juxtaposed panels are commonly supported within a single securing element, in this embodiment a separate securing element is provided for each flange. Thus, each of the flanges 15 is secured within its respective securing element 16 that may be formed of material having a similar coefficient of expansion to the joining flange 15 and which has a longitudinal bore 57 of complementary shape to the joining flange 15. Each securing element 16 has a base supporting opposing ears 58 that are slidably mounted within corresponding channels 24 of a support element 20 secured to the structure 80 by means of screws 25. Thus, at its upper end the securing element 16 serves to secure the respective panel while at its base it also serves to retain the panel within support member 20.

Each of the support members 20 is supported by a respective mounting bracket 91 that is fixed to the structure 80 by corresponding screws 25. In order to ensure proper abutment of the adjoining edges of the juxtaposed panels, the joining panels 15 are mounted inward of the adjoining edges so as to leave sufficient overhang 93 that allows for sufficient clearance between the two support members. In Fig. 13, the respective mounting brackets 91 of adjacent support members 20 are spatially separated and each is separately fixed to the structure 80. Thus, during assembly, each bracket is screwed to the structure 80 by self-tapping screws 25, the securing elements 16 are then slidably mounted within the channels of the support members 20 and the panels 11, 12 are then mounted in the respective securing elements 16.

- 11 -

In Fig. 14 the respective mounting brackets 91 of a pair of adjoining support members 20 overlap and are commonly fixed to the structure 80 by screws 25. In this case, sufficient gap must be left between the respective support members of adjoining panels to provide access to the screw 25. It is emphasized that all the figures are schematic and are not drawn to scale.

It is also reiterated that in all embodiments, self-tapping screws 25 may be used since this simplifies assembly. But any other suitable form of attachment may be employed, such as regular screws, bolts, rivets, welding and so on. Likewise, in all embodiments the support element may be integral with the structure or constituted by the structure itself.

While the drawings show constructional panels having two major surfaces defining the height of the panel, and covering sub-spaces formed therein, as known *per se*, it is emphasized that the present invention is also applicable to other types of similar panels, such as panels without inner sub-spaces, or panels in which the connecting flanges are within the height of the panel, etc.

It should also be emphasized that while a large number of variations of joints and support elements have been shown, it is not intended that each variation be confined to the specific embodiment in connection with which it is illustrated and described. Thus, different variations may be combined as required and all such permutations are to be embraced by the appended claims as though they were separated illustrated and described.

While in the embodiments described, the panels and adjoining flanges and the securing element are formed of polycarbonate or other plastic materials having similar temperature coefficients of expansion, the securing element 16 may be formed of metal such as aluminum having a significantly smaller coefficient of expansion than the joining flanges. This does not matter because buckling of the panels owing to longitudinal expansion is prevented by virtue of the free sliding of the panels relative to the support structure.

Likewise, it is to be understood that while the flanges are shown as tapered, this is not essential. What is important is that the flanges be secured by the securing element in a manner that ensures they both expand and contract together at similar rates of thermal expansion. Likewise, in those embodiments having a retaining member, this also should be formed of material having a similar coefficient of thermal expansion to

55

- 12 -

the panels and securing element so that when the retaining member moves within the channel of the support member, the panels and securing element move with the retaining member. It is this property that ensures that the panels are able to slide freely relative to the support structure and avoids buckling or other distortion of the panels.

- 5 It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrated embodiments and that the present invention may be embodied in other specific forms without departing from the scope of the claims and equivalents thereof.

- 13 -

CLAIMS:

1. An assembly (10) for securing a panel or two juxtaposed panels (11, 12) to a structure (80) so as to allow unimpeded mutual sliding of the panel or panels relative to said structure, each of said panels including a first surface (13), an opposing second
5 surface (14) and a joining flange (15) located in association with an edge thereof, said edge defining a longitudinal axis of the panel, said joining flanges being configured for fastening by at least one securing element (16), the assembly comprising
for each securing element (16), a respective support element (20) configured for slidably supporting the panels relative to the respective support element in a direction
10 parallel to said longitudinal axis, wherein:
each support element (20) is adapted for fixedly attaching directly or via an intermediate element to the structure and supports opposing side walls (22, 23) that form a channel (24) that is dimensioned to allow free sliding therein of the respective securing element (16) or an associated retaining member (30), and
15 each panel is supported by the at least one securing element without applying lateral pressure to the side walls (22, 23) of the respective support element (20).
2. The assembly according to claim 1, comprising a retaining member (30) adapted to retain the respective joining flanges of a pair of juxtaposed panels and being mountable within the support element and configured for longitudinal sliding relative
20 thereto;
said at least one support element having a different coefficient of thermal expansion than the retaining member.
3. The assembly according to claim 2, wherein respective coefficients of thermal expansion of the at least one support element and the retaining member differ by a
25 factor of at least two.
4. The assembly according to claim 1, wherein respective coefficients of thermal expansion of the at least one support element and the securing element (16) differ by a factor of at least two.

- 14 -

5. The assembly according to claim 2 or 3, wherein said at least one support element has a lower coefficient of thermal expansion than the retaining member.
6. The assembly according to any one of claims 2 to 5, wherein the at least one support element is formed of metal and the retaining member is formed of plastics.
- 5 7. The assembly according to any one of claims 2 to 6, wherein the at least one support element (20) is formed of aluminum and the retaining member (30) is formed of polycarbonate.
8. The assembly according to any one of claims 2 to 7, wherein the at least one support element (20) comprises a base unit (45) adapted for fixedly attaching to the
10 structure and supporting opposing side walls (22, 23) that together with the base unit form a channel (24) that is wider than the retaining member so as to slidably accommodate the retaining member (30) therein.
9. The assembly according to any one of claims 1 to 8, wherein the support element (20) is formed of a first portion (20a) and second portion (20b) that interlocks
15 with the first portion.
10. The assembly according to claim 9, wherein the first portion is a generally U-shaped bracket that is adapted for fixedly attaching to the structure and the second portion is a generally U-shaped channel.
11. The assembly according to claim 9 or 10, wherein the second portion (20b) is
20 provided on an outer surface thereof with outwardly protruding hooks (63) for engaging complementary hooks (63) in the first portion.
12. The assembly according to any one of claims 8 to 11, wherein:
the retaining member (30) comprises a body portion (55) integrally formed with a planar base portion (56),
25 said body portion having a longitudinal bore (41) configured for resiliently accommodating therein respective joining flanges of a pair of juxtaposed panels, and
said base portion (56) supporting outwardly protruding ears (58) on opposing sides thereof for slidable accommodation within the channel (24) of the mount.

- 15 -

13. The assembly according to any one of claims 8 to 11, wherein:
the retaining member (30) is generally I-shaped and comprises a planar base portion (31) and a planar top portion (33) interconnected by a central column (32),
said base portion being dimensioned for slidable accommodation within the
5 channel (24) of the support element (20),
the support element (20) having opposing support surfaces (35, 36) each for supporting thereon one of the juxtaposed panels, and
the column (32) having a height that is slightly greater than a combined height of the panels (11, 12), joining flanges (15) and material thickness of the support element
10 (20) so that when the respective first surfaces (13) of the panels are supported on the support surfaces (35, 36) of the mount, respective tips of the joining flanges retained between the base portion (31) and the top portion (33) of the retaining member;
the securing element (16) being configured for resiliently engaging the joining flanges so as to prevent lateral displacement of the joining flanges relative to the
15 retaining member whereby the top portion (33) of the retaining member (30) retains the tips (31) of the flanges and resists rotation thereof, thus anchoring the retaining member to the panels to form a composite assembly that is able to slide within the channel of the mount upon thermal expansion or contraction of the panels.
14. The assembly according to any one of claims 1 to 13, wherein the panels are
20 light transmissive.
15. The assembly according to any one of claims 1 to 14, wherein the panels are formed of plastics.
16. The assembly according to any one of claims 1 to 15, wherein the joining flanges (15) protrude from one of the first and second surfaces (13, 14) of the panels
25 and the securing element (16) forms a water impermeable barrier between the panels and the structure (80).
17. The assembly according to any one of claims 1 to 16, wherein the support element (16) is integral with, or is constituted by, the structure (80).
18. The assembly according to any one of claims 1 to 17, wherein each securing
30 element (16) has a base supporting opposing ears (58) that retain the securing element

- 16 -

(16) within a corresponding channel (24) of the support element (20) and serve as the retaining element (30).

19. The assembly according to any one of claims 1 to 18, wherein adjoining flanges (15) of a pair of juxtaposed panels (11, 12) are commonly supported within a single
5 securing element (16).

20. The assembly according to any one of claims 1 to 18, wherein a separate securing element (16) is provided for each joining flange.

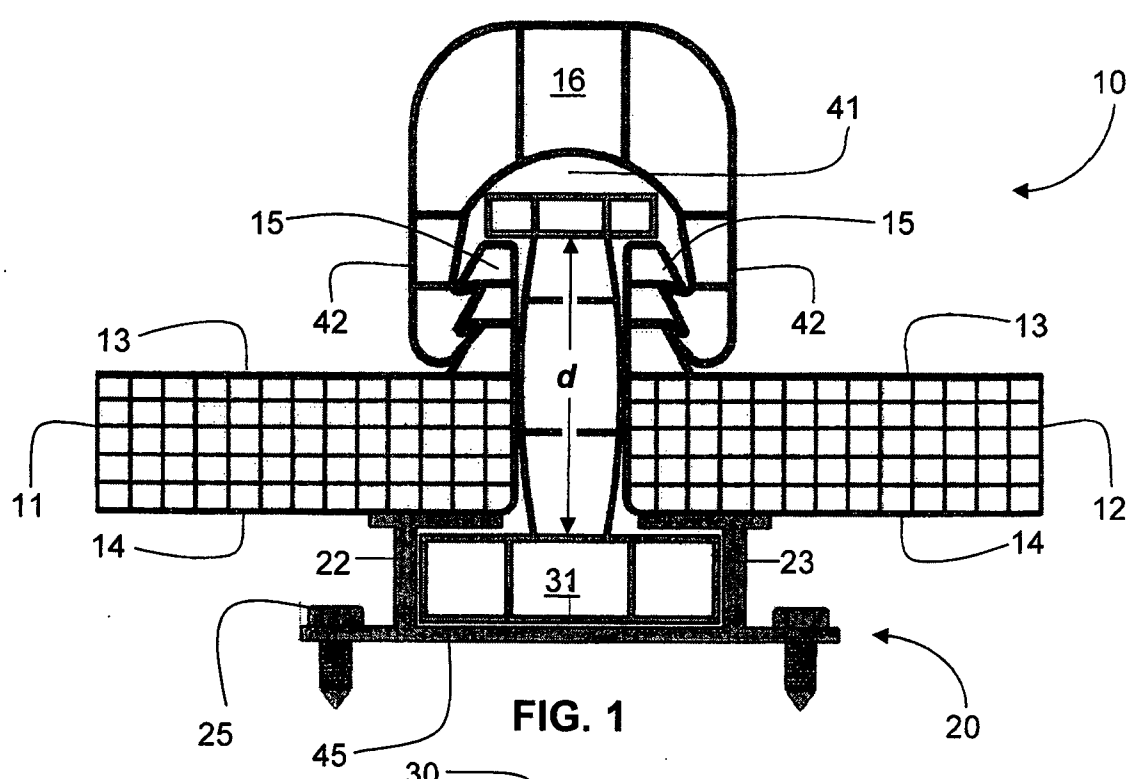


FIG. 1

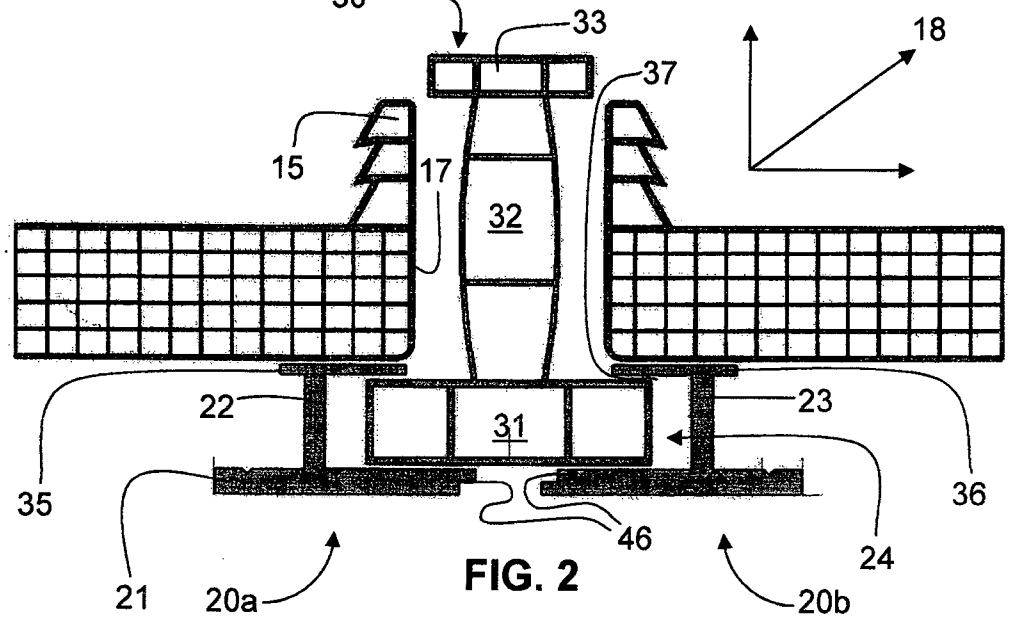


FIG. 2

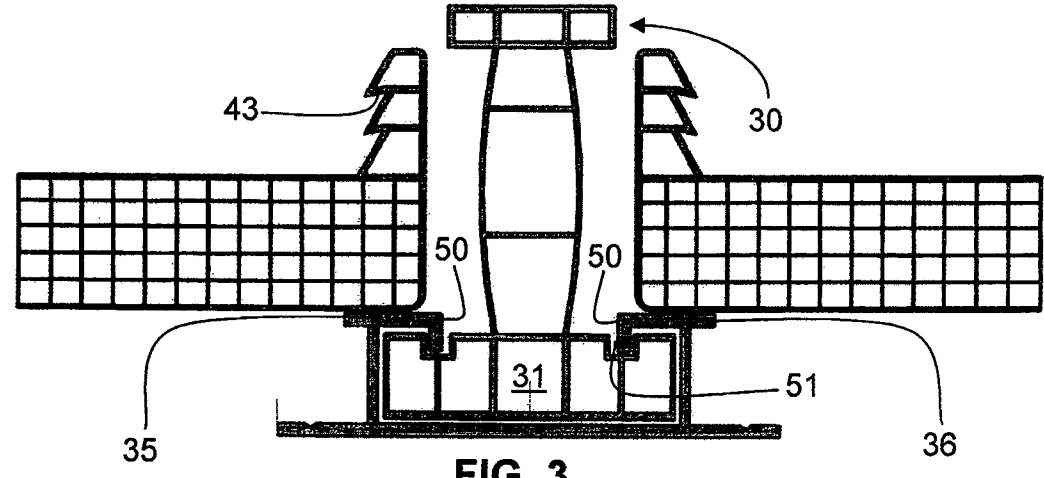


FIG. 3

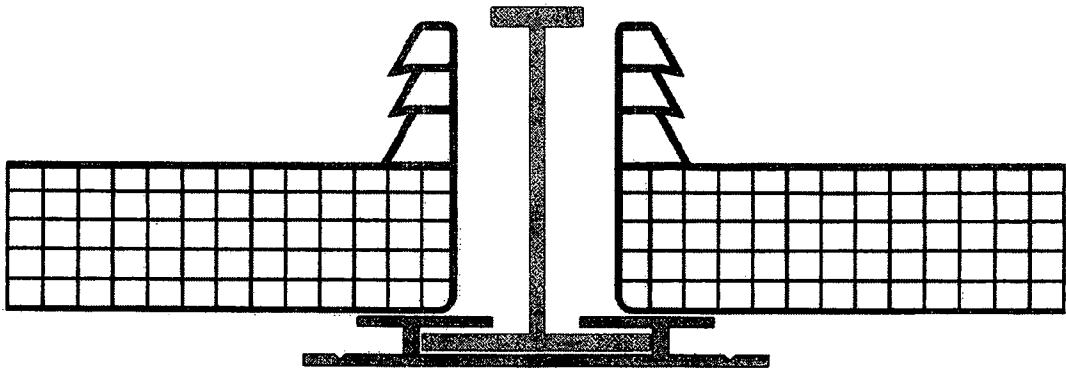


FIG. 4

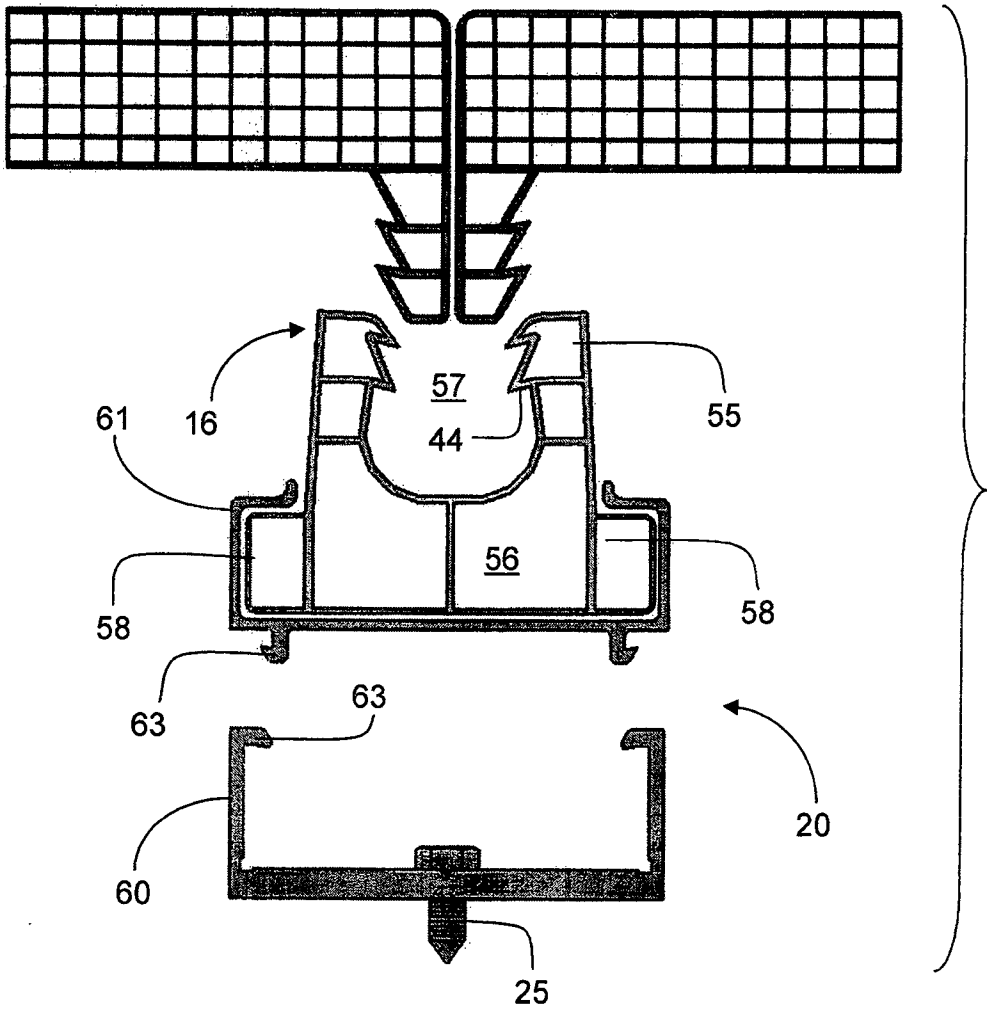
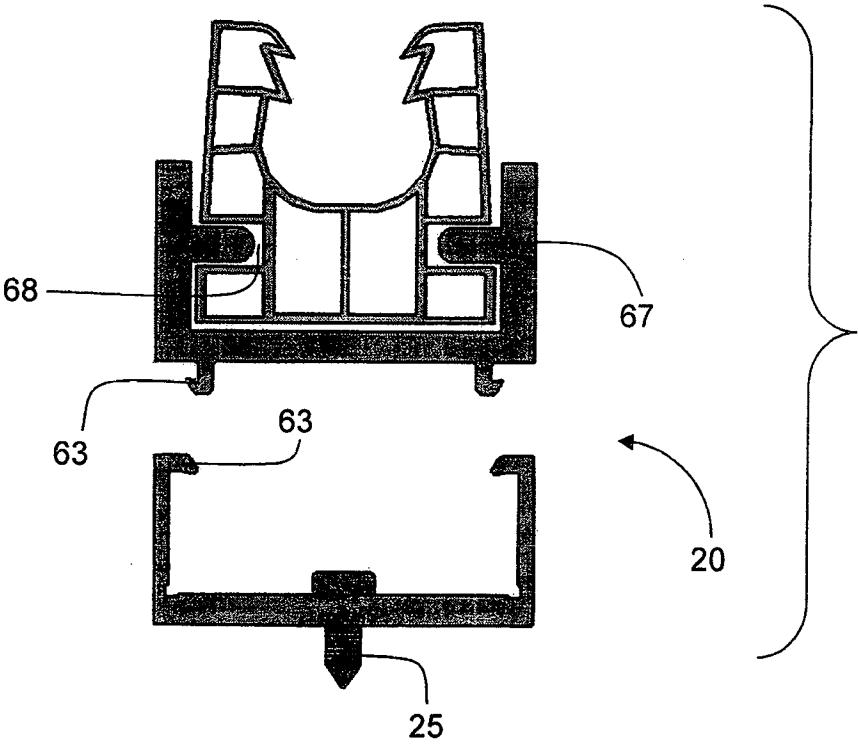
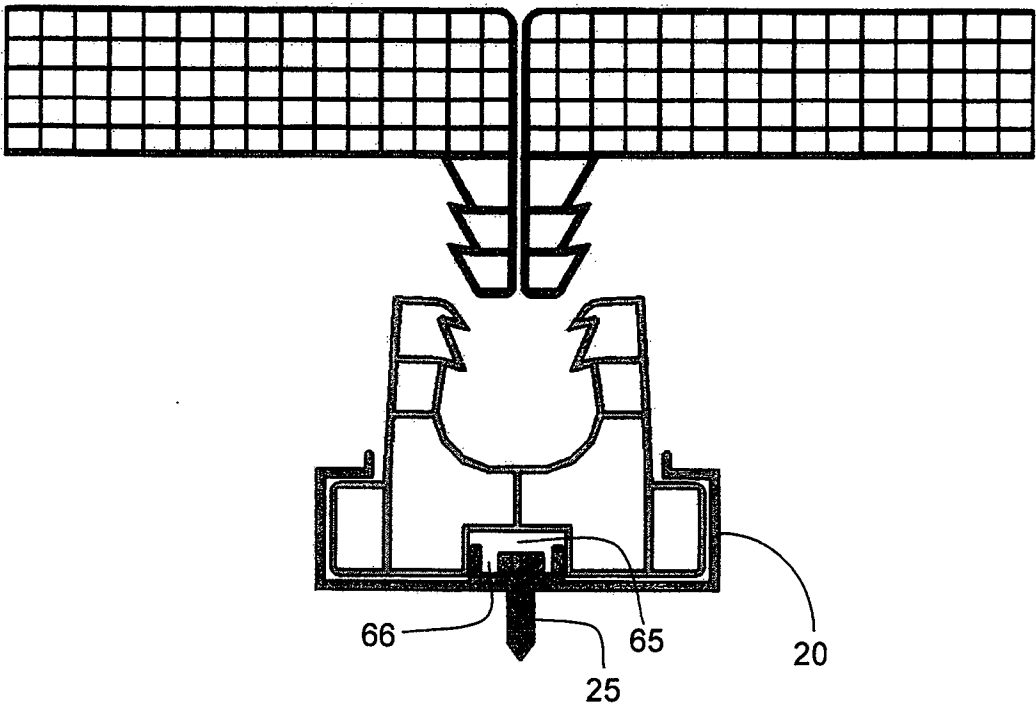


FIG. 5

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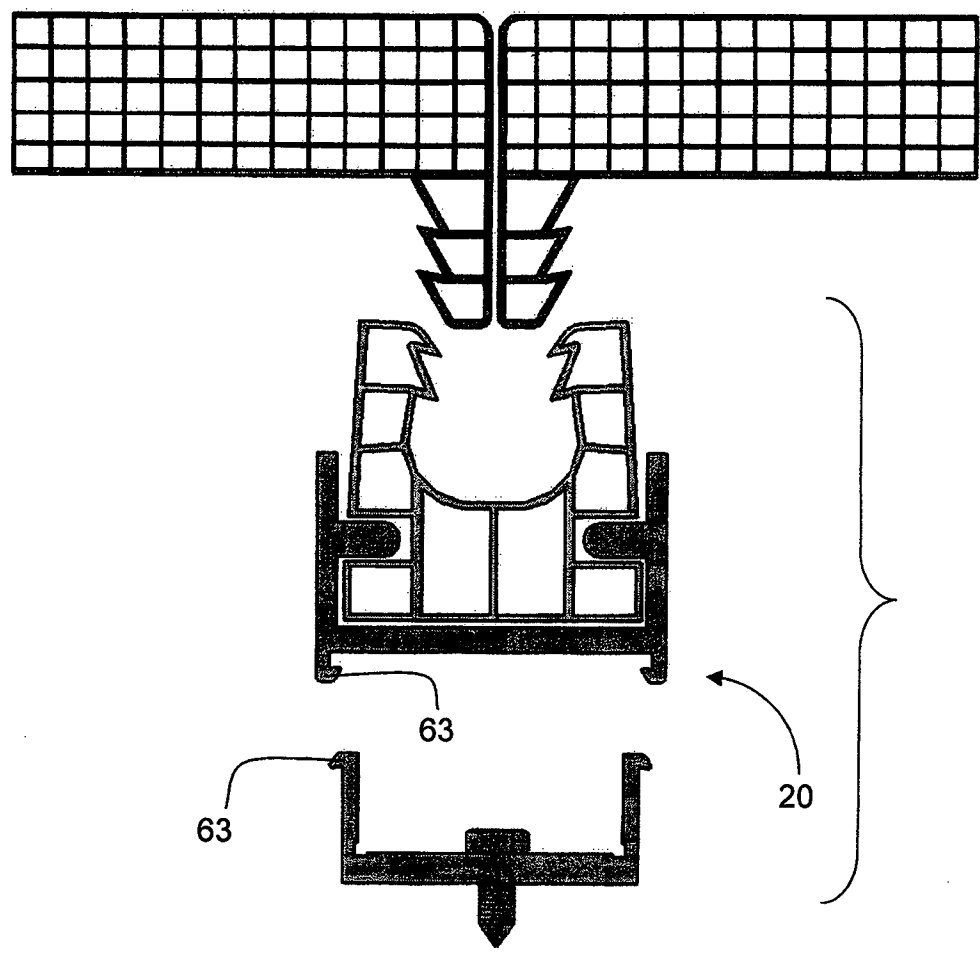


FIG. 8

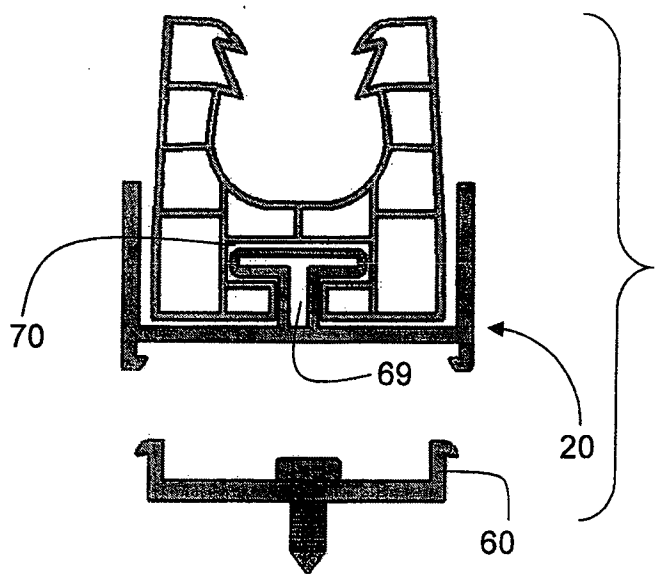


FIG. 9

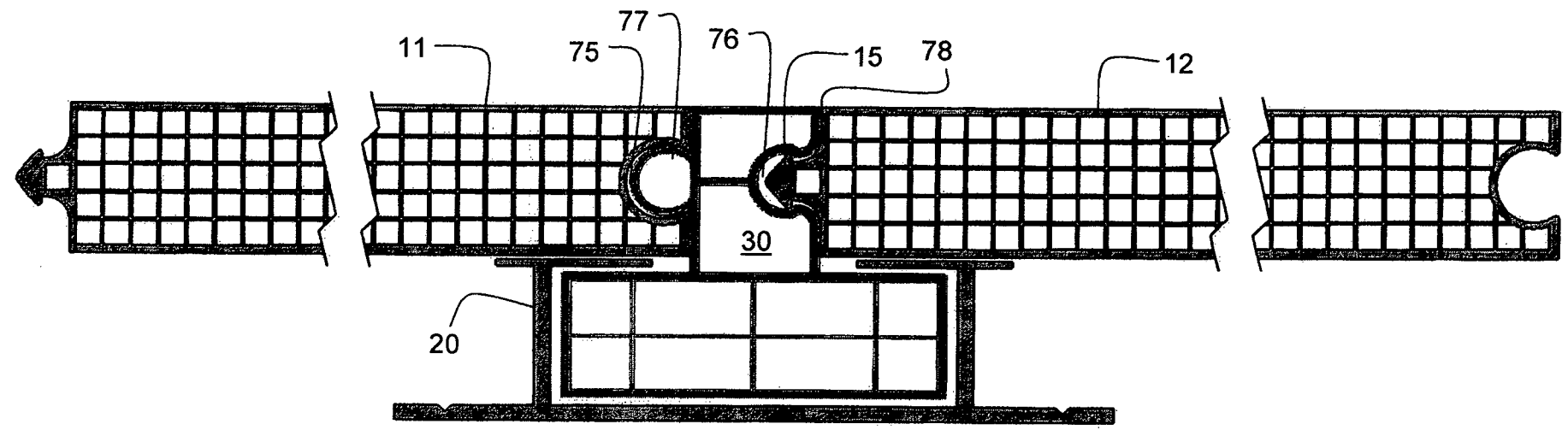


FIG. 10

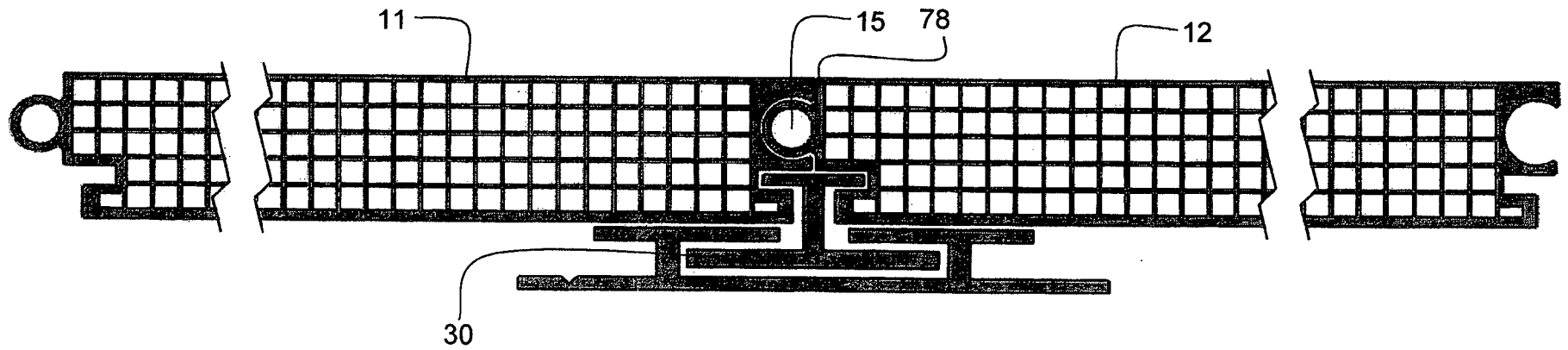


FIG. 11

65

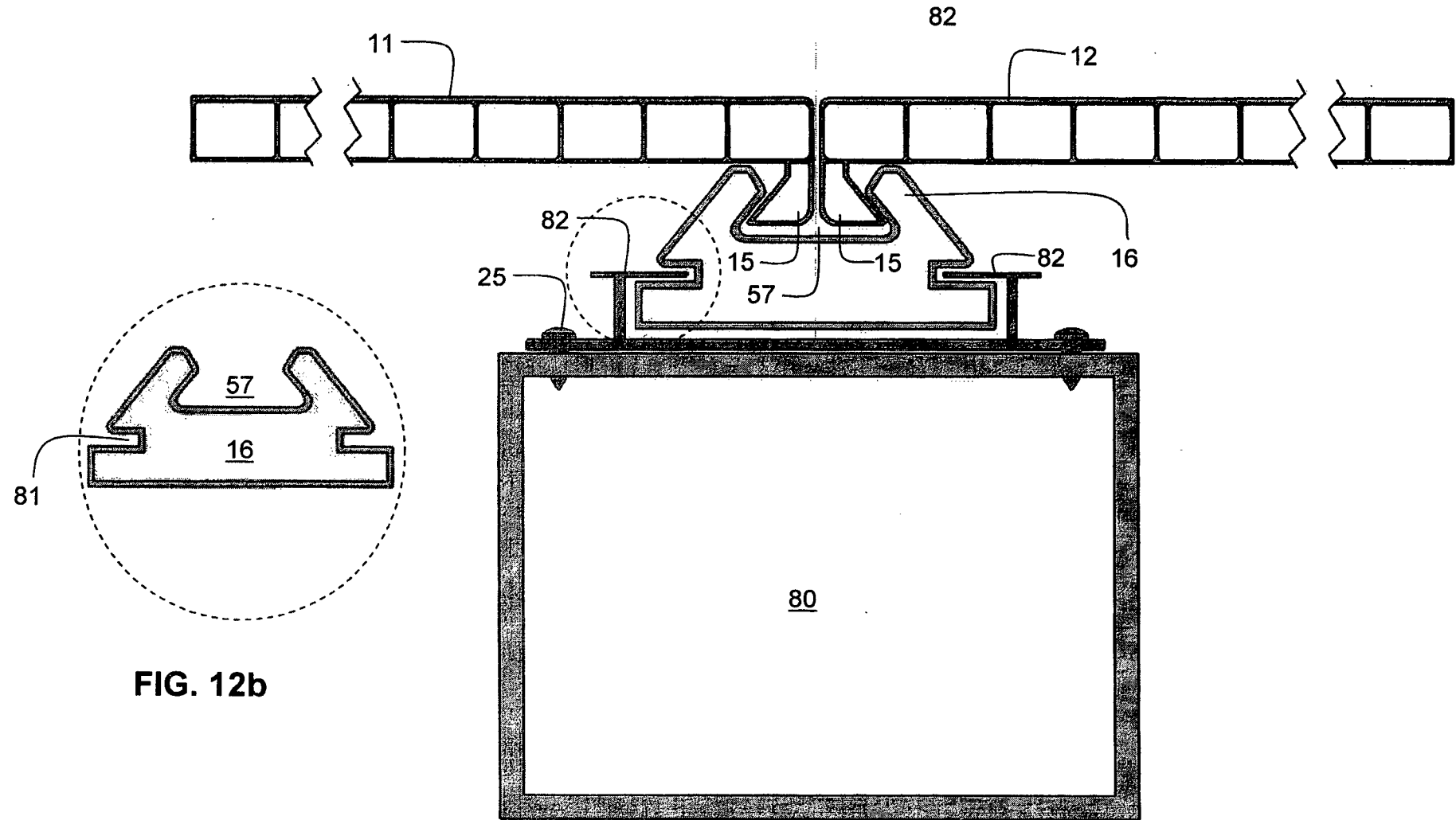


FIG. 12b

FIG. 12a

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

Topper, Jonathan
WOLFF BREGMAN AND GOLLER
P.O. Box 1352
Jerusalem 91013
ISRAEL

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year) 11 October 2012 (11-10-2012)	
Applicant's or agent's file reference 213693PCT	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/IL2012/050215	International filing date (day/month/year) 21 June 2012 (21-06-2012)
Applicant DAN-PAL	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see PCT Applicant's Guide, International Phase, paragraphs 9.004 - 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	Authorized officer DE JONG, Coen Tel: +31 (0)70 340-2015
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 213693PCT	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/IL2012/050215	International filing date (day/month/year) 21/06/2012	(Earliest) Priority Date (day/month/year) 21/06/2011
Applicant DAN - PAL		

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

This international search report consists of a total of 4 sheets.

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

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (see Box No III)

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2012/050215

A. CLASSIFICATION OF SUBJECT MATTER

INV. E04C2/54 E04D3/28
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04C E04D

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 111 153 A2 (XTRALITE IND ROOFLIGHTS LTD [GB]) 27 June 2001 (2001-06-27) figures 1, 4 -----	1-3,5-8, 13-20
X	US 2010/132293 A1 (VOEGELE JR WILLIAM P [US] ET AL) 3 June 2010 (2010-06-03) paragraphs [0011], [0031]; figure 5 -----	1,4,7,8, 12,14-20
X	US 2003/188500 A1 (VOEGELE WILLIAM P [US]) 9 October 2003 (2003-10-09) paragraphs [0002], [0031], [0032], [0035], [0036]; figure 4 -----	1-3, 5-10, 13-20
X	US 2005/102943 A1 (VOEGELE WILLIAM P JR [US] VOEGELE JR WILLIAM P [US]) 19 May 2005 (2005-05-19) paragraph [0035]; figures 8-9 ----- -/-	1-3,5-8, 13-20

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

☒ See patent family annex.

* Special categories of cited documents :

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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

3 October 2012

Date of mailing of the international search report

11/10/2012

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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Fax: (+31-70) 340-3016

Authorized officer

Demeester, Jan

INTERNATIONAL SEARCH REPORT

International application No PCT/IL2012/050215

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 203 09 516 U1 (RODECA GMBH [DE]) 11 September 2003 (2003-09-11) figure 7 -----	1,4,8, 14,15, 17,19,20

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2012/050215

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1111153 A2	27-06-2001	EP 1111153 A2	27-06-2001
		GB 2362179 A	14-11-2001
US 2010132293 A1	03-06-2010	NONE	
US 2003188500 A1	09-10-2003	NONE	
US 2005102943 A1	19-05-2005	US 2005102943 A1	19-05-2005
		US 2008053026 A1	06-03-2008
		US 2009293241 A1	03-12-2009
DE 20309516 U1	11-09-2003	NONE	

72

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2012/050215

A. CLASSIFICATION OF SUBJECT MATTER INV. E04C2/54 E04D3/28 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) E04C E04D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 111 153 A2 (XTRALITE IND ROOFLIGHTS LTD [GB]) 27 June 2001 (2001-06-27) figures 1, 4	1-3,5-8, 13-20
X	US 2010/132293 A1 (VOEGELE JR WILLIAM P [US] ET AL) 3 June 2010 (2010-06-03) paragraphs [0011], [0031]; figure 5	1,4,7,8, 12,14-20
X	US 2003/188500 A1 (VOEGELE WILLIAM P [US]) 9 October 2003 (2003-10-09) paragraphs [0002], [0031], [0032], [0035], [0036]; figure 4	1-3, 5-10, 13-20
X	US 2005/102943 A1 (VOEGELE WILLIAM P JR [US] VOEGELE JR WILLIAM P [US]) 19 May 2005 (2005-05-19) paragraph [0035]; figures 8-9	1-3,5-8, 13-20
-/-		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 3 October 2012		Date of mailing of the international search report 11/10/2012
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Demeester, Jan

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2012/050215

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 203 09 516 U1 (RODECA GMBH [DE]) 11 September 2003 (2003-09-11) figure 7 -----	1,4,8, 14,15, 17,19,20

24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2012/050215

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1111153	A2	27-06-2001	EP 1111153 A2	27-06-2001
			GB 2362179 A	14-11-2001

US 2010132293	A1	03-06-2010	NONE	

US 2003188500	A1	09-10-2003	NONE	

US 2005102943	A1	19-05-2005	US 2005102943 A1	19-05-2005
			US 2008053026 A1	06-03-2008
			US 2009293241 A1	03-12-2009

DE 20309516	U1	11-09-2003	NONE	

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

WOLFF BREGMAN AND GOLLER
P.O. Box 1352
Jerusalem 91013
ISRAEL

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing
(day/month/year)

20.09.2013

Applicant's or agent's file reference
21369PCT

IMPORTANT NOTIFICATION

International application No.
PCT/IL2012/050215

International filing date (day/month/year)
21.06.2012

Priority date (day/month/year)
21.06.2011

Applicant
DAN-PAL

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:



European Patent Office P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040
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Authorized Officer

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 21369PCT	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IL2012/050215	International filing date (day/month/year) 21.06.2012	Priority date (day/month/year) 21.06.2011	
International Patent Classification (IPC) or national classification and IPC INV. E04C2/54			
Applicant DAN-PAL			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>8</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ sent to the applicant and to the International Bureau a total of <u>13</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3bis of Annex C of the Administrative Instructions).			
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☐ Box No. VIII Certain observations on the international application			
Date of submission of the demand 18.04.2013		Date of completion of this report 20.09.2013	
Name and mailing address of the international preliminary examining authority: European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016		Authorized officer Demeester, Jan Telephone No. +31 70 340-1052	



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/IL2012/050215

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1, 2, 4-6, 8, 9 as originally filed
3, 3a, 7, 10-12 filed with telefax on 18-04-2013

Claims, Numbers

1-16 filed with telefax on 25-07-2013

Drawings, Sheets

1/7-7/7 as originally filed

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 70.2 (e)).
6. ☐ Supplementary international search report(s) from Authority(ies) have been received and taken into account in drawing up this report (Rule 45bis.8(b) and (c)).

INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY

International application No.
PCT/IL2012/050215

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>4, 5, 9, 12, 14-16</u>
	No: Claims	<u>1-3, 6-8, 10, 11, 13</u>
Inventive step (IS)	Yes: Claims	<u>4, 5, 16</u>
	No: Claims	<u>1-3, 6-15</u>
Industrial applicability (IA)	Yes: Claims	<u>1-16</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

1 Re Item I

Basis of the report

- 1.1 New claim 1 filed with telefax on 25.07.2013 introduces subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2) (b) PCT for the following reasons:
 - 1.1.1 Some features of original claim 1 have been deleted without basis for such a deletion in the application as filed:
 - The definition of *the longitudinal axis* by the flanges 15 and a sliding along said axis allowed by the support element 20.
 - The feature that the flanges 15 are *configured for fastening by a securing element 16*.
 - The feature that the assembly is designed for securing two panels *to a structure 80*.
 - 1.1.2 The following feature of original claim 1 has been modified and shifted without basis for such a change in the application as filed:
The feature "*configured to allow unimpeded mutual sliding ... or contraction of the panels*" is in original claim 1 and in the original application linked to the assembly comprising the support element and the securing element 16. In present claim 1 this feature is linked only to the support element 20.
 - 1.1.3 A new feature has been introduced in claim 1. There appears to be no clear basis for this features in the application as filed:
The first lines of the characterising part of claim 1 defines that *the retaining member 30 and the securing member 16 have a similar coefficient of thermal expansion to the panels 11, 12*. However, the original application only disclose that the securing member 16 and the panels 11, 12 have a similar coefficient of thermal expansion (see page 4, line 25-29). It is noted that lines 29-31 on page 8 are related to the embodiment of figure 10 and therefore do not form a basis for this feature in combination with the embodiment of figures 1-4 defined by present claim 1. The only clear disclosure in the original application concerning the thermal expansion of the retaining member 30 in the embodiment of figures 1-4 is given in original claim 2.
- 1.2 The above objections could be overcome by the following claim 1 which is mainly literally based on original claims 1 and 2, and lines 25-29 on page 4:
*A panel assembly comprising:
two juxtaposed panels (11, 12), each of said panels including a first surface (13), an opposing second surface (14) and a joining flange (15) located in association with an edge thereof, said edge defining a longitudinal axis of the*

panel, said joining flanges (15) being configured for fastening by at least one securing element (16), and

an assembly (10) for securing said two juxtaposed panels (11, 12) to a structure (80) so as to allow unimpeded mutual sliding of the panel or panels relative to said structure, said securing assembly comprising:

- *a support element (20) slidably supporting said two juxtaposed panels (11, 12) relative to the respective support element (20) in a direction parallel to said longitudinal axis, said support element (20) being adapted for fixedly attaching directly or via an intermediate element to the structure (80);*
- *a retaining member (30) retaining the respective joining flanges (15) of said two juxtaposed panels (11, 12) and being mounted within the support element (20) and configured for longitudinal sliding relative thereto; and*
- *a securing element (16) clamping the respective joining flanges (15) of said two juxtaposed panels (11, 12);*

said support element (20) supporting opposing side walls (22, 23) that form a channel (24) that is dimensioned to allow free sliding therein of said associated retaining member (30),

characterised in that:

said two juxtaposed panels (11, 12) and the securing element are formed of a material having a similar coefficient of thermal expansion so that the joining flanges (15) and the securing element (16) expand and contract at similar rates;

said support element (20) has a different coefficient of thermal expansion than the retaining member (30); and

each of said two juxtaposed panels (11, 12) is fastened to the securing element (16) without applying lateral pressure to the side walls (22, 23) of the support element (20).

- 1.3 In the remaining part of this report (see Item V below), novelty and inventive step are discussed with respect to the above claim 1.
- 1.4 Similar added subject-matter objections (Article 34(2)(b) PCT) apply to independent claims 13, 15 and 16. Furthermore the following Art. 34(2)(b)-objections are formulated with respect to claims 15 and 16:
 - Claim 15 defines "a retaining member (30) articulated to the pair of juxtaposed panels". No basis for the term "articulated" can be found in the original disclosure.
 - Claim 16 does no longer comprises the following feature of original claim 1: "each of the panels includes a joining flange (15) located in association with an edge thereof". Indeed this feature is in contradiction with the embodiments

of figures 13 and 14. However the embodiments of figures 13 and 14 do not disclose panels with any kind of flange, but only disclose panels including a specific kind of flange, i.e. a flange mounted inward from the adjoining edge so to leave sufficient overhang (93) for the installation of the support member (see page 10, line 25-26). Therefore, present claim 16 introduces added subject-matter.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

2 Reference is made to the following documents:

D1: EP 1 111 153 A2

D3: US 2003/188500 A1

D5: DE 203 09 516 U1

D6: US 6 536 175 B2

3 Independent claim 1 - novelty objection (D3)

3.1 The subject-matter of claim 1 of par. 1.2 above is not new (Art. 33(2) PCT), because **D3** (fig. 4) discloses (the references in parentheses applying to this document):

a panel assembly comprising two juxtaposed panels (19) with joining flanges (31), and an assembly for securing said panels (19) to a structure (15) so as to allow unimpeded mutual sliding of the panel or panels relative to said structure (15) (see par. 0030-0032).

Said securing assembly comprises: (i) a support element (mount member 12) slidably supporting said two juxtaposed panels (19); (ii) a retaining member (clip member 14) retaining the respective joining flanges (31) and being mounted within the support element (12) and configured for longitudinal sliding relative thereto; and (iii) a securing element (snap-cap 20) clamping the joining flanges (31).

Said support element (12) supports opposing side walls (36) forming a channel allowing free sliding therein of said retaining member (14).

Said panels (19) and the securing element (cap 20) are made of the same

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/IL2012/050215

material, i.e. polycarbonate (see par. 0024 reference to polycarbonate roof of the company Politec (www.politecsa.com)).

The support element (mount member 12) has a different coefficient of thermal expansion than the retaining member (clip member 14) (see end of par. 010: one of the option is a mount member 12 of extruded aluminium and a clip member of steel. The thermal expansion of aluminium is about two times higher than the thermal expansion of steel).

The panels (19) are fastened to the securing element (20) without applying lateral pressure to the side walls (36) of the support element (12).

3.2 Therefore, **D3** discloses all the features of claim 1. It is clear from paragraph 3.1. above that the embodiment of D3 (fig. 4) discloses also the additional features of claims 2-3, 6-8, 10 and 11, which are thus also not new over D3.

3.3 The combination of all the features of claim 1 of par. 1.2 above and the features of new claim 4 filed on 25.07.2013 is neither known from, nor rendered obvious by, the available prior art.

The reasons are as follows: There is no hint in the prior art to replace the retaining member, i.e. the steel clip member 14, in D3 by a plastic one.

D1 teaches the use of a retaining member made of FRP (fiber reinforced plastic - see D1, par. 0048). However, the intermediate part 17 in D1 is an elongated supporting beam (see D1, fig. 2 and 3) and thus has to be strong (see D1, par. 0048), while the clip member 14 in D3 is a short fixation clip (see D3, fig. 5). Therefore, the skilled person would not apply the teaching of D1 is to the embodiment of D3 (fig. 4).

Moreover, D1 discloses said FRP beam 17 only in combination with an aluminium cap member 16 (see par. 0045). Therefore, Ds teaches away from a panel assembly wherein th cap member and the panels have a similar thermal expansion.

4 Independent claims 13, 15 and 16

4.1 Notwithstanding the Article 34(2)(b) PCT-objections formulated above, the following is noted with respect to novelty and inventive step of claims 13-16:

4.2 Independent claim 13 is not new (Art. 33(2) PCT), because **D6 (see fig. 1, 7 and 8)**, which is a document cited by the applicant in the original application, discloses: a panel assembly comprising two polycarbonate panels (11, 12) having flanges (15, 16) clamped by a polycarbonate securing element (joining element 13) (see D6, claim 6). The securing element (13) can slide in the metal bracket (46-48, see par. 0045).

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/IL2012/050215

There is no indication that the hooking portions 46 block a thermal expansion. On the contrary, figure 9 shows a detail of a similar part of the embodiment of figure 8. Figure 9 clearly discloses a space in between hook 46 and recess 45. Therefore, D6 discloses all the features of claim 13.

Claim 14 is not inventive: the protruding ears are an obvious alternative to the recesses 45 of D6.

- 4.3 Independent claim 15 is not inventive over **D5 (fig. 7)** for the following reasons: D5 (fig. 7) discloses two panels (2, 3) joined by a retaining member (fixation element 60). Said retaining member (60) slides in a support element (61).

Due to the forms disclosed in figure 7, the skilled person would consider producing the panels 2, 3 and the retaining member 60 of one and the same material, i.e. polycarbonate. Steel or aluminium is an obvious material selection for support element 60 in D5. These obvious material selections lead directly to the subject-matter of claim 15.

- 4.4 The subject-matter of a claim 16 (when meeting the requirements of Article 34 (2)(b) PCT-objections - see objections of par. 1.4 above) is neither known from, nor rendered obvious by, the available prior art.

The reasons are as follows: None of the cited prior art documents suggest an assembly wherein each flange has its corresponding securing element and its corresponding support element.

(J. Demeester)

- 3 -

opposing internal walls of the polycarbonate jointing element. It is apparent from Fig. 7 of the patent that this also urges the walls of the jointing element against the metal track thereby increasing friction between the track and the jointing element and militating against sliding of the jointing element within the metal track.

5 EP 1 111 153 discloses a glazing system comprising a plurality of plastic glazing panels each having at least one edge region juxtaposed with the edge region of the other panel. The juxtaposed edges have an abutment extending transversely of the plane of each glazing panel. A support structure at least partially encloses the abutments to deter separation of the glazing panels from the support structure.

10 US 2010/132293 discloses an internal structural mullion for a standing seam panel system. A two-piece assembly includes a main extrusion having one hooked portion and a secondary extrusion having an opposing hooked portion. A cavity is defined on the main extrusion, and the secondary extrusion includes a foot which upon insertion into the cavity forms a fulcrum about which the secondary extrusion can bend
15 away from the main extrusion and be tightened or loosened by the tightening or loosening of a screw, as a result forming a clamp for engaging panels of the panel system with variable pressure.

US 2003/188500 discloses a panel clip assembly for use with skylight or roof panel systems and having allowance for reduced movement of panels both parallel and
20 perpendicular to the seam formed by adjoining panels.

US 2005/102943 discloses a clip assembly for securing standing seam skylight or roofing panels to substrates and including a first clip member and a second clip member each having an upright member and an upper flange member and a lower flange member extending therefrom. A gap is formed between the upright member of
25 the first clip member and the upright member of the second clip member and a base allows the assembly to slide.

DE 203 09 516 discloses a retainer comprising at least two polycarbonate plates forming chambers and a number of cross pieces with corresponding secure fixings.

- 3a -

SUMMARY OF THE INVENTION

It is therefore a broad object of the present invention to provide an assembly consisting of extruded, modular panel units and a matching joining member for constructing walls, roofs and the like, that is better adapted than hitherto-proposed arrangements for allowing thermal expansion and contraction of the panels.

In accordance with one aspect of the invention there is therefore provided an assembly having the features of claim 1 for securing a panel or two juxtaposed panels to a structure so as to allow unimpeded mutual sliding of the panel or panels relative to the structure.

10 BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be carried out in practice, embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Figs. 1 to 4 are cross-sectional views showing a panel assembly constructed according to variations of a first embodiment;

Figs. 5 to 9 are cross-sectional views showing a panel assembly constructed according to variations of a second embodiment;

Figs. 10 and 11 are cross-sectional views showing a panel assembly constructed according to variations of a third embodiment;

Fig. 12a is a cross-sectional view showing an alternative flange construction for use with any of the embodiments of Figs. 1 to 9;

Fig. 12b shows a detail of an integral securing element and retaining member used in the embodiment of Fig. 12a; and

Figs. 13 and 14 are cross-sectional views showing a panel assembly constructed according to variations of a fourth embodiment.

- 7 -

In the embodiment shown in Fig. 1, the support element 20 is a unitary construction formed of extruded aluminum and having a base unit 45 supporting the support element 20 and having toward opposing edges holes for accommodating the screws 25. Fig. 2 shows a variation where the base unit 45 is split so as to form a pair of
5 opposing support elements 20a, 20b, whose base units may optionally have opposing recesses 46, which cooperate to form a continuous planar support surface.

Fig. 3 shows a variation where the support surfaces 35 and 36 have downwardly depending edges 50 that slidably engage complementary channels 51 formed in an upper surface of the base portion 31 of the retaining member 30. Fig. 4 shows another
10 variation similar in principle to that shown in Fig. 1 and having a T-shaped retention member 30 adapted for sliding engagement in a low-profile support element 20.

Fig. 5 shows a different embodiment that operates on a slightly different principle in that no T-shaped retaining member is required. Instead, the panels 11, 12 are inverted so that the flanges 15 face downward and are retained by the securing element 16 also in the form of a clamping member, which is adapted for sliding
15 accommodation within the support element 20. To this end, the securing element 16 comprises a body portion 55 integrally formed with a planar base portion 56. The body portion 55 has a longitudinal bore 57 configured for resiliently accommodating therein respective joining flanges of a pair of juxtaposed panels. The base portion 56 supports
20 outwardly protruding ears 58 on opposing sides thereof for slidable accommodation within the channel of the support element 20. In this embodiment, the securing element 16 serves as the retaining member 30 of the previous embodiment since it both retains the joining flanges 15 and slidably engages the support element 20.

Since in this embodiment, the support element retains the securing element but
25 does not support the panels directly, the support element 20 may be simply a U-shaped bracket that is secured to the support structure and provides a channel for slidably accommodating the base portion 56 of the securing element 16. The support element 20 may be secured using screws or any other suitable fastener as described above. In the embodiment shown in Fig. 5, the support element 20 is formed of a first portion 60 and
30 second portion 61 that interlocks with the first portion. The first portion 60 is a generally U-shaped bracket that is adapted for fixedly attaching to the structure and the second portion is a generally U-shaped channel. Thus in this embodiment, the securing element is adapted for fixedly mounting to the structure via an intermediate element.

- 10 -

Figs. 1 to 9 of the drawings. Also in this embodiment, the securing element 16 serves both to secure the adjoining flanges of a pair of juxtaposed panels and also to slidably retain the panels within the support element 20.

Figs. 13 and 14 show a structure 80 to which there are slidably secured a pair of juxtaposed panels 11, 12 having flanges 15 that may tapered so as to be wider at their respective tips than at their bases. More generally, and equally true for all the embodiments, the flanges are of complementary shape to the hollow of the securing element 16. Where the securing element 16 is provided with indents, the flanges are likewise provided with indents, although again this is not mandatory as can be seen with reference to Figs. 10, 11 and 12 where the flanges have no indents but are still of complementary shape to the hollow of securing element 16.

Unlike the embodiments so far described where adjoining flanges of a pair of juxtaposed panels are commonly supported within a single securing element, in this embodiment a separate securing element is provided for each flange. Thus, each of the flanges 15 is secured within its respective securing element 16 that may be formed of material having a similar coefficient of expansion to the joining flange 15 and which has a longitudinal bore 57 of complementary shape to the joining flange 15. Each securing element 16 has a base supporting opposing ears 58 that are slidably mounted within corresponding channels 24 of a support element 20 secured to the structure 80 by means of screws 25. Thus, at its upper end the securing element 16 serves to secure the respective panel while at its base it also serves to retain the panel within support element 20.

Each of the support elements 20 is supported by a respective mounting bracket 91 that is fixed to the structure 80 by corresponding screws 25. In order to ensure proper abutment of the adjoining edges of the juxtaposed panels, the joining panels 15 are mounted inward of the adjoining edges so as to leave sufficient overhang 93 that allows for sufficient clearance between the two support members. In Fig. 13, the respective mounting brackets 91 of adjacent support elements 20 are spatially separated and each is separately fixed to the structure 80. Thus, during assembly, each bracket is screwed to the structure 80 by self-tapping screws 25, the securing elements 16 are then slidably mounted within the channels of the support elements 20 and the panels 11, 12 are then mounted in the respective securing elements 16.

- 11 -

In Fig. 14 the respective mounting brackets 91 of a pair of adjoining support elements 20 overlap and are commonly fixed to the structure 80 by screws 25. In this case, sufficient gap must be left between the respective support elements of adjoining panels to provide access to the screw 25. It is emphasized that all the figures are schematic and are not drawn to scale.

It is also reiterated that in all embodiments, self-tapping screws 25 may be used since this simplifies assembly. But any other suitable form of attachment may be employed, such as regular screws, bolts, rivets, welding and so on. Likewise, in all embodiments the support element may be integral with the structure or constituted by the structure itself.

While the drawings show constructional panels having two major surfaces defining the height of the panel, and covering sub-spaces formed therein, as known *per se*, it is emphasized that the present invention is also applicable to other types of similar panels, such as panels without inner sub-spaces, or panels in which the connecting flanges are within the height of the panel, etc.

It should also be emphasized that while a large number of variations of joints and support elements have been shown, it is not intended that each variation be confined to the specific embodiment in connection with which it is illustrated and described. Thus, different variations may be combined as required and all such permutations are to be embraced by the appended claims as though they were separated illustrated and described.

While in the embodiments described, the panels and adjoining flanges and the securing element are formed of polycarbonate or other plastic materials having similar temperature coefficients of expansion, the securing element 16 may be formed of metal such as aluminum having a significantly smaller coefficient of expansion than the joining flanges. This does not matter because buckling of the panels owing to longitudinal expansion is prevented by virtue of the free sliding of the panels relative to the support structure.

Likewise, it is to be understood that while the flanges are shown as tapered, this is not essential. What is important is that the flanges be secured by the securing element in a manner that ensures they both expand and contract together at similar rates of thermal expansion. Likewise, in those embodiments having a retaining member, this also should be formed of material having a similar coefficient of thermal expansion to

89

- 12 -

the panels and securing element so that when the retaining member moves within the channel of the support element, the panels and securing element move with the retaining member. It is this property that ensures that the panels are able to slide freely relative to the support structure and avoids buckling or other distortion of the panels.

- 5 It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrated embodiments and that the present invention may be embodied in other specific forms without departing from the scope of the claims and equivalents thereof.

25. Jul. 2013 17:38

WOLFFPATENT JRLM ISRAEL 6242266

No. 4372 P. 1

Wolff, Bregman and Goller

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July 25, 2013

European Patent Office
Munich D-80298
Germany

VIA FACSIMILE
49 89 2399-4465

Total 14 pages

Attention: Mr. Jan Demeester

Re: PCT Application No. PCT/IL2012/050215
Assembly for Securing Two Juxtaposed Panels to a Structure So As to
Allow Thermal Expansion and Contraction
in the name of Dan-Pal
Our Ref: 213693 PCT JJT (145517)

Dear Mr. Demeester,

Thank you for your telephone call of 23.5.2013 and your subsequent memo dated 29.5.2013 affording me an opportunity to make further amendments to the claims.

As suggested, I attach a replacement set of claims having four independent claims, which I list in order of commercial importance as follows:

Claim 13 relates to the embodiment of Figs. 5-9 and 12a, b

Claim 16 relates to the embodiment of Figs. 13-14

Claim 1 relates to the embodiment of Figs. 1-4

Claim 15 relates to the embodiment of Figs. 10-11

To this end please find attached new pages 13-17 together with copies of the amended pages showing tracked amendments.

I have made no further amendments to the description and I have nothing, at this stage, to add to the arguments that I sent you on April 18, 2013.

If you still have misgivings and time permits, I would obviously appreciate being afforded a further opportunity to discuss the case with you before you issue the IPRP.

PCT Application No. PCT/IL2012/050215

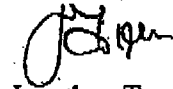
Page 2 of 2

Assembly for Securing Two Juxtaposed Panels to a Structure So As to Allow Thermal Expansion and Contraction

To this end, you can reach the undersigned during office hours on +972 2 624 2255 and on +972 523 426 324 (mobile) or by e-mail to j.topper@wbpat.co.il.

Very truly yours,

WOLFF, BREGMAN AND GOLLER



Jonathan Topper

- 13 -

CLAIMS:

1. An assembly (10) comprising:

two juxtaposed panels (11, 12) each including a first surface (13), an opposing second surface (14) and a joining flange (15) located in association with an edge thereof,

a support element (20) configured to allow unimpeded mutual sliding of the panels relative to said support element (20) in a direction that permits longitudinal expansion or contraction of the panels,

a retaining member (30) adapted for engaging the respective flanges of a pair of juxtaposed panels (11, 12); and

a securing element (16) for clamping together the respective joining flanges of the two panels;

the support element (20) supporting opposing side walls (22, 23) that form a channel (24) that is dimensioned to allow free sliding therein of the retaining member (30);

characterized in that:

the retaining member (30) and the securing element (16) are both formed of a material having a similar coefficient of thermal expansion to the panels (11, 12) so that when the retaining element moves within the channel of the support element (20), the panels and the securing element and the retaining member move together; and

each panel is fastened to the securing element without applying lateral pressure to the side walls (22, 23) of the support element (20).

2. The assembly according to claim 1, wherein respective coefficients of thermal expansion of the support element and the retaining element differ by a factor of at least two.

3. The assembly according to claim 1 or 2, wherein said at least one support element has a lower coefficient of thermal expansion than the retaining member.

4. The assembly according to any one of claims 1 to 3, wherein the support element is formed of metal and the retaining member is formed of plastics.

- 14 -

5. The assembly according to any one of claims 1 to 4, wherein the support element (20) is formed of aluminum and the retaining member (30) is formed of polycarbonate.
6. The assembly according to any one of claims 1 to 5, wherein the support
5 element (20) comprises a base unit (45) adapted for fixedly attaching to the structure and supporting opposing side walls (22, 23) that together with the base unit form a channel (24) that is wider than the retaining member so as to slidably accommodate the retaining member (30) therein.
7. The assembly according to any one of claims 1 to 6, wherein the support
10 element (20) is formed of a first portion (20a) and second portion (20b) that interlocks with the first portion.
8. The assembly according to claim 7, wherein the first portion is a generally U-shaped bracket that is adapted for fixedly attaching to the structure and the second portion is a generally U-shaped channel.
9. The assembly according to claim 7 or 8, wherein the second portion (20b) is
15 provided on an outer surface thereof with outwardly protruding hooks (63) for engaging complementary hooks (63) in the first portion.
10. The assembly according to any one of claims 6 to 9, wherein:
the retaining member (30) is generally I-shaped and comprises a planar base
20 portion (31) and a planar top portion (33) interconnected by a central column (32),
said base portion is dimensioned for slidable accommodation within the channel (24) of the support element (20),
the support element (20) has opposing support surfaces (35, 36) each for supporting thereon one of the juxtaposed panels, and
25 the column (32) has a height that is slightly greater than a combined height of the panels (11, 12), joining flanges (15) and material thickness of the support element (20) so that when the respective first surfaces (13) of the panels are supported on the support surfaces (35, 36) of the mount, respective tips of the joining flanges retained between the base portion (31) and the top portion (33) of the retaining member;

- 15 -

the securing element (16) being configured for resiliently engaging the joining flanges so as to prevent lateral displacement of the joining flanges relative to the retaining member whereby the top portion (33) of the retaining member (30) retains the tips (31) of the flanges and resists rotation thereof, thus anchoring the retaining member to the panels to form a composite assembly that is able to slide within the channel of the mount upon thermal expansion or contraction of the panels.

11. The assembly according to any one of claims 1 to 10, wherein the securing element (16) forms a water impermeable barrier between the panels and the structure (80).

12. The assembly according to any one of claims 1 to 11, wherein the support element (16) is integral with, or is part of, the structure (80).

13. An assembly (10) comprising:

two juxtaposed panels (11, 12) each including a first surface (13), an opposing second surface (14) and a joining flange (15) located in association with an edge thereof,

a support element (20) configured to allow unimpeded mutual sliding of the panels relative to said support element (20) in a direction that permits longitudinal expansion or contraction of the panels, and

a securing element (16) for clamping together the respective joining flanges of the two panels;

the support element (20) supporting opposing side walls (22, 23) that form a channel (24) that is dimensioned to allow free sliding therein of the securing element (16);

characterized in that:

the securing element (30) is formed of a material having a similar coefficient of thermal expansion to the panels (11, 12) so that when the securing element moves within the channel of the support element (20), the panels and the securing element move together; and

each panel is fastened to the securing element without applying lateral pressure to the side walls (22, 23) of the support element (20).

- 16 -

14. The assembly according to claim 13, wherein:

the securing element (30) comprises a body portion (55) integrally formed with a planar base portion (56),

said body portion has a longitudinal bore (41) configured for resiliently
5 accommodating therein respective joining flanges of a pair of juxtaposed panels, and
said base portion (56) supports outwardly protruding ears (58) on opposing sides thereof for slidable accommodation within the channel (24) of the mount.

15. An assembly (10) comprising:

two juxtaposed panels (11, 12) each including a first surface (13), and an
10 opposing second surface (14),

a first one of the panels (12) having a joining flange (15) protruding out of an end surface thereof, and a second one of the panels (11) having a recess (75) in an end surface thereof,

a support element (20) configured to allow unimpeded mutual sliding of the
15 panels relative to said support element (20) in a direction that permits longitudinal expansion or contraction of the panels, and

a retaining member (30) articulated to the pair of juxtaposed panels (11, 12),

the support element (20) supports opposing side walls (22, 23) that form a channel (24) that is dimensioned to allow free sliding therein of the retaining member
20 (30);

characterized in that:

the retaining member (30) is formed of a material having a similar coefficient of thermal expansion to the panels (11, 12) so that when the retaining member moves within the channel of the support element (20), the panels and the retaining member
25 move together; and

each panel is articulated to the retaining member without applying lateral pressure to the side walls (22, 23) of the support element (20).

16. An assembly (10) comprising:

two juxtaposed panels (11, 12) each including a first surface (13) and an
30 opposing second surface (14),

a pair of securing elements (16) each for clamping a respective joining flange of the two panels; and

- 17 -

for each securing element (16), a respective support element (20) configured for slidably supporting the securing element together with a respective one of the panels relative to the respective support element in a direction that permits longitudinal expansion or contraction of the panels, wherein:

5 each support element (20) is supports opposing side walls (22, 23) that form a channel (24) that is dimensioned to allow free sliding therein of the respective securing element (16);

the securing element (16) is formed of a material having a similar coefficient of thermal expansion to the panels (11, 12) so that when each securing element moves
10 within the channel of the respective support element (20), the panels and the securing elements move together; and

each panel is fastened to the respective securing element without applying lateral pressure to the side walls (22, 23) of the respective support element (20).

97

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	VR PAGO
CONSIGNACION	BANCO DE BOGOTA	062754387	450019986	26/12/2013	2.444.000.00

*** Conceptos Pagados ***

CANT.	RENTISTICO	CONCEPTO	Vr.UNDITARIO	Vr.CONCEPTO
5	50005-01-01 SOLICITUDES	1607 REIVINDICACION PATENTE UNITARIA ADICIONAL A LAS 10 INIC	30.000.00	150.000.00
				\$150.000.00
			=====	

SON: **CIENTO CINCUENTA MIL PESOS MONEDA CORRIENTE***

Responsable: _____

Recibo de Caja Aplicado al Expediente No. _____

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No. 13-301524- -00000-0000

Fecha: 2013-12-27 16:12:34 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 98

Sede Centro: Carrera 13 No. 27 - 00 Pisos 3,4,5 y 10 Bogotá, D.C.- Colombia

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98

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TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	VR. PAGO
CONSIGNACION	BANCO DE BOGOTA	062754387	450019986	26/12/2013	2.444.000.00

*** Conceptos Pagados ***

CANT.	RENTISTICO	CONCEPTO	Vr. UNDITARIO	Vr. CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE INVENCIÓN	500.000.00	500.000.00
				\$500.000.00
			=====	

SON: **QUINIENTOS MIL PESOS MONEDA CORRIENTE***

Responsable: _____

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PATENTE DE INVENCION ☐

MODELO DE

☐	Indicación que se solicita una patente.
☐	Datos de identificación del solicitante o de la persona que presenta la solicitud
☐	Descripción de la invención
☐	Dibujos de ser estos pertinentes
☐	Comprobante de pago de las tasas establecidas (De ser el caso formato de descuento)
Completa ☐ Incompleta ☐	

PATENTE DE INVENCION PCT ☐

MODELO DE UTILIDAD PCT ☐

Art.33 Decisión 486/00, Circular Única

☐	Indicación que se solicita una PCT
☐	Copia de la solicitud en español, tal como fue presentada inicialmente (capítulo descriptivo, reivindicatorio, resumen)
☐	Dibujos de ser estos pertinentes
☐	Comprobante de pago de las tasas establecidas (de ser el caso formato de descuento)
Completa ☐ Incompleta ☐	

DISEÑO INDUSTRIAL ☐

(Art. 119 Decisión 486/00)

☐	Indicación que se solicita Diseño industrial
☐	Datos de identificación del solicitante o de la persona que presenta la solicitud
☐	Representación gráfica y fotográfica del Diseño industrial o muestra del material que incorpora el diseño
☐	Comprobante de pago de las tasas establecidas
Completa ☐ Incompleta ☐	

ESQUEMA DE TRAZADO ☐

(Art. 92 Decisión 486/00)

☐	Indicación que se solicita un esquema de trazado
☐	Datos de identificación del solicitante o de la persona que presenta la solicitud
☐	Representación gráfica de un esquema de trazado
☐	Comprobante de pago de las tasas establecidas
Completa ☐ Incompleta ☐	