



Industria y Comercio

SUPERINTENDENCIA

DELEGATURA DE PROPIEDAD INDUSTRIAL

SOLICITUD

PATENTE DE INVENCIÓN

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-085745- -00000-0000

Fecha: 2014-04-22 16:38:09 Dep. 2020 DIR.NUEVASCR
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 142

21. EXPEDIENTE No. _____

54. TÍTULO Sistema de cerchas

51. CLASIFICACIÓN INTERNACIONAL _____

71. SOLICITANTE Dan-Pal

DOMICILIO Israel

74. APODERADO Juan Carlos Uribe

22. BOGOTÁ, D. C., Abril 22/2014

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

No. 14-085745- -00000-0000

Fecha: 2014-04-22 16:38:09
Tra. 11 PATENTEIYII
Act. 411 PRESENTACION

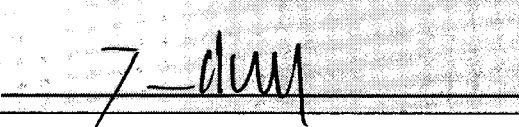
Dep. 2020 DIR.NUEVASCR
Eve: 379 FASENACIONALI
Folios: 144 142

esivo de radicación

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/ AU2012/000963	Fecha 15/08/2012
Publicación Internacional No.		WO 2013/049878 A1	Fecha 11/04/2013
3	TÍTULO DE LA INVENCIÓN (200 caracteres o espacios máximos)		
SISTEMA DE CERCHAS			
4	CLASIFICACIÓN INTERNACIONAL (CIP)		
E04C 3/04 (2006.01) E04B 2/58 (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
BURGESS, REX		KELVIN	AUSTRALIANA
DIRECCIÓN DE CORREO ELECTRÓNICO:			
8	DATOS INVENTOR (ES)		
PAÍS RESIDENCIA	DEPARTAMENTO/ESTADO	CIUDAD	DIRECCIÓN
AUSTRALIA	NEW SOUTH WALES	AUBURN	UNIT 11, JUNCTION ESTATE, 4-6 JUNCTION STREET, AUBURN, NSW 2144, AUSTRALIA
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@turnet.com	
PAÍS COLOMBIA		No. RADICACIÓN DE PROTOCOLO DE PODER GENERAL	

10	DECLARACIONES DE PRIORIDAD ☒ SI ☐ NO			
(33) PAÍS DE ORIGEN AUSTRALIA		CÓDIGO PAÍS AU	(31) NÚMERO 2011232748	(32) FECHA (AAAA/MM/DD) 05/10/2011
11	DECLARACIÓN SOBRE USO DE RECURSOS GENÉTICOS O BIOLÓGICOS			
<i>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.</i> ☐ 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			
<i>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.</i> ☐ 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			
<i>Declaro que carezco de medios económicos para presentar la solicitud de patente.</i> ☐ 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 <i>Junto a cada firma, indicar el nombre del firmante y su calidad (si tal calidad no es obvia al leer el petitorio)</i>			
				
17	ANEXOS			
Documentación Técnica Solicitud Internacional en castellano 1. ☒ Descripción N° de folios: 2. ☒ Reivindicaciones N° Reivindicaciones: 25 3. ☒ Dibujos y/o figuras N° folios: 4. ☒ Resumen. 5. ☐ Certificado de depósito de material biológico si fuera el caso. 6. ☐ Listado de secuencias de nucleótidos y/o aminoácidos en forma digital si fuera el caso. 7. ☐ Arte final 12 x 12. 8. ☐ Anexo formato digital.		Documentación Jurídica 9. ☒ Poderes, si fuera el caso. 10. ☐ Documento que legalmente pruebe la cesión del invento al solicitante o a su causante. 11. ☐ Copia del contrato de acceso de recursos genéticos o productos derivados, certificado o número de registro, si fuera el caso. 12. ☐ Copia de la licencia o autorización de Conocimientos Tradicionales, certificado o número de registro, si fuera el caso. 13. Reducción de tasas Micro, pequeñas o medianas empresas ☐ Copia simple de la declaración de renta del año inmediatamente anterior, o en su defecto prueba documental idónea. ☐ 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.		

	16. ☐ Comprobante de pago de la tasa por concepto de excedente de palabras en la publicación. 17. ☒ Comprobante de pago por reivindicación adicional a 10.
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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800.176.089-2

- / -



Industria y Comercio
SUPERINTENDENCIA

RECIBO DE CAJA

No. 14 - 0041900

Bogotá D.C., Abril 21 de 2014 - 16:24:54

RECIBIDO DE : TRIANA URIBE & MICHELSEN LTDA

NI 830.001.432

*** Soporte del Pago ***

TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	VR. PAGO
CONSIGNACION	BANCO DE BOGOTA	062754387	616896173	21/04/2014	980.000.00

*** Conceptos Pagados ***

CANT.	RENTISTICO	CONCEPTO	Vr. UNDITARIO	Vr. CONCEPTO
15	50005-01-01 SOLICITUDES	1607 REIVINDICACION PATENTE UNITARIA ADICIONAL A LAS 10 INIC	31.000.00	465.000.00
				\$465.000.00

SON: **CUATROCIENTOS SESENTA Y CINCO MIL PESOS MONEDA CORRIENTE**

Responsable: _____

Recibo de Caja Aplicado al Expediente No. _____

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-085745- 00000-0000

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Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 144 *Kfz*

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

Web: www.sic.gov.co e-mail: Info@sic.gov.co Conmutador: (571) 5870000 Fax: (571) 5870284 Línea: 018000-910165 Call Center: (571) 6513240

, Abril 21 de 2014 - 16:24:54

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800.176.089-2

- / -



Industria y Comercio
SUPERINTENDENCIA

RECIBO DE CAJA

No. 14 - 0041899

Bogotá D.C., Abril 21 de 2014 - 16:24:54

RECIBIDO DE : TRIANA URIBE & MICHELSEN LTDA

NI 830.001.432

*** Soporte del Pago ***

TIPO PAGO	BANCO	CUENTA	Nº PAGO	FECHA PAGO	VR PAGO
CONSIGNACION	BANCO DE BOGOTA	062754387	616896173	21/04/2014	980.000.00

*** Conceptos Pagados ***

CANT.	RENTISTICO	CONCEPTO	Vr.UNDITARIO	Vr.CONCEPTO
1	50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE INVENCIÓN	515.000.00	515.000.00
				\$515.000.00

SON: **QUINIENTOSQUINCE MIL PESOS MONEDA CORRIENTE**

Responsable: _____

Recibo de Caja Aplicado al Expediente No. _____

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 14-085745- -00000-0000

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Tra. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 411 PRESENTACION Folios: 14142

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

Web: www.sic.gov.co e-mail: info@sic.gov.co Conmutador: (571) 5870000 Fax: (571) 5870284 Línea: 018000-910165 Call Center: (571) 6513240

, Abril 21 de 2014 - 16:24:54



TRIANA, URIBE & MICHELSEN

REPRESENTATION AND POWER OF ATTORNEY

I (we), the undersigned

ALEX BENSHALOM

in representation of DAN - PAL

domiciled in KIBBUTZ DAN
UPPER GALILEE
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 GALILEE
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,



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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 [Signature]

Dan Pal

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

DUMMER, Peter, C.
Wallington-Dummer
GPO Box 3888
Sydney, NSW 2001
AUSTRALIE

Date of mailing (day/month/year) 02 April 2014 (02.04.2014)	
Applicant's or agent's file reference	IMPORTANT NOTIFICATION
International application No. PCT/AU2012/000963	International filing date (day/month/year) 15 August 2012 (15.08.2012)

1. The following indications appeared on record concerning:				
☐ the applicant	☐ the inventor	☐ the agent	☐ the common representative	
Name and Address	State of Nationality	State of Residence		
	Telephone No.			
	Facsimile No.			
	E-mail address			
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:				
☒ the person	☐ the name	☐ the address	☐ the nationality	☐ the residence
Name and Address	State of Nationality	State of Residence		
DAN-PAL	IL	IL		
Mobile Post	Telephone No.			
Kibbutz Dan	Facsimile No.			
12245 Upper Galilee	E-mail address			
Israel	☐ Notifications by e-mail authorized			
3. Further observations, if necessary: The person identified in Box 2 has been added as applicant for CL, CO, EP, IN, IL and MX				
4. A copy of this notification has been sent to:				
☒ the receiving Office	☐ the International Preliminary Examining Authority			
☐ the International Searching Authority	☐ the designated Offices concerned			
☐ the Authority(ies) specified for supplementary search	☒ the elected Offices concerned			
	☐ other:			

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Vernhes Thierry e-mail pt04.pct@wipo.int Telephone No. +41 22 338 74 04
Facsimile No. +41 22 338 89 95	

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

DUMMER, Peter, C.
Wallington-Dummer
GPO Box 3888
Sydney, NSW 2001
AUSTRALIE

Date of mailing (day/month/year)

02 April 2014 (02.04.2014)

Applicant's or agent's file reference

IMPORTANT NOTIFICATION

International application No.

PCT/AU2012/000963

International filing date (day/month/year)

15 August 2012 (15.08.2012)

1. The following indications appeared on record concerning:

☐ the applicant☐ the inventor☐ the agent☐ the common representative

Name and Address

State of Nationality

State of Residence

Telephone No.

Facsimile No.

E-mail address

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person☐ the name☐ the address☐ the nationality☐ the residence

Name and Address

State of Nationality

State of Residence

DAN-PAL

IL

IL

Mobile Post

Telephone No.

Kibbutz Dan

Facsimile No.

12245 Upper Galilee

Israel

E-mail address

☐ Notifications by e-mail authorized

3. Further observations, if necessary:

The person identified in Box 2 has been added as applicant for CL, CO, EP, IN, IL and MX

4. A copy of this notification has been sent to:

☒ the receiving Office☐ the International Searching Authority☐ the Authority(ies) specified for supplementary search☐ the International Preliminary Examining Authority☐ the designated Offices concerned☒ the elected Offices concerned☐ other:The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Vernhes Thierry

e-mail pt04.pct@wipo.int

Telephone No. +41 22 338 74 04

Facsimile No. +41 22 338 89 95

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
11 April 2013 (11.04.2013)



(10) International Publication Number
WO 2013/049878 A1

- (51) International Patent Classification:
E04C 3/04 (2006.01) *E04B 2/58* (2006.01)
- (21) International Application Number:
PCT/AU2012/000963
- (22) International Filing Date:
15 August 2012 (15.08.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2011232748 5 October 2011 (05.10.2011) AU
- (71) Applicant (for all designated States except US): **DANPAL AUSTRALIA PTY LIMITED** [AU/AU]; Unit 11, Junction Estate, 4-6 Junction Street, Auburn, NSW 2144 (AU).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **BURGESS, Rex, Kelvin** [AU/AU]; Unit 11, Junction Estate, 4-6 Junction Street, Auburn, NSW 2144 (AU).
- (74) Agent: **DUMMER, Peter, C.**; Wallington-Dummer, GPO Box 3888, Sydney, NSW 2001 (AU).

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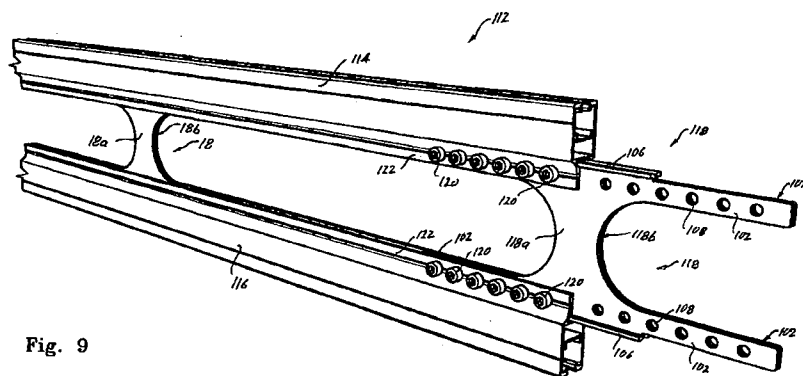


Fig. 9

(57) Abstract: A truss system for roofing a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element; said first and second elongate elements interconnected at intervals by a series of fish-plate assemblies; said fish-plate assemblies arranged in sliding engagement with respective extruded fish-plate channels of said first and second elongate elements.

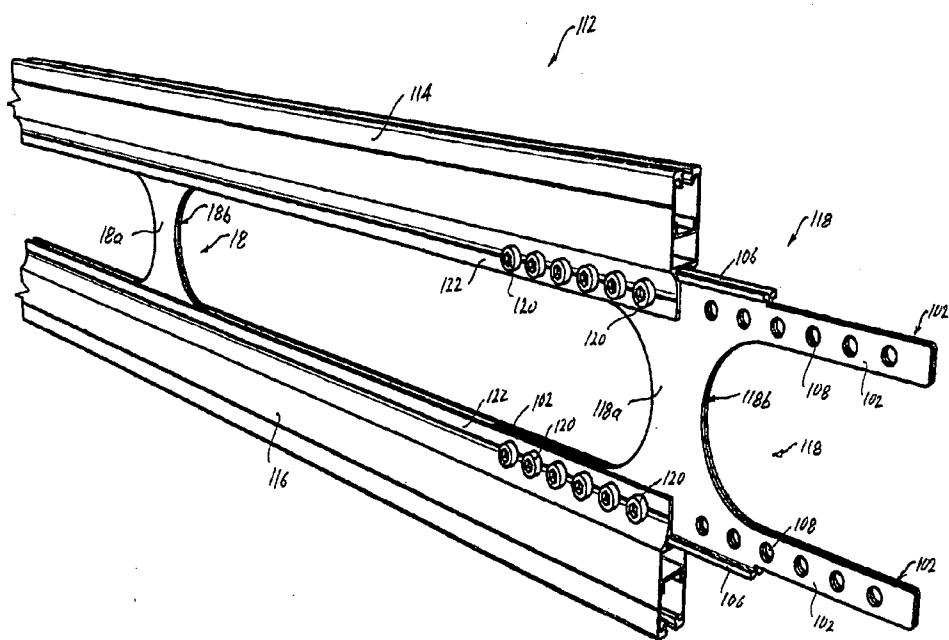


Fig. 9

TRUSS SYSTEM**TECHNICAL FIELD**

[0001] The present invention relates to building structures and, more particularly, to roof truss, roof panelling and
5 curtain wall systems.

BACKGROUND

[0002] The covering of outdoor and indoor areas, as well as building facades, with light transmitting materials is well
10 known, and polymer, typically polycarbonate sheeting or panels for this purpose, are in common use. A range of materials and configurations of supporting members are used to span the area or facade required to be covered. Conventional systems rely on
15 sloping rafters with regular arrays of transverse purlins, the latter providing both stabilising elements and support for the polymer sheeting.

[0003] To span relatively large areas, such as sporting venues for example, requires large and heavy structural timber
20 or steel trusses, adding considerably to the cost of the roof structure.

[0004] The use of timber or steel trusses with the added array of purlins is often undesirable from an aesthetic point of view, and in some environments, such as indoor swimming
25 pools for example, these structural elements can be subject to corrosion and deterioration.

[0005] It is an object of the present invention to address or at least ameliorate some of the above disadvantages.

Notes

5 [0006] The term "comprising" (and grammatical variations thereof) is used in this specification in the inclusive sense of "having" or "including", and not in the exclusive sense of "consisting only of".

[0007] The above discussion of the prior art in the
10 Background of the invention, is not an admission that any information discussed therein is citable prior art or part of the common general knowledge of persons skilled in the art in any country.

[0008] The term "fish plate" as used in this specification
15 indicates a plate for interconnecting two structural elements, either through interlocking elements or by means of fasteners.

BRIEF DESCRIPTION OF INVENTION

20 [0009] Accordingly, in a first broad form of the invention, there is provided a truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising an first elongate element and a second elongate element; said first and
25 second elongate elements interconnected at intervals by a series of fish-plate assemblies; said fish-plate assemblies

engaging with respective extruded fish-plate channels of said first and second elongate elements.

[0010] Preferably, each said first and second elongate element of a said truss segment comprises an extruded section; said extruded section including a panel retaining channel and
5 said extruded fish-plate channel.

[0011] Preferably, a said extruded section further includes a connector plate slot; said connector blade slot adapted for friction fit insertion of a connector plate.

10 [0012] Preferably, a said extruded section further includes a cable channel; said cable channel adapted to receive a free-running tensioning cable.

[0013] Preferably, each of said series of fish-plate assemblies comprises a pair of fish-plates arranged back to back when in use; each fish-plate of said pair of fish-plates comprising a planar plate portion provided at respective upper and lower edges with a flange; said flanges projecting outwardly and normal to an outer surface of said planar plate portion.
15

20 [0014] Preferably, said panel retaining channel includes panel retaining elements; said panel retaining elements formed along outer edges of said panel retaining channel; said panel retaining elements directed inwards towards a median plane of said panel retaining channel.

25 [0015] Preferably, a said truss supports said panels by retaining flange elements of said panels in said panel

retaining channels; said panel retaining elements locking respective said flange elements of adjacent said panels into said panel retaining channel as a snap fit.

[0016] Preferably, a said truss supports said panels along
5 said first elongate elements of said truss.

[0017] Preferably, a said truss supports said panels along said second elongate element of said truss.

[0018] Preferably, a said truss supports said panels along both said first and said second elongate elements of said
10 truss.

[0019] Preferably, said panels interconnect adjacent ones of said trusses; said panels fulfilling the function of purlins.

[0020] Preferably, said first and second elongate elements of said truss comprise aluminium extrusions.

15 [0021] Preferably, fish-plates of said fish plate assemblies comprise stainless steel pressings.

[0022] Preferably, said tensioning cable comprises stainless steel wire rope.

[0023] Preferably, said panels comprise transparent or
20 translucent polymer panels.

[0024] Preferably, translucent insulating panels are retained between said panels arranged along both said first and said second elongate elements of said truss.

[0025] In another broad form of the invention, there is
25 provided a method of providing roofing or curtain walling of a

building or area; said method including assembly and erection of trusses; said method including the steps of:

- (a) assembling a required number of truss segments into said trusses; each said segment comprising a first and a second elongate element,
- (b) interconnecting said first and second elongate elements of each said segment with at least one fish-plate assembly; fish-plates of said at least one fish-plate assembly engaging with respective fish-plate channels of said first and second elongate elements;
- (c) connecting abutting ones of said required number of truss segments by insertion of connector plates into connector plate slots of said abutting truss segments,
- (d) passing tensioning cables through cable channels of said first and second elongate elements of said abutting truss segments,
- (e) tensioning said tensioning cables.

[0026] Preferably, said method further includes the steps of:

- (a) erecting said trusses on suitable supporting elements at predetermined intervals,
- (b) snap-fitting panels into panel retaining channels of either or both of elongate first and second elements of adjacent said truss segments.

[0027] Preferably, insulating panels are retained between said panels attached to both said first and second elements.

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[0028] In another broad form of the invention, there is provided a truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element interconnected at intervals by one or more short fish-plate assemblies; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements, and wherein abutting truss segments are connected together by means of a long fish plate assembly.

[0029] Preferably, said long fish plate assembly comprises a back to back assembly of two long fish plates; each said long fish plate comprising a central section and extension arms extending from upper and lower portions of said central section; said central section and said extension arms provided with respective upper and lower series of through holes.

[0030] Preferably, said central section is provided with outwardly projecting flange elements at an upper edge and a lower edge of said central section such that when said long fish plates are assembled in said back to back assembly said outwardly projecting flange elements project outwardly from said assembly.

[0031] Preferably, said outwardly projecting flange elements engage with said extruded fish plate channels of said first and second elongate elements.

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[0032] Preferably, half of a length of a said long fish plate assembly is secured in said extruded fish plate channels of a first said truss segments by bolts passing through flange elements of said first and second elongate elements and said through holes; a second half of said length of said long fish plate assembly secured in said fish plate channels of an adjoining said truss segment by bolts passing through flange elements of said first and second elongate elements and said through holes.

10 [0033] In another broad form of the invention, there is provided a method of securing together adjoining segments of a truss; each said truss segment comprising first and second elongate elements interconnected by short fish plate assemblies; said method including the steps of:

- 15 (a) inserting a first pair of extension arms projecting from a central portion of a long fish plate assembly into fish plate channels of respective first and second elongate elements of a first said truss segment,
- (b) securing said long fish plate assembly in said first and second elongate elements by bolts passing through flanges of said elongate elements and through holes in said extension arms and in said central portion of said fish plate assembly,
- 20 (c) sliding first and second elongate elements of a said adjoining truss segment onto an opposite second pair of extension arms of said long fish plate assembly so as to
- 25

abut corresponding said first and second elongate elements of said first truss segment,

(d) securing said adjoining truss segment to said long fish plate assembly by bolts passing through flanges of said elongate elements and through holes in said extension arms and said central portion of said fish plate assembly.

BRIEF DESCRIPTION OF DRAWINGS

[0034] Embodiments of the present invention will now be described with reference to the accompanying drawings wherein:

Figure 1, is a side view of an exemplary truss according to a preferred embodiment of the invention,

Figure 2 is a perspective view of portion of a truss segment of the truss of figure 1,

Figure 3 is an end view of an extrusion forming first and second elongate elements of a truss segment,

Figures 4 and 5 are side and end views respectively of one of a pair of fish-plate components of the truss system,

Figure 6 is a sectioned view of a portion of a roof formed with the truss system of the invention,

Figure 7 is a perspective view of a portion of a truss segment in which one of first and second elongate elements includes an enclosed section,

Figure 8 is a side view of one of a pair of fish plate components according to a second preferred embodiment of the invention,

Figure 9 is a perspective view of a pair of fish plates of figure 8 assembled to the ends of extrusions forming first and second elongate elements of a portion of a truss segment,

Figures 10 and 11 are end views of alternative extrusions forming either one of the elongate elements forming a truss segment.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

First Preferred Embodiment

10 [0035] With reference to figure 1, the truss system of the present invention comprises a truss (10) formed of one or more arched truss segments (12) which may be interconnected together to form the truss (10) for support of roofing over a building (not shown) or area, or, when in straight, non arched sections, 15 form the support for a curtain wall.

[0036] Each of the truss segments (12) comprises a first elongate element (14) and a second elongate element (16), which are interconnected at intervals by a series of fish-plate assemblies (18). As can be seen in figures 2 to 5, fish-plate 20 assemblies (18) are assembled in sliding engagement with respective extruded fish-plate channels (20) respectively of the first and second elongate elements, (14) and (16).

[0037] Preferably, as best seen in figure 3, each of the first and second elongate elements (14) and (16) of a truss 25 segment (12), comprises an identical extruded aluminium section which includes a roof (or wall) panel retaining channel (24),

as well as the fish-plate channel (20). Depending on the application, the truss elements (14) and (16) may be straight for relatively short spans or curtain walls, or curved to span large roof or covered areas as shown in figure 1.

5 [0038] The extruded section of the elongate elements (14) and (16) further includes a connector plate slot (26) which is adapted for friction fit insertion of a connector plate (28). Also included in each extruded section is a cable channel (30) which is adapted to receive a free-running tensioning cable
10 (32).

[0039] With reference to figures 2 to 5, each of the fish-plate assemblies (18) in the series of fish-plate assemblies of a truss segment (12), comprises a pair of fish-plates, (18a,18b), arranged back-to-back when assembled to the first
15 and second elongate extruded elements (14,16). Each fish-plate (18a,18b) of the paired fish-plates comprises a planar plate portion (40) which is provided at its respective upper and lower edges with identical flanges (42,44), which project outwardly and normal to the outer surface of the planar plate
20 portion (40).

[0040] As can be seen from figures 2 and 3, the fish-plate channel (20) is so formed as to retain the fish-plate assembly (18) of fish-plates (18a,18b) by capture of the flanges (42,44) when both are located back-to-back in the channel (20). The
25 inner, that is, the narrow part of the fish-plate channel is of a width sufficient to allow insertion of the first of the pair

of fish-plates. The second of the pair may also be inserted into the opposing channels adjacent to the first fish-plate. The pair may then be slid together into the back-to-back position shown in fig 2, to complete the fish-plate assembly.

5 [0041] It will be understood that the fish-plates may be made in a range of sizes so as to adapt the depth of the truss to suit the required span, wind load factors and other design parameters.

[0042] Preferably, both the connector plates (28) and the
10 pairs of fish-plates (18a,18b) are of stainless steel, with the tensioning cables (32) also of stainless steel.

[0043] As best seen in figures 3 and 6, the roof (or wall) panel retaining channel (24) includes panel retaining elements (46,48) formed along the outer edges (50,52) of the panel
15 retaining channel (24). These panel retaining elements (46,48) are directed inwards towards the median plane (54) of the panel retaining channel, and are formed to allow insertion of retaining flange elements (56,58) of adjacent panels (60,62) into the panel retaining channel (24) as shown in figure 6. The
20 panel retaining elements (46,48) lock the respective flange elements (56,58) of the adjacent panels (60,62) into the panel retaining channel as a snap fit.

[0044] As can also be seen from figure 6, the truss (10) may support panels (60,62) along the upper of the two elongate
25 elements (14) of the truss in a roofing application of the invention. Alternatively, or in addition, panels (60,62) may be

supported along the lower elongate elements (16). In the former case, the close abutment between the adjacent panels provides for a continuous cover over the truss (10) when viewed from above (or from outside in the case of a curtain wall).
5 Similarly, panels supported by the lower elongate elements (14) completely cover the truss (10) when viewed from below (or from inside).

In Use

- 10 [0045] The panels adapted for use with the truss system of the invention, may be of metal, but are preferably of opaque or translucent polymer, more preferably polycarbonate, sheeting provided with the edge flanges suited to engagement with the panel retaining channels of the truss.
- 15 [0046] For large spans, the aluminium extrusions of the first and second elements of the truss segments may be roll formed into an arcuate form so that when the segments are assembled, the truss forms an arch over the building or area to be covered.
- 20 [0047] To assemble a truss, firstly the required number of truss segments is assembled. This is effected by placing the first and second elongate elements of each truss segment side by side with the fish-plate channels facing each other. The first fish-plates of the series of fish-plate assemblies for
25 that truss segment are then placed into the opposing channels. At this stage the first and second elongate elements are not

locked together and the corresponding second fish-plates of each back-to-back pair may also be inserted into the opposing channels adjacent their opposite plates.

[0048] The second fish-plates are then slid into their back-to-back positions to complete the fish-plate assemblies and lock the first and second elongate elements together, as the retaining flange elements then lock into the fish-plate channels. Assemblies may be secured in position by riveting for example through the parallel sides of the fish-plate channel.

10 [0049] A major advantage of the fish-plate assemblies is that, unlike bolted connections between first and second elements of a truss, there are no stress points at bolt hole locations. The load is transferred between the first and second elongate elements of the truss system of the invention and is spread over the considerable length of the flange elements of the fish-plates.

[0050] Connector plates are driven into the connector plate slots at that end of the truss segment to be joined to the next truss segment and the two segments forced into abutment. This process is repeated until the required number of truss segments has been connected together. Tensioning cables are then fed through the tensioning channels and tensioned by means of swage studs (not shown) at each end of the truss to secure the truss into a load bearing unit.

25 [0051] In the case of roofing, trusses are lifted into position on suitable supporting elements at predetermined

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spacings. Roofing panels are then snap-fitted into the roof panel retaining channels of either or both of elongate first and second elements of adjacent trusses. The roof panels of the system interconnect adjacent ones of the trusses, and the structural properties of the polycarbonate panels of the system are such that no other support is required than that provided by the trusses, with the panels in effect fulfilling the function of purlins.

[0052]. The system of the invention thus offers three glazing solutions. Firstly, in a roof construction, polycarbonate roofing panels may be arranged at the upper elongate elements of the truss only, providing a continuous glazed surface over the roof with the trusses exposed from below. Alternatively, roofing panels may be arranged at the lower elongate elements only, providing a continuous glazed surface as viewed from below, leaving the trusses exposed above, while thirdly, panels may be provided at both the upper and lower elongate elements of the trusses.

[0053] Where both an upper and a lower layer of roofing panels are to be supported by the trusses, the lower layer is installed first and may be followed by placing translucent insulation bats to substantially fill the space between the upper and lower roofing panels. Alternatively, as shown in figure 7, where only a single layer of panels is required, a modified elongate element 80 with an enclosed section 82 may be used as either the first or second elongate element.

It will be appreciated, especially from figure 6, that the closely abutting polycarbonate panels of the lower layer effectively protect the trusses from any corrosive gasses, such as are present in an enclosed swimming pool for example. Similarly an upper layer of panels protect the trusses from the elements.

Second Preferred Embodiment

[0054] In this second embodiment with reference to figures 8 to 11, in which like features are similarly numbered, truss segments (112) to made up a truss such as shown in figure 1, are likewise made up of first and second elongate elements (114) and (116) interconnected at intervals by assemblies of pairs of fish plates 18 (hereinafter referred to as "short fish plates") as described above and shown in figures 2, 4 and 5. In this embodiment however, with reference firstly to figure 8, a second form of fish plates 118a and 118b ("long fish plates") of a modified configuration are provided in which extension arms 102 project from the upper and lower extremities of the central portion (104) of the plate.

[0055] Only the central portion (104) of each long fish plate (118a) and (118b) is provided with outwardly projecting flanges (106), (as described for the first embodiment above), at the upper and lower edged of the plate. A series of through holes 108 is provided along the upper and lower portions of the fish plate and along the extension arms 102. If required, depending on the degree of curvature of the elongate elements

of the truss to which they are to be applied, the long fish plates may be provided with matching curvature.

[0056] In this embodiment, with reference now to **figure 9** the short fish plates (18a) and (18b) are again inserted and
5 slid into back-to-back association to form fish plate assemblies (18) as before described, to interconnect the elements (114) and (116) of a truss segment (112) at intervals along the segment as required. However, in this embodiment the long fish plate assemblies 118 provide connections between
10 adjoining truss segments.

[0057] To join prior assembled truss segments one to another, a long fish plate assembly (118) is inserted into the ends of first and second elongate elements (114) and (116) at the end of one of the two truss segments to be joined. The long
15 fish plate assembly (118) is inserted to half its length as shown in figure 9 and the long fish plates then locked to the elongate elements (114) and (116) by through bolts (120) passing through pre-drilled holes, (or after drilling the required holes), through flanges (122) and the holes (108) in
20 extension arms (102) of the long fish plate assembly (118).

[0058] The truss segment to be connected (without a long fish plate assembly inserted into the abutting ends of its elongate elements) may then be slid over the projecting sections of the long fish plate assembly (118) projecting from
25 the prepared truss segment and the two segments secured

together by similarly bolting through the flanges (120) and the opposite extension arms (102) of the long fish plates.

[0059] The extruded elongate elements (114) and (116) making up the first and second truss elements of a truss segment (112) may be of the same profile as described above and shown in figures 3 and 6. Alternatively, truss segments may be formed with elongate element extrusions shown in figures 10 and 11.

[0060] In the case of the extrusion (130) of figure 10, the outer portion of the extrusion is provided with a channel structure and snap-in formations to accept the edges of polycarbonate panels as described above and as shown in figure 6. The overall depth of the profile of the extrusion (130) may be selected to suit the load requirements of a particular range of spans for which assembled trusses may be used.

[0061] In an alternative arrangement as shown in figure 11, the extrusion (200) making up the first and second elements of a truss segment, may include a panel retaining formation in the form of a projected element (210) in the form of a "T" extending outward from an upper surface of a hollow section (214). In this arrangement, panels (not shown) are retained between the undersides (216) of the flanges (218) and (220) of the "T" section.

[0062] Although the above description is mainly focused on the use of the trusses in a roofing context, it will be understood that extensive facades may be provided with a

translucent or transparent curtain wall by use of the truss assemblies of the invention arranged in vertical or sloping arrays and similarly combined with panels.

[0063] The above describes only some embodiments of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

CLAIMS

1. A truss system for roof or façade panelling of a building; a
5 truss of said truss system including at least one truss
segment; each said truss segment comprising a first elongate
element and a second elongate element; said first and second
elongate elements interconnected at intervals by a series of
fish-plate assemblies; said fish-plate assemblies engaging
10 with respective extruded fish-plate channels of said first
and second elongate elements.
2. The truss system of claim 1 wherein each said first and
second elongate element of a said truss segment comprises an
extruded section; said extruded section including a panel
15 retaining channel and said extruded fish-plate channel.
3. The truss system of claim 1 or 2 wherein a said extruded
section further includes a connector plate slot; said
connector blade slot adapted for friction fit insertion of a
connector plate.
- 20 4. The truss system of any one of claims 1 to 3 wherein a said
extruded section further includes a cable channel; said
cable channel adapted to receive a free-running tensioning
cable.
- 25 5. The truss system of any one of claims 1 to 4 wherein each of
said series of fish-plate assemblies comprises a pair of
fish-plates arranged back to back when in use; each fish-

plate of said pair of fish-plates comprising a planar plate portion provided at respective upper and lower edges with a flange; said flanges projecting outwardly and normal to an outer surface of said planar plate portion.

- 5 6. The truss system of any one of claims 2 to 5 wherein said panel retaining channel includes panel retaining elements; said panel retaining elements formed along outer edges of said panel retaining channel; said panel retaining elements directed inwards towards a median plane of said panel
- 10 retaining channel.
7. The truss system of any one of claims 2 to 6 wherein a said truss supports said panels by retaining flange elements of said panels in said panel retaining channels; said panel retaining elements locking respective said flange elements
- 15 of adjacent said panels into said panel retaining channel as a snap fit.
8. The truss system of any one of claims 2 to 7 wherein a said truss supports said panels along said first elongate elements of said truss.
- 20 9. The truss system of any one of claims 2 to 7 wherein a said truss supports said panels along said second elongate element of said truss.
10. The truss system of any one of claims 2 to 7 wherein a said truss supports said panels along both said first and
- 25 said second elongate elements of said truss.

11. The truss system of any one of claim 2 to 10 wherein said panels interconnect adjacent ones of said trusses; said panels fulfilling the function of purlins.
12. The truss system of any one of claims 1 to 11 wherein said
5 first and second elongate elements of said truss comprise aluminium extrusions.
13. The truss system of any one of claims 1 to 12 wherein fish-plates of said fish plate assemblies comprise stainless steel pressings.
- 10 14. The truss system of any one of claims 4 to 13 wherein said tensioning cable comprises stainless steel wire rope.
15. The truss system of any one of claims 2 to 14 wherein said panels comprise transparent or translucent polymer panels.
16. The truss system of any one of claims 2 to 15 wherein
15 translucent insulating panels are retained between said panels arranged along both said first and said second elongate elements of said truss.
17. A method of providing roofing or curtain walling of a building or area; said method including assembly and
20 erection of trusses; said method including the steps of:
- (a) assembling a required number of truss segments into said trusses; each said segment comprising a first and a second elongate element,
 - (b) interconnecting said first and second elongate elements
25 of each said segment with at least one fish-plate assembly; fish-plates of said at least one fish-plate

assembly engaging with respective fish-plate channels of said first and second elongate elements;

- (a) connecting abutting ones of said required number of truss segments by insertion of connector plates into connector plate slots of said abutting truss segments,
- (d) passing tensioning cables through cable channels of said first and second elongate elements of said abutting truss segments,
- (e) tensioning said tensioning cables.

10 18. The method of claim 17, wherein said method further includes the steps of:

- (a) erecting said trusses on suitable supporting elements at predetermined intervals,
- (b) snap-fitting panels into panel retaining channels of either or both of elongate first and second elements of adjacent said truss segments.

19. The method of claim 18 wherein insulating panels are retained between said panels attached to both said first and second elements.

20 20. A truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element interconnected at intervals by one or more short fish-plate assemblies; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate

elements, and wherein abutting truss segments are connected together by means of a long fish plate assembly.

21. The truss system of claim 20 wherein said long fish plate assembly comprises a back to back assembly of two long fish plates; each said long fish plate comprising a central section and extension arms extending from upper and lower portions of said central section; said central section and said extension arms provided with respective upper and lower series of through holes.
22. The truss system of claim 21 wherein said central section is provided with outwardly projecting flange elements at an upper edge and a lower edge of said central section such that when said long fish plates are assembled in said back to back assembly said outwardly projecting flange elements project outwardly from said assembly.
23. The truss system of claim 22 wherein said outwardly projecting flange elements engage with said extruded fish plate channels of said first and second elongate elements.
24. The truss system of any one of claims 21 to 23 wherein half of a length of a said long fish plate assembly is secured in said extruded fish plate channels of a first said truss segments by bolts passing through flange elements of said first and second elongate elements and said through holes; a second half of said length of said long fish plate assembly secured in said fish plate channels of an adjoining said truss segment by bolts passing through flange elements

of said first and second elongate elements and said through holes.

25. A method of securing together adjoining segments of a truss; each said truss segment comprising first and second elongate elements interconnected by short fish plate assemblies; said method including the steps of:

(a) inserting a first pair of extension arms projecting from a central portion of a long fish plate assembly into fish plate channels of respective first and second elongate elements of a first said truss segment,

(b) securing said long fish plate assembly in said first and second elongate elements by bolts passing through flanges of said elongate elements and through holes in said extension arms and in said central portion of said fish plate assembly,

(c) sliding first and second elongate elements of a said adjoining truss segment onto an opposite second pair of extension arms of said long fish plate assembly so as to abut corresponding said first and second elongate elements of said first truss segment,

(d) securing said adjoining truss segment to said long fish plate assembly by bolts passing through flanges of said elongate elements and through holes in said extension arms and said central portion of said fish plate assembly.

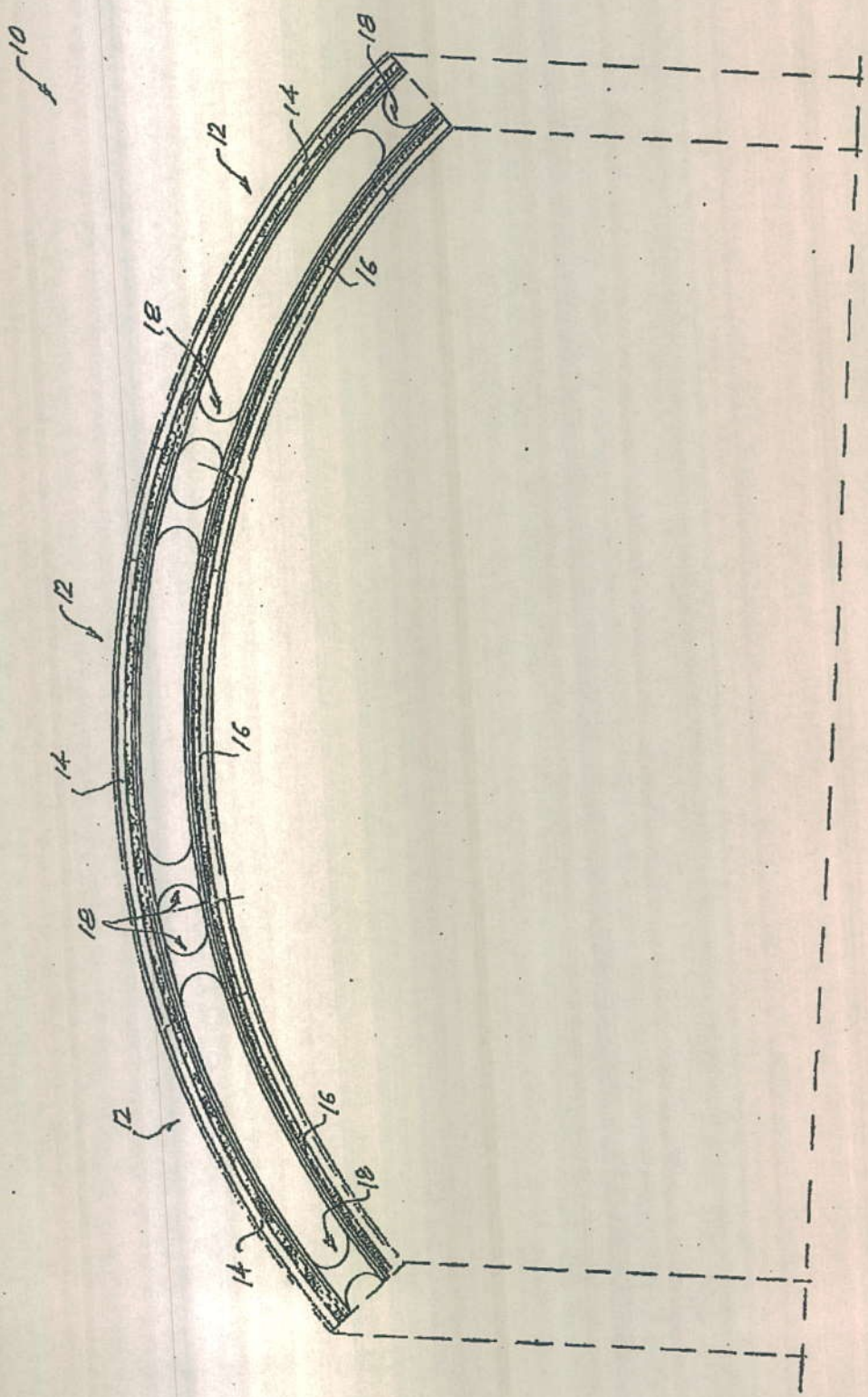


Fig. 1

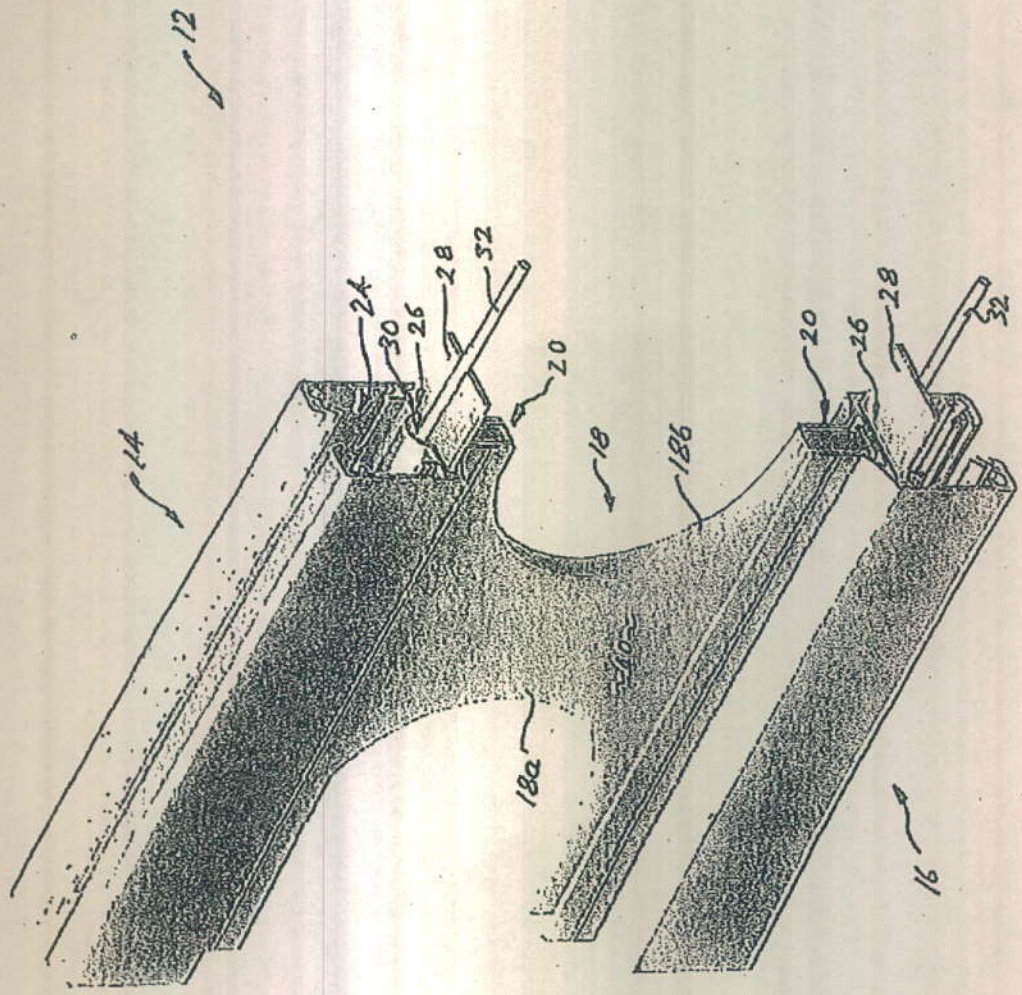


Fig. 2

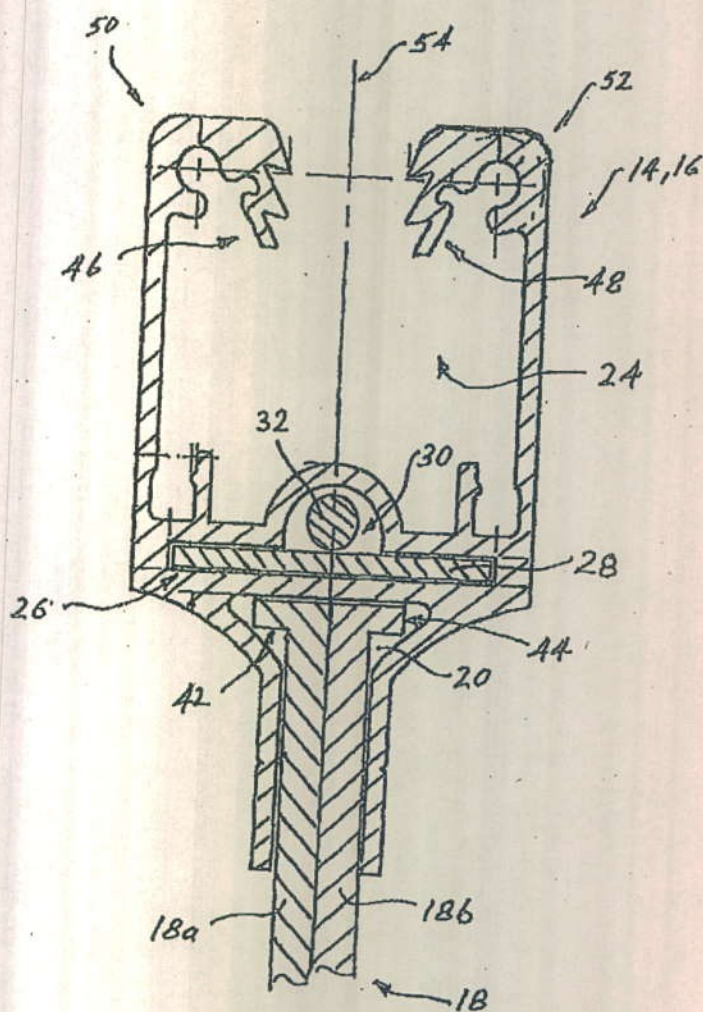
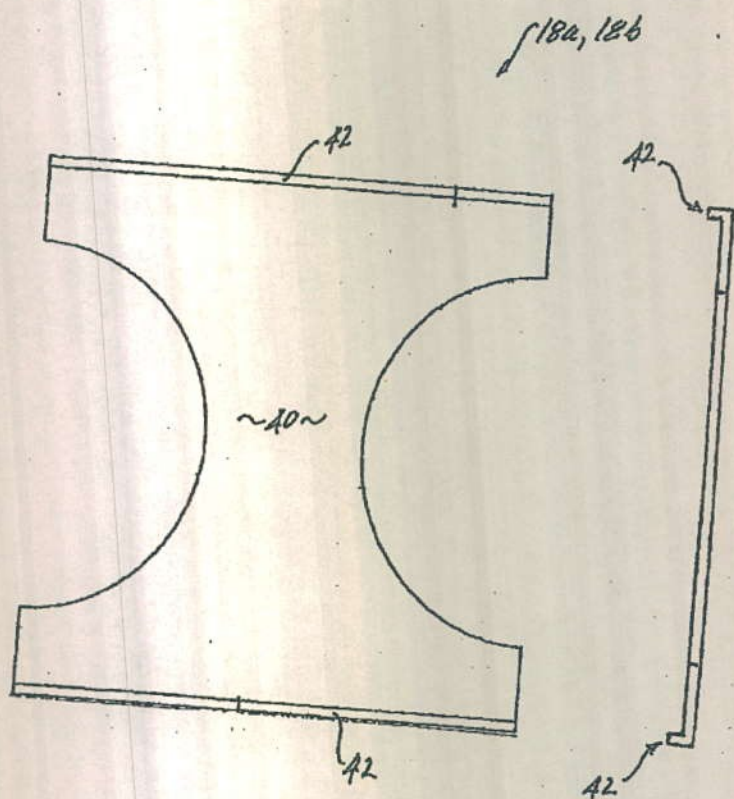


Fig. 3



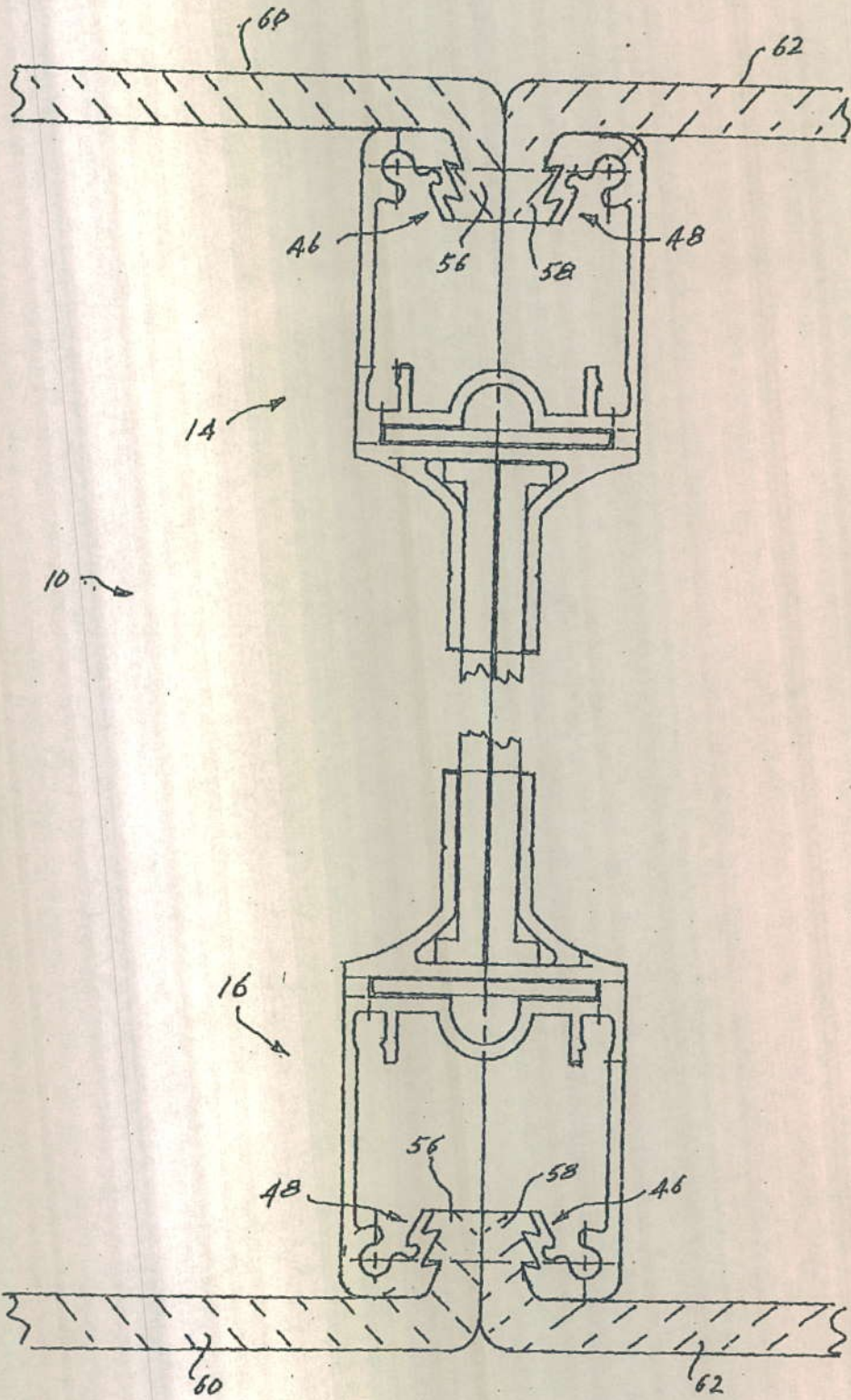
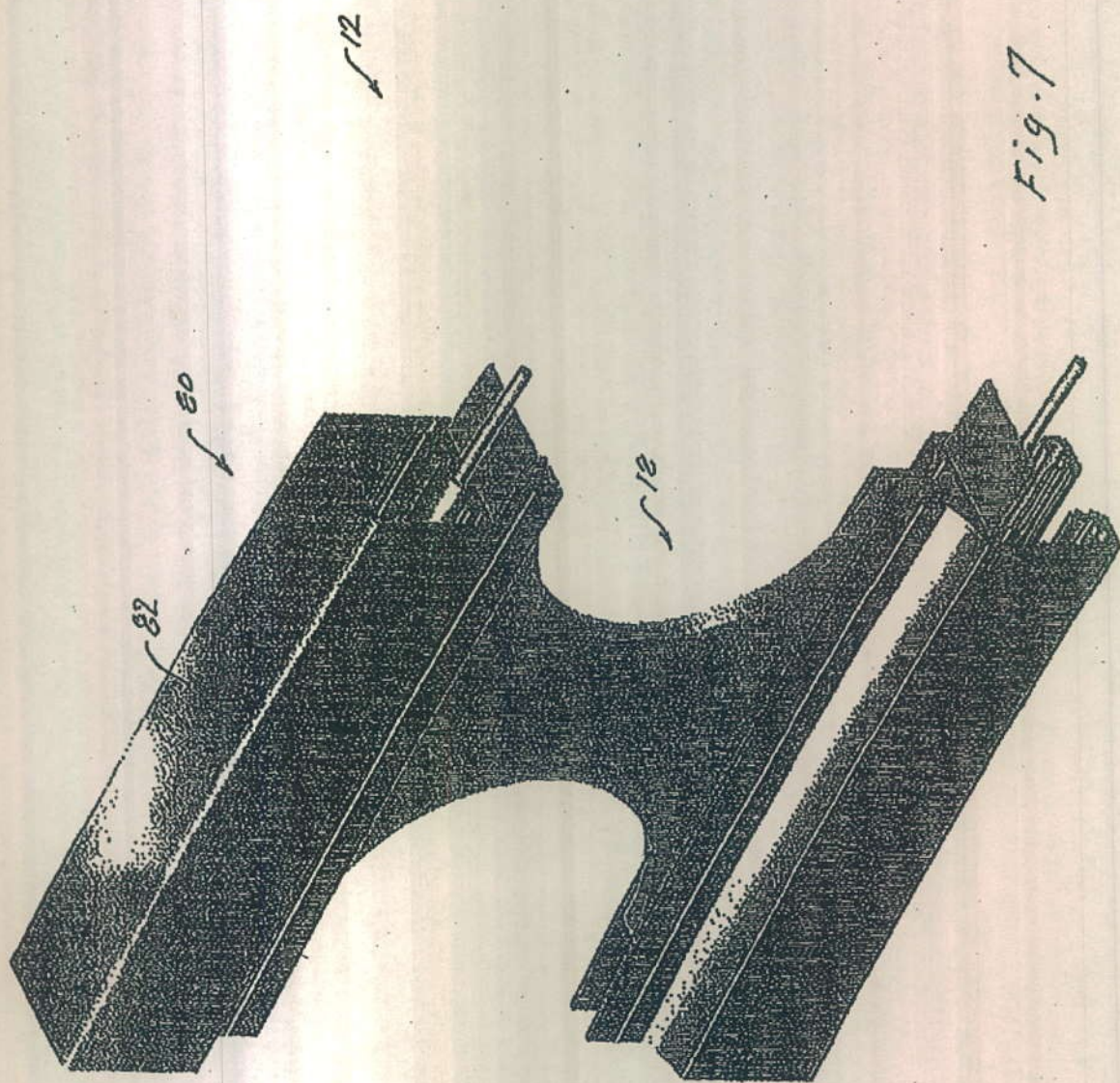


Fig. 6

42



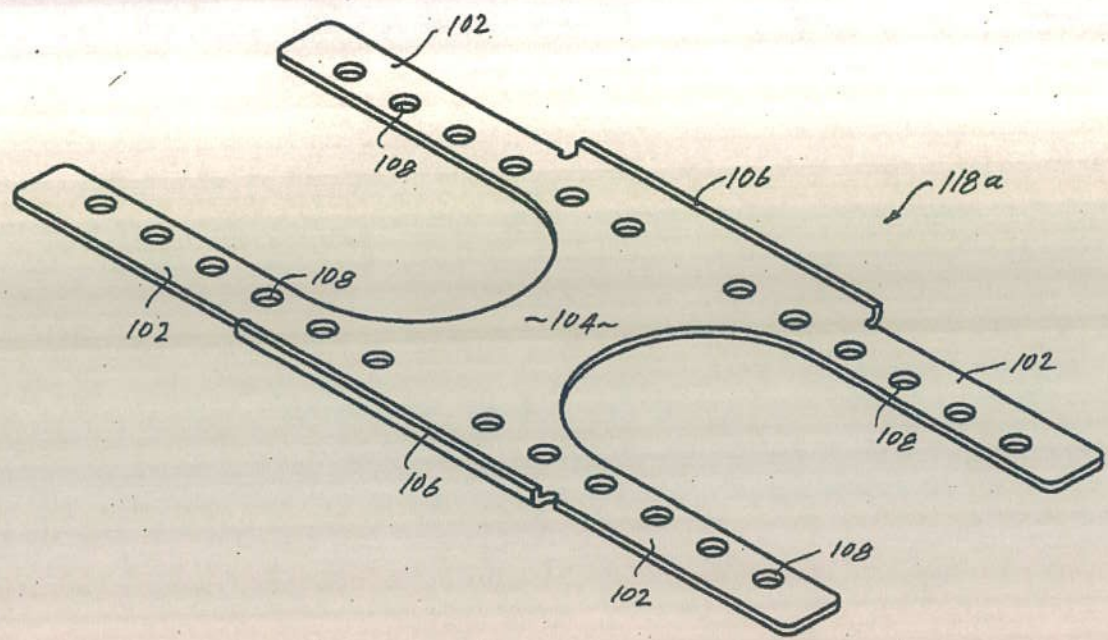


Fig. 8

44

WO 2013/049878

8/10

PCT/AU2012/000963

44

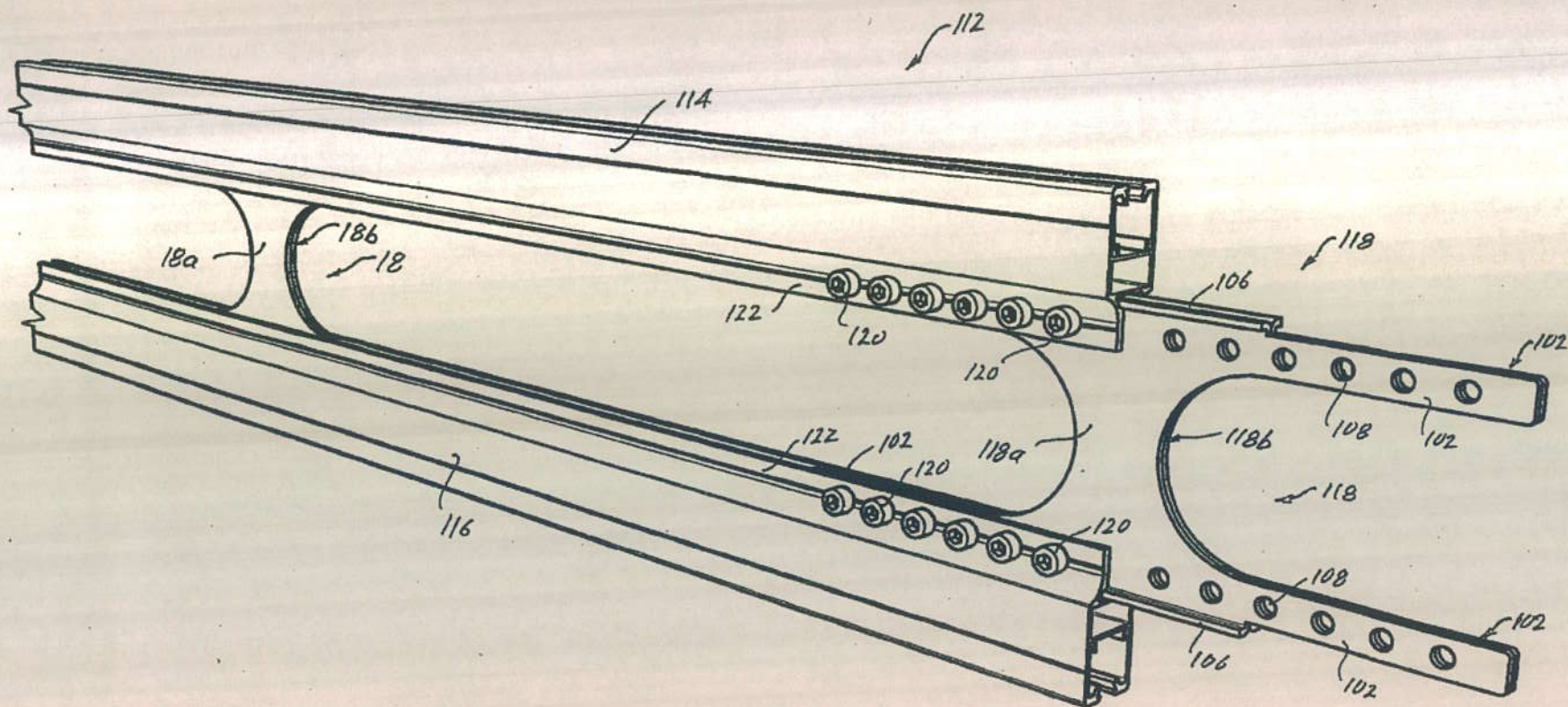


Fig. 9

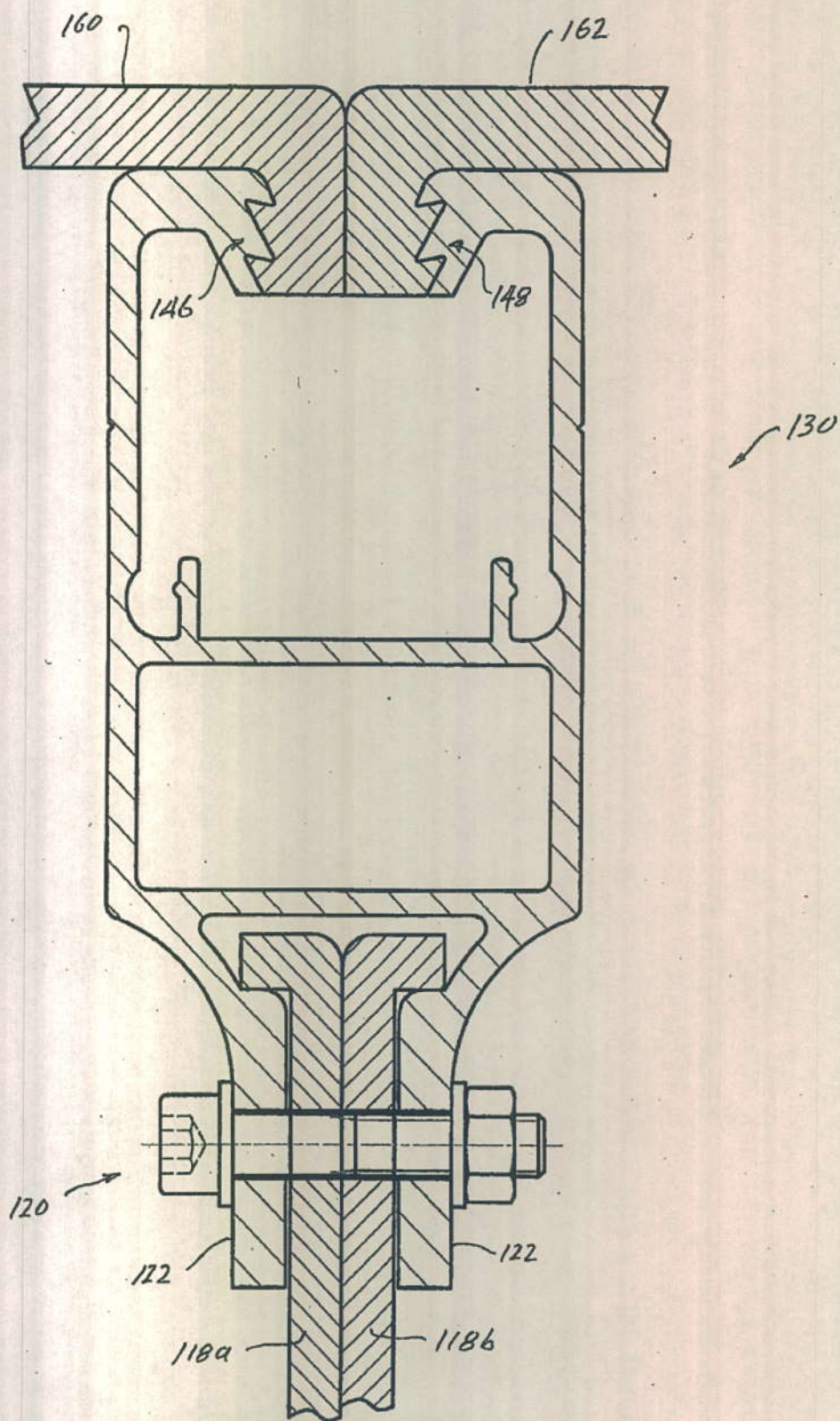


Fig. 10

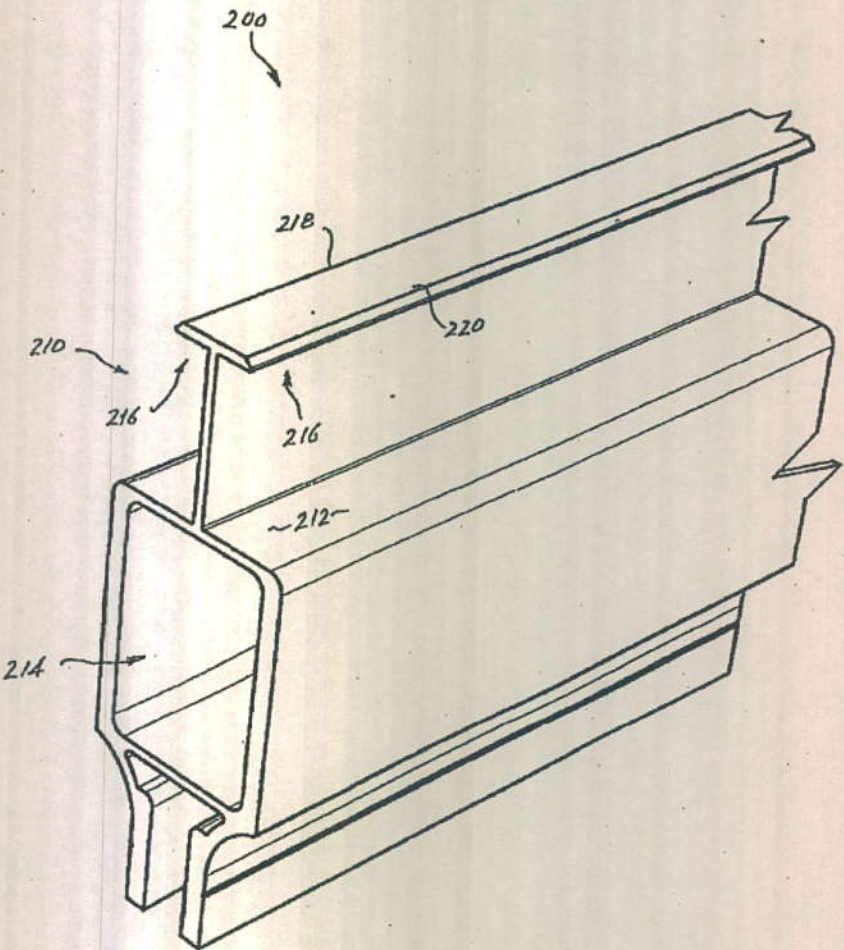


Fig. 11.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2012/000963

A. CLASSIFICATION OF SUBJECT MATTER

E04C 3/04 (2006.01) E04B 2/58 (2006.01)

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)

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)

EPODOC and WPI: /EC/IC E04C, E04B with keywords: fish, plate, web, brace, connect, attach, secure, channel, recess, cavity, gap, roof, truss, cable, tension and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
23 November 2012Date of mailing of the international search report
23 November 2012

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
Email address: pct@ipaustalia.gov.au
Facsimile No.: +61 2 6283 7999

Authorised officer

Leopold Filipovic
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. 0262832105

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2012/000963
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2008/0245025 A1 (SLATER et al) 09 October 2008 Paragraphs 41-61 and Figures 1-25 Paragraphs 41-61 and Figures 1-25	1-5, 8-10, 12-16 17-25
X Y	AT 002947 U2 (ALUTECHNIK MATAUSCHEK GMBH) 26 July 1999 Figures 1 and 2 Figures 1 and 2	1-4, 6-8, 11-16 17-25
Y	GB 1487244 A (VALLOUREC (USINES A TUBES DE LORRAINE-ESCAUT ET VALLOUREC REUNIES)) 28 September 1977 Figures 1 and 2	17-25
A	US 4890429 A (GATZKA et al) 02 January 1990 Figure 5	4, 14, 17-19
Form PCT/ISA/210 (fifth sheet) (July 2009)		

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2012/000963

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

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

1.

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

2.

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

3.

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

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

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

See Supplemental Box for Details

1.

☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2.

☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3.

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

4.

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

Remark on Protest

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

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

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (third sheet) (July 2009)

INTERNATIONAL SEARCH REPORT	International application No. PCT/AU2012/000963
Supplemental Box	
Continuation of: Box III This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups: • Claims 1-16 are directed to a truss system.. The feature of the fish-plate assemblies engaging with the respective extruded fish-plate channels of the first and second elongate elements is specific to this group of claims. • Claims 17-19 are directed to a method of providing roofing or curtain walling, claims 20-24 are directed to a truss system and claim 25 is directed to a method of securing together adjoining segments of a truss. The feature of the means to connect abutting truss segments is specific to this group of claims. PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art. When there is no special technical feature common to all the claimed inventions there is no unity of invention. In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only feature common to all of the claimed inventions and which provides a technical relationship among them is the feature of the truss segment comprising first and second elongate elements interconnected by at least one fish plate assembly. However this feature does not make a contribution over the prior art because it is disclosed in: D1: US 2008/0245025 A1 (see Figures 1-25) and D2: AT 002947 U2 (see figures 1 and 2) Therefore in the light of this document this common feature cannot be a special technical feature. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied <i>a posteriori</i>. Form PCT/ISA/210 (Supplemental Box) (July 2009)	

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2012/000963	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
US 2008/0245025 A1	09 Oct 2008	US 2008245025 A1	09 Oct 2008
		WO 2008119183 A1	09 Oct 2008
AT 002947 U2	26 Jul 1999	None	
GB 1487244 A	28 Sep 1977	BE 820969 A1	11 Apr 1975
		ES 430922 A1	16 Oct 1976
		FR 2247597 A1	09 May 1975
		FR 2247597 B1	24 Mar 1978
		GB 1487244 A	28 Sep 1977
		IT 1022813 B	20 Apr 1978
US 4890429 A	02 Jan 1990	AU 594056 B2	01 Mar 1990
		AU 5802486 A	17 Sep 1987
		CN 86104405 A	28 Oct 1987
		CN 1011807 B	27 Feb 1991
		CN 1043182 A	20 Jun 1990
		CN 1017173 B	24 Jun 1992
		EP 0237667 A2	23 Sep 1987
		EP 0237667 B1	23 Jan 1991
		JP 62220636 A	28 Sep 1987
		JP 6037790 B	18 May 1994
		KR 910008081 B1	07 Oct 1991
		NZ 218222 A	29 Aug 1989
		US 4890429 A	02 Jan 1990
End of Annex			
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. Form PCT/ISA/210 (Family Annex)(July 2009)			

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Rule 71.1)

To: WALLINGTON-DUMMER GPO Box 3888 SYDNEY NSW 2001 AUSTRALIA		Date of mailing (day/month/year) 06 February 2013	
Applicant's or agent's file reference 125009		IMPORTANT NOTIFICATION	
International application No. PCT/AU2012/000963	International filing date (day/month/year) 15 August 2012	Priority date (day/month/year) 05 October 2011	
Applicant DANPAL AUSTRALIA PTY LIMITED (et al.)			

- 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.
- A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
- 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 translations to those Offices.
- 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 invention 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 ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au Facsimile No. +61 2 6283 7999	Authorised officer Leopold Filipovic AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832105
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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 125009	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/AU2012/000963	International filing date (<i>day/month/year</i>) 15 August 2012	Priority date (<i>day/month/year</i>) 05 October 2011
International Patent Classification (IPC) or national classification and IPC E04C 3/04 (2006.01) E04B 2/58 (2006.01)		
Applicant DANPAL AUSTRALIA PTY LIMITED (et al.)		

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 **3** 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 **62 (Excluding amendments to Abstract which are of no effect since the abstract cannot be amended under Article 34)** sheets, as follows:

☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).

☐ sheets containing rectifications not taken into account by this Authority because they were not available at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4*bis*, 70.2(e), 70.16 and 91.2).

☐ Superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).

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 3*bis* 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 and industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand 21 December 2012	Date of completion of this report 6 February 2013
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaaustralia.gov.au Facsimile No.: +61 2 6283 7999	Authorised officer Leopold Filipovic AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832105

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/AU2012/000963

Box No. I	Basis of the report
1.	With regard to the language, this report has been established on the basis of: ☒ The international application in the language in which it was filed: ☐ A translation of the international application into , which is the language of a translation furnished for the purposes of : ☐ international search (under Rules 12.3(a) and 23.1 (b)). ☐ publication of the international application (under Rule 12.4(a)). ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a) and (b)).
2.	With regard to the elements of the international application, this report is based on <i>(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)</i>: ☐ the international application as originally filed/furnished ☒ the description: pages , as originally filed/furnished pages 1-20 , received by this Authority on 21 December 2012 with the letter of 20 December 2012 pages , received by this Authority on with the letter of ☒ the claims: pages , as originally filed/furnished pages , as amended (together with any statement) under Article 19, pages 21-29 , received by this Authority on 21 December 2012 with the letter of 20 December 2012 pages , received by this Authority on with the letter of ☒ the drawings: pages 1/10-10/10 , as originally filed/furnished pages , received by this Authority on with the letter of pages , received by this Authority on with the letter of ☐ 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. 25 ☐ the drawings, sheets/figs ☐ the 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 report has been established: ☐ taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)). ☐ without taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rules 66.4bis and 70.2(e)).
6.	☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45 bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY		International Application No. PCT/AU2012/000963
Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement	
1. Statement		
Novelty (N)	Claims 1-24 and 26	YES
	Claims NONE	NO
Inventive step (IS)	Claims 1-24 and 26	YES
	Claims NONE	NO
Industrial applicability (IA)	Claims 1-24 and 26	YES
	Claims NONE	NO
2. CITATIONS AND EXPLANATIONS:		
CITATIONS		
D1: US 2008/0245025 A1 (SLATER et al) 09 October 2008		
D2: AT 002947 U2 (ALUTECHNIK MATAUSCHEK GMBH) 26 July 1999		
D3: GB 1487244 A (VALLOUREC (USINES A TUBES DE LORRAINE-ESCAUT ET VALLOUREC REUNIES))) 28 September 1977		
D4: US 4890429 A (GATZKA et al) 02 January 1990		
NOVELTY (N)		
Claims 1, 16, 19, 24 and 26 meet the criteria set forth in PCT Article 33(2) for novelty. The prior art published before the priority date does not disclose the feature of each of the fish-plate assemblies comprising a pair of fish-plates arranged back-to-back when in use, each of the fish plates comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of the planar plate portion, the flanges being captured in the fish plate channels provided in the first and second elongate elements.		
Appended claims 2-15, 17, 18 and 20-23 add further features to those defined in claims 1, 16 and 19 and are therefore also novel.		
INVENTIVE STEP (IS)		
Claims 1, 16, 19, 24 and 26 meet the criteria set out in PCT Article 33(3) with regard to the requirement of Inventive Step because the prior art does not obviously suggest to a person skilled in the art the feature of each of the fish-plate assemblies comprising a pair of fish-plates arranged back-to-back when in use, each of the fish plates comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of the planar plate portion, the flanges being captured in the fish plate channels provided in the first and second elongate elements.		
Claims 2-15, 17, 18 and 20-23 embody further aspects of the inventive concept and therefore also meet the requirements of Article 33(3) of the PCT.		
INDUSTRIAL APPLICABILITY (IA)		
The invention defined in claims 1-24 and 26 is considered to meet the requirements of Industrial Applicability under Article 33(4) of the PCT because it can be made by, or used in, industry.		

Form PCT/IPEA/409 (Box V) (July 2011)

WALLINGTON-DUMMER

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20 December 2012

IP Australia
PO Box 200
WODEN ACT 2606
AUSTRALIA

LODGEMENT UNIT		
A)	S. <u>784</u>	Payable
B)	S. <u>797</u>	Received
C)	S.	Underpaid
D)	S. <u>12</u>	Overpaid
FANG BATCH No:		
<u>7728895</u>		

IP Australia
21 DEC 2012
RECEIVED FEP FAX

Attention: Leopold Fillipovic

Re: International PCT Patent Application No. PCT/AU2012/000963
In the name of: Danpal Australia Pty Limited et al
Entitled: Truss System
Our Ref. 125009

We refer to the Written Opinion of the International Preliminary Examining Authority, dated 15 August 2012.

The Applicant seeks leave to amend the claims of this application in the International Phase under Article 34. To do so, we enclose:

- Statement of Proposed Amendments
- Amended specification pages 1 to 20
- Amended claims pages 21 to 29
- Amended abstract page 30
- Annotated copies of specification and claims pages indicating amendments
- Demand for International Preliminary Examination
- Official fee of \$797.00. See attached Editable Payment Options Form.

Article 34 Amendments

Differences between the claims as filed and those as amended are listed below:

Claims 1, 17, 20, 21 and 25 (now claims 1, 16, 19, 20 and 24) are amended

Claim 5 is cancelled

A new claim 25 is inserted

Basis for the features inserted into independent claims 1, 16, 19 and 24 as now presented is as follows (paragraph and page numbers refer to the specification as filed):

1. for the feature of back-to-back arrangement of the fish plate assemblies, see [0056] on page 16 of the specification.

Principal:

Patent Attorney:

2. for the features of the fish-plates including a planar plate portion with flanges at upper and lower edges, see [0013] on page 4.
3. for the retention of the fish-plate assemblies through capture of the fish-plate flanges in fish-plate channels, see [0040] on page 10.
4. for the features of the long fish-plate assemblies comprising back-to-back long fish-plates including a central section and extension arms, see [0029] on page 6.

Basis for the method of claim 25 is found at [0040] on page 10

Written Submission - Multiple Inventions

Each of the independent claims now incorporate the novel (and as will be argued below, inventive) features of the fish-plates which make up the fish-plate assembly of the invention. Those features include the flange elements which project outwardly from the upper and lower edges of each of the fish-plates and by means of which the fish-plate assemblies are retained in the fish-plate channels provided in the two elongate elements of the truss.

It is submitted that these features provide the common technical relationship among the claimed inventions as identified by the Examiner, and that these features clearly make a contribution over the cited prior art, there being no teaching or suggestion in the prior art of retaining fish plates by means of flanges captured in fish-plate channels.

Written Submission - Novelty

In the Written Opinion, Claim 1 was found not novel in view of the citations:

- D1 US2008/0245025 A1 (Slater),
- D2 AT002947 U2 (Alutechnic)
- D3 GB1487244 (Valourec)

It is respectfully submitted that none of the above citations disclose an essential feature of claim 1 as originally filed. Claim 1 is specific that the interconnection of the first and second elongate elements of the truss of the invention is by means of a series of fish-plate assemblies. It is clear we submit that the analogous interconnecting elements in each of the citations are not assemblies as that term is commonly understood and as construed from the description and drawings. The fish-plate assembly of the invention is clearly comprised of two distinct fish-plate elements.

In any event, Claim 1 has been further distinguished from the cited prior art by the features now inserted as set out above.

Written Submission - Inventive Step

In the Written Opinion, Claims 1 to 25 were found to lack inventive step in view of the citations listed above.

The invention of the present application as now made explicit in the independent claims as amended, and as now claimed in new claim 25, is distinguished from the prior art by the interconnection of the elongate truss elements by the particular form of the fish-plate assemblies of the invention. Specifically, it is the form of the fish-plate channels

and the outwardly projecting flanges of the fish-plates which provide a unique interconnection of the elements of the truss.

Each of the disclosures of D1 to D3 as noted above, provides a single, planar interconnection element (at least along the outer areas where the elements engage with the longitudinal truss members). In each case additional fastening means (clinchng, bolting or screwing in D1, stainless steel bolts in the case of D2 or nuts and bolts in D3). There is no disclosure or suggestion in any of the citations of specifically formed fish-plate channels which can secure an interconnecting web or fish-plate without the need for some form of fastening.

The fact that the arrangement of the present invention allows for the interconnection of the fish-plates and the elongate truss elements without fasteners, drilling through flange elements etc provides a clear advantage over the prior art.

Attention is further drawn to the provision by the fish-plate assemblies of the invention of a unique and inventive manner of assembly, by allowing the two flanged fish-plates making up a fish-plate assembly, to be inserted through the narrow part of the fish-plate channel. When the plates are then slid together into their back-to-back position the flanges of the respective plates combine to lock the plate in the fish-plate channels of the respective elongate truss elements.

For the above reasons it is submitted that the invention as now claimed is both novel and inventive over the cited prior art.

We would be grateful if examination of our response could commence immediately.

In order to have the opportunity to make further amendments during the International Phase, we would be grateful if the office would issue a further Written Opinion.

Yours respectfully
WALLINGTON-DUMMER



Johannes van Leeuwen
Patent Attorney

TRUSS SYSTEM**TECHNICAL FIELD**

[0001] The present invention relates to building structures and, more particularly, to roof truss, roof panelling and
5 curtain wall systems.

BACKGROUND

[0002] The covering of outdoor and indoor areas, as well as building facades, with light transmitting materials is well
10 known, and polymer, typically polycarbonate sheeting or panels for this purpose, are in common use. A range of materials and configurations of supporting members are used to span the area or facade required to be covered. Conventional systems rely on framing, typically, in the case of roof structures, comprising
15 sloping rafters with regular arrays of transverse purlins, the latter providing both stabilising elements and support for the polymer sheeting.

[0003] To span relatively large areas, such as sporting venues for example, requires large and heavy structural timber
20 or steel trusses, adding considerably to the cost of the roof structure.

[0004] The use of timber or steel trusses with the added array of purlins is often undesirable from an aesthetic point of view, and in some environments, such as indoor swimming
5 pools for example, these structural elements can be subject to corrosion and deterioration.

[0005] It is an object of the present invention to address or at least ameliorate some of the above disadvantages.

Notes

5 [0006] The term "comprising" (and grammatical variations thereof) is used in this specification in the inclusive sense of "having" or "including", and not in the exclusive sense of "consisting only of".

[0007] The above discussion of the prior art in the
10 Background of the invention, is not an admission that any information discussed therein is citable prior art or part of the common general knowledge of persons skilled in the art in any country.

[0008] The term "fish plate" as used in this specification
15 indicates a plate for interconnecting two structural elements, either through interlocking elements or by means of fasteners.

BRIEF DESCRIPTION OF INVENTION

20 [0009] Accordingly, in one broad form of the invention, there is provided a truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element; said first and
25 second elongate elements interconnected at intervals by a series of fish-plate assemblies; each fish-plate assembly of

said series of fish-plate assemblies comprising a pair of fish-plates arranged back-to-back when in use; each fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; said fish-plate channels formed so as to retain said fish-plate assemblies by capture of said flanges when said pair of fish-plates are assembled back-to-back.

[0010] Preferably, each said first and second elongate element of a said truss segment comprises an extruded section; said extruded section including a panel retaining channel and said extruded fish-plate channel.

[0011] Preferably, a said extruded section further includes a connector plate slot; said connector blade slot adapted for friction fit insertion of a connector plate.

[0012] Preferably, a said extruded section further includes a cable channel; said cable channel adapted to receive a free-running tensioning cable.

[0013] Preferably, said panel retaining channel includes panel retaining elements; said panel retaining elements formed along outer edges of said panel retaining channel; said panel retaining elements directed inwards towards a median plane of said panel retaining channel.

[0014] Preferably, a said truss supports said panels by retaining flange elements of said panels in said panel retaining channels; said panel retaining elements locking respective said flange elements of adjacent said panels into said panel retaining channel as a snap fit.

[0015] Preferably, a said truss supports said panels along said first elongate elements of said truss.

[0016] Preferably, a said truss supports said panels along said second elongate element of said truss.

[0017] Preferably, a said truss supports said panels along both said first and said second elongate elements of said truss.

[0018] Preferably, said panels interconnect adjacent ones of said trusses; said panels fulfilling the function of purlins.

[0019] Preferably, said first and second elongate elements of said truss comprise aluminium extrusions.

[0020] Preferably, fish-plates of said fish-plate assemblies comprise stainless steel pressings.

[0021] Preferably, said tensioning cable comprises stainless steel wire rope.

[0022] Preferably, said panels comprise transparent or translucent polymer panels.

[0023] Preferably, translucent insulating panels are retained between said panels arranged along both said first and said second elongate elements of said truss.

[0024] In another broad form of the invention, there is provided a method of providing roofing or curtain walling of a building or area; said method including assembly and erection of trusses; said method including the steps of:

5 (a) assembling a required number of truss segments into said trusses; each said segment comprising a first and a second elongate element,

10 (b) interconnecting said first and second elongate elements of each said segment with at least one fish-plate assembly; fish-plates of said at least one fish-plate assembly engaging with respective fish-plate channels of said first and second elongate elements;

15 (c) connecting abutting ones of said required number of truss segments by insertion of connector plates into connector plate slots of said abutting truss segments,

(d) passing tensioning cables through cable channels of said first and second elongate elements of said abutting truss segments,

(e) tensioning said tensioning cables, and

20 wherein each fish-plate assembly comprises a pair of fish-plates arranged back to back when in use; each said fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said flanges captured in fish-plate channels
25 provided in each of said first and second elongate element.

[0025] Preferably, said method further includes the steps of:

(a) erecting said trusses on suitable supporting elements at predetermined intervals,

5 (b) snap-fitting panels into panel retaining channels of either or both of elongate first and second elements of adjacent said truss segments.

[0026] Preferably, insulating panels are retained between said panels attached to both said first and second elements.

10 In another broad form of the invention, there is provided a truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element interconnected at
15 intervals by one or more short fish-plate assemblies; each said short fish-plate assembly comprising a pair of fish-plates arranged back-to-back when in use; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; each said fish-plate
20 comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said flanges captured in said fish-plate channels, and wherein abutting truss segments are connected together by means of a long fish-
25 plate assembly.

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[0027] Preferably, said long fish-plate assembly comprises a back-to-back assembly of two long fish-plates; each said long fish-plate comprising a central section; said long fish-plate assemblies including extension arms extending from upper and lower portions of said central section; said central section and said extension arms provided with respective upper and lower series of through holes.

[0028] Preferably, said central section is provided with outwardly projecting flange elements at an upper edge and a lower edge of said central section such that when said long fish-plates are assembled in said back to back assembly said outwardly projecting flange elements project outwardly from said assembly.

[0029] Preferably, said outwardly projecting flange elements engage with said extruded fish-plate channels of said first and second elongate elements.

[0030] Preferably, half of a length of a said long fish-plate assembly is secured in said extruded fish-plate channels of a first said truss segments by bolts passing through flange elements of said first and second elongate elements and said through holes; a second half of said length of said long fish-plate assembly secured in said fish-plate channels of an adjoining said truss segment by bolts passing through flange elements of said first and second elongate elements and said through holes.

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[0031] In another broad form of the invention, there is provided a method of securing together adjoining segments of a truss; each said truss segment comprising first and second elongate elements interconnected by short fish-plate assemblies; each of said short fish-plate assemblies comprising a pair of short fish-plates arranged back to back when in use; each of said short fish-plates comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said fish-plates retained in said fish-plate channels by capture of said flanges in said fish-plate channels, said method including the steps of:

(a) inserting a first pair of extension arms projecting from a central portion of a long fish-plate assembly into fish-plate channels of respective first and second elongate elements of a first said truss segment,

(b) securing said long fish-plate assembly in said first and second elongate elements by bolts passing through flanges of said elongate elements and through holes in said extension arms and in said central portion of said fish-plate assembly,

(c) sliding first and second elongate elements of a said adjoining truss segment onto an opposite second pair of extension arms of said long fish-plate assembly so as to abut corresponding said first and second elongate elements of said first truss segment,

(d) securing said adjoining truss segment to said long fish-plate assembly by bolts passing through flanges of said elongate elements and through holes in said extension arms and said central portion of said fish-plate assembly, and

wherein a said long fish-plate assembly comprises a pair of said long fish-plates arranged back-to-back; said long fish-plates including a central portion with extension arms projecting from upper and lower extremities of said central portion; at least said central portion provided along respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said long fish-plates retained in said fish-plate channels by said flanges captured in said fish-plate channels.

[0032] In another broad form of the invention there is provided a method of assembling fish-plate assemblies to elongate elements of a truss; said truss comprising first and second elongate elements interconnected by a series of said fish-plate assemblies; each said fish-plate assembly comprising a pair of fish-plates arranged in a back-to-back position when in use; said method including the steps of:

- a. inserting first and second fish-plates of each of said series of fish-plate assemblies into a narrow part of a fish-plate channels provided in said first and second elongate element,

b. sliding said first and second fish-plates together into
said back-to-back position, and
wherein each said fish-plate includes a planar plate portion
provided along respective upper and lower edges with flanges
projecting outwardly from an outer surface of said planar
plate portion; said fish-plate channels of sufficient width
for insertion of said fish-plates; said fish-plate assembly
retained in said in said fish-plate channels by captured of
said flanges in said fish-plate channels when said pair of
fish-plates are assembled in said back-to-back position.

BRIEF DESCRIPTION OF DRAWINGS

[0033] Embodiments of the present invention will now be
described with reference to the accompanying drawings wherein:

Figure 1, is a side view of an exemplary truss according
to a preferred embodiment of the invention,

Figure 2 is a perspective view of portion of a truss
segment of the truss of figure 1,

Figure 3 is an end view of an extrusion forming first and
second elongate elements of a truss segment,

Figures 4 and 5 are side and end views respectively of one
of a pair of fish-plate components of the truss system,

Figure 6 is a sectioned view of a portion of a roof formed
with the truss system of the invention,

Figure 7 is a perspective view of a portion of a truss segment in which one of first and second elongate elements includes an enclosed section,

Figure 8 is a side view of one of a pair of fish plate components according to a second preferred embodiment of the invention,

Figure 9 is a perspective view of a pair of fish plates of figure 8 assembled to the ends of extrusions forming first and second elongate elements of a portion of a truss segment,

Figures 10 and 11 are end views of alternative extrusions forming either one of the elongate elements forming a truss segment.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

First Preferred Embodiment

[0034] With reference to **figure 1**, the truss system of the present invention comprises a truss (10) formed of one or more arched truss segments (12) which may be interconnected together to form the truss (10) for support of roofing over a building (not shown) or area, or, when in straight, non arched sections, form the support for a curtain wall.

[0035] Each of the truss segments (12) comprises a first elongate element (14) and a second elongate element (16), which are interconnected at intervals by a series of fish-plate assemblies (18). As can be seen in **figures 2 to 5**, fish-plate assemblies (18) are assembled in sliding engagement with

respective extruded fish-plate channels (20) respectively of the first and second elongate elements, (14) and (16).

[0036] Preferably, as best seen in **figure 3**, each of the first and second elongate elements (14) and (16) of a truss segment (12), comprises an identical extruded aluminium section which includes a roof (or wall) panel retaining channel (24), as well as the fish-plate channel (20). Depending on the application, the truss elements (14) and (16) may be straight for relatively short spans or curtain walls, or curved to span large roof or covered areas as shown in **figure 1**.

[0037] The extruded section of the elongate elements (14) and (16) further includes a connector plate slot (26) which is adapted for friction fit insertion of a connector plate (28). Also included in each extruded section is a cable channel (30) which is adapted to receive a free-running tensioning cable (32).

[0038] With reference to **figures 2 to 5**, each of the fish-plate assemblies (18) in the series of fish-plate assemblies of a truss segment (12), comprises a pair of fish-plates, (18a,18b), arranged back-to-back when assembled to the first and second elongate extruded elements (14,16). Each fish-plate (18a,18b) of the paired fish-plates comprises a planar plate portion (40) which is provided at its respective upper and lower edges with identical flanges (42,44), which project outwardly and normal to the outer surface of the planar plate portion (40).

[0039] As can be seen from **figures 2 and 3**, the fish-plate channel (20) is so formed as to retain the fish-plate assembly (18) of fish-plates (18a,18b) by capture of the flanges (42,44) when both are located back-to-back in the channel (20). The inner, that is, the narrow part of the fish-plate channel is of a width sufficient to allow insertion of the first of the pair of fish-plates. The second of the pair may also be inserted into the opposing channels adjacent to the first fish-plate. The pair may then be slid together into the back-to-back position shown in fig 2, to complete the fish-plate assembly.

[0040] It will be understood that the fish-plates may be made in a range of sizes so as to adapt the depth of the truss to suit the required span, wind load factors and other design parameters.

[0041] Preferably, both the connector plates (28) and the pairs of fish-plates (18a,18b) are of stainless steel, with the tensioning cables (32) also of stainless steel.

[0042] As best seen in **figures 3 and 6**, the roof (or wall) panel retaining channel (24) includes panel retaining elements (46,48) formed along the outer edges (50,52) of the panel retaining channel (24). These panel retaining elements (46,48) are directed inwards towards the median plane (54) of the panel retaining channel, and are formed to allow insertion of retaining flange elements (56,58) of adjacent panels (60,62) into the panel retaining channel (24) as shown in **figure 6**. The panel retaining elements (46,48) lock the respective flange

elements (56,58) of the adjacent panels (60,62) into the panel retaining channel as a snap fit.

[0043] As can also be seen from **figure 6**, the truss (10) may support panels (60,62) along the upper of the two elongate elements (14) of the truss in a roofing application of the invention. Alternatively, or in addition, panels (60,62) may be supported along the lower elongate elements (16). In the former case, the close abutment between the adjacent panels provides for a continuous cover over the truss (10) when viewed from above (or from outside in the case of a curtain wall). Similarly, panels supported by the lower elongate elements (14) completely cover the truss (10) when viewed from below (or from inside).

In Use

[0044] The panels adapted for use with the truss system of the invention, may be of metal, but are preferably of opaque or translucent polymer, more preferably polycarbonate, sheeting provided with the edge flanges suited to engagement with the panel retaining channels of the truss.

[0045] For large spans, the aluminium extrusions of the first and second elements of the truss segments may be roll formed into an arcuate form so that when the segments are assembled, the truss forms an arch over the building or area to be covered.

[0046] To assemble a truss, firstly the required number of truss segments is assembled. This is effected by placing the first and second elongate elements of each truss segment side by side with the fish-plate channels facing each other. The first fish-plates of the series of fish-plate assemblies for that truss segment are then placed into the opposing channels. At this stage the first and second elongate elements are not locked together and the corresponding second fish-plates of each back-to-back pair may also be inserted into the opposing channels adjacent their opposite plates.

[0047] The second fish-plates are then slid into their back-to-back positions to complete the fish-plate assemblies and lock the first and second elongate elements together, as the retaining flange elements then lock into the fish-plate channels. Assemblies may be secured in position by riveting for example through the parallel sides of the fish-plate channel.

[0048] A major advantage of the fish-plate assemblies is that, unlike bolted connections between first and second elements of a truss, there are no stress points at bolt hole locations. The load is transferred between the first and second elongate elements of the truss system of the invention and is spread over the considerable length of the flange elements of the fish-plates.

[0049] Connector plates are driven into the connector plate slots at that end of the truss segment to be joined to the next truss segment and the two segments forced into abutment. This

process is repeated until the required number of truss segments has been connected together. Tensioning cables are then fed through the tensioning channels and tensioned by means of swage studs (not shown) at each end of the truss to secure the truss into a load bearing unit.

[0050] In the case of roofing, trusses are lifted into position on suitable supporting elements at predetermined spacings. Roofing panels are then snap-fitted into the roof panel retaining channels of either or both of elongate first and second elements of adjacent trusses. The roof panels of the system interconnect adjacent ones of the trusses, and the structural properties of the polycarbonate panels of the system are such that no other support is required than that provided by the trusses, with the panels in effect fulfilling the function of purlins.

[0051] The system of the invention thus offers three glazing solutions. Firstly, in a roof construction, polycarbonate roofing panels may be arranged at the upper elongate elements of the truss only, providing a continuous glazed surface over the roof with the trusses exposed from below. Alternatively, roofing panels may be arranged at the lower elongate elements only, providing a continuous glazed surface as viewed from below, leaving the trusses exposed above, while thirdly, panels may be provided at both the upper and lower elongate elements of the trusses.

[0052] Where both an upper and a lower layer of roofing panels are to be supported by the trusses, the lower layer is installed first and may be followed by placing translucent insulation bats to substantially fill the space between the upper and lower roofing panels. Alternatively, as shown in **figure 7**, where only a single layer of panels is required, a modified elongate element 80 with an enclosed section 82 may be used as either the first or second elongate element.

It will be appreciated, especially from **figure 6**, that the closely abutting polycarbonate panels of the lower layer effectively protect the trusses from any corrosive gasses, such as are present in an enclosed swimming pool for example. Similarly an upper layer of panels protect the trusses from the elements.

Second Preferred Embodiment

[0053] In this second embodiment with reference to **figures 8** to 11, in which like features are similarly numbered, truss segments (112) to made up a truss such as shown in **figure 1**, are likewise made up of first and second elongate elements (114) and (116) interconnected at intervals by assemblies of pairs of fish plates 18 (hereinafter referred to as "short fish plates") as described above and shown in **figures 2, 4 and 5**. In this embodiment however, with reference firstly to **figure 8**, a second form of fish plates 118a and 118b ("long fish plates") of a modified configuration are provided in which extension

arms 102 project from the upper and lower extremities of the central portion (104) of the plate.

[0054] Only the central portion (104) of each long fish plate (118a) and (118b) is provided with outwardly projecting
5 flanges (106), (as described for the first embodiment above), at the upper and lower edges of the plate. A series of through holes 108 is provided along the upper and lower portions of the fish plate and along the extension arms 102. If required, depending on the degree of curvature of the elongate elements
10 of the truss to which they are to be applied, the long fish plates may be provided with matching curvature.

[0055] In this embodiment, with reference now to **figure 9** the short fish plates (18a) and (18b) are again inserted and slid into back-to-back association to form fish plate
15 assemblies (18) as before described, to interconnect the elements (114) and (116) of a truss segment (112) at intervals along the segment as required. However, in this embodiment the long fish plate assemblies 118 provide connections between adjoining truss segments.

20 [0056] To join prior assembled truss segments one to another, a long fish plate assembly (118) is inserted into the ends of first and second elongate elements (114) and (116) at the end of one of the two truss segments to be joined. The long fish plate assembly (118) is inserted to half its length as
25 shown in figure 9 and the long fish plates then locked to the elongate elements (114) and (116) by through bolts (120)

passing through pre-drilled holes, (or after drilling the required holes), through flanges (122) and the holes (108) in extension arms (102) of the long fish plate assembly (118).

[0057] The truss segment to be connected (without a long fish plate assembly inserted into the abutting ends of its elongate elements) may then be slid over the projecting sections of the long fish plate assembly (118) projecting from the prepared truss segment and the two segments secured together by similarly bolting through the flanges (120) and the opposite extension arms (102) of the long fish plates.

[0058] The extruded elongate elements (114) and (116) making up the first and second truss elements of a truss segment (112) may be of the same profile as described above and shown in **figures 3 and 6**. Alternatively, truss segments may be formed with elongate element extrusions shown in figures 10 and 11.

[0059] In the case of the extrusion (130) of **figure 10**, the outer portion of the extrusion is provided with a channel structure and snap-in formations to accept the edges of polycarbonate panels as described above and as shown in figure 6. The overall depth of the profile of the extrusion (130) may be selected to suit the load requirements of a particular range of spans for which assembled trusses may be used.

[0060] In an alternative arrangement as shown in **figure 11**, the extrusion (200) making up the first and second elements of a truss segment, may included a panel retaining formation in the form of a projected element (210) in the form of a "T"

extending outward from an upper surface of a hollow section (214). In this arrangement, panels (not shown) are retained between the undersides (216) of the flanges (218) and (220) of the "T" section.

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[0061] Although the above description is mainly focused on the use of the trusses in a roofing context, it will be understood that extensive facades may be provided with a translucent or transparent curtain wall by use of the truss assemblies of the invention arranged in vertical or sloping arrays and similarly combined with panels.

[0062] The above describes only some embodiments of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

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CLAIMS

1. A truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element; said first and second elongate elements interconnected at intervals by a series of fish-plate assemblies; each fish-plate assembly of said series of fish-plate assemblies comprising a pair of fish-plates arranged back-to-back when in use; each fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; said fish-plate channels formed so as to retain said fish-plate assemblies by capture of said flanges when said pair of fish-plates are assembled back-to-back.
2. The truss system of claim 1 wherein each said first and second elongate element of a said truss segment comprises an extruded section; said extruded section including a panel retaining channel and said extruded fish-plate channel.

3. The truss system of claim 1 or 2 wherein a said extruded section further includes a connector plate slot; said connector blade slot adapted for friction fit insertion of a connector plate.
4. The truss system of any one of claims 1 to 3 wherein a said extruded section further includes a cable channel; said cable channel adapted to receive a free-running tensioning cable.
5. The truss system of any one of claims 2 to 4 wherein said panel retaining channel includes panel retaining elements; said panel retaining elements formed along outer edges of said panel retaining channel; said panel retaining elements directed inwards towards a median plane of said panel retaining channel.
6. The truss system of any one of claims 2 to 5 wherein a said truss supports said panels by retaining flange elements of said panels in said panel retaining channels; said panel retaining elements locking respective said flange elements of adjacent said panels into said panel retaining channel as a snap fit.
7. The truss system of any one of claims 2 to 6 wherein a said truss supports said panels along said first elongate elements of said truss.

8. The truss system of any one of claims 2 to 6 wherein a said truss supports said panels along said second elongate element of said truss.
9. The truss system of any one of claims 2 to 6 wherein a said truss supports said panels along both said first and said second elongate elements of said truss.
10. The truss system of any one of claim 2 to 9 wherein said panels interconnect adjacent ones of said trusses; said panels fulfilling the function of purlins.
11. The truss system of any one of claims 1 to 10 wherein said first and second elongate elements of said truss comprise aluminium extrusions.
12. The truss system of any one of claims 1 to 11 wherein fish-plates of said fish-plate assemblies comprise stainless steel pressings.
13. The truss system of any one of claims 4 to 12 wherein said tensioning cable comprises stainless steel wire rope.
14. The truss system of any one of claims 2 to 13 wherein said panels comprise transparent or translucent polymer panels.
15. The truss system of any one of claims 2 to 14 wherein translucent insulating panels are retained between said panels arranged along both said first and said second elongate elements of said truss.

16. A method of providing roofing or curtain walling of a building or area; said method including assembly and erection of trusses; said method including the steps of:

- (a) assembling a required number of truss segments into said trusses; each said segment comprising a first and a second elongate element,
- (b) interconnecting said first and second elongate elements of each said segment with at least one fish-plate assembly; fish-plates of said at least one fish-plate assembly engaging with respective fish-plate channels of said first and second elongate elements;
- (c) connecting abutting ones of said required number of truss segments by insertion of connector plates into connector plate slots of said abutting truss segments,
- (d) passing tensioning cables through cable channels of said first and second elongate elements of said abutting truss segments,
- (e) tensioning said tensioning cables, and

wherein each fish-plate assembly comprises a pair of fish-plates arranged back to back when in use; each said fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer

surface of said planar plate portion; said flanges captured in fish-plate channels provided in each of said first and second elongate element.

17. The method of claim 16, wherein said method further includes the steps of:

- (a) erecting said trusses on suitable supporting elements at predetermined intervals,
- (b) snap-fitting panels into panel retaining channels of either or both of elongate first and second elements of adjacent said truss segments.

18. The method of claim 17 wherein insulating panels are retained between said panels attached to both said first and second elements.

19. A truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element interconnected at intervals by one or more short fish-plate assemblies; each said short fish-plate assembly comprising a pair of fish-plates arranged back-to-back when in use; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; each said fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to

- an outer surface of said planar plate portion; said flanges captured in said fish-plate channels, and wherein abutting truss segments are connected together by means of a long fish-plate assembly.
20. The truss system of claim 19 wherein said long fish-plate assembly comprises a back-to-back assembly of two long fish-plates; each said long fish-plate comprising a central section; said long fish-plate assemblies including extension arms extending from upper and lower portions of said central section; said central section and said extension arms provided with respective upper and lower series of through holes.
21. The truss system of claim 20 wherein said central section is provided with outwardly projecting flange elements at an upper edge and a lower edge of said central section such that when said long fish-plates are assembled in said back to back assembly said outwardly projecting flange elements project outwardly from said assembly.
22. The truss system of claim 21 wherein said outwardly projecting flange elements engage with said extruded fish-plate channels of said first and second elongate elements.
23. The truss system of any one of claims 20 to 22 wherein half of a length of a said long fish-plate assembly is secured in said extruded fish-plate

channels of a first said truss segments by bolts passing through flange elements of said first and second elongate elements and said through holes; a second half of said length of said long fish-plate assembly secured in said fish-plate channels of an adjoining said truss segment by bolts passing through flange elements of said first and second elongate elements and said through holes.

24. A method of securing together adjoining segments of a truss; each said truss segment comprising first and second elongate elements interconnected by short fish-plate assemblies; each of said short fish-plate assemblies comprising a pair of short fish-plates arranged back to back when in use; each of said short fish-plates comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said fish-plates retained in said fish-plate channels by capture of said flanges in said fish-plate channels, said method including the steps of:

- (a) inserting a first pair of extension arms projecting from a central portion of a long fish-plate assembly into fish-plate channels of respective first and second elongate elements of a first said truss segment,

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- (b) securing said long fish-plate assembly in said first and second elongate elements by bolts passing through flanges of said elongate elements and through holes in said extension arms and in said central portion of said fish-plate assembly,
- (c) sliding first and second elongate elements of a said adjoining truss segment onto an opposite second pair of extension arms of said long fish-plate assembly so as to abut corresponding said first and second elongate elements of said first truss segment,
- (d) securing said adjoining truss segment to said long fish-plate assembly by bolts passing through flanges of said elongate elements and through holes in said extension arms and said central portion of said fish-plate assembly, and
- wherein a said long fish-plate assembly comprises a pair of said long fish-plates arranged back-to-back; said long fish-plates including a central portion with extension arms projecting from upper and lower extremities of said central portion; at least said central portion provided along respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said long fish-plates retained in said fish-

plate channels by said flanges captured in said fish-plate channels.

26. A method of assembling fish-plate assemblies to elongate elements of a truss; said truss comprising first and second elongate elements interconnected by a series of said fish-plate assemblies; each said fish-plate assembly comprising a pair of fish-plates arranged in a back-to-back position when in use; said method including the steps of:

- a. inserting first and second fish-plates of each of said series of fish-plate assemblies into a narrow part of a fish-plate channels provided in said first and second elongate element,
- b. sliding said first and second fish-plates together into said back-to-back position, and

wherein each said fish-plate includes a planar plate portion provided along respective upper and lower edges with flanges projecting outwardly from an outer surface of said planar plate portion; said fish-plate channels of sufficient width for insertion of said fish-plates; said fish-plate assembly retained in said in said fish-plate channels by captured of said flanges in said fish-plate channels when said pair of fish-plates are assembled in said back-to-back position.

MARKED UP DESCRIPTION

TRUSS SYSTEM**TECHNICAL FIELD**

[0001] The present invention relates to building structures and, more particularly, to roof truss, roof panelling and
5 curtain wall systems.

BACKGROUND

[0002] The covering of outdoor and indoor areas, as well as building facades, with light transmitting materials is well
10 known, and polymer, typically polycarbonate sheeting or panels for this purpose, are in common use. A range of materials and configurations of supporting members are used to span the area or facade required to be covered. Conventional systems rely on
15 sloping rafters with regular arrays of transverse purlins, the latter providing both stabilising elements and support for the polymer sheeting.

[0003] To span relatively large areas, such as sporting venues for example, requires large and heavy structural timber
20 or steel trusses, adding considerably to the cost of the roof structure.

[0004] The use of timber or steel trusses with the added array of purlins is often undesirable from an aesthetic point of view, and in some environments, such as indoor swimming
25 pools for example, these structural elements can be subject to corrosion and deterioration.

[0005] It is an object of the present invention to address or at least ameliorate some of the above disadvantages.

Notes

5 [0006] The term "comprising" (and grammatical variations thereof) is used in this specification in the inclusive sense of "having" or "including", and not in the exclusive sense of "consisting only of".

10 [0007] The above discussion of the prior art in the Background of the invention, is not an admission that any information discussed therein is citable prior art or part of the common general knowledge of persons skilled in the art in any country.

15 [0008] The term "fish plate" as used in this specification indicates a plate for interconnecting two structural elements, either through interlocking elements or by means of fasteners.

BRIEF DESCRIPTION OF INVENTION

20 [0009] Accordingly, in one broad form of the invention, there is provided a truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element; said first and
25 second elongate elements interconnected at intervals by a series of fish-plate assemblies; each fish-plate assembly of

said series of fish-plate assemblies comprising a pair of fish-plates arranged back-to-back when in use; each fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to
5 an outer surface of said planar plate portion; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; said fish-plate channels formed so as to retain said fish-plate assemblies by capture of said flanges when said pair of fish-
10 plates are assembled back-to-back.

[0010] Preferably, each said first and second elongate element of a said truss segment comprises an extruded section; said extruded section including a panel retaining channel and said extruded fish-plate channel.

15 [0011] Preferably, a said extruded section further includes a connector plate slot; said connector blade slot adapted for friction fit insertion of a connector plate.

[0012] Preferably, a said extruded section further includes a cable channel; said cable channel adapted to receive a free-
20 running tensioning cable.

~~Preferably, each of said series of fish-plate assemblies comprises a pair of fish-plates arranged back to back when in use; each fish-plate of said pair of fish-plates comprising a planar plate portion provided at respective upper and lower~~
25 ~~edges with a flange; said flanges projecting outwardly and normal to an outer surface of said planar plate portion.~~

[0013] Preferably, said panel retaining channel includes panel retaining elements; said panel retaining elements formed along outer edges of said panel retaining channel; said panel retaining elements directed inwards towards a median plane of
5 said panel retaining channel.

[0014] Preferably, a said truss supports said panels by retaining flange elements of said panels in said panel retaining channels; said panel retaining elements locking
10 respective said flange elements of adjacent said panels into said panel retaining channel as a snap fit.

[0015] Preferably, a said truss supports said panels along said first elongate elements of said truss.

[0016] Preferably, a said truss supports said panels along said second elongate element of said truss.

15 [0017] Preferably, a said truss supports said panels along both said first and said second elongate elements of said truss.

[0018] Preferably, said panels interconnect adjacent ones of said trusses; said panels fulfilling the function of purlins.

20 [0019] Preferably, said first and second elongate elements of said truss comprise aluminium extrusions.

[0020] Preferably, fish-plates of said fish-plate assemblies comprise stainless steel pressings.

[0021] Preferably, said tensioning cable comprises stainless
25 steel wire rope.

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[0022] Preferably, said panels comprise transparent or translucent polymer panels.

[0023] Preferably, translucent insulating panels are retained between said panels arranged along both said first and
5 said second elongate elements of said truss.

[0024] In another broad form of the invention, there is provided a method of providing roofing or curtain walling of a building or area; said method including assembly and erection of trusses; said method including the steps of:

- 10 (a) assembling a required number of truss segments into said trusses; each said segment comprising a first and a second elongate element,
- (b) interconnecting said first and second elongate elements of each said segment with at least one fish-plate
15 assembly; fish-plates of said at least one fish-plate assembly engaging with respective fish-plate channels of said first and second elongate elements;
- (c) connecting abutting ones of said required number of truss segments by insertion of connector plates into
20 connector plate slots of said abutting truss segments,
- (d) passing tensioning cables through cable channels of said first and second elongate elements of said abutting truss segments,
- (e) tensioning said tensioning cables, and
- 25 wherein each fish-plate assembly comprises a pair of fish-plates arranged back to back when in use; each said fish-

plate comprising a planar plate portion provided at
respective upper and lower edges with flanges projecting
outwardly and normal to an outer surface of said planar
plate portion; said flanges captured in fish-plate channels
5 provided in each of said first and second elongate element.

[0025] Preferably, said method further includes the steps
of:

- (a) erecting said trusses on suitable supporting elements
at predetermined intervals,
- 10 (b) snap-fitting panels into panel retaining channels of
either or both of elongate first and second elements of
adjacent said truss segments.

[0026] Preferably, insulating panels are retained between
said panels attached to both said first and second elements.

15 In another broad form of the invention, there is provided a
truss system for roof or façade panelling of a building; a
truss of said truss system including at least one truss
segment; each said truss segment comprising a first elongate
element and a second elongate element interconnected at
20 intervals by one or more short fish-plate assemblies; each said
short fish-plate assembly comprising a pair of fish-plates
arranged back-to-back when in use; said fish-plate assemblies
engaging with respective extruded fish-plate channels of said
first and second elongate elements; each said fish-plate
25 comprising a planar plate portion provided at respective upper
and lower edges with flanges projecting outwardly and normal to

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an outer surface of said planar plate portion; said flanges
captured in said fish-plate channels, and wherein abutting
truss segments are connected together by means of a long fish-
plate assembly.

5 [0027] Preferably, said long fish-plate assembly comprises a
back-to-back assembly of two long fish-plates; each said long
fish-plate comprising a central section; said long fish-plate
assemblies including ~~and~~ extension arms extending from upper
and lower portions of said central section; said central
10 section and said extension arms provided with respective upper
and lower series of through holes.

[0028] Preferably, said central section is provided with
outwardly projecting flange elements at an upper edge and a
lower edge of said central section such that when said long
15 fish-plates are assembled in said back to back assembly said
outwardly projecting flange elements project outwardly from
said assembly.

[0029] Preferably, said outwardly projecting flange elements
engage with said extruded fish-plate channels of said first and
20 second elongate elements.

[0030] Preferably, half of a length of a said long fish-
plate assembly is secured in said extruded fish-plate channels
of a first said truss segments by bolts passing through flange
elements of said first and second elongate elements and said
15 through holes; a second half of said length of said long fish-
plate assembly secured in said fish-plate channels of an

adjoining said truss segment by bolts passing through flange elements of said first and second elongate elements and said through holes.

[0031] In another broad form of the invention, there is
5 provided a method of securing together adjoining segments of a truss; each said truss segment comprising first and second elongate elements interconnected by short fish-plate assemblies; each of said short fish-plate assemblies comprising a pair of short fish-plates arranged back to back when in use;
10 each of said short fish-plates comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said fish-plates retained in said fish-plate channels by capture of said flanges in said fish-
15 plate channels, said method including the steps of:

- (a) inserting a first pair of extension arms projecting from a central portion of a long fish-plate assembly into fish-plate channels of respective first and second elongate elements of a first said truss segment,
- 20 (b) securing said long fish-plate assembly in said first and second elongate elements by bolts passing through flanges of said elongate elements and through holes in said extension arms and in said central portion of said fish-plate assembly,
- 25 (c) sliding first and second elongate elements of a said adjoining truss segment onto an opposite second pair of

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extension arms of said long fish-plate assembly so as to abut corresponding said first and second elongate elements of said first truss segment,

(d) securing said adjoining truss segment to said long fish-plate assembly by bolts passing through flanges of said elongate elements and through holes in said extension arms and said central portion of said fish-plate assembly, and

wherein a said long fish-plate assembly comprises a pair of said long fish-plates arranged back-to-back; said long fish-plates including a central portion with extension arms projecting from upper and lower extremities of said central portion; at least said central portion provided along respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said long fish-plates retained in said fish-plate channels by said flanges captured in said fish-plate channels.

[0032] In another broad form of the invention there is provided a method of assembling fish-plate assemblies to elongate elements of a truss; said truss comprising first and second elongate elements interconnected by a series of said fish-plate assemblies; each said fish-plate assembly comprising a pair of fish-plates arranged in a back-to-back position when in use; said method including the steps of:

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a. inserting first and second fish-plates of each of said series of fish-plate assemblies into a narrow part of a fish-plate channels provided in said first and second elongate element,

5 b. sliding said first and second fish-plates together into said back-to-back position, and

wherein each said fish-plate includes a planar plate portion provided along respective upper and lower edges with flanges projecting outwardly from an outer surface of said planar plate portion; said fish-plate channels of sufficient width for insertion of said fish-plates; said fish-plate assembly retained in said in said fish-plate channels by captured of said flanges in said fish-plate channels when said pair of fish-plates are assembled in said back-to-back position.

BRIEF DESCRIPTION OF DRAWINGS

[0033] Embodiments of the present invention will now be described with reference to the accompanying drawings wherein:

Figure 1, is a side view of an exemplary truss according to a preferred embodiment of the invention,

Figure 2 is a perspective view of portion of a truss segment of the truss of figure 1,

Figure 3 is an end view of an extrusion forming first and second elongate elements of a truss segment,

Figures 4 and 5 are side and end views respectively of one of a pair of fish-plate components of the truss system,

Figure 6 is a sectioned view of a portion of a roof formed with the truss system of the invention,

Figure 7 is a perspective view of a portion of a truss segment in which one of first and second elongate elements
5 includes an enclosed section,

Figure 8 is a side view of one of a pair of fish plate components according to a second preferred embodiment of the invention,

Figure 9 is a perspective view of a pair of fish plates of
10 figure 8 assembled to the ends of extrusions forming first and second elongate elements of a portion of a truss segment,

Figures 10 and 11 are end views of alternative extrusions forming either one of the elongate elements forming a truss segment.

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DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

First Preferred Embodiment

[0034] With reference to **figure 1**, the truss system of the present invention comprises a truss (10) formed of one or more
20 arched truss segments (12) which may be interconnected together to form the truss (10) for support of roofing over a building (not shown) or area, or, when in straight, non arched sections, form the support for a curtain wall.

[0035] Each of the truss segments (12) comprises a first
25 elongate element (14) and a second elongate element (16), which are interconnected at intervals by a series of fish-plate

assemblies (18). As can be seen in **figures 2 to 5**, fish-plate assemblies (18) are assembled in sliding engagement with respective extruded fish-plate channels (20) respectively of the first and second elongate elements, (14) and (16).

5 [0036] Preferably, as best seen in **figure 3**, each of the first and second elongate elements (14) and (16) of a truss segment (12), comprises an identical extruded aluminium section which includes a roof (or wall) panel retaining channel (24), as well as the fish-plate channel (20). Depending on the
10 application, the truss elements (14) and (16) may be straight for relatively short spans or curtain walls, or curved to span large roof or covered areas as shown in **figure 1**.

[0037] The extruded section of the elongate elements (14) and (16) further includes a connector plate slot (26) which is
15 adapted for friction fit insertion of a connector plate (28). Also included in each extruded section is a cable channel (30) which is adapted to receive a free-running tensioning cable (32).

[0038] With reference to **figures 2 to 5**, each of the fish-plate assemblies (18) in the series of fish-plate assemblies of
20 a truss segment (12), comprises a pair of fish-plates, (18a,18b), arranged back-to-back when assembled to the first and second elongate extruded elements (14,16). Each fish-plate (18a,18b) of the paired fish-plates comprises a planar plate
25 portion (40) which is provided at its respective upper and lower edges with identical flanges (42,44), which project

outwardly and normal to the outer surface of the planar plate portion (40).

[0039] As can be seen from **figures 2 and 3**, the fish-plate channel (20) is so formed as to retain the fish-plate assembly (18) of fish-plates (18a,18b) by capture of the flanges (42,44) when both are located back-to-back in the channel (20). The inner, that is, the narrow part of the fish-plate channel is of a width sufficient to allow insertion of the first of the pair of fish-plates. The second of the pair may also be inserted into the opposing channels adjacent to the first fish-plate. The pair may then be slid together into the back-to-back position shown in fig 2, to complete the fish-plate assembly.

[0040] It will be understood that the fish-plates may be made in a range of sizes so as to adapt the depth of the truss to suit the required span, wind load factors and other design parameters.

[0041] Preferably, both the connector plates (28) and the pairs of fish-plates (18a,18b) are of stainless steel, with the tensioning cables (32) also of stainless steel.

[0042] As best seen in **figures 3 and 6**, the roof (or wall) panel retaining channel (24) includes panel retaining elements (46,48) formed along the outer edges (50,52) of the panel retaining channel (24). These panel retaining elements (46,48) are directed inwards towards the median plane (54) of the panel retaining channel, and are formed to allow insertion of retaining flange elements (56,58) of adjacent panels (60,62)

into the panel retaining channel (24) as shown in **figure 6**. The panel retaining elements (46,48) lock the respective flange elements (56,58) of the adjacent panels (60,62) into the panel retaining channel as a snap fit.

5 [0043] As can also be seen from **figure 6**, the truss (10) may support panels (60,62) along the upper of the two elongate elements (14) of the truss in a roofing application of the invention. Alternatively, or in addition, panels (60,62) may be supported along the lower elongate elements (16). In the former
10 case, the close abutment between the adjacent panels provides for a continuous cover over the truss (10) when viewed from above (or from outside in the case of a curtain wall). Similarly, panels supported by the lower elongate elements (14) completely cover the truss (10) when viewed from below (or from
15 inside).

In Use

[0044] The panels adapted for use with the truss system of the invention, may be of metal, but are preferably of opaque or
20 translucent polymer, more preferably polycarbonate, sheeting provided with the edge flanges suited to engagement with the panel retaining channels of the truss.

[0045] For large spans, the aluminium extrusions of the first and second elements of the truss segments may be roll
25 formed into an arcuate form so that when the segments are

assembled, the truss forms an arch over the building or area to be covered.

[0046] To assemble a truss, firstly the required number of truss segments is assembled. This is effected by placing the first and second elongate elements of each truss segment side by side with the fish-plate channels facing each other. The first fish-plates of the series of fish-plate assemblies for that truss segment are then placed into the opposing channels. At this stage the first and second elongate elements are not locked together and the corresponding second fish-plates of each back-to-back pair may also be inserted into the opposing channels adjacent their opposite plates.

[0047] The second fish-plates are then slid into their back-to-back positions to complete the fish-plate assemblies and lock the first and second elongate elements together, as the retaining flange elements then lock into the fish-plate channels. Assemblies may be secured in position by riveting for example through the parallel sides of the fish-plate channel.

[0048] A major advantage of the fish-plate assemblies is that, unlike bolted connections between first and second elements of a truss, there are no stress points at bolt hole locations. The load is transferred between the first and second elongate elements of the truss system of the invention and is spread over the considerable length of the flange elements of the fish-plates.

[0049] Connector plates are driven into the connector plate slots at that end of the truss segment to be joined to the next truss segment and the two segments forced into abutment. This process is repeated until the required number of truss segments has been connected together. Tensioning cables are then fed through the tensioning channels and tensioned by means of swage studs (not shown) at each end of the truss to secure the truss into a load bearing unit.

[0050] In the case of roofing, trusses are lifted into position on suitable supporting elements at predetermined spacings. Roofing panels are then snap-fitted into the roof panel retaining channels of either or both of elongate first and second elements of adjacent trusses. The roof panels of the system interconnect adjacent ones of the trusses, and the structural properties of the polycarbonate panels of the system are such that no other support is required than that provided by the trusses, with the panels in effect fulfilling the function of purlins.

[0051] The system of the invention thus offers three glazing solutions. Firstly, in a roof construction, polycarbonate roofing panels may be arranged at the upper elongate elements of the truss only, providing a continuous glazed surface over the roof with the trusses exposed from below. Alternatively, roofing panels may be arranged at the lower elongate elements only, providing a continuous glazed surface as viewed from below, leaving the trusses exposed above, while thirdly, panels

may be provided at both the upper and lower elongate elements of the trusses.

[0052] Where both an upper and a lower layer of roofing panels are to be supported by the trusses, the lower layer is installed first and may be followed by placing translucent insulation bats to substantially fill the space between the upper and lower roofing panels. Alternatively, as shown in **figure 7**, where only a single layer of panels is required, a modified elongate element 80 with an enclosed section 82 may be used as either the first or second elongate element.

It will be appreciated, especially from **figure 6**, that the closely abutting polycarbonate panels of the lower layer effectively protect the trusses from any corrosive gasses, such as are present in an enclosed swimming pool for example. Similarly an upper layer of panels protect the trusses from the elements.

Second Preferred Embodiment

[0053] In this second embodiment with reference to **figures 8 to 11**, in which like features are similarly numbered, truss segments (112) to made up a truss such as shown in **figure 1**, are likewise made up of first and second elongate elements (114) and (116) interconnected at intervals by assemblies of pairs of fish plates 18 (hereinafter referred to as "short fish plates") as described above and shown in **figures 2, 4 and 5**. In this embodiment however, with reference firstly to **figure 8**, a second form of fish plates 118a and 118b ("long fish plates")

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of a modified configuration are provided in which extension arms 102 project from the upper and lower extremities of the central portion (104) of the plate.

[0054] Only the central portion (104) of each long fish plate (118a) and (118b) is provided with outwardly projecting flanges (106), (as described for the first embodiment above), at the upper and lower edges of the plate. A series of through holes 108 is provided along the upper and lower portions of the fish plate and along the extension arms 102. If required, depending on the degree of curvature of the elongate elements of the truss to which they are to be applied, the long fish plates may be provided with matching curvature.

[0055] In this embodiment, with reference now to **figure 9** the short fish plates (18a) and (18b) are again inserted and slid into back-to-back association to form fish plate assemblies (18) as before described, to interconnect the elements (114) and (116) of a truss segment (112) at intervals along the segment as required. However, in this embodiment the long fish plate assemblies 118 provide connections between adjoining truss segments.

[0056] To join prior assembled truss segments one to another, a long fish plate assembly (118) is inserted into the ends of first and second elongate elements (114) and (116) at the end of one of the two truss segments to be joined. The long fish plate assembly (118) is inserted to half its length as shown in figure 9 and the long fish plates then locked to the

elongate elements (114) and (116) by through bolts (120) passing through pre-drilled holes, (or after drilling the required holes), through flanges (122) and the holes (108) in extension arms (102) of the long fish plate assembly (118).

5 [0057] The truss segment to be connected (without a long fish plate assembly inserted into the abutting ends of its elongate elements) may then be slid over the projecting sections of the long fish plate assembly (118) projecting from the prepared truss segment and the two segments secured
10 together by similarly bolting through the flanges (120) and the opposite extension arms (102) of the long fish plates.

[0058] The extruded elongate elements (114) and (116) making up the first and second truss elements of a truss segment (112) may be of the same profile as described above and shown in
15 **figures 3 and 6**. Alternatively, truss segments may be formed with elongate element extrusions shown in figures 10 and 11.

[0059] In the case of the extrusion (130) of **figure 10**, the outer portion of the extrusion is provided with a channel structure and snap-in formations to accept the edges of
20 polycarbonate panels as described above and as shown in figure 6. The overall depth of the profile of the extrusion (130) may be selected to suit the load requirements of a particular range of spans for which assembled trusses may be used.

[0060] In an alternative arrangement as shown in **figure 11**,
25 the extrusion (200) making up the first and second elements of a truss segment, may included a panel retaining formation in

the form of a projected element (210) in the form of a "T" extending outward from an upper surface of a hollow section (214). In this arrangement, panels (not shown) are retained between the undersides (216) of the flanges (218) and (220) of
5 the "T" section.

[0061] Although the above description is mainly focused on the use of the trusses in a roofing context, it will be understood that extensive facades may be provided with a
10 translucent or transparent curtain wall by use of the truss assemblies of the invention arranged in vertical or sloping arrays and similarly combined with panels.

[0062] The above describes only some embodiments of the present invention and modifications, obvious to those skilled
15 in the art, can be made thereto without departing from the scope of the present invention.

MARKED UP CLAIMS

1. A truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second elongate element; said first and second elongate elements interconnected at intervals by a series of fish-plate assemblies; each fish-plate assembly of said series of fish-plate assemblies comprising a pair of fish-plates arranged back-to-back when in use; each fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; said fish-plate channels formed so as to retain said fish-plate assemblies by capture of said flanges when said pair of fish-plates are assembled back-to-back.
2. The truss system of claim 1 wherein each said first and second elongate element of a said truss segment comprises an extruded section; said extruded section including a panel retaining channel and said extruded fish-plate channel.

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3. The truss system of claim 1 or 2 wherein a said extruded section further includes a connector plate slot; said connector blade slot adapted for friction fit insertion of a connector plate.
 4. The truss system of any one of claims 1 to 3 wherein a said extruded section further includes a cable channel; said cable channel adapted to receive a free-running tensioning cable.
 5. ~~The truss system of any one of claims 1 to 4 wherein each of said series of fish-plate assemblies comprises a pair of fish-plates arranged back to back when in use; each fish-plate of said pair of fish-plates comprising a planar plate portion provided at respective upper and lower edges with a flange; said flanges projecting outwardly and normal to an outer surface of said planar plate portion.~~
 6. The truss system of any one of claims 2 to 5 wherein said panel retaining channel includes panel retaining elements; said panel retaining elements formed along outer edges of said panel retaining channel; said panel retaining elements directed inwards towards a median plane of said panel retaining channel.
 7. The truss system of any one of claims 2 to 6 wherein a said truss supports said panels by retaining flange elements of said panels in said panel retaining channels; said panel retaining elements locking

respective said flange elements of adjacent said panels into said panel retaining channel as a snap fit.

8. The truss system of any one of claims 2 to 7 wherein a said truss supports said panels along said first elongate elements of said truss.
9. The truss system of any one of claims 2 to 7 wherein a said truss supports said panels along said second elongate element of said truss.
10. The truss system of any one of claims 2 to 7 wherein a said truss supports said panels along both said first and said second elongate elements of said truss.
11. The truss system of any one of claim 2 to 10 wherein said panels interconnect adjacent ones of said trusses; said panels fulfilling the function of purlins.
12. The truss system of any one of claims 1 to 11 wherein said first and second elongate elements of said truss comprise aluminium extrusions.
13. The truss system of any one of claims 1 to 12 wherein fish-plates of said fish-plate assemblies comprise stainless steel pressings.
14. The truss system of any one of claims 4 to 13 wherein said tensioning cable comprises stainless steel wire rope.

15. The truss system of any one of claims 2 to 14 wherein said panels comprise transparent or translucent polymer panels.
16. The truss system of any one of claims 2 to 15 wherein translucent insulating panels are retained between said panels arranged along both said first and said second elongate elements of said truss.
17. A method of providing roofing or curtain walling of a building or area; said method including assembly and erection of trusses; said method including the steps of:
- (a) assembling a required number of truss segments into said trusses; each said segment comprising a first and a second elongate element,
 - (b) interconnecting said first and second elongate elements of each said segment with at least one fish-plate assembly; fish-plates of said at least one fish-plate assembly engaging with respective fish-plate channels of said first and second elongate elements;
 - (c) connecting abutting ones of said required number of truss segments by insertion of connector plates into connector plate slots of said abutting truss segments,

(d) passing tensioning cables through cable channels of said first and second elongate elements of said abutting truss segments,

(e) tensioning said tensioning cables, and

wherein each fish-plate assembly comprises a pair of fish-plates arranged back to back when in use; each said fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said flanges captured in fish-plate channels provided in each of said first and second elongate element.

18. The method of claim 17, wherein said method further includes the steps of:

(a) erecting said trusses on suitable supporting elements at predetermined intervals,

(b) snap-fitting panels into panel retaining channels of either or both of elongate first and second elements of adjacent said truss segments.

19. The method of claim 18 wherein insulating panels are retained between said panels attached to both said first and second elements.

20. A truss system for roof or façade panelling of a building; a truss of said truss system including at least one truss segment; each said truss segment comprising a first elongate element and a second

elongate element interconnected at intervals by one or more short fish-plate assemblies; each said short fish-plate assembly comprising a pair of fish-plates arranged back-to-back when in use; said fish-plate assemblies engaging with respective extruded fish-plate channels of said first and second elongate elements; each said fish-plate comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said flanges captured in said fish-plate channels, and wherein abutting truss segments are connected together by means of a long fish-plate assembly.

21. The truss system of claim 20 wherein said long fish-plate assembly comprises a back-to-back assembly of two long fish-plates; each said long fish-plate comprising a central section; said long fish-plate assemblies including ~~and~~ extension arms extending from upper and lower portions of said central section; said central section and said extension arms provided with respective upper and lower series of through holes.
22. The truss system of claim 21 wherein said central section is provided with outwardly projecting flange elements at an upper edge and a lower edge of said central section such that when said long fish-plates are assembled in said back to back assembly said

outwardly projecting flange elements project outwardly from said assembly.

23. The truss system of claim 22 wherein said outwardly projecting flange elements engage with said extruded fish-plate channels of said first and second elongate elements.

24. The truss system of any one of claims 21 to 23 wherein half of a length of a said long fish-plate assembly is secured in said extruded fish-plate channels of a first said truss segments by bolts passing through flange elements of said first and second elongate elements and said through holes; a second half of said length of said long fish-plate assembly secured in said fish-plate channels of an adjoining said truss segment by bolts passing through flange elements of said first and second elongate elements and said through holes.

25. A method of securing together adjoining segments of a truss; each said truss segment comprising first and second elongate elements interconnected by short fish-plate assemblies; each of said short fish-plate assemblies comprising a pair of short fish-plates arranged back to back when in use; each of said short fish-plates comprising a planar plate portion provided at respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of

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said planar plate portion; said fish-plates retained
in said fish-plate channels by capture of said flanges
in said fish-plate channels, said method including the
steps of:

- (a) inserting a first pair of extension arms projecting from a central portion of a long fish-plate assembly into fish-plate channels of respective first and second elongate elements of a first said truss segment,
- (b) securing said long fish-plate assembly in said first and second elongate elements by bolts passing through flanges of said elongate elements and through holes in said extension arms and in said central portion of said fish-plate assembly,
- (c) sliding first and second elongate elements of a said adjoining truss segment onto an opposite second pair of extension arms of said long fish-plate assembly so as to abut corresponding said first and second elongate elements of said first truss segment,
- (d) securing said adjoining truss segment to said long fish-plate assembly by bolts passing through flanges of said elongate elements and through holes in said extension arms and said central portion of said fish-plate assembly, and

wherein a said long fish-plate assembly comprises a pair of said long fish-plates arranged back-to-back; said long fish-plates including a central portion with extension arms projecting from upper and lower extremities of said central portion; at least said central portion provided along respective upper and lower edges with flanges projecting outwardly and normal to an outer surface of said planar plate portion; said long fish-plates retained in said fish-plate channels by said flanges captured in said fish-plate channels.

26. A method of assembling fish-plate assemblies to elongate elements of a truss; said truss comprising first and second elongate elements interconnected by a series of said fish-plate assemblies; each said fish-plate assembly comprising a pair of fish-plates arranged in a back-to-back position when in use; said method including the steps of:

- a. inserting first and second fish-plates of each of said series of fish-plate assemblies into a narrow part of a fish-plate channels provided in said first and second elongate element,
 - b. sliding said first and second fish-plates together into said back-to-back position, and
- wherein each said fish-plate includes a planar plate portion provided along respective upper and lower

edges with flanges projecting outwardly from an outer surface of said planar plate portion; said fish-plate channels of sufficient width for insertion of said fish-plates; said fish-plate assembly retained in said in said fish-plate channels by captured of said flanges in said fish-plate channels when said pair of fish-plates are assembled in said back-to-back position.

f1

SISTEMA DE CERCHAS

CAMPO TÉCNICO

5 La presente invención se refiere a estructuras de construcción y, más particularmente, a cerchas, empanelado de techos y sistemas de muros de cortina.

ANTECEDENTES DE LA INVENCION

10 Se conoce bien el recubrimiento de áreas interiores y exteriores, así como de las fachadas de las construcciones, con materiales de transmisión de luz, y para este fin, los polímeros, típicamente láminas o paneles de policarbonato, son de uso común. Una gran variedad de materiales y configuraciones de elementos de soporte se utilizan para abarcar
15 la área o fachada que se requiere cubrir. Los sistemas convencionales se basan en el encuadramiento, por lo general, en el caso de estructuras de techo, comprendiendo cabios inclinados con arreglos regulares de viguetas transversales, este último proporciona tanto los elementos estabilizadores como de soporte para el laminado polimérico.

20 Para abarcar áreas relativamente grandes, tales como centros deportivos por ejemplo, se requieren vigas o cerchas estructurales de acero grandes y pesadas, aumentando considerablemente el costo de la estructura del techo.

25 La utilización de las vigas o cerchas de acero con el arreglo agregado de viguetas a menudo no es deseable desde el punto de vista estético, y, en algunos entornos, tales como piscinas cubiertas por ejemplo, esos elementos estructurales pueden estar sujetos a la corrosión y el deterioro.

2

Es un objetivo de la presente invención resolver o por lo menos aminorar algunas de las desventajas anteriores.

Notas

5 El término "comprende" (y sus variaciones gramaticales) se utiliza en esta especificación en el sentido más amplio de "tener" o "incluir", y no en el sentido exclusivo de "consiste sólo de".

La discusión anterior de la técnica previa en los antecedentes de la invención, no es una admisión de que cualquier información que se discute
10 en ella es arte previo citable o parte de los conocimientos generales comunes de las personas expertas en la técnica en cualquier país.

El término "cubrejunta" como se utiliza en esta especificación indica una placa para la interconexión de dos elementos estructurales, ya sea
a través de elementos de interbloqueo o por medio de sujetadores.

15

BREVE DESCRIPCIÓN DE LA INVENCION

En consecuencia, en una primera forma general de la invención, se proporciona un sistema de cercha para el empanelado del techo o de fachada de una construcción; una cercha de dicho sistema de cerchas incluye por lo menos un segmento de cercha; cada uno de dichos segmentos de cercha comprende un primer elemento alargado y un segundo elemento alargado, dicho primero y segundo elementos alargados están interconectados a intervalos, por una serie de ensambles de cubrejuntas; dichos ensambles de cubrejuntas se conectan con respectivos canales de cubrejuntas de dicho primero y segundo elementos alargados.

Preferiblemente, cada uno dicho primero y segundo elementos alargados de dicho segmento de cercha comprende una sección extruida; dicha sección extruida, incluye un canal de panel de retención y dicho canal de cubrejunta extruido.

Preferiblemente, dicha sección extruida incluye, además, una ranura de placa conectora, dicha ranura de hoja conectora está adaptada para ajuste por fricción de inserción de una placa conectora.

Preferiblemente, dicha sección extruida incluye además un canal de cable, dicho canal de cable está adaptado para recibir un cable tensor de carrera libre.

Preferiblemente, cada una de dichas series de ensambles de cubrejuntas comprende un par de cubrejuntas dispuestos a parte posterior a parte posterior cuando están en uso; cada cubrejuntas de dicho par de cubrejuntas comprende una parte de placa planar proporcionada en los bordes superior e inferior respectivos con una brida, dichas bridas se proyectan hacia el exterior y son normales a la superficie externa de dicha parte de placa planar.

4

Preferiblemente, dicho canal de retención de panel incluye elementos de retención; dichos elementos de retención están formados a lo largo de los bordes exteriores de dicho panel de retención; dichos elementos de retención de panel están dirigidos hacia adentro, hacia un plano medio de dicho canal de retención de panel.

Preferiblemente, dicha cercha soporta dichos paneles por medio de elementos de brida de dichos paneles en dichos canales de retención de panel; dichos elementos de retención de panel bloquean dichos respectivos elementos de brida de dichos paneles adyacentes dentro de dicho canal de retención de panel como un ajuste a presión

Preferiblemente, dicha cercha soporta dichos paneles a lo largo de dichos primeros elementos alargados de dicha cercha.

Preferiblemente, dicha cercha soporta dichos paneles a lo largo de dicho segundo elemento alargado de dicha cercha.

Preferiblemente, dicha cercha soporta dichos paneles a lo largo de ambos de dichos primero y segundo elementos alargados de dicha cercha.

Preferiblemente, dichos paneles interconectan unos adyacentes de dichas cerchas; dichos paneles cumplen la función de viguetas.

Preferiblemente, dichos primero y segundo elementos alargados de dicha cercha comprenden extrusiones de aluminio.

Preferiblemente, las cubrejuntas de dichos ensambles de cubrejuntas comprenden piezas estampadas de acero inoxidable.

Preferiblemente, dicho cable tensor de cables de acero inoxidable.

Preferiblemente, dichos paneles comprenden paneles poliméricos transparentes o translúcidos.

5

Preferiblemente, se retienen paneles translúcidos aislantes entre dichos paneles dispuestos a lo largo tanto de dicho primero como del segundo elementos alargados de dicha cercha.

En otra forma general de la invención, se proporciona un
5 método para proporcionar techado o enmurado de cortina de una construcción o área; dicho método incluye el ensamble y el montaje de cerchas; dicho método incluye los pasos de:

(a) ensamblar un número requerido de segmentos de cercha dentro de dichas cerchas; cada uno de dichos segmentos comprende un
10 primero y un segundo elementos alargados,

(b) interconectar dicho primero y segundo elementos alargados de cada uno de dichos segmentos con por lo menos un ensamble de cubrejuntas; los cubrejuntas de dicho por lo menos un ensamble de cubrejuntas se conectan con canales de cubrejuntas respectivos de dicho
15 primero y segundo elementos alargados;

(c) conectar los segmentos de cercha colindantes de dicho número requerido de segmentos de cercha mediante la inserción de placas conectoras en las ranuras de placas conectoras de dichos segmentos de cercha colindantes,

20 (d) pasar cables tensores a través de canales de cable de dicho primero y segundo elementos alargados de dichos segmentos de cercha colindantes,

(e) tensar dichos cables tensores.

Preferiblemente, dicho método incluye además los pasos de:

25 (a) montar dichas cerchas en elementos de soporte a intervalos predeterminados,

(b) ajustar a presión los paneles en los canales de retención de panel de cualquiera o ambos del primero y segundo elementos alargados de dichos segmentos de cercha adyacentes.

Preferiblemente, se retienen los paneles aislantes entre dichos
5 paneles unidos tanto a dicho primero como a dicho segundo elementos.

En otra forma general de la invención, se proporciona un sistema de cercha para un empanelado de techo o fachada de una construcción; una cercha de dicho sistema de cerchas, incluye por lo menos un segmento de cercha; cada segmento de cercha comprende un primer elemento alargado y
10 un segundo elemento alargado interconectados a intervalos por uno o más ensambles de cubrejuntas cortos; dichos ensambles de cubrejuntas se conectan con respectivos canales de cubrejuntas extruidos de dichos primero y segundo elementos alargados, y en donde los segmentos de cercha colindantes están conectados entre sí a través de un ensamble de cubrejuntas
15 largo.

Preferiblemente, dicho ensamble de cubrejunta comprende un ensamble de parte posterior a parte posterior de dos cubrejuntas largos; cada uno de dichos cubrejuntas largos comprende una sección central y brazos de extensión que se extienden desde partes superior e inferior de dicha parte
20 central; dicha sección central y dichos brazos de extensión están provistos con respectivas series de orificios pasantes superiores e inferiores.

Preferiblemente, dicha sección central está provista con elementos de brida que se proyectan hacia afuera en un borde superior y un borde inferior de dicha sección central de manera que cuando dichas
25 cubrejuntas largas son ensambladas en dicho ensamble de parte posterior a parte posterior, dichos elementos de brida que se proyectan hacia afuera se proyectan hacia afuera desde dicho ensamble.

Preferiblemente, dichos elementos de brida que se proyectan hacia afuera se conectan con dichos canales de cubrejunta extruida de dicho primero y segundo elementos alargados.

Preferiblemente, una mitad de la longitud de dicho ensamble de cubrejuntas está fijado en dichos canales de cubrejuntas extruidos de un primero de dichos segmentos de cercha por pernos que pasan a través de los elementos de brida de dicho primero y segundo elementos alargados y dichos orificios pasantes; una segunda mitad de dicha longitud de dicho ensamble de cubrejuntas largos fijado en dichos canales de cubrejuntas de uno de dichos segmentos de cercha adyacentes por pernos que pasan a través de los elementos de brida dicho primero y segundo elementos alargados y dichos orificios pasantes.

En otra forma general de la invención, se proporciona un método para fijar conjuntamente segmentos contiguos de una cercha; cada segmento de cercha comprende primero y segundo elementos alargados interconectados por ensambles de cubrejuntas cortos; dicho método incluye los pasos de:

(a) insertar un primer par de brazos de extensión que se proyectan desde una parte central de un ensamble de cubrejuntas largos en canales de cubrejuntas de respectivos primero y segundo elementos alargados de un primero de dichos segmentos de cercha,

(b) fijar dicho ensamble de cubrejuntas largos en dicho primero y segundo elementos alargados por pernos que pasan a través de las bridas de dichos elementos alargados y a través de orificios pasantes en dichos brazos de extensión y en dicha parte central de dicho ensamble de cubrejuntas,

(c) deslizar primero y segundo elementos alargados de dicho segmento de cercha contiguo sobre un segundo par opuesto de brazos de extensión de dicho ensamble de cubrejuntas largos a modo de hacer

colindantes correspondientes dichos primero y segundo elementos alargados de dicho primer segmento de cercha,

(d) fijar dicho segmento de cercha adyacente a dicho ensamble de cubrejuntas largos por pernos que pasan a través de las bridas de dichos
5 elementos alargados y través de los orificios pasantes en dichos brazos de extensión y dicha parte central de montaje de dicho ensamble de cubrejuntas.

BREVE DESCRIPCIÓN DE LOS DIBUJOS

10 Ahora se describirán las modalidades de la invención presente con referencia a los dibujos anexos, en los cuales:

La figura 1, es una vista lateral de una cercha ejemplar de acuerdo a una modalidad preferida de la invención,

La figura 2 es una vista en perspectiva de una parte de un
15 segmento de cercha de la figura 1,

La figura 3 es una vista del extremo de una extrusión que forma el primero y segundo elementos alargados de un segmento de cercha,

Las figuras 4 y 5 son vistas lateral y del extremo, respectivamente, de un par de componentes de cubrejuntas del sistema de
20 cerchas,

La figura 6 es una vista seccionada de una parte de un techo formado con el sistema de cerchas de la invención,

La figura 7 es una vista en perspectiva de una parte de un segmento de cercha en el que uno del primero y segundo elementos
25 alargados incluye una sección cerrada,

La figura 8 es una vista lateral de uno de un par de componentes de cubrejuntas de acuerdo con una segunda modalidad preferida de la invención,

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La figura 9 es una vista en perspectiva de un par de cubrejuntas de la figura 8 ensamblados en los extremos de extrusiones que forman el primero y segundo elementos alargados de una parte de un segmento de cercha,

5 Las figuras 10 y 11 son vistas de extremos de extrusiones alternativas que forman cualquiera de los elementos alargados que forman un segmento de cercha.

DESCRIPCIÓN DETALLADA DE LA INVENCION

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Primera modalidad preferida

Con referencia a la figura 1, el sistema de cerchas de la presente invención comprende una cercha (10) formada por uno o más segmentos arqueados de cercha (12), que pueden ser interconectados entre

15 sí para formar la cercha (10) para el soporte del techo sobre una construcción (no se muestra) o área, o bien, cuando se encuentre en secciones rectas, no arqueadas, forman el soporte para un muro de cortina.

Cada uno de los segmentos de cercha (12) comprende un primer elemento alargado (14) y un segundo elemento alargado (16), que

20 están interconectados a intervalos por una serie de ensambles de cubrejuntas (18). Como se puede observar en las figuras 2 a 5, los ensambles de cubrejuntas (18) están ensamblados en conexión deslizante con respectivos canales de cubrejuntas extruidos (20), respectivamente del primero y segundo elementos alargados, (14) y (16).

25 Preferiblemente, como mejor puede verse en la figura 3, cada uno del primero y segundo elementos alargados (14) y (16) de un segmento de cercha (12), comprende una sección idéntica de aluminio extruido que incluye un canal de retención de techo (o pared) (24), así como los canales de

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cubrejuntas (20). Dependiendo de la aplicación, los elementos de cercha (14) y (16) pueden ser rectos para espacios o muros cortina relativamente cortos, o curvos para abarcar grandes techos o áreas cubiertas como se muestra en la figura 1.

5 La sección extruida de los elementos alargados (14) y (16) incluye además una ranura de la placa conectora (26) que está adaptada para ajuste por fricción de inserción de una placa conectora (28). También se incluye en cada sección extruida un canal de cable (30) que está adaptado para recibir un cable tensor de carrera libre (32).

10 Con referencia a las figuras 2 a 5, cada uno de los ensambles de cubrejunta (18) en la serie de ensambles de cubrejuntas de un segmento de cercha (12), comprende un par de cubrejuntas, (18a, 18b), dispuestos de parte posterior a parte posterior cuando se ensamblan al primero y segundo elementos alargados extruidos (14,16). Cada cubrejuntas (18a, 18b) de los
15 cubrejuntas apareados comprende una parte de placa planar (40) que se proporciona en sus respectivos bordes superior e inferior con bridas idénticas (42,44), que se proyectan hacia afuera y normal a la superficie exterior de la parte de placa planar (40) .

 Como se puede observar en las figuras 2 y 3, el canal de los
20 cubrejuntas (20) se forman de manera que retenga el ensamble de cubrejuntas (18) de los cubrejuntas (18a, 18b) por la captura de las bridas (42,44) cuando ambos se encuentran ubicados de parte posterior a parte posterior en el canal (20). El interior, es decir, la parte más estrecha del canal de los cubrejuntas es de una anchura suficiente para permitir la inserción del
25 primero del par de cubrejuntas. El segundo del par también puede ser insertado en los canales opuestos adyacentes al primero cubrejunta. El par puede entonces ser deslizado en la posición de parte posterior a parte posterior mostrada en la figura 2, para completar el ensamble de cubrejuntas.

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Se entenderá que los cubrejuntas pueden fabricarse en un amplio intervalo de tamaños para adaptarse a la profundidad de las cerchas que abarcan el espacio requerido, los factores de carga del viento y otros parámetros de diseño.

5 Preferiblemente, tanto las placas conectoras (28) como los pares de cubrejuntas (18a, 18b) son de acero inoxidable, con los cables tensores (32) también de acero inoxidable.

10 Como se observa mejor en las figuras 3 y 6, el canal de retención del panel de techo (o de pared) (24) incluye elementos de retención de panel (46,48) formados a lo largo de los bordes exteriores (50,52) del canal de retención de panel (24). Estos elementos de retención de panel (46,48) están dirigidos hacia adentro del plano medio (54) del canal de retención de panel, y están formados para permitir la inserción de elementos de brida de retención (56,58) de paneles adyacentes (60,62) en el canal de retención del panel (24) como se muestra en la figura 6. Los elementos de retención de panel (46,48) bloquean los respectivos elementos de brida (56,58) de los paneles adyacentes (60,62) en el canal de retención de panel como un ajuste a presión.

20 Como también puede verse en la figura 6, la cercha (10) puede soportar los paneles (60,62) a lo largo de la parte superior de los dos elementos alargados (14) de la cercha en una aplicación de techado de la invención. Como alternativa, o además, los paneles (60,62) pueden ser soportados a lo largo de elementos alargados inferiores (16). En el primer caso, la colindancia próxima de los paneles adyacentes proporciona una
25 cubierta continua sobre la cercha (10) cuando se ve desde arriba (o desde el exterior en el caso de un muro de cortina). Del mismo modo, los paneles soportados por los elementos alargados inferiores (14) cubren completamente la cercha (10) cuando se ven desde abajo (o desde el interior).

En uso

Los paneles adaptados para su uso con el sistema de cerchas de la invención, pueden ser de metal, pero son preferiblemente de polímeros opacos o translúcidos, preferiblemente de láminas de policarbonato, provistas con bridas de borde adecuadas para conectarse con los canales de retención de panel de la cercha.

Para espacios grandes, las extrusiones de aluminio del primero y segundo elementos de los segmentos de cercha pueden formarse por laminado en una forma arqueada de manera que cuando los segmentos se ensamblan, la cercha forma un arco sobre la construcción o área a ser cubierta.

Para ensamblar una cercha, en primer lugar se ensambla el número requerido de segmentos de cercha. Esto se lleva a cabo colocando el primero y segundo elementos alargados de cada segmento de cercha lado a lado con los canales de cubrejuntas uno frente al otro. Los primeros cubrejuntas de la serie de ensambles de cubrejuntas para ese segmento de cercha luego se colocan en los canales opuestos. En esta etapa, el primero y segundo elementos alargados no se bloquean entre sí y los correspondientes segundos cubrejuntas de cada par en parte posterior a parte posterior también pueden ser insertados en los canales opuestos adyacentes a sus placas opuestas.

Los segundos cubrejuntas entonces se deslizan en sus posiciones de parte posterior a parte posterior para completar los ensambles de cubrejuntas y bloquear conjuntamente el primero y el segundo elementos alargados, a medida que los elementos de brida de retención entonces se bloquean en los canales de los cubrejuntas. Los ensambles pueden fijarse en

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su posición, por ejemplo, con remaches a través de los lados paralelos del canal de cubrejuntas.

Una de las principales ventajas de los ensambles de cubrejuntas es que, a diferencia de las conexiones a pernos entre el primero y el segundo
5 elementos de una cercha, no hay puntos de esfuerzo en los lugares del orificio del perno. La carga se transfiere entre el primero y el segundo elementos alargados del sistema de cerchas de la invención y se extiende sobre la longitud considerable de los elementos de brida de los cubrejuntas.

Las placas conectoras se conducen dentro de las ranuras de la
10 placa conectora en ese extremo del segmento de cercha a ser unido al siguiente segmento de cercha y los dos segmentos se llevan a colindancia. Este procedimiento se repite hasta que el número requerido de segmentos de cercha haya sido conectado conjuntamente. Los cables tensores a continuación se alimentan a través de los canales de tensión y se tensan por
15 medio de pasadores estampados (no mostrados) en cada extremo de la cercha para fijar la cercha a la unidad portadora de carga.

En el caso de techado, las cerchas se elevan a su posición en elementos de soporte adecuados con espaciamientos predeterminados. Los paneles de techado entonces son ajustados a presión en los canales de
20 extensión de panel de techo o a ambos del primero y segundo elementos alargados de cerchas adyacentes. Los paneles de techo del sistema se interconectan con cerchas adyacentes, y las propiedades estructurales de los paneles de policarbonato del sistema son tales que no se requiere ningún otro soporte que ese proporcionado por las cerchas, con los paneles en efecto
25 cumpliendo la función de viguetas.

El sistema de la invención, por lo tanto, ofrece tres soluciones transparentes. En primer lugar, en una construcción de techo, los paneles de policarbonato para techados pueden disponerse en los elementos alargados

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(C)

superiores sólo de la cercha, proporcionado una superficie acristalada continua, por encima del techo con las cerchas expuestas desde abajo. Como alternativa, los paneles para techados pueden estar dispuestos sólo en los elementos alargados inferiores, lo que proporciona una superficie acristalada continua tal como se ve desde abajo, dejando a las cerchas expuestas por arriba, mientras que en tercer lugar, los paneles pueden ser proporcionados tanto en los elementos alargados superiores como inferiores de las cerchas.

Donde serán soportados tanto una capa superior como una inferior de paneles de techado por las cerchas, la capa inferior se instala en primer lugar, y puede ser seguida por la colocación de estantería traslúcida de aislamiento para llenar sustancialmente el espacio entre los paneles de techado superior e inferior. Como alternativa, como se muestra en la figura 7, donde solo se requiere una única capa de paneles, puede usarse un elemento alargado 80 modificado con una sección cerrada 82 como el primero o el segundo elementos alargados.

Se apreciará, especialmente de la figura 6, que los paneles de policarbonato colindantes próximos de la capa inferior protegen de manera eficaz a las cerchas de cualesquiera gases corrosivos, tales como los que se presentan, por ejemplo, en una piscina cerrada. De igual forma, una capa superior de paneles protege las cerchas de los elementos.

Segunda modalidad preferida

En esta segunda modalidad con referencia a las figuras 8 a 11, en la que las características similares se numeran de forma similar, los segmentos de cercha (112) para formar una cercha, tal como se muestra en la figura 1, también se forman de primero y segundo elementos alargados (114) y (116) interconectados a intervalos por ensambles de pares de cubrejuntas 18 (en lo sucesivo, llamadas "cubrejuntas cortos") como se ha descrito

anteriormente, y como se muestra en las figuras 2, 4 y 5. En esta modalidad sin embargo, con referencia primero a la figura 8, se proporciona una segunda forma de cubrejuntas 118a y 118b ("cubrejuntas largos") de una configuración modificada, en la que los brazos de extensión 102 se proyectan desde las extremidades superior e inferior de la parte central (104) de la placa.

Sólo en la parte central (104) de cada cubrejuntas largo (118a) y (118b) se proporciona con bridas que se proyectan hacia afuera (106), (como se describe para la primera modalidad anterior), en el borde superior e inferior de la placa. Una serie de orificios pasantes 108 se proporciona a lo largo de las partes superior e inferior de los cubrejuntas y a lo largo de los brazos de extensión 102. Si es necesario, según el grado de curvatura de los elementos alargados de la cercha a los que se van a aplicar, los cubrejuntas largos pueden ser proporcionados con una curvatura coincidente.

En esta modalidad, con referencia ahora a la figura 9, los cubrejuntas cortos (18a) y (18b) son nuevamente insertados y deslizados en asociación de parte posterior a parte posterior para formar los ensambles de cubrejuntas (18) como se describió antes, para interconectar los elementos (114) y (116) de un segmento de cercha (112) a intervalos a lo largo del segmento según se requiera. Sin embargo, en esta modalidad los ensambles de cubrejuntas largos 118 proporcionan conexiones entre segmentos de cerchas adyacentes.

Para unir segmentos de cercha previamente ensamblados entre sí, un ensamble de cubrejuntas largo (118) se inserta en los extremos del primero y segundo elementos alargados (114) y (116) al extremo de uno de los dos segmentos de cercha a ser unidos. El ensamble de cubrejuntas largos (118) se inserta a la mitad de su longitud, tal como se muestra en la figura 9 y los cubrejuntas largos entonces se bloquean a los elementos alargados (114) y (116) a través de pernos pasantes (120) que pasan a través de los orificios

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perforados, (o después de taladrar los orificios necesarios), a través de bridas (122) y los orificios (108) en los brazos de extensión (102) del ensamble de cubrejuntas largos (118).

El segmento de cercha a ser conectado (sin un ensamble de cubrejuntas largos insertado en los extremos colindantes de su elementos alargados) entonces puede ser deslizado sobre las secciones proyectadas del ensamble de cubrejuntas largos (118) que se proyectan desde el segmento de cercha preparado y los dos segmentos fijados en conjunto mediante un pernado similar a través de las bridas (120) y los brazos de extensión (102) opuestos de los cubrejuntas largos.

Los elementos alargados extruidos (114) y (116) que forman el primero y segundo elementos de cerchas de un segmento de cerchas (112) puede tener el mismo perfil como se describió anteriormente y como se muestra en las figuras 3 y 6. Alternativamente, los segmentos de cercha podrán formarse con extrusiones de elementos alargados como se muestra en las figuras 10 y 11.

En el caso de la extrusión (130) de la figura 10, la parte exterior de la extrusión se proporciona con una estructura de canal y formaciones de ajuste a presión para aceptar los bordes de los paneles de policarbonato como se describe arriba, y como se muestra en la figura 6. La profundidad total del perfil de la extrusión (130) puede ser seleccionada para que se adapte a los requisitos de carga de un intervalo determinado de espacios para los que pueden utilizarse las cerchas ensambladas.

En una disposición alternativa, como se muestra en la figura 11, la extrusión (200) que forma el primero y segundo elementos de un segmento de cercha, puede incluir una formación de retención de panel en la forma de un elemento proyectado (210) en la forma de una "T" que se extiende hacia afuera desde una superficie superior de una sección hueca (214). En esta

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disposición, los paneles (no mostrados) son retenidos entre las partes subyacentes (216) de las bridas (218) y (220) de la sección en "T".

A pesar de que la descripción anterior se centra principalmente en el uso de las cerchas en un contexto de techado, se entenderá que las fachadas amplias pueden estar provistas de un muro de cortina traslúcido o transparente mediante el uso de ensambles de cerchas de la invención dispuestos en arreglos verticales o inclinados e igualmente combinados con paneles.

Lo anterior sólo describe algunas modalidades de la presente invención, y pueden hacerse modificaciones a las mismas, obvias para los expertos en la técnica, sin separarse del alcance de la presente invención.

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NOVEDAD DE LA INVENCION

REIVINDICACIONES

5 1. Un sistema cerchas para el empanelado del techo o fachada
de una construcción; una cercha de dicho sistema de cerchas incluye por lo
menos un segmento de cercha; cada uno de dichos segmentos de cercha
comprende un primer elemento alargado y un segundo elemento alargado;
dicho primero y segundo elementos alargados están interconectados a
10 intervalos por una serie de ensambles de cubrejuntas; dichos ensambles de
cubrejuntas se conectan con respectivos canales de cubrejuntas extruidos de
dicho primero y segundo elementos alargados.

2. El sistema de cerchas de conformidad con la reivindicación 1,
caracterizado además porque cada primero y segundo elementos alargados
15 de uno de dichos segmentos de cerchas comprende una sección extruida;
dicha sección extruida incluye un canal de retención de panel y dicho canal de
cubrejuntas extruido.

3. El sistema de cerchas de conformidad con la reivindicación 1 o
2, caracterizado además porque una de dicha sección extruida incluye
20 adicionalmente una ranura de placa conectora; dicha ranura de hoja conectora
está adaptada para inserción de ajuste por fricción de una placa conectora.

4. El sistema de cerchas de conformidad con cualquiera de las
reivindicaciones 1 a 3, caracterizado además porque una de dicha sección
extruida incluye adicionalmente un canal de cable; dicho canal de cable está
25 adaptado para recibir un cable tensor que corre libremente.

5. El sistema de cerchas de conformidad con cualquiera de las
reivindicaciones 1 a 4, caracterizado además porque cada una de dichas
series de ensambles de cubrejuntas comprende un par de cubrejuntas

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dispuestos de parte posterior a parte posterior cuando están en uso; cada cubrejuntas de dicho par de cubrejuntas comprende una parte de placa planar proporcionada en respectivos bordes superior e inferior con una brida; dichas bridas se proyectan hacia afuera y normal a una superficie exterior de dicha parte de placa planar.

6. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 5, caracterizado además porque dicho canal de retención de panel incluye elementos de retención de panel; dichos elementos de retención de panel están formados a lo largo de los bordes exteriores de dicho canal de retención de panel; dichos elementos de retención de panel están dirigidos hacia adentro, hacia un plano medio de dicho canal de retención de panel.

7. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 6, caracterizado además porque una de dichas cerchas soporta dichos paneles mediante elementos de brida de retención de dichos paneles en dichos canales de retención de panel; dichos elementos de retención de panel bloquean a dichos elementos de brida respectivos de dichos paneles adyacentes en dicho canal de retención de panel como un ajuste a presión.

8. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 7, caracterizado además porque una de dichas cerchas soporta dichos paneles a lo largo de dichos primeros elementos alargados de dicha cercha.

9. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 7, caracterizado además porque una de dichas cerchas soporta dichos paneles a lo largo de dicho segundo elemento alargado de dicha cercha.

10. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 7, caracterizado además porque una de dichas cerchas soporta dichos paneles a lo largo tanto de dicho primero como de dicho segundo elementos alargados de dicha cercha.

5 11. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 10, caracterizado además porque dichos paneles interconectan cerchas adyacentes de dichas cerchas; dichos paneles cumplen la función de viguetas.

10 12. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 1 a 11, caracterizado además porque dicho primero y segundo elementos alargados de dicha cercha comprenden extrusiones de aluminio.

15 13. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 1 a 12, caracterizado además porque los cubrejuntas de dichos ensambles de cubrejuntas comprenden piezas estampadas de acero inoxidable.

 14. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 4 a 13, caracterizado además porque dicho cable tensor comprende un cable de acero inoxidable.

20 15. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 14, caracterizado además porque dichos paneles comprenden paneles poliméricos transparentes o translúcidos.

25 16. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 2 a 15, caracterizado además porque se retienen los paneles aislantes translúcidos entre dichos paneles dispuestos a lo largo tanto de dicho primero como de dicho segundo elementos alargados de dicha cercha.

 17. Un método para proporcionar un techado o enmurado de cortina de una construcción o área; dicho método incluye el ensamble y el

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montaje de cerchas; dicho método incluye los pasos de: (a) ensamblar un número requerido de segmentos de cercha dentro de dichas cerchas; cada uno de dichos segmentos comprende un primero y un segundo elementos alargados, (b) interconectar dicho primero y segundo elementos alargados de cada uno de dichos segmentos con por lo menos un ensamble de cubrejuntas; los cubrejuntas de por lo menos un ensamble de cubrejuntas se conecta con respectivos canales de cubrejuntas de dicho primero y segundo elementos alargados; (c) conectar los segmentos de cercha colindantes de dicho número requerido de segmentos de cercha mediante la inserción de placas conectoras en las ranuras de placas conectoras de dichos segmentos de cercha colindantes, (d) pasar cables tensores a través de canales de cable de dicho primero y segundo elementos alargados de dichos segmentos de cercha colindantes, (e) tensar dichos cables tensores.

18. El método de conformidad con la reivindicación 17, caracterizado además porque dicho método incluye adicionalmente los pasos de: (a) montar dichas cerchas en elementos de soporte adecuados a intervalos predeterminados, (b) ajustar a presión los paneles en los canales de retención de panel de cualquiera o ambos del primero y segundo elementos alargados de dichos segmentos de cercha adyacentes.

19. El método de conformidad con la reivindicación 18, caracterizado además porque se retienen los paneles aislantes entre dichos paneles conectados tanto a dicho primero como a dicho segundo elementos.

20. Un sistema de cerchas para el empanelado del techo o fachada de una construcción; una cercha de dicho sistema de cerchas incluye por lo menos un segmento de cercha; cada uno de dichos segmentos de cercha comprende un primer elemento alargado y un segundo elemento alargado interconectados a intervalos mediante uno o más ensambles de cubrejuntas cortos, dichos ensambles de cubrejuntas se conectan con

respectivos canales de cubrejuntas extruidos de dicho primero y segundo elementos alargados, y en donde los segmentos de cerchas colindantes están conectados entre sí a través de un ensamble de cubrejuntas largos.

21. El sistema de cerchas de conformidad con la reivindicación 5 20, caracterizado además porque dicho ensamble de cubrejuntas largos comprende un ensamble de parte posterior a parte posterior de dos cubrejuntas largos; cada uno de dichos cubrejuntas largos comprende una sección central y brazos de extensión que se extienden desde las partes superior e inferior de dicha sección central; dicha sección central y dichos 10 brazos de extensión están provistos con respectivas series superiores e inferiores de orificios pasantes.

22. El sistema de cercha de conformidad con la reivindicación 15 21, caracterizado además porque dicha sección central está provista con elementos de brida que se proyectan hacia afuera en un borde superior y un borde inferior de dicha sección central de manera que cuando dichos cubrejuntas largos son ensamblados en el ensamble de parte posterior a parte posterior, dichos elementos de brida que se proyectan hacia afuera se proyectan hacia afuera desde dicho ensamble.

23. El sistema de cercha de conformidad con la reivindicación 20 22, caracterizado además porque dichos elementos de brida que se proyectan hacia afuera se conectan con dichos canales de cubrejuntas extruidos de dicho primero y segundo elementos alargados.

24. El sistema de cerchas de conformidad con cualquiera de las reivindicaciones 21 a 23, caracterizado además porque la mitad de una 25 longitud de uno de dichos ensambles de cubrejuntas largos está fijado en dichos canales de cubrejuntas extruidos de uno de dichos primeros segmentos de cercha mediante pernos que pasan a través de los elementos de brida de dicho primero y segundo elementos alargados y dichos orificios

pasantes; una segunda mitad de dicha longitud de dicho ensamble de cubrejuntas largo fijado en dichos canales de cubrejuntas de uno de dichos segmentos de cercha adyacentes mediante pernos que pasan a través de los elementos de brida de dicho primero y segundo elementos alargados y dichos
5 orificios pasantes.

25. Un método para fijar conjuntamente segmentos adyacentes de una cercha; cada uno de dichos segmentos de cercha comprende primero y segundo elementos alargados interconectados por ensambles de cubrejuntas cortos; dicho método incluye los pasos de: (a) insertar un primer
10 par de brazos de extensión que se proyectan desde una parte central de un ensamble de cubrejuntas largos en canales de cubrejuntas de respectivos primero y segundo elementos alargados de un primero de dichos segmentos de cercha, (b) fijar dicho ensamble de cubrejuntas largos en dicho primero y segundo elementos alargados mediante pernos que pasan a través de bridas
15 de dichos elementos alargados y a través de orificios pasantes en dichos brazos de extensión y en dicha parte central de dicho ensamble de cubrejuntas, (c) deslizar el primero y el segundo elementos alargados de uno de dichos segmentos de cerchas contiguos sobre un segundo par opuesto de brazos de extensión de dicho ensamble de cubrejuntas largos para hacer
20 colindantes dicho primero y segundo elementos alargados correspondientes de dicho primer segmento de cercha, (d) fijar dicho segmento de cercha adyacente a dicho ensamble de cubrejuntas largos por pernos que pasan a través de las bridas de dichos elementos alargados y través de los orificios pasantes en dichos brazos de extensión y dicha parte central de dicho
25 ensamble de cubrejuntas.

RESUMEN DE LA INVENCION

Un sistema de cerchas para techado de una construcción; una cercha de dicho sistema de cerchas incluye por lo menos un segmento de cercha; cada uno de dichos segmentos de cercha comprende un primer
5 elemento alargado y un segundo elemento alargado; dicho primero y segundo elementos alargados están interconectados a intervalos mediante una serie de ensambles de cubrejuntas, dichos ensambles de cubrejuntas están dispuestos en conexión deslizante con respectivos canales de cubrejuntas extruidos de
10 dicho primero y segundo elementos alargados.

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PATENTE DE INVENCION ☐

MODELO DE UTILIL ☐

Art. 33 Decisión 486/00

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☐	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 ☐