

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO	
RAD: 14-119811- -4	FECHA: 2015-07-28 14:29:38
DEP: 2020 DIRECCION DE NUEVAS CREACIONES	EVE: 1 REGISTRO/DEPOSITO/CONCESION/DEPOSITO
TRA: 2 PATENTES DE INVENCION	FOLIOS: 10
ACT: 430 REQUERSOLICITA	

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
OSCAR OSPINA RAMIREZ

Asunto: Radicación: 14-119811- -4
Trámite: 2
Evento: 1
Actuación: 430
Oficio: 8941
Folios: 10

Patente de Invención	X			Patente de Modelo de Utilidad	
Vía Nacional	X				
Vía PCT (Fase Nacional)		Capítulo I		Capítulo II	
No. Solicitud Internacional					
Fecha de Presentación Internacional					

Como resultado del examen de fondo realizado, con fundamento en el Artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se comunica:

1. Documentos estudiados

Descripción:	Rad. N° 14-119811-00000-0000	04/junio/2014
Reivindicaciones:	Rad. N° 14-119811-00000-0000	04/junio/2014
	Rad. N° 14-119811-00002-0000	11/agosto/2014
Dibujos:	Rad. N° 14-119811-00000-0000	04/junio/2014

2. Objeto de la invención

De acuerdo con lo establecido en el numeral 1.2.2.2 del Capítulo Primero del Título X de la Circular Única para efectos del examen de patentabilidad, se tendrá en cuenta la tasa pagada por el solicitante al momento de comenzar el examen para las reivindicaciones adicionales; esto es que cuando la solicitud contenga más de diez (10) reivindicaciones y no se haya pagado la tasa complementaria, sólo se estudiarán las cubiertas por la tasa pagada. Por lo tanto, se estudiaran las reivindicaciones 1 a 8.

Título de la solicitud: “Moldes de fabricación para piezas de cemento para plaquetas, columnas, vigas, retículas, cabezotes hembra y macho para configurar estructuras y módulos, para construcción de vivienda hexagonal” (Fl. 1).

El problema planteado en esta solicitud, consiste en lograr un sistema de construcción para estructuras hexagonales con el que se disminuyan los costos y áreas de construcción, así como también facilitar el levantamiento de viviendas.

Para resolver este problema técnico, la solicitud en estudio propone moldes para plaquetas de cemento, una estructura hexagonal de concreto, moldes de aluminio para vigas en cemento y hierro, moldes de aluminio para columnas, cabezotes hembra, cabezotes macho y viguetas en cemento.

El objeto de la presente solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): E 04 B 1/00.

3. De la solicitud de patente

Descripción (Art 28 D 486)

Generalmente, la descripción incluye: sector tecnológico, estado de la técnica, descripción de la invención, explicación detallada de los dibujos y los dibujos o gráficas. Se sugiere al solicitante consultar el anexo 2 del presente comunicado que contiene aclaraciones y un ejemplo guía de como presentar la descripción.

Dentro de la descripción, se utiliza un mismo número de referencia para designar características diferentes, por ejemplo se utiliza el número (2) para las ranuras laterales (descripción dibujo 7) y para los ganchos de hierro (descripción dibujo 8). Se sugiere al solicitante utilizar un número de referencia diferente para cada una de las características incluidas en la solicitud. Estos números de referencia deben coincidir con los incluidos en las reivindicaciones y los dibujos.

Los dibujos deben estar referenciados utilizando la leyenda “Figura X”, donde X es el número correspondiente de la figura.

Reivindicaciones (Art 30 D 486, Art 22 PCT)

El capítulo reivindicatorio no es claro porque:

- El capítulo reivindicatorio no cumple con lo establecido en el artículo 30 de la Decisión 486, toda vez que no es claro si el solicitante quiere reclamar un sistema de construcción para estructuras hexagonales o si cada una de las reivindicaciones representa una invención diferente. En caso de que el solicitante quisiera reclamar un sistema de construcción, en ningún aparte de la solicitud se expone la forma como los elementos descritos en cada una de las reivindicaciones interactúan estructuralmente entre sí para conformar dicha estructura hexagonal, además, el preámbulo de las reivindicaciones 3 a 6 menciona las mismas dimensiones sin especificar alguna configuración de cada uno de los elementos incluidos en el capítulo reivindicatorio. En consecuencia, esta oficina concluye que la información expuesta en la solicitud no es suficiente para comprender la invención para la cual se solicita protección.

Adicionalmente, no es claro si el capítulo reivindicatorio presentado en el escrito radicado bajo No. Rad. N° 14-119811-00002-0000 es complemento del incluido en la solicitud inicialmente presentada. En este caso, las reivindicaciones presentadas en el Rad. N° 14-119811-00002-0000 tienen relación de dependencia respecto a las presentas en la solicitud inicial, por lo tanto, esta Oficina asume que en efecto el segundo capítulo reivindicatorio es complemento del inicial y no una modificación que

reemplaza completamente el mismo. De acuerdo con esto, y al evaluar los dos capítulos reivindicatorios en conjunto, se considera que todas las reivindicaciones del Rad. N° 14-119811-00002-0000 carecen de concisión, toda vez que las características incluidas en las mimas, habían sido reclamadas previamente en la solicitud inicialmente presentada. Por todo lo anterior, se sugiere al solicitante eliminar las reivindicaciones incluidas en el Rad. N° 14-119811-00002-0000.

- La estructura de las reivindicaciones en efecto es: preámbulo – enlace gramatical (caracterizado por) y parte caracterizadora, sin embargo no es necesario separar dichas partes. Generalmente, dichas partes vienen incluidas en un mismo párrafo tal y como se muestra en los ejemplos incluidos en los anexos 1 y 2 del presente requerimiento.

Por otro lado, las reivindicaciones dependientes no deben tener ningún tipo de resumen. Éstas también tienen la estructura: preámbulo – enlace gramatical (caracterizado por) y parte caracterizadora, comparten el mismo preámbulo que la reivindicación independiente y también están estructuradas en un solo párrafo.

Se sugiere al solicitante realizar las modificaciones correspondientes. Todo lo anterior, se puede observar en los anexos 1 y 2 de este comunicado.

- Las expresiones: *“...a la construcción de módulos hexagonales para desarrollar unidades de vivienda...”, “...formando una caja modular con dobleces formados con ángulos de 90° (F) que permiten conformar una unidad de 60 cms largo X 40cm de ancho X10 cm de grueso.”* (reivindicación 1), *“...que permite crear las bases horizontales y verticales como soporte a vigas, viguetas y estructura de la unidad general de vivienda estilo hexagonal...”*, *“creando una estructura integral con resistencia a sismos.”* (reivindicación 2), *“...crear una formaleta que al doblarla por sus canaletas a 90 grados permiten una resistencia de soporte al peso de la mezcla de cemento y fundirse en una sola unidad en la estructura general en su disposición horizontal.”* (reivindicación 3), *“...crear una formaleta que al doblarla por sus canaletas a 90 grados (2) permiten formar una unidad de cuatro lados y resistir la mezcla de cemento destinada al soporte de la estructura general en su disposición vertical.”* (reivindicación 4), *“...por recibir el cabezote macho facilitando la unión de las extensiones a lo largo (...), bloques y ladrillo con mezcla de cemento.”* (reivindicación 5), *“...por unirse al cabezote hembra (8) y fundir a la vez las vigas y columnas con cemento.”* (reivindicación 6), *“...por entre lazarse en cuadrículas a 10 cm al cuadrado, dando resistencia total a entre pisos.”* (reivindicación 7), *“...que permite fundir el cemento a las plaquetas (2F) a través de sus canales (2) de recuadro.”*, *“...permitiendo fraguar el cemento a vigas principales (4) y plaquetas (2) simultáneamente.”* (reivindicación 8); describen funciones, efectos, ventajas o resultados a alcanzar, los cuales no son aspectos susceptibles de patente. Para mayor claridad, el producto reclamado se debe definir técnicamente mediante sus características estructurales. Se sugiere al solicitante eliminar las expresiones citadas.
- Las reivindicaciones 3 a 8 no son claras, toda vez que en su preámbulo mencionan los moldes en aluminio, pero también incluyen las expresiones: *“...para vigas en cemento y hierro (4) con plaquetas (...) o diámetro ya armado (3) de 20X20X20X20 cms.”* y *“... para columnas en aluminio con plaquetas (...) o diámetro ya armado dibujos 2 (H) de 20X20X20X20 cms.”*, *“...cabezote en cemento hembra (8) con plaquetas de 1.5 cm de espesor o grueso con malla metálica en dimensiones ya armado de 20X20X20X20 cms.”*, *“...para cabezote en cemento macho (9) con plaqueta de 1.5 cm de espesor o grueso con malla metálica en dimensiones terminado o armado de 20X20X20X20*

cms.”, “...para fundir plaquetas (retículas) de 1 cm de grueso X 7 cms de ancho (dibujo 10) dando resistencia a plaquetas (recuadro de cada dibujo 2) que formaran los pisos y soteas.”, “...para viguetas en cemento en formas de trapecio (dibujo 7)...”, las cuales describen características de las vigas, columnas, cabezotes etc, que se conformarían al interior del molde y, por lo tanto, son elementos diferentes a éste. En consecuencia, no es posible identificar con claridad si el solicitante quiere reclamar el molde o las características los demás elementos de la invención. Se sugiere realizar las correcciones y aclaraciones pertinentes.

- La reivindicación 8 es una reivindicación de producto, y sólo puede ser definidas en términos de su proceso de fabricación si el producto no se puede definir por sus características estructurales. De igual manera, las expresiones: “*fundidas a columnas*” y “*fundidas en cemento*” (reivindicación 2), hacen referencia a procesos de fabricación. Se sugiere definir la invención por sus características esenciales estructurales (tangibles).
- Las reivindicaciones 3 y 4 comprenden posibles errores de transcripción. En ambas reivindicaciones se utiliza la palabra “diámetro” al hacer referencia a un elemento cúbico. Por su parte, en la reivindicación 4 se menciona que las columnas son en “*aluminio y hierro*” y no en cemento y hierro. Se sugiere al solicitante realizar las correcciones correspondientes.

Se recuerda al solicitante que en la reivindicación independiente se incluyen las características técnicas que se quieren proteger y que diferencian la invención del estado de la técnica. Por su parte, en las reivindicaciones dependientes se incluyen características particulares que complementan la invención. Adicionalmente, es preciso agregar que las características técnicas que quieren reclamarse deben incluirse en la parte característica de las reivindicaciones, mientras que el preámbulo menciona las características ya conocidas y generalmente coincide con el título de la invención. Todo esto, se puede encontrar en los anexos 1 y 2 de este requerimiento.

4. Unidad de invención (Art 25 D 486)

La solicitud no cumple con el requisito de unidad de invención porque se refiere a 8, grupos inventivos. Lo anterior, teniendo en cuenta que cada reivindicación independiente incluye un elemento diferente. Los grupos inventivos están definidos así:

- Grupo 1: Moldes para plaquetas en cemento para la construcción de módulos hexagonales (reivindicación 1).
- Grupo 2: Estructura hexagonal (reivindicación 2).
- Grupo 3: Moldes de aluminio para vigas en cemento y hierro (reivindicación 3).
- Grupo 4: Molde en aluminio para columnas (reivindicación 4).
- Grupo 5: Molde en aluminio para cabezote en cemento hembra (reivindicación 5).
- Grupo 6: Molde de aluminio para cabezote en cemento macho (reivindicación 6).
- Grupo 7: Molde en aluminio para fundir plaquetas (retículas) (reivindicación 7).
- Grupo 8: Molde en aluminio para viguetas en cemento en formas de trapecio (reivindicación 8).

Se le sugiere al solicitante restringir la materia a patentar en un solo concepto común inventivo aclarando la invención, tal y como se requirió en el numeral 3 del presente comunicado, especificando el avance tecnológico sobre el estado de la técnica. Esto se logra entre otras formas definiendo las características esenciales de la invención y

mostrando las otras características particulares como dependientes, pero sin perjuicio de la concisión de las nuevas reivindicaciones tanto independientes como dependientes.

El solicitante también puede realizar una o más de las divisionales de acuerdo a los grupos de conceptos técnicos inventivos presentados en esta solicitud, esto claro, sin ampliar el objeto inicial de la invención.

5. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación de la solicitud de patente nacional: junio 4 de 2014, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	US 2012/0311939	'Freestanding building module that is portable and foldable and can be interconnected for vertical and horizontal expansion'	13/Diciembre/2012
D2	DE 23 59 997	'Wavenelement – Bausystem'	12/Junio/1973
D3	US 2011/0061336	'Building system, concrete or osb, pour molded or pressed molded composite panels, trusses, and products, with engineering methods and fasteners, and related transportation, erection, and materials processing equipment'	17/Marzo/2011
D4	US 6'050.043	'Apparatus and method for supporting concrete beams, walls and the like'	18/Abril/2000
D5	US 5'667.192	'Concrete panel construction mold'	16/Septiembre/1997
D6	US 1'329.095	'Mold for constructing hollow walls of concrete'	27/Enero/1920

El documento D1¹ divulga una propuesta constructiva independiente, que consiste en un modelo básico que puede ser ensamblado y re-ensamblado de acuerdo con especificaciones determinadas (resumen).

El documento D2² divulga un sistema de construcción en forma de panel de abeja (traducción de la descripción, Párr. 3).

El documento D3³ divulga un nuevo sistema de construcción de conformado fácil usando concreto o madera prensada para construcciones residenciales y pequeños edificios comerciales (reivindicación 1).

El documento D4⁴ divulga un aparato para vigas de concreto, paredes o similares que comprende una caja completamente cerrada y reforzada para formar que es conformada por una lámina plana que tiene una pluralidad de pliegues paralelos (resumen).

1 <https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US20120311939.pdf>

2 http://gb.espacenet.com/search97/cgi/s97_cgi.exe?Action=FormGen&Template=gb/en/advanced.htm

3 <https://www.google.ca/patents/US20110061336?dq=20110061336&hl=es&sa=X&ved=0CB0Q6AEwAGoVChMlip2TkBD0xglVCdKACH1jzwCe>

4 <https://www.google.ca/patents/US6050043?dq=foldable+formwork+for+concrete+beams+and+columns&hl=es&sa=X&ved=0CBsQ6AEwADgKahUKewi7i-WH0M7GAhVDriAKHSxfAKE>

El documento D5⁵ divulga un molde adaptado para conformar paneles reticulados que pude ser desarmado y reinstalado debido a sus sistemas de bisagra (resumen).

El documento D6⁶ divulga un molde usado en la construcción de paredes huecas y reforzadas de concreto u otro material similar (Pág. 1, líneas 9 a 12).

6. Examen de Patentabilidad (Art 14 D486)

Novedad (Art 16 D486)

La reivindicación 1 consiste en: “*Moldes para plaquetas en cemento (2) a la construcción de módulos hexagonales para desarrollar unidades de vivienda...*” (Ver página 9 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1	D2	D3
Moldes para plaquetas de cemento caracterizadas por:	Módulo de edificación independiente caracterizado por:	Sistema de construcción caracterizado por:	Sistema de construcción caracterizado por:
Plaqueta en concreto con malla formando una caja modular con dobleces formados con ángulos de 90 grados.	Módulos básicos que conforman una caja modular con dobleces formados con ángulos de 90 grados (Figs. 10 y 11)	Elementos de cemento que conforman una caja modular con dobleces formados con ángulos (1) (Pág. 9)	Núcleos aislados para paneles de concreto moldeados (G-1), (H-1), con dobleces formados en ángulos de 90º (Fig. 1; reivindicación 1b, 1m).

De acuerdo con la tabla anterior, las características esenciales del molde de plaqueta de la reivindicación 1 habían sido divulgadas previamente en los documentos D1 a D3, por lo tanto, la materia reivindicada no es nueva.

Es bien conocido en la técnica el uso de aislamiento térmico y acústico, así como también de retículas (zapatas corridas de concreto armado)^{7 8}, en cualquier estructura de concreto. En consecuencia, estas características no pueden dar novedad a la invención. De igual manera, estas características también son divulgadas en el documento D3 que enseña que los paneles, vigas, columnas, entre otros elementos, incluyen Styfoam (aislante), malla de alambre, cemento tipo M, entre otros, además de divulgar las zapatas de concreto (Fig. 1; reivindicación 1b).

La reivindicación 2 consiste en: “*Estructura hexagonal en concreto, madera o hierro que permite crear las bases horizontales y verticales como soporte a vigas...*” (Ver página 9 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D1
Estructura en concreto	Sistema de

5 <https://www.google.ca/patents/US5667192?dq=aluminium+mold+concrete+waffle+slabs&hl=es&sa=X&ved=0CBwQ6AEwAGoVChMlvdL7v5PUxglVCZQNCh0AcAKE>

6 <https://www.google.ca/patents/US1329095?dq=1329095&hl=es&sa=X&ved=0CB0Q6AEwAGoVChMlL3EI5rUxglVSNYeCh0DPQgY>

7 <https://www.youtube.com/watch?v=GFhGspEQEY0>

8 <http://www.elconstructorcivil.com/2012/05/zapatas-corridas-de-concreto-armado.html>

caracterizada por:	construcción hexagonal independiente caracterizado por:
Conformar el núcleo que recibirá en sus viguetas de forma trapezoide, las plaquetas columnas, vigas, cabezote.	Un módulo básico que está integrado por fragmentos simétricos de cubierta (7), pared (8) y piso (9). La pared (8) comprende una viga superior (11), una viga inferior (12), conformada por sus correspondientes partes simétricas; Columnas (13), entre otros (reivindicación 1).

De acuerdo con la tabla anterior, las características esenciales de la estructura de la reivindicación 2 habían sido divulgadas previamente en el documento D1, por lo tanto, la materia reivindicada no es nueva.

La reivindicación 3 consiste en: “*Moldes en aluminio para vigas en cemento y hierro (4) con plaquetas de 1.5 cm de espesor o grueso...*” (Ver página 9 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D4
Moldes en aluminio para vigas.	Aparato para vigas de concreto, paredes o similares que comprende una caja completamente cerrada y reforzada para formar que es conformada por una lámina plana que tiene una pluralidad de pliegues paralelos (resumen).

De acuerdo con la tabla anterior, las características esenciales de los moldes de la reivindicación 3 habían sido divulgadas previamente en el documento D4, por lo tanto, la materia reivindicada no es nueva.

La reivindicación 4 consiste en: “*Molde en aluminio para columnas en aluminio y hierro con plaquetas de 1.5 cms de espesor...*” (Ver página 9 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D4
Moldes en aluminio para columnas.	Aparato para vigas de concreto, paredes o similares que comprende una caja completamente cerrada y reforzada para formar que es conformada por una lámina plana que tiene una pluralidad de pliegues paralelos

	(resumen).
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De acuerdo con la tabla anterior, las características esenciales de los moldes de la reivindicación 4 habían sido divulgadas previamente en el documento D4, por lo tanto, la materia reivindicada no es nueva.

La reivindicación 5 consiste en: “*Molde en aluminio para cabezote en cemento hembra (8) con plaqueta de 1.5 cm de espesor o grueso con malla metálica en dimensiones...*” (Ver página 10 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D3
Molde en aluminio para cabezote en cemento hembra.	Intersección de dos secciones (F-1) con clavija de inserción o unión, con concreto corrugado y secciones de tubería de aluminio y acero. Conexión macho-hembra (F-2) (Fig. 1; Párr. [0007]).

De acuerdo con la tabla anterior, las características esenciales del molde de la reivindicación 5 habían sido divulgadas previamente en el documento D3, por lo tanto, la materia reivindicada no es nueva.

La reivindicación 6 consiste en: “*Molde en aluminio para cabezote en cemento macho (9) con plaqueta de 1.5 cm de espesor o grueso con malla metálica en dimensiones...*” (Ver página 10 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D3
Molde en aluminio para cabezote en cemento macho.	Intersección de dos secciones (F-1) con clavija de inserción o unión, con concreto corrugado y secciones de tubería de aluminio y acero. Conexión macho-hembra (F-2) (Fig. 1; Párr. [0007]).

De acuerdo con la tabla anterior, las características esenciales del molde de la reivindicación 6 habían sido divulgadas previamente en el documento D3, por lo tanto, la materia reivindicada no es nueva.

La reivindicación 7 consiste en: “*Molde en aluminio para fundir plaquetas (retículas) de 1 cm de grueso X 7 cms...*” (Ver página 10 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D5
Molde en aluminio para fundir plaquetas (retículas).	Un molde adaptado para conformar paneles reticulados (Fig. 1).

De acuerdo con la tabla anterior, las características esenciales del molde de la reivindicación 6 habían sido divulgadas previamente en el documento D5, por lo tanto, la materia reivindicada no es nueva.

La reivindicación 8 consiste en: “*Molde en aluminio para viguetas en cemento en formas de trapecio...*” (Ver página 10 del radicado N° 14-119811-00000-0000).

Comparación de las características técnicas esenciales, con las del estado de la técnica:

Características esenciales	D6
Molde en aluminio para viguetas de cemento en forma de trapecio.	Molde en aluminio para viguetas de cemento en forma de trapecio (Figs. 2, 4 y 5).

De acuerdo con la tabla anterior, las características esenciales del molde de la reivindicación 6 habían sido divulgadas previamente en el documento D6, por lo tanto, la materia reivindicada no es nueva.

Las reivindicaciones 3 a 8 y las incluidas en el Rad. N° 14-119811-00002-0000 también fueron afectadas en los numerales 3 y 4 de la presente comunicación.

7. Conclusión

Los requisitos de Patentabilidad de la presente solicitud están afectados así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	US 2012/0311939	1 , 2	Novedad/Nivel Inventivo
D2	DE 23 59 997	1	Novedad/Nivel Inventivo
D3	US 2011/0061336	1, 5, 6	Novedad/Nivel Inventivo
D4	US 6'050.043	3 , 4	Novedad/Nivel Inventivo
D5	US 5'667.192	7	Novedad/Nivel Inventivo
D6	US 1'329.095	8	Novedad/Nivel Inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta (60) días contados a partir del día siguiente de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Se invita al solicitante se sirva indicar, si así lo considera, su renuncia al término faltante de sesenta (60) días para dar respuesta a este requerimiento y presentarla por escrito.

Finalmente, se le recuerda al solicitante que si como respuesta a este requerimiento llegara a modificar el capítulo reivindicatorio y éste contenga más de diez (10) reivindicaciones, no pagará la tasa de modificación voluntaria pero sí la correspondiente al pago por reivindicación adicional.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No. 10 de 2001.



JOSÉ LUIS SALAZAR LÓPEZ
Director de Nuevas Creaciones (c)

El anterior requerimiento fue notificado por fijación en lista, de fecha 2015-08-04

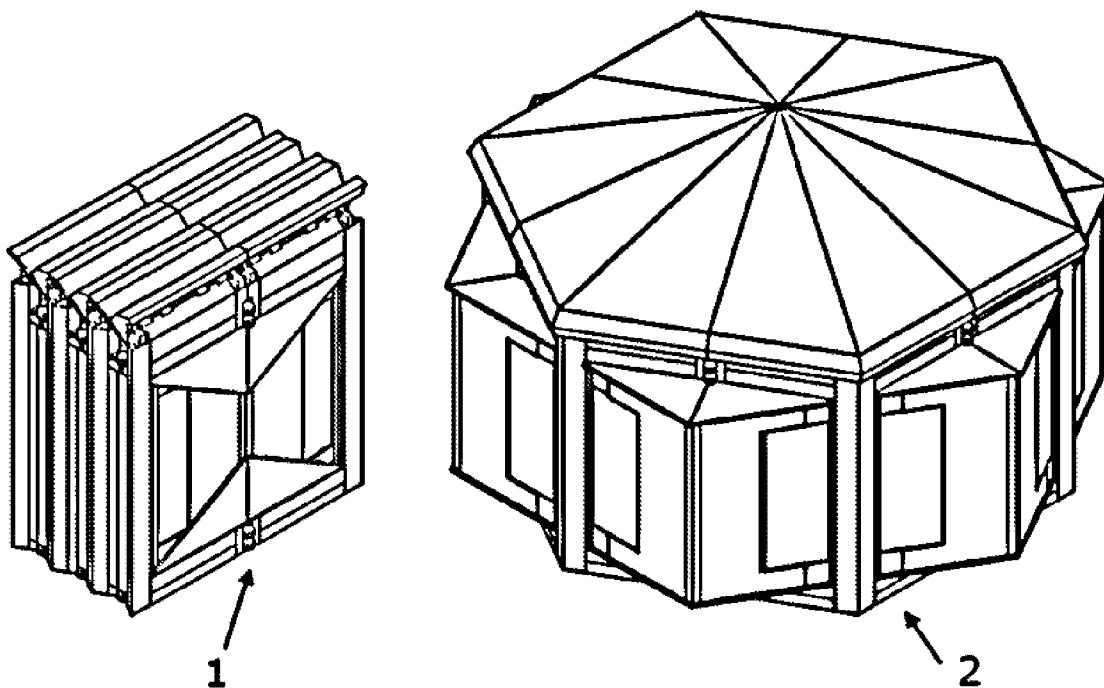
Elaboró: Monica Andrea Gutierrez Almonacid
Revisó: Sonia Andrea Diaz Pirazan



US 20120311939A1

(19) **United States**(12) **Patent Application Publication**
Barragán Olaya(10) **Pub. No.: US 2012/0311939 A1**(43) **Pub. Date: Dec. 13, 2012**(54) **FREESTANDING BUILDING MODULE THAT
IS PORTABLE AND FOLDABLE AND CAN BE
INTER-CONNECTED FOR VERTICAL AND
HORIZONTAL EXPANSION**(52) **U.S. Cl. 52/79.5; 52/745.02**(76) **Inventor: Alvaro Alfonso Barragán Olaya,**
Bogota (CO)(21) **Appl. No.: 13/579,557**(22) **PCT Filed: Nov. 3, 2010**(86) **PCT No.: PCT/IB2010/054981**§ 371 (c)(1),
(2), (4) Date: **Aug. 16, 2012****Publication Classification**(51) **Int. Cl.**
E04B 1/344 (2006.01)
E04H 1/00 (2006.01)(57) **ABSTRACT**

The present invention relates to a freestanding architectonic and constructive proposal, produced in the manufacturing facilities, which starting from an interconnectable basic model it can be assembled and reassembled according to specific requirements. Depending on the amount and shapes, it can scale up into horizontal, vertical or both complex architectonic structures. It is a foldable structure which allows easy arrangements for transportation and location in situ. Its configuration is carried through synchronized and symmetric orthogonal rotations and translations, both in its folding phase (1) and its unfolding phase (2), (FIG. 1), executed through any electric, pneumatic, hydraulic or manual system. Each one is integrated by axially symmetric segments forming the cover, the functional wall and the floor. The functional wall can lodge in its frame a typical wall, a functional piece of furniture or incorporate a Specialized Coupling Module.



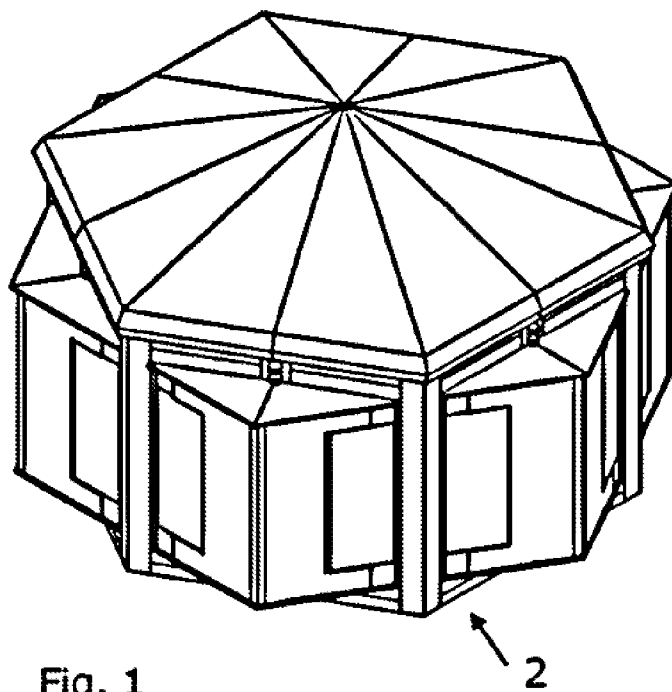
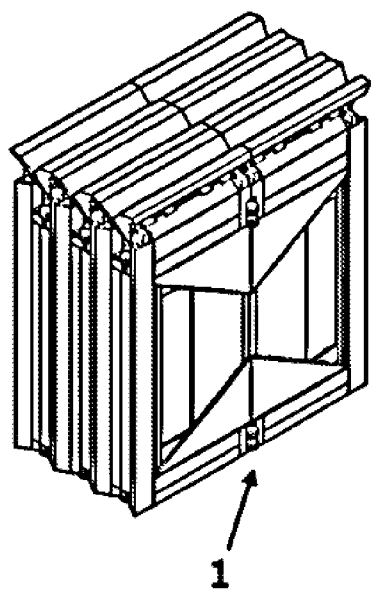


Fig. 1

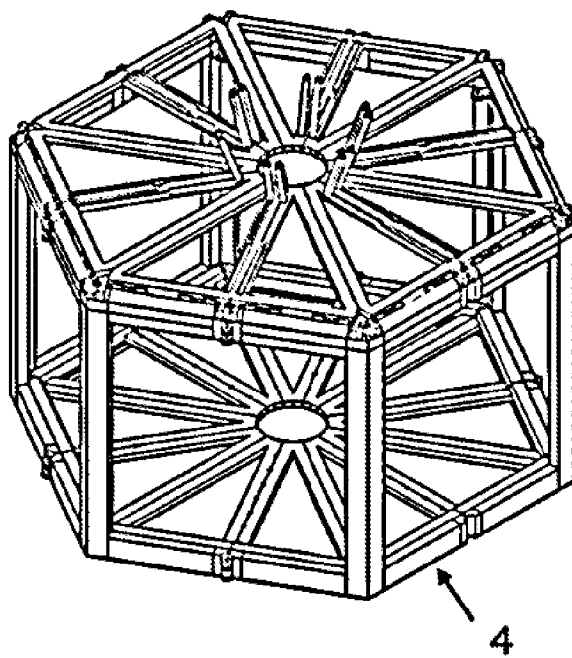
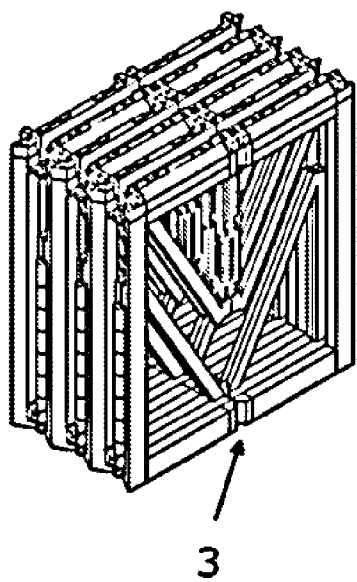


Fig. 2

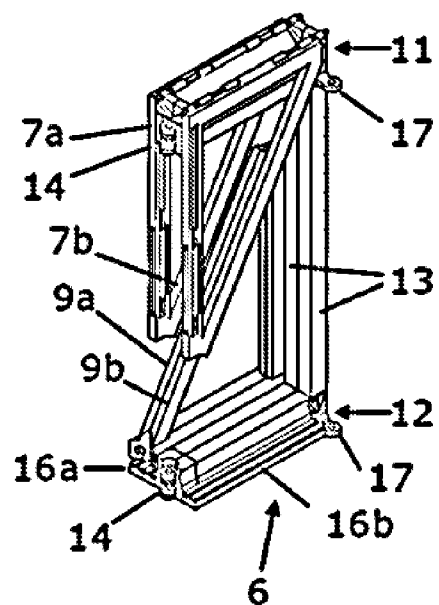
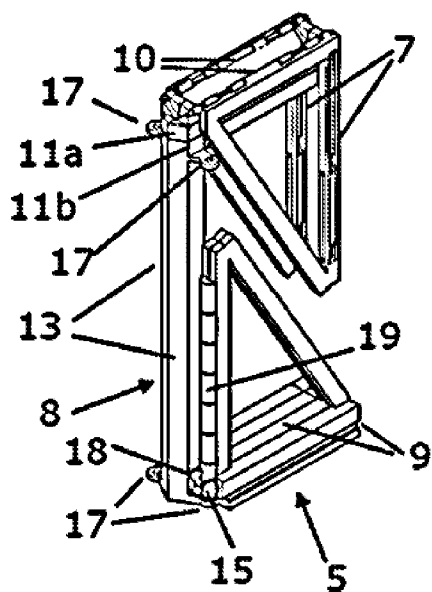


Fig. 3

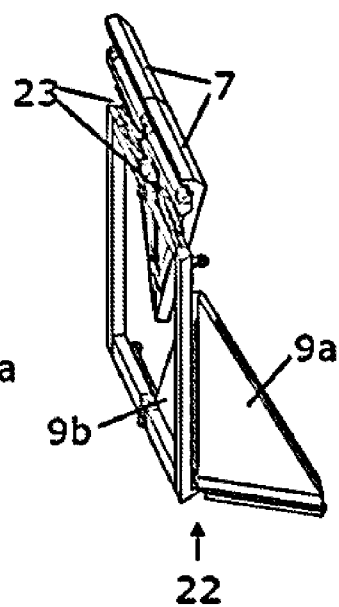
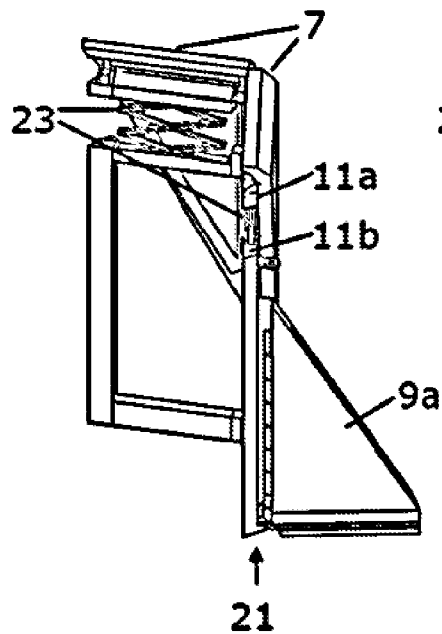
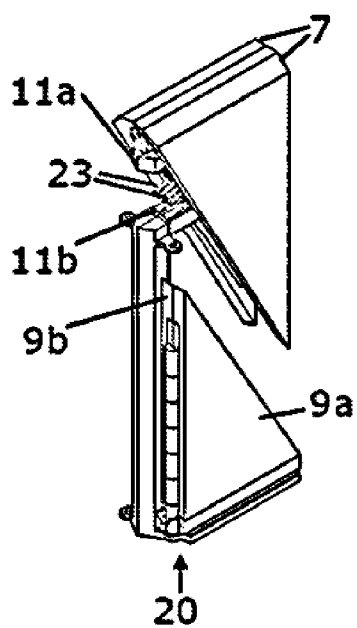


Fig. 4

Fig. 7

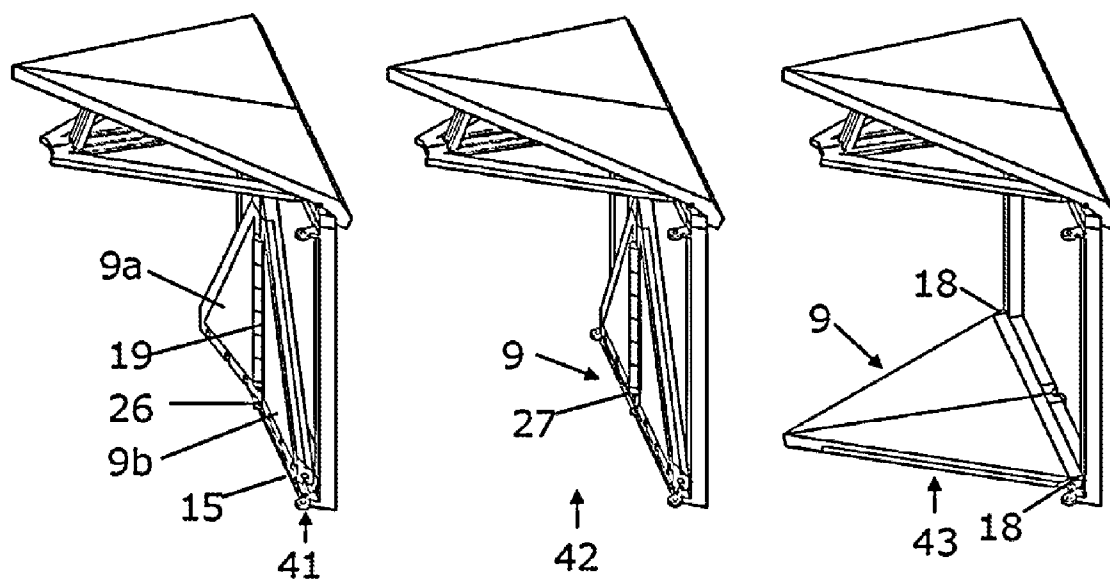


Fig. 8

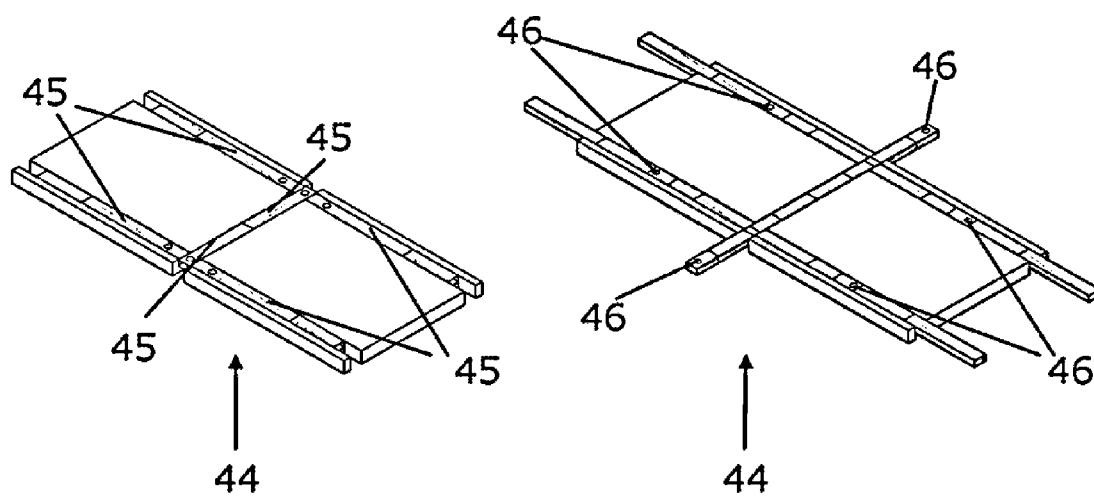


Fig. 9

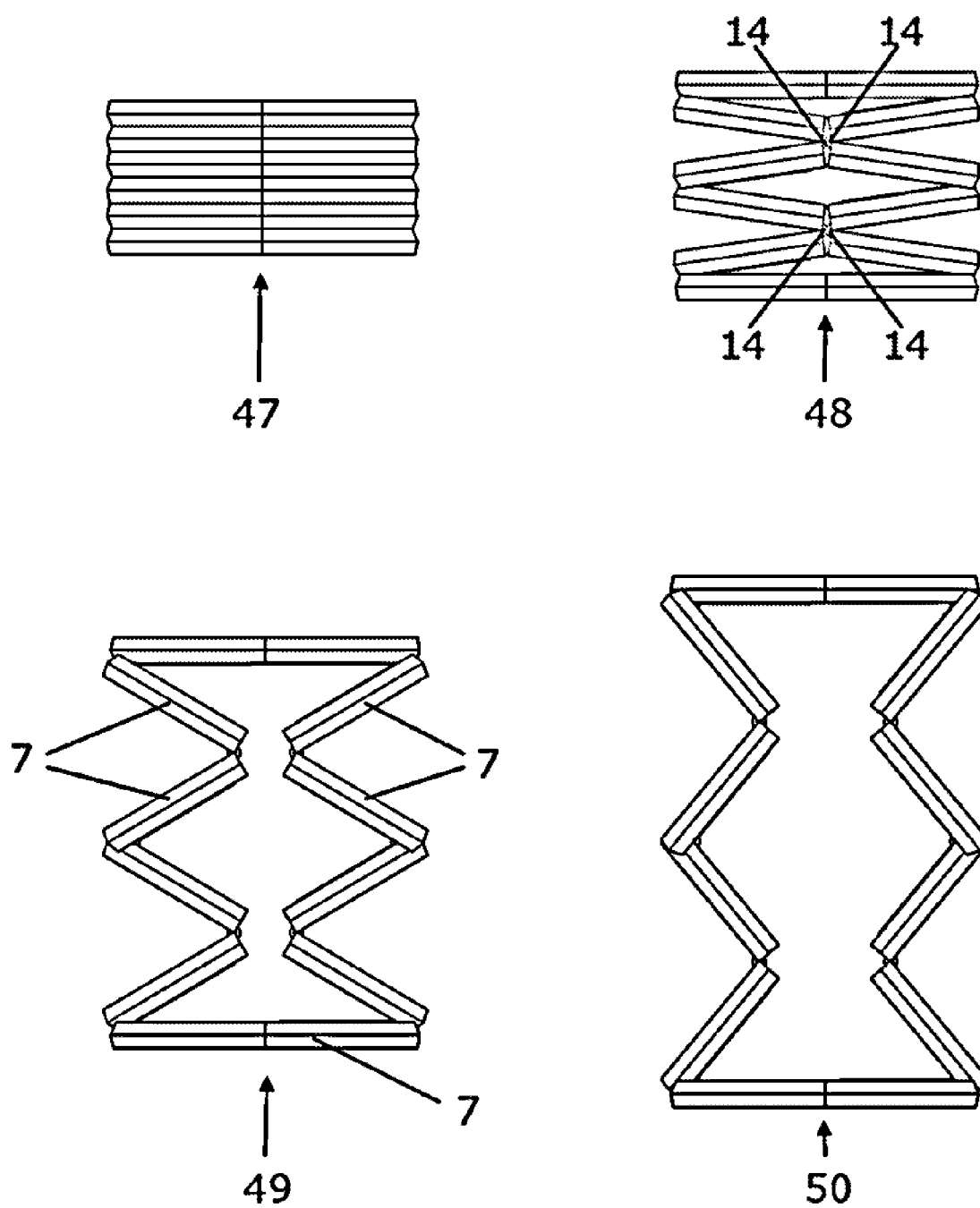


Fig. 10

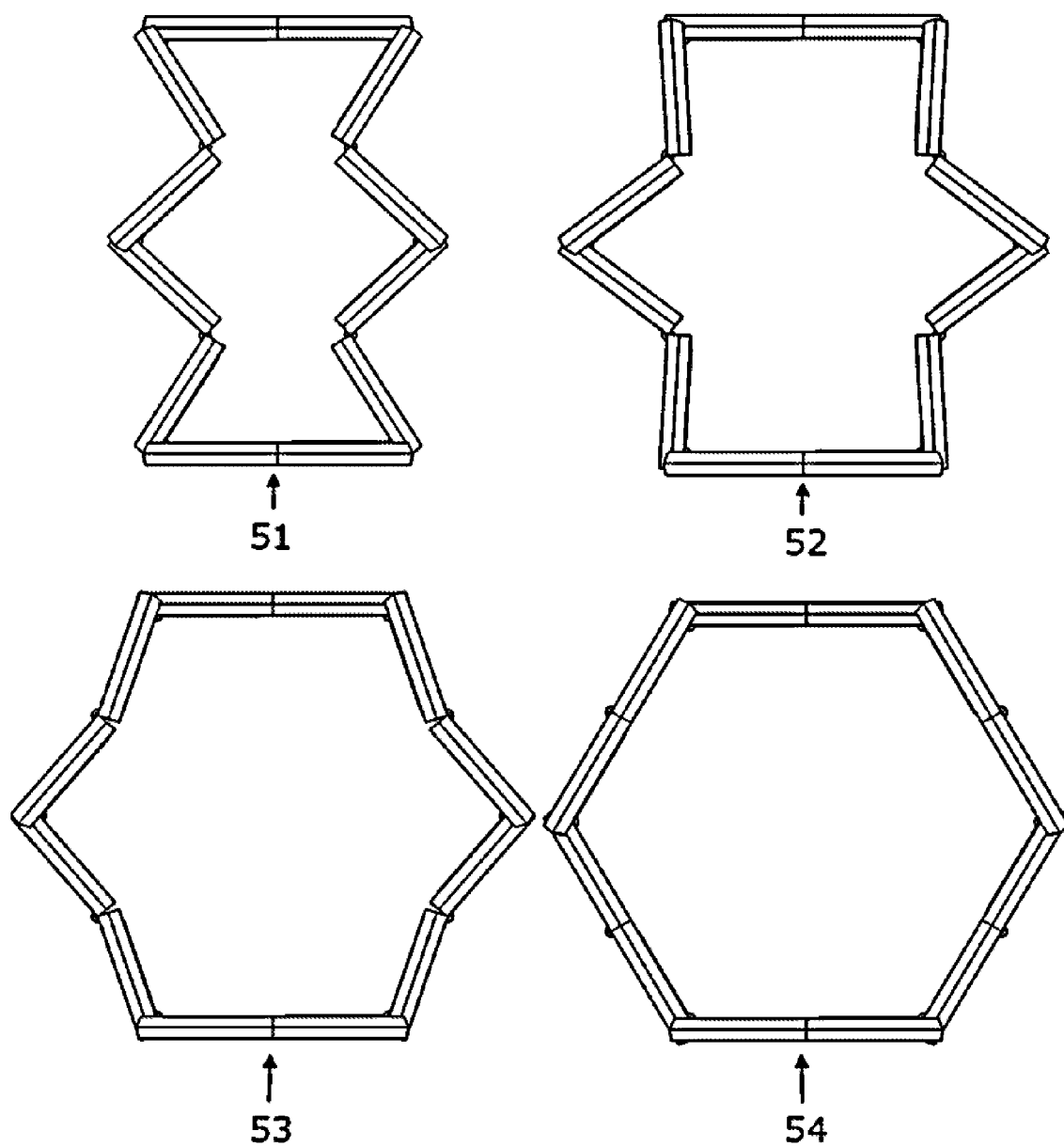


Fig. 11

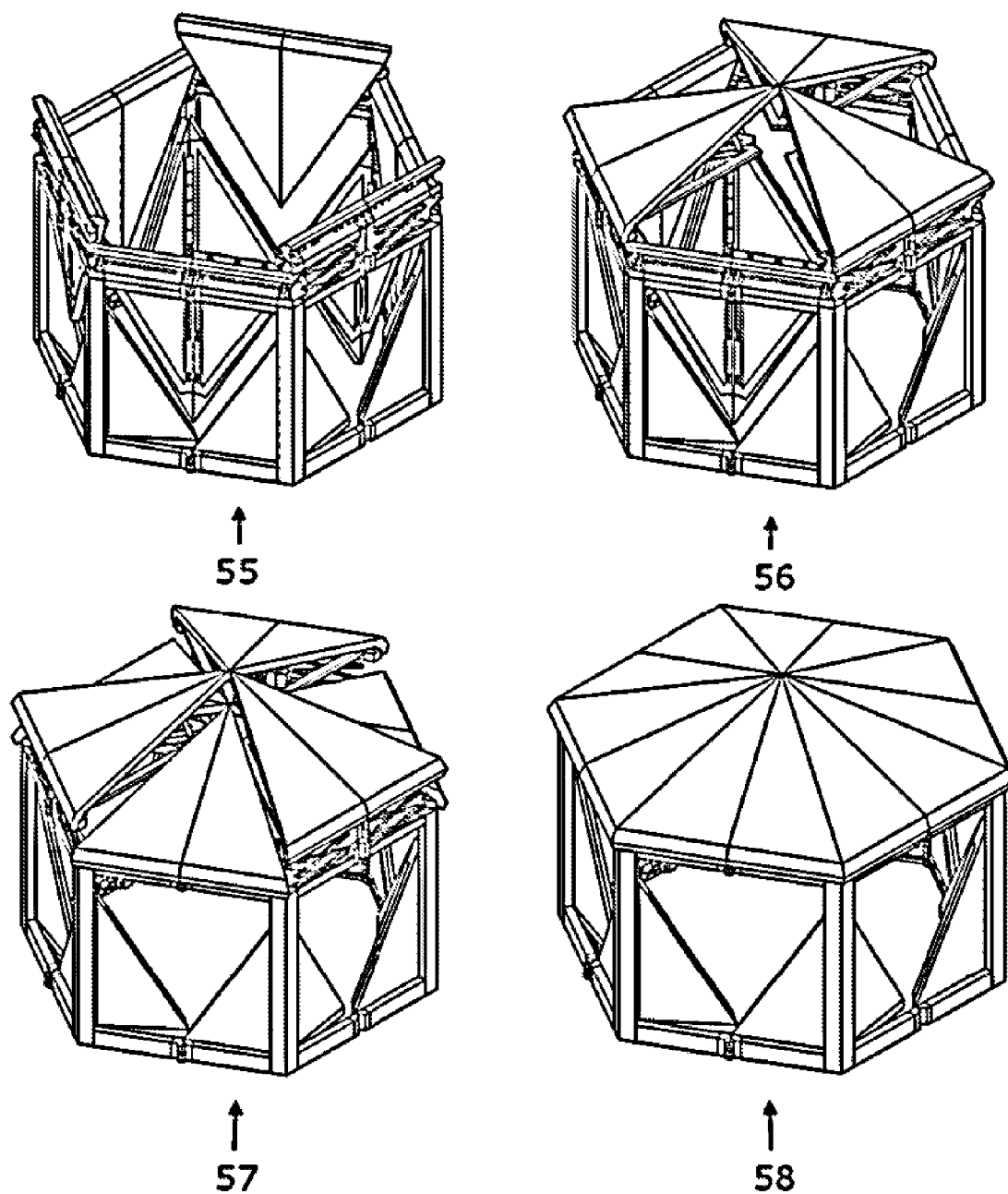


Fig. 12

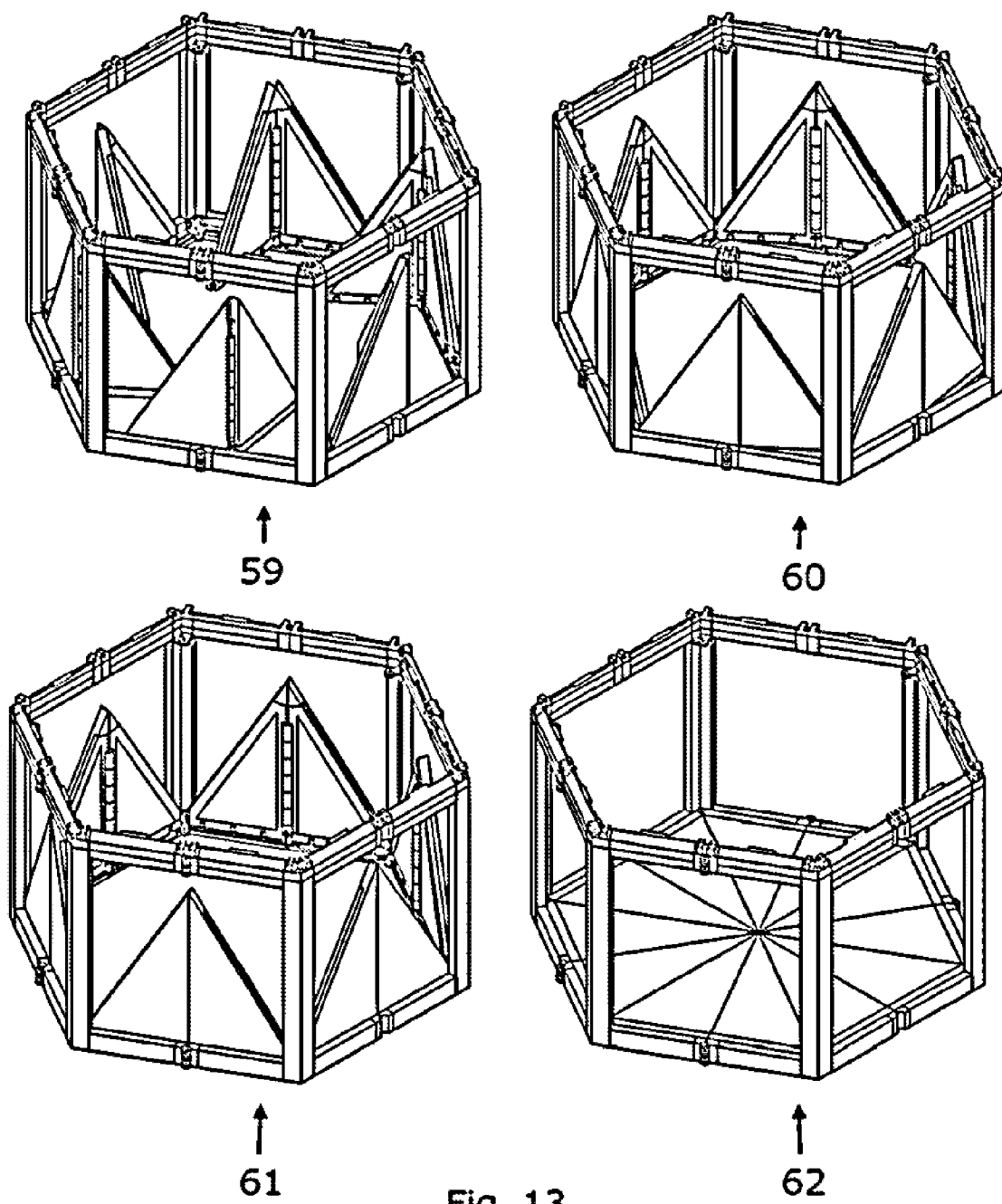


Fig. 13

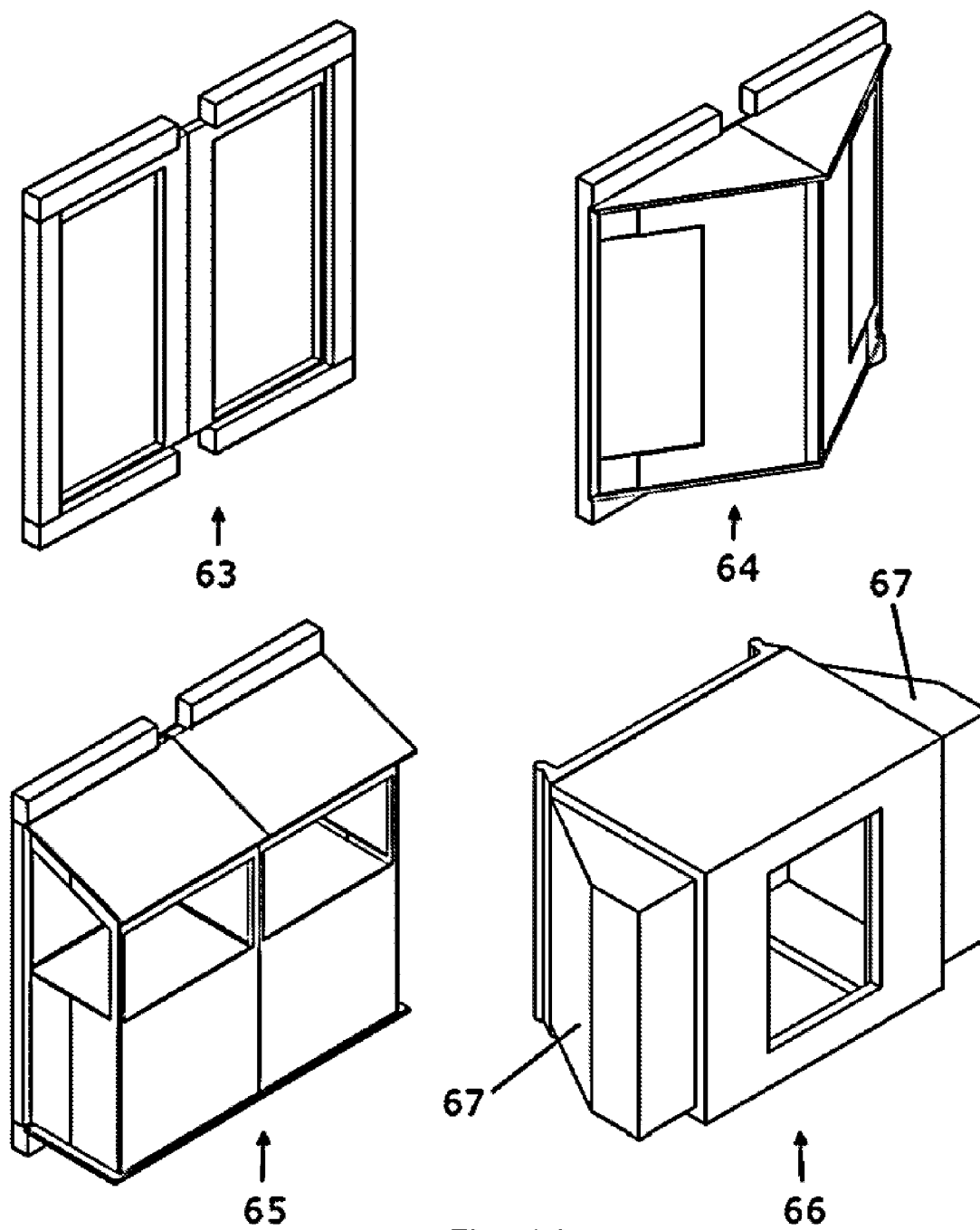


Fig. 14

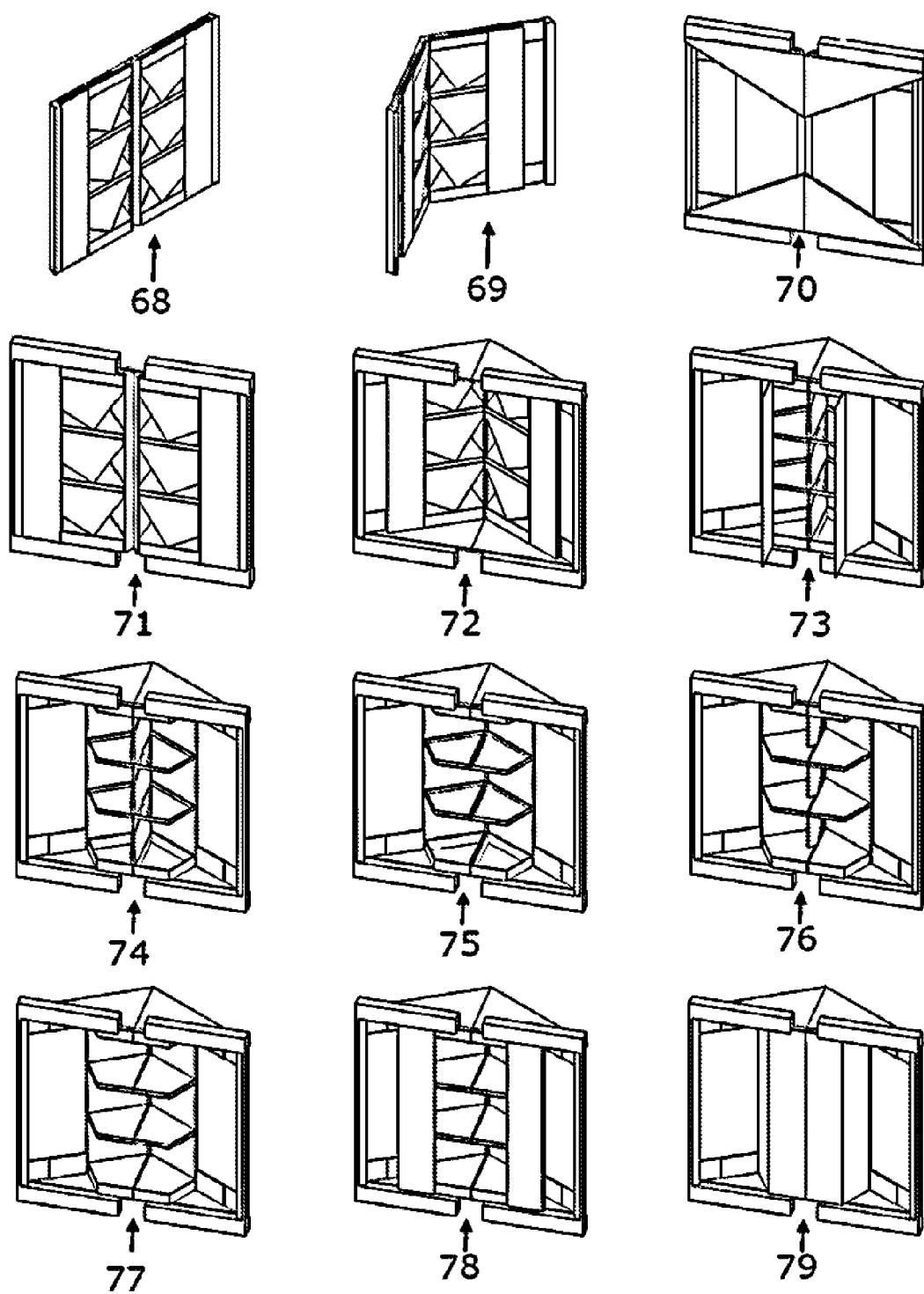
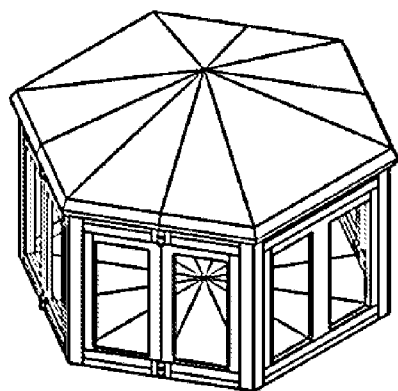
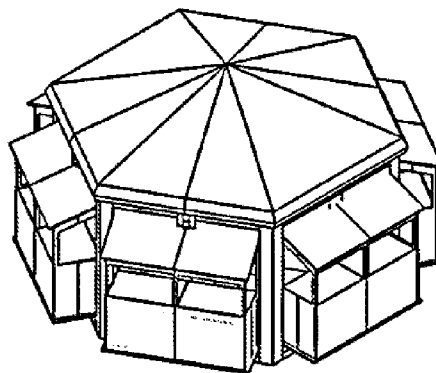


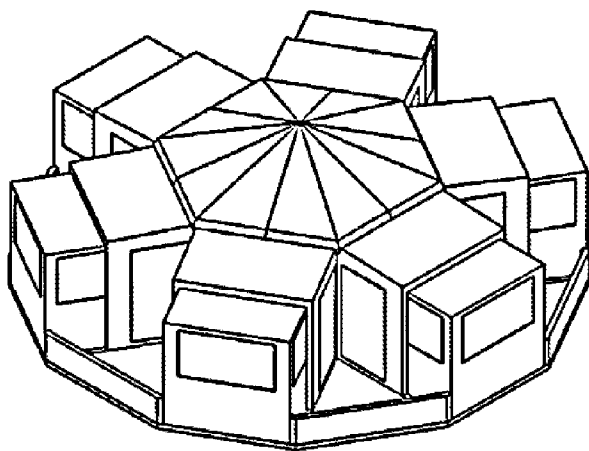
Fig. 15



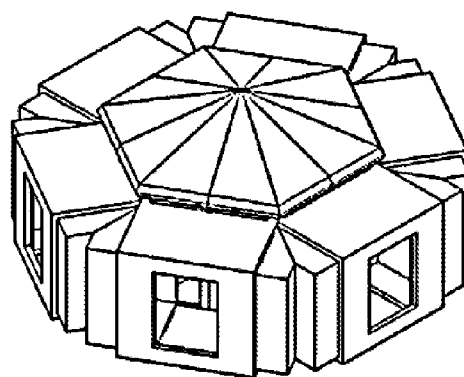
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80



↑
81



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82



↑
83

Fig. 16

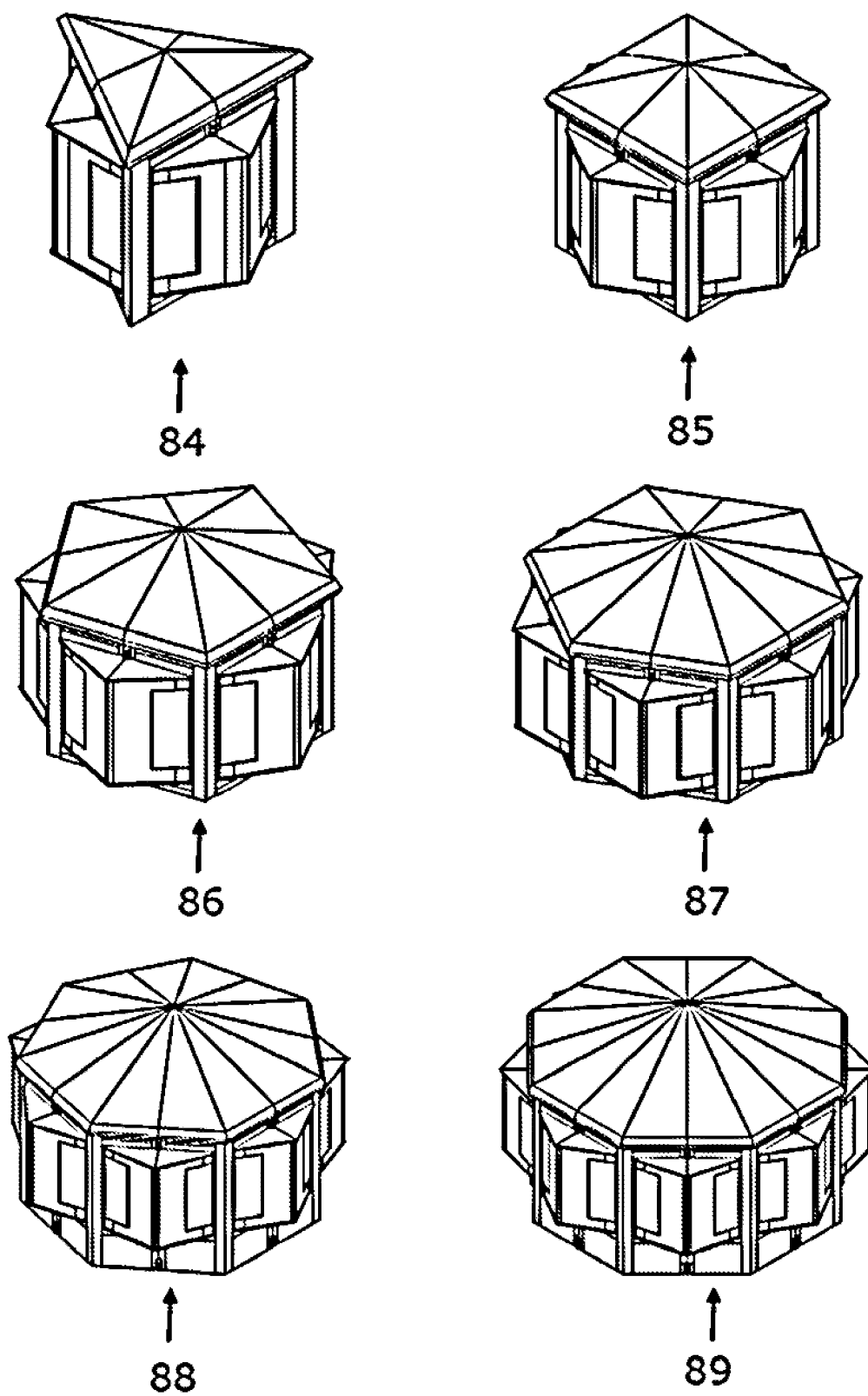
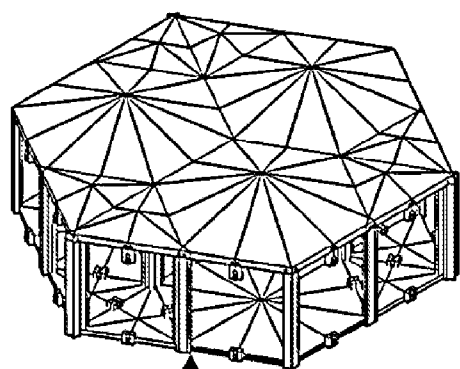
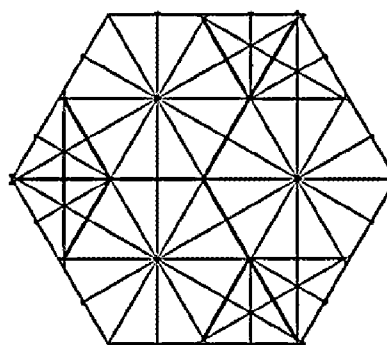


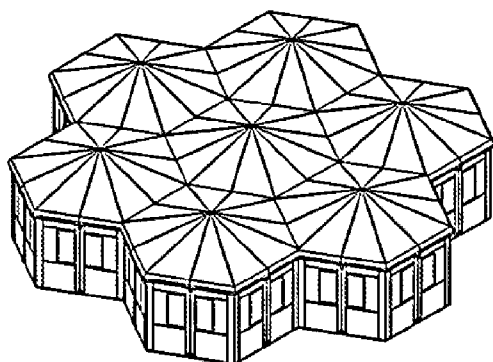
Fig. 17



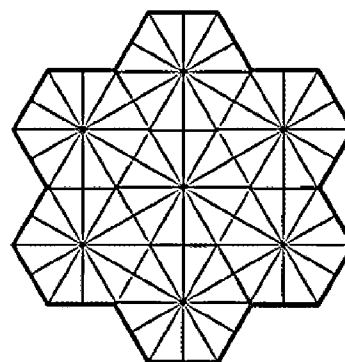
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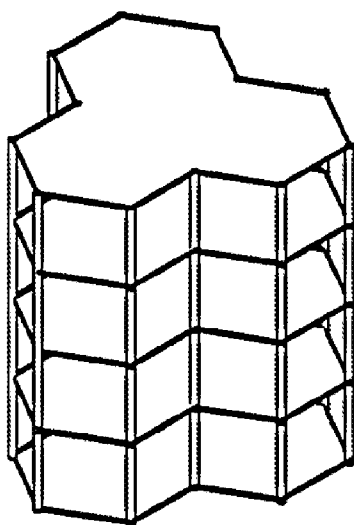
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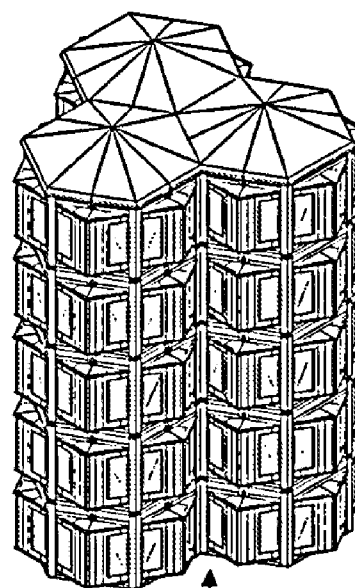
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Fig. 18

FREESTANDING BUILDING MODULE THAT IS PORTABLE AND FOLDABLE AND CAN BE INTER-CONNECTED FOR VERTICAL AND HORIZONTAL EXPANSION

TECHNICAL FIELD

[0001] The freestanding, portable, folding and interconnectable architectonic module is a versatile constructive and architectonic proposal, which starting from an interconnectable basic model it can be assembled and reassembled according to destination and specific requirements. Thanks to the coupling concept, true complex architectonic structures may be created combining various of these modules in a horizontal, vertical or both arrangement, readdressing the architecture concept and the construction industry. In such concept, the industrial and technological developments, and the strong ecologic trends of the new millennium can converge. Today, mankind is searching for equilibrium between its needs, welfare, comfort, and planet health. This objective is hard to reach if there is not a rethinking and convergence towards unique standards and norms of its habitat. Society is migrating from industrial era to information era, due to science advance, development of new technologies, and the men's ability and capacity for integrate and benefit thereof. Mobility and portability are the main milestones thus breaking space and time paradigms in all community activities.

STATE OF THE ART

[0002] Architectonic constructions have been a special, unique and unrepeatable product. It is a result of variables which start in culture and tradition, passing through needs, preferences and environment, and ending in economical, political and social regulations. After evaluating and defining the use requirements, such as: housing, industry, education, health, research, work, marketing, time-out, etc, different processes come into scene including design, engineering, planning, execution, and completion of each project. All under the fundamental premise of minimizing costs overruns due to delays and accidents, derived from lack of specialized labor, raw material availability, climate conditions, transport, etc. Therefore, its evolution has been addressed to developing economic, more efficient, constructive system involving new materials and technologies, including improvement of traditional processes up to assembling parts or semi-manufactured modules which are assembled in-situ, requiring technical labor for mounting and assisting with adequate machinery and tools.

DESCRIPTION

[0003] The design of the freestanding, portable, folding and interconnectable architectonic module shown in FIG. 1, is based on the reiterative utilization of various Basic Modules which are coupled to each other forming a regular architectonic system, which main purpose is minimizing the space used when being in its fold position 1 and providing the maximum area in its unfolded position 2. This provides a solution to multiple ends thanks to the Specialized Coupling Modules complement which when integrated to the main parts the required specific architectonic system is structured.

[0004] Prior to studying its configuration phases from the fold position to its total unfold position, it is important to point out the inherent characteristics of its rotating and translational movements. One is, a vertical displacement, from a

height which depends on the design. This characteristic has the following purpose: first, unlocking the freestanding, portable, folding and interconnectable architectonic module when found in the folded position thus allowing the rotation and movements, and second, locking once the final configuration process is reached. This allows a locking status in these two main conditions, adding more rigidity and stability to the system. Another characteristic movement is that one corresponding to horizontal displacements, which are orthogonal, symmetric and synchronized, which is a required action in order to execute its location. Finally, rotating movements independent from translational and necessary for its final configuration and installation.

[0005] As symmetry is a typical characteristic, because both through the Basic Module design and the regular shapes obtained thereof, each essential element comprises its two symmetric axial segments, which are identified as only one. In the following paragraphs, when referring to anyone of its two elements, particularly, the letters "a" and "b" shall be used for identification. As to keep the objectivity in the integral explanation, each figure has been organized by the functional unit and its processes. Therein are pointed out these functional units with arrows, and the particular elements with an indicative line.

[0006] In order to understand the behavior we will first study the Basic Module and then the freestanding, portable, folding and interconnectable architectonic module as such, and finally some illustrative examples are given, but these examples do not have the purpose of limiting or restricting the scope of the present invention. The freestanding, portable, folding and interconnectable architectonic module taken as an example is a design which provides a hexagonal shaped architectonic solution having an automatic configuration. Thus, it comprises six Basic Modules which are arranged forming sixty degrees angle between each other, once the final position has been reached.

[0007] In order to make a simple and clear exposition those details of the complementary elements such as control elements, those generating the required rotation and translation, locking or anchoring devices, as well as the hermetic seal elements for each joint will be obviated, as there are a great number of solutions thereof. In addition, the configuration operations can be executed or performed through any electrical, pneumatic, hydraulic or manual system, depending on the purpose, performance, utilization and costs; which are not the purpose of this description.

[0008] FIG. 2 provides an example of the freestanding, portable, folding and interconnectable architectonic module, showing its structural integrity both in the folded status 3, and unfolded status ready for use 4. The Basic Module offers the freestanding characteristic by integrating a structural part to an external finish part thus obtaining a consistent assembly. In the present description this assembly is taken as one single piece and will refer to its structural part as that one is performing the fundamental role. The external finish will not be taken into account as its only purpose is exclusively esthetic and will only be called when necessary, identified with a letter c. For easiness, the structural part of each element is shown solid but in practice these are reticulated structures.

[0009] The Basic Module in its folded status, is shown in FIG. 3 as a front isometric view 5, and a rear isometric view 6. It comprises three essential elements, which perform their own functions of: cover 7, functional wall 8 and floor 9. Each essential element comprises two axially symmetric parts,

which in the case of the functional wall **8** and the floor **9** are coupled and articulated through pivoting hinges, this characteristic allows its contraction into its initial position, forming an angle of 0° between them, or its expansion, forming a specific angle when reaching its final or duty position. The axially symmetric parts of the cover **7**, **7a** and **7b**, do not bear this characteristic as a vertical displacement of some of these segments is required as was previously explained. The cover **7** and functional wall **8** form an axially pivoting axis through a pivoting hinge **10**. The functional wall **8** comprises a top beam **11**, a bottom beam **12**, and columns **13**. This is the functional piece practically supporting all the Basic Module arrangement. The top **11** and bottom **12** beams are conformed by their respective axially symmetric parts, which are articulated by top and bottom pivoting hinges **14**, located at their inner end. These pivoting hinges **14** are found height graded in order to allow overlap of its equivalent in the Basic Modules converging when reaching the folded position. Such grading also allows various freestanding, portable, folding and interconnectable architectonic modules to be couples in such cases of multiple configurations.

[0010] The top beam **11** acts as a support and rotating element for the cover **7**, and is divided in two horizontal sections **11a** and **11b** containing in an inner recess a lifting device which cases the vertical displacement of section **11a**. The bottom beam **12** acts as support and anchoring for floor **9** through a rotating and horizontal displacing element **15**, which translational movement performed on a toothed guide **16a** and **16b** located on it.

[0011] Columns **13** of the functional wall **8** conform external side vertical elements of the Basic Module. Their main function is to articulate along with the related Basic Modules and allow them to rotate due to the pivoting hinges **17** height graded, located at their top and bottom zone. In the bottom segment of columns **13** there is a complement piece **18** of the floor for design reasons and will be discussed below.

[0012] Floor **9** also comprises two axially symmetric parts **9a** and **9b**, coupled through a pivoting hinge **19** which holds them together. Due to design needs, a portion of its area has been excluded from its bottom external zone, and has been located in the bottom zone of column **13** of the functional wall **8**. This is the complement piece of the floor **18**, for two important reasons, first optimizing the space by being located floor **9a** to a zone apt for that in the related Basic Module maintaining the compactness characteristic of the design. And second because it allows that during the configuration process its rotation and translation are synchronous with the remaining elements of the design. Due to its atypical arrangement it is necessary to introduce a mechanism which performs the work of locating the same in the required place during the configuration of the Basic Module, this is the rotating and horizontal displacing element **15**.

Operation

[0013] The configuration of both the Basic Module and the freestanding, portable, folding and interconnectable architectonic module is divided in two steps: the first corresponds with its physical positioning, due to translation movements, and the second to the configuration process in its particular structure, due to independent rotating movements.

[0014] FIG. 4 shows three positions, initial **20**, mid **21** and final **22** of the Basic Module. Positioning of the symmetric parts is done according to the horizontal symmetric displacements which the freestanding, portable, folding and intercon-

nectable architectonic module must do as a whole, which will be discussed below. In the initial position **20** the two axially symmetric segments forming the Basic Module form a core degrees angle. In order to allow free rotations and displacements within the configuration process, before its path is initiated it is necessary to lift the cover **7**. As an option in this example, a scissors type of lifter **23** is used, its performance is not explained as this is a technological option. One can clearly see the two horizontal sections **11a** and **11b** and its inner recess wherein this lifting device is lodged. Once the translating movement starts, then one can see that the floor segment **9a** displaces and rotates at the same time with all the structure as seen in **21**, due to the movements of the related Basic Module to which it is temporally attached. This process will be better understood when the freestanding, portable, folding and interconnectable architectonic module is analyzed as a whole. When the Basic Module reaches an angle of one hundred and eighty degrees at its final position **22**, one can visualize the temporal arrangement of floor **9a**, which occupies the space which will be used by the segment of floor **9b** of the related Basic Module in its final position, and forming the angle of sixty degrees with its symmetric part **9b**, a characteristic of this example.

[0015] Once its final position has been reached, the next configuration phase occurs in its inside. FIG. 5 shows the preparation of cover **7**. Cover **7** and the functional wall **8** create an pivoting axis because of the pivoting hinge **10**, forming a zero degree angle in its initial position **22**, rear view. It is also indicated that the floor segment **9a** is released from the anchor and reduces its angle formed with segment **9b** in some degrees, enough as to allow the free displacement of the floor segment **9b** of the related Basic Module thereafter. This small rotation is done due to the rotating and horizontal displacing element **15**. In the final position **24**, the structure of the cover **7** forms a ninety degrees angle with respect to the functional wall **8**, and the finish part of the cover **7c** will form a bigger angle with respect to its structure, indicated by the inclination level computed in the design. The mechanism executing this action is the lifting arm **25**. Its performance is not considered herein as it is a technological option.

[0016] Before we explain the configuration process of floor **9**, the two complementary elements involved in said final arrangement will be described.

[0017] FIG. 6 presents the rotating and horizontal displacing element **15** in an isometric view and some side views thereof, wherein it can be seen the orthogonal rotation of a coupling element **27**, which will transmit both the axial rotation of floor segment **9a**, in order to located in its position, and the orthogonal rotation in order to fix floor **9** in its end position. One can more clearly distinguish, in the side views, the gear system of the vertical axial rotation **26**. The rotating axis **28** and the floor supports **29** are shown, also it can be seen the slipping platform **30** coupled to the bottom beam **12** with the guides **31**. The rotating axis **28** and the floor supports **29** are fixed therein. The gear system of the vertical axial rotation **26** comprises three pinions. The rotation generating pinion **32** passing by the toothed guide **16**, which must be calibrated in the number of teeth and the distance between them such that when the displacement of floor **9** has ended, the rotation of one hundred and eighty degrees of the floor segment **9a** has been completed. Pinion **33** is responsible for inverting and transmitting the rotation towards pinion **34**, which causes the rotation of the coupling element **27** around the pin axis **35**. In the case of floor segment **9a**, its rotation axis **28** and supports

29 are found free and only fixed to the beam **12a** once the final position has been reached. Both the referred displacement and orthogonal rotation of floor **9** and the anchoring are provided through mechanisms which are not discussed herein as there are a variety of commercial options.

[0018] FIG. 7 shows the other important element, the floor complement piece **18** both in its initial position and final position, and a cross-sectional view **36** which shows clearly the interaction of floor **9** when rotating towards its end position causing the axial displacement of stop **37**, which causes the floor portion **38** to rotate when drove by the cam **39**. The stop **37** and the cam **39** are axially connected. The whole floor complement **18** is mounted on its base **40**.

[0019] FIG. 8 shows the positioning of floor **9** with its floor fragment **9a** rotating around the pivoting hinge **19**, towards its final location **41**, once vertically placed in the required location **42** and in its final position after its orthogonal rotation **43** occurred.

[0020] The configuration process of floor **9** is carried out in two steps. The first step consists in that floor **9** is located in its required position by the action of the rotating and horizontal displacing element **15**, thus forming, between the two segments **9a** and **9b** an angle of hundred and eighty degrees through the action of the gear system of the vertical axial rotation **26** which transmits this rotation to the coupling element **27**, which in turn to the floor segment **9a**. At this stage, floor **9** remains in a perpendicular position with respect to its normal position. The second step consists in that floor **9** is located now horizontally, in its definite position, through an orthogonal rotation of ninety degrees of the coupling element **27**. The complement piece **18** of the floor located in the bottom segment of columns **13** reaches a coplanar position with floor **9**.

[0021] Once the Basic Module has been analyzed, we proceed with the study of the hexagonal model of the freestanding, portable, folding and interconnectable architectonic module shown in FIG. 1, constituted by six Basic Modules interconnected through pivoting hinges **17** located in the upper and lower zones of columns **13** of each one. This example highlights the invariable position of the two outer Basic Modules which due to the design maintain from the beginning the required arrangement of one hundred and eighty degrees between their two axially symmetric parts, and therefore lack of pivoting hinge **14**.

[0022] Prior to starting the transition sequence, it must be taken into account that in the example under analysis the configuration is carried automatically. There is a variety of possibilities and forms of execution for these movements. In this example, we will take a platform base **44** (FIG. 9), which integrates six displacement telescopic arms **45**, each one oriented and in this case guided in synchronous manner in order to produce the required orthogonal movements. The formed pair of columns **13** of each one of the related Basic Modules is anchored to its corresponding displacement telescopic arm **45** through an anchoring device **46**. The operation of the platform base **44**, the displacement telescopic arms **45** and the anchoring devices **46** are not explicitly analyzed because there are different commercial manner for their operation.

[0023] In order that the freestanding, portable, folding and interconnectable architectonic module can perform free rotations and displacements, prior to starting its run in some of the Basic Modules, depending on the specific design, it is necessary to lift up their covers a required distance. For a better understanding, the translation sequence of the assembly from

an initial position up to its final position, emphasizing the total symmetry conservation, is divided in four phases. The first two positioning phases are shown in the plan view and the other two configuration phases in the isometric views. The first corresponds to a symmetric longitudinal translation for reaching a distance, between the two outer Basic Modules, greater than that required for its final positioning, in order to allow the symmetric segments of the four inner Basic Modules carrying out this process to surpass the restricted angle present in the final location step. FIG. 10 shows some of these temporary positions, starting with its initial position **47**, wherein we notice the compactness. At the beginning of the symmetric longitudinal translation, one can observe how the pivoting hinges **14** are being discovered from the functional wall of the inner Basic Modules which were previously overlapped due to their height grading **48**. The overlap of covers **7** can be seen in **49**, which covers have been lifted thus allowing their positioning without any obstruction. The reached position of the outer Basic Modules in their maximum elongation is shown in **50**. The second positioning phase shown in FIG. 11, is related to a symmetric transverse translation. The run carried out by the inner Basic Modules to reach their final transverse position is shown in **51** and **52**. **53** shows how the restricted angle has been overcome due to the greater longitudinal distance of the outer Basic Modules. In **54**, when the latter are contracted, searching for their final positioning, their distances are reduced thus helping to complete the final arrangement of the inner Basic Modules. Now the positioning process of the whole freestanding, portable, folding and interconnectable architectonic module is ended.

[0024] FIG. 12 shows phase three corresponding to the configuration of the cover. In **55**, once positioning is ended, the arrangement of covers **7** is presented. The next step, **56**, is the final location of covers **7** which have remained lifted due to the rotation of the pivoting hinge **10**, and the action of the lifting arm **25**. Once located, the next step **57** carries out the same operation to the covers **7** which were not lifted. In that position, the preparation process of the fixing and hermetic sealing systems is started, their edges must have overlapping elements, for example, spoilers, which when arriving to their final position fit to cover the joints and thus eliminate the permeability. For this example these will not be studied as there are several methods, forms and mechanisms for obtaining thereof. In step **58**, the lifted covers return to their final position thus reaching two important purposes, the hermetic seal and blocking of the whole freestanding, portable, folding and interconnectable architectonic module thus obtaining a integrally rigid and stable structure.

[0025] In the last phase shown in FIG. 13, the floor configuration is discussed. In order to better understanding covers **7** have been deleted. In step **59**, one can observe that the floor symmetric segments **9a** have been freed from their anchorage in the bottom beam **12** of the related Basic Module which caused its rotation at the same time thereof. Once loose, they rotate thus reducing their aperture angle due to the tense rotation spring located in the coupling element **27**, thus obtaining two purposes, first to clear out the path so that the floor **9** can displace itself to its final position in each Basic Module. And locate in its position the gear system of the vertical axial rotation **26**. Both the attaching element and the tense rotation spring are not discussed in connection with their function as there are several commercial options available. In step **60**, it can be seen the location of floor **9** arriving to its final position thanks to the rotating and horizontal dis-

placing element **15** and its gear system of the vertical axial rotation **26**. In step **61**, the position of floor **9** in its place and completely extended is presented, at that moment the preparation process of the fixing and hermetic sealing systems starts. In step **62**, due to the orthogonal rotation of the coupling element **27**, the system as a whole acquires its final position including the floor complementary piece **18**.

[0026] Up to now, the fundamental configuration of the freestanding, portable, folding and interconnectable architectonic module has been studied, which is used for conforming complex architectonic structures. From here on we will discuss one of its strengths, the functional wall **8**, previously discussed concerning its structural part. Such function is offered by a system contained in the frame formed by its beams **11** and **12**, and columns **13**. Its arrangement process is started once the freestanding, portable, folding and interconnectable architectonic module is on its final position. The options presented in FIG. **14**, as examples, do not limit the diverse possibilities which can be obtained. The configuration process will be discussed later on below taking one of these options as a sample. Also, for clearness commercial devices used for rotation, translation, retention and anchoring will not be further discussed as are not an interest of the present discussion. In step **63**, a typical wall is taught. In step **64**, discloses a wall with an integrated piece of furniture. In step **65**, another wall model with integrated piece of furniture is disclosed. And step **66** discloses an example of the Specialized Coupling Module, which has the purpose of serving as a container or storage device, comprising particular elements and equipment, including electric, hydraulic, heating, control, surveillance, security services and facilities, etc, which once being coupled to the freestanding, portable, folding and interconnectable architectonic module offer the optimum solution to any demand. These are integrated to the functional wall **8** according to the requirements and uses of the model. They bear the quality of being retractable, their sections **67** are displaced outwardly, freeing the required space in their inside.

[0027] FIG. **15** shows, as can be seen, in a particular example, the way in which the furniture function is arranged. This is formed by two expandable symmetrical racks. The expandable rack is in turn constituted by two panels, one inner panel which supports the shelves, the covers and doors of the furniture and displace on rails on the other outer panel which contains it and which supports the windows. In the outer central zone there is an articulation and rotation element, a pivoting hinge, which joins the two expandable racks. There are other two pivoting hinges, at their ends, which anchor these racks to the structural wall **8**. In their initial position **68** their parts form an angle of one hundred and eighty degrees in the same plane of the structural wall **8**. In the first configuration phase the central pivoting hinge is displaced towards the outside **69**, thus reaching its final position. In the previous views the structural wall **8** has been deleted, in order to obtain a total panorama. In **70** and **71**, it can be seen an initial isometric view of the wall furniture on its outer and inner face, respectively. When the furniture carries out its translational movement, two important actions take place. On one hand, the top and lower covers rotate in order to locate in their horizontal position, and on the other hand, the expandable racks retreat until their final prolongation thus locating the shelves in their position and exposing the area corresponding to the windows, **72**. Further on, the supports of the shelves are located along with the side covers, **73**. In **74**, the side covers

and doors have been deleted from the isometric view, in order to clearly expose the arrangement of the shelves. In **75**, the upper and lower covers of the shelves have been deleted to show the shelf supports in their definite position. In **76**, the upper covers of the shelves have been fixed and then the lower covers, **77**. In **78**, the furniture is shown completely assembled with the doors open, and in **79**, the furniture is shown with the front face closed. The shelves, covers and doors are articulated with hinges.

[0028] Now that the hexagonal freestanding, portable, folding and interconnectable architectonic module has been completely analyzed as an example, in FIG. **16**, other exploitation possibilities are taught under the same concept. In **80**, an assembly with a conventional wall face is taught. In **81**, another furniture model is used. In **82** and **83**, some models with Specialized Coupling Modules are shown.

[0029] Another of the strengths of the freestanding, portable, folding and interconnectable architectonic module is its versatility for scaling in more complex architectonic structures, by selecting not only the amount but the shape of these Modules. Its shape derives from its regular symmetry characteristic and according to the number of Basic Modules being used. Non-limitative examples are shown in FIG. **17**, such as a triangular model **84**, quadrangular model **85**, pentagonal model **86**, hexagonal model **87**, heptagonal model **88** and octagonal model **89**.

The Best Way to Carry it Out and Where Can it Be Applied

[0030] The freestanding, portable, folding and interconnectable architectonic module is a folding structure easy to be arranged for transporting and locating in situ. the simple preparation and arrangement done under basic instructions, including automation, using a computer or a microcontroller, allows executing a determined sequence of rotations and translations both during the folding phase and the unfolding phase. Such movements are made with any electrical, pneumatic, hydraulic or manual system, depending on the purpose, performance, use and costs.

[0031] The freestanding, portable, folding and interconnectable architectonic module can be an alternative to lots of construction needs of today's world: Due to its variety of applications and configurations, by offering reasonable, efficient, secure and comfortable spaces. Due to its low construction costs, allowing, during manufacturing, the inclusion of related systems such as hydraulic, electric, control, etc., integrated as a functional unit, under a series production thus favoring scale economy, minimizing overcosts and delays. Due to its easiness for being repaired and maintained, its configuration starts with a repeating Basic Module, formed by a set of essential pieces, according to requirements. Due to its efficiency which allows the use of reusable materials for its structural component, such as: biodegradable polymers, composites, light steels, aluminums, etc., thus guaranteeing a good thermal and acoustic isolation, and great physical and chemical resistance to environment. Due to its portability and mobility, being one solid, stacking and low weight assembly makes it easy for transporting and fast mounting thereof. Due to its flexibility while being reconfigurable and expandable thanks to its modular conception and its scaling into more complex architectonic structures, being able to integrate equipments and solutions for a specific destination such as: emergency housing in great disasters, hospitals and movable care centers, research centers located in wild places, definite

housing options for rehabilitation or immediate development zones both in land or water, rural schools and libraries, production and gathering centers, application in space stations and explorations, in promotion and publicity campaigns and programs, moving homes and recreational vehicles, and in endless possibilities. The freestanding, portable, folding and interconnectable architectonic module can be folded and stored in a construction provided underground which will maintain the same safe from hurricanes or monsoons. It can be maintained over the water when sustained on a floating platform, in case of flooding, support strong telluric movements when anti-oscillating elements are added to its structure. The cities of the future vertically developed find an option as this system is totally modular, structurally strong and has low weight, integrally constructed in facilities and easy to transport to the required location.

[0032] FIG. 18 shows examples of scaling into complex structures in horizontal and vertical developments. 90 refers to an isometric view, and 91 refers to a plant view, which show a model developed with three hexagonal freestanding, portable, folding and interconnectable architectonic modules and six triangular thereof. 92 refers to an isometric view, and 93 refers to a plant view, which show a model developed with seven hexagonal freestanding, portable, folding and interconnectable architectonic modules. 94 and 95 present a multi-level solution having a configuration of three hexagonal freestanding, portable, folding and interconnectable architectonic modules in each level, 94 shows the receptacle structure and 95 the finished solution.

BRIEF DESCRIPTION OF THE FIGURES

[0033] FIG. 1. The freestanding, portable, folding and interconnectable architectonic module taken as an example, shown in its initial and final status.

[0034] FIG. 2. The structure of the freestanding, portable, folding and interconnectable architectonic module taken as an example, shown in its initial and final status.

[0035] FIG. 3. Front and rear Isometric views of the structure of the Basic Module in its folded status.

[0036] FIG. 4. Arrangement of the Basic Module in its typical steps.

[0037] FIG. 5. Configuration of the cover of the Basic Module.

[0038] FIG. 6. Isometric and side views describing the horizontal displacement and rotating element.

[0039] FIG. 7. Isometric and cross-sectional views of the positioning describing the complement piece of the floor.

[0040] FIG. 8. Configuration of the floor of the Basic Module.

[0041] FIG. 9. Arrangement of the platform base and arrangement of the displacement telescopic arms.

[0042] FIG. 10. Arrangement of the freestanding, portable, folding and interconnectable architectonic module during the symmetric longitudinal translation.

[0043] FIG. 11. Positioning of the freestanding, portable, folding and interconnectable architectonic module during the symmetric longitudinal translation.

[0044] FIG. 12. Configuration of the cover of the freestanding, portable, folding and interconnectable architectonic module.

[0045] FIG. 13. Configuration of the floor of the freestanding, portable, folding and interconnectable architectonic module.

[0046] FIG. 14. Examples of configurations of the functional wall with integrated piece of furniture and with Specialized Coupling Module.

[0047] FIG. 15. Example of a typical configuration of a furniture integrated with a functional wall.

[0048] FIG. 16. Examples of models of functional configuration of the freestanding, portable, folding and interconnectable architectonic module.

[0049] FIG. 17. Examples of regular models of the freestanding, portable, folding and interconnectable architectonic module.

[0050] FIG. 18. Examples of horizontal and vertical scalability of the freestanding, portable, folding and interconnectable architectonic module.

1. A freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend, characterized in that is configured repeatedly using a freestanding basic module, and in that optionally is complemented with a standard wall, a folded piece of furniture or a specialized services module, wherein:

The basic module is integrated by axially symmetric fragments of cover (7), wall (8) and floor (9); said cover (7) and wall (8) form an axial rotation axis due to the pivoting hinge (10); the axially symmetric parts of the cover (7), (7a) and (7b), are not coupled and articulated through pivoting hinges as a vertical displacement of some of these segments is required in order to unlock and lock the architectonic module during its configuration process, and in the final folded and unfolded positions respectively: The functional wall (8) comprises a top beam (11), a bottom beam (12), conformed by their respective axially symmetric parts, which are articulated by top and bottom pivoting hinges (14), located at their inner end; columns (13) conform external side vertical segments which allow their articulation along with the related basic modules and allow them to rotate due to the pivoting hinges (17) located at their top and bottom part; Floor (9) comprises two axially symmetric parts (9a) and (9b) coupled through a pivoting hinge (19) which holds them together; a portion of its area has been excluded from its bottom external parts, allowing the floor segment (9a) to temporarily locate itself in the space which is to be used by the floor segment (9b) of the related basic module in its final position, it is the floor complement piece (18) which is located in the respective column (13).

The complement option lodged in the structural frame formed by the beams (11) and (12), and the columns (13) of the wall (8): a standard wall including its lighting and vent element (63) is fixed thereof; a system of folded furniture (64, 65) with lighting and vent elements, formed by expandable symmetric frames which when moving outwardly provide the space in the inside required for its configuration, is fixed through pivoting hinges at its ends; or a specialized services coupling module (66), with lighting and vent elements, which serves as container or storage device and wherein particular service elements and equipment are installed. It has the quality of being retractable; its sections (67) are displaced outwardly, providing the necessary space inside.

2. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claim 1, characterized in that the cover

structure (7) forms a ninety degrees angle with respect to the wall (8), and the finishing part of the cover (7c) form an angle equal or greater with respect to its structure.

3. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claim 1, characterized in that the pivoting hinges (14) are interspersed in the wall (8), in order to allow the overlapping of their equivalent in the inner basic modules which converge when their folded position is reached and also allow coupling of the various architectonic modules; the upper beam (11) supports the cover (7); the lower beam (12) supports and anchors the floor (9) through the horizontal displacement and rotation element (15) with a translating movement done on a toothed guide (16a) and (16b) located thereof.

4. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claims 1 and 3, characterized in that the horizontal displacement and rotation element (15) comprises: a system of vertical axial rotation pinion (26) comprising three pinions; a rotation generating pinion (32) passing by the toothed guide (16); a pinion (33) responsible for inverting and transmitting the rotation towards pinion (34) which causes the rotation of the coupling element (27) around the pin axis (35); the coupling element (27) which transmits both the axial rotation to the floor segment (9a) in order to located in its position and the orthogonal rotation in order to fix floor (9) in its end position; a slipping platform (30) coupled to the bottom beam (12) with the guides (31). The rotating axis (28) and supports (29) of the floor segment (9b) are fixed to the slipping platform (30); the rotation axis (28) and supports (29) of the floor segment (9a) are found free and can only be fixed to the beam (12a) once the final position has been reached.

5. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claim 1, characterized in that the floor complement piece (18) is mounted on its base (40) and takes its final position through the interaction of the floor (9), when rotating towards its terminal position by axially displacing the stop (37) which causes the rotation of floor portion (38) by being pushed by the cam (39).

6. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claim 1, characterized in that the folded furniture system (64, 65) comprises components such as shelves, covers, doors and other elements attached to the expandable symmetric racks, required for configuring a closet, library, desk, or any other related device.

7. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically

extend according to claim 1, characterized in that the specialized services coupling module (66) includes control, surveillance, security services; or electric, hydraulic, heating installations, or any other required service or installation.

8. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claim 1, characterized in that its configuration of folded status (1) or unfolded status (29) can be executed in an automatic manner through an electric, pneumatic, hydraulic or manual system.

9. The freestanding, portable, folding and interconnectable architectonic module which can horizontally and vertically extend according to claim 1, characterized in that horizontally and vertically extending architectonic structures can be developed by selecting not only an amount of basic modules conforming each architectonic module but by combining the latter in an assembly.

10. A process for configuring freestanding, portable, folding and interconnectable architectonic module, characterized in that its unfolding is carried out in four phases, once the covers (7) have been lifted in an alternating manner unlocking the architectonic module: the first phase corresponds to a symmetric longitudinal translation until reaching a maximum elongation in order to allow the symmetric segments of the inner basic modules to surpass the restricted angle present in the final location step; the second phase is related to a symmetric transverse translation until it reaches its final position, once there the longitudinal elongation is reduced to its final position thus ending the configuration of the inner basic modules; the third phase corresponds to the configuration of the covers (7), wherein covers (7) which have remained lifted return down to their definite position blocking the architectonic module; the four phase corresponds to the configuration of floor (9) wherein the floor symmetric segment (9a) is freed from their anchorage and reduces its angle formed with the floor segment (9b) in order to allow the free displacement of the floor segment (9b) of the related basic module; the configuration process of floor (9) is carried out in two steps: in the first step, the floor is located in its required position through a horizontal displacement and a rotation thus forming a one hundred and eighty degrees angle between the two segments (9a) and (9b) in a perpendicular position with respect to its normal; in the second step the floor is horizontally located taking its definite position through an orthogonal rotation of ninety degrees; this action also produces the rotation of the floor complement piece (18). The folding process is the reverse of the above.

* * * * *

⑤

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⑤④

Bezeichnung:

Wabenelement-Bausystem

⑦①

Anmelder:

Stelter, Axel, 3320 Salzgitter

⑦②

Erfinder:

gleich Anmelder

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G 73 42 843.0

NACHGEFICHT

Seite 1-3

Axel S t e l t e r

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B e s c h r e i b u n g

Bezeichnung der Erfindung:

Wabenelement-Bausystem

Anwendungsgebiet:

Industrielles Bauen

Stand der Technik und Kritik:

Zwar gibt es bereits eine große Anzahl von Bausystemen, die für den Wohnungsbau anwendbar sind, die aber kaum die Bedürfnisse der Benutzer berücksichtigen. Außerdem sind sie aufgrund ihrer Vielzahl unterschiedlicher Elemente unwirtschaftlich. Gebäude, die den Bedürfnissen der Benutzer gerecht werden und außerdem eine verdichtete Besiedelung ermöglichen, wie z.B. Terrassenhäuser, werden nach wie vor kostspielig in konventioneller Bauweise erstellt.

Aufgabe:

Der Erfindung liegt die Aufgabe zugrunde, eine neue Wohnstruktur zu schaffen, die es ermöglicht, bei verdichteter Bauweise jedem Bewohner seinen eigenen Freiraum zur Verfügung zu stellen, was bei dem Bau von "Mietskasernen" nach wie vor nicht berücksichtigt wird. Es soll eine Alternative zum bis heute dominierenden "Einfamilienhäuschen im Grünen" geschaffen werden, das aufgrund der dadurch erfolgenden Zersiedelung nicht mehr zu vertreten ist. Außerdem soll der zu schaffende Wohnraum finanziell erschwinglich sein, was zwangsweise zu einer Industrialisierung führt, die stärker als bisher üblich rationalisiert ist, z.B. durch Reduzierung der unterschiedlichen Bauelemente auf wenige systembestimmende Fertigteile.

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Lösung:

Das entwickelte Bausystem bietet die Wohnqualitäten eines Einfamilienhauses bei gleichzeitig dichter und somit raumsparender Bebauung. Die Wohnqualitäten sind insbesondere durch die terrassierte Bauweise gegeben, die jeder Wohnung einen angemessenen Freiraum zuordnet (Zeichnung 5). Durch die Formgebung und die Elementierung ist es gelungen, eine extrem wirtschaftliche Lösung anzubieten, was insbesondere auf der Tatsache beruht, daß der gesamte Rohbau nur aus der wiederholten Addition eines einzigen Betonelementes erstellt wird (Ze. 4). Das bedeutet, daß zur Produktion hierfür nur eine einzige Schalungsform notwendig ist.

Das entwickelte Betonelement (Ze. 1) ist $1/3$ einer wabenartigen Röhre. Das Element ist so ausgebildet, daß sich mit ihm - durch unterschiedliche Aufstellung - differenzierte Räume bilden lassen (Ze. 3). Das Element läßt sich wirtschaftlich produzieren, kann platzsparend gelagert werden und problemlos transportiert und montiert werden. Bei der Montage werden die Elemente durch Stahlverschraubungen miteinander verbunden. Die zwischen den Elementen bestehenden Fugen werden abgedichtet (Ze. 2 Punkt 2).

Eine Wabenzelle aus drei Elementen ist aufgrund ihrer Dreigelenkigkeit in sich stabil.

Zur Gründung eines Gebäudes sind lediglich Streifenfundamente notwendig (Ze. 2 Pu. 6), auf die die Wabenelemente, die die Raumunterseite darstellen, gelegt werden. Darüber entsteht ein Wohnraum mit dachartiger Decke (Ze. 2 Pu. 1). Den Fußboden bildet eine eingelegte Bodenplatte (Ze. 2 Pu. 4).

Der unterhalb dieser Platte entstehende Raum wird für Ver- und Entsorgungsleitungen, Be- und Entlüftung, (Fußboden-) Heizung usw. verwendet (Ze. 2 Pu. 5).

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Der entstandene Nutzraum kann konventionell unterteilt werden (Ze. 2 Pu. 3). Die Raumbegrenzung an beiden Enden der Röhre bildet eine eingesetzte Glaswand (Ze. 5).

Das Gebäude kann durch Rampen und Wege von außen erschlossen werden.

Zur Elementherstellung ist wärmedämmender Leichtbeton vorgesehen. Andere Materialien, wie z.B. Kunststoff, könnten in ferner Zukunft ebenfalls in Betracht kommen.

Weitere Anwendungsmöglichkeiten des Wabenelementes:
Tunnelbau; Gebäude durch Addition der Elemente in der Ebene auf Sechseck-Grundrißraster; Silobau.

P a t e n t a n s p r ü c h e

Wabenelement-Bausystem

NACHGEREICHT

Bausystem dadurch gekennzeichnet, daß durch die Addition gleicher Betonelemente sechseckige, wabenartige Räume entstehen.

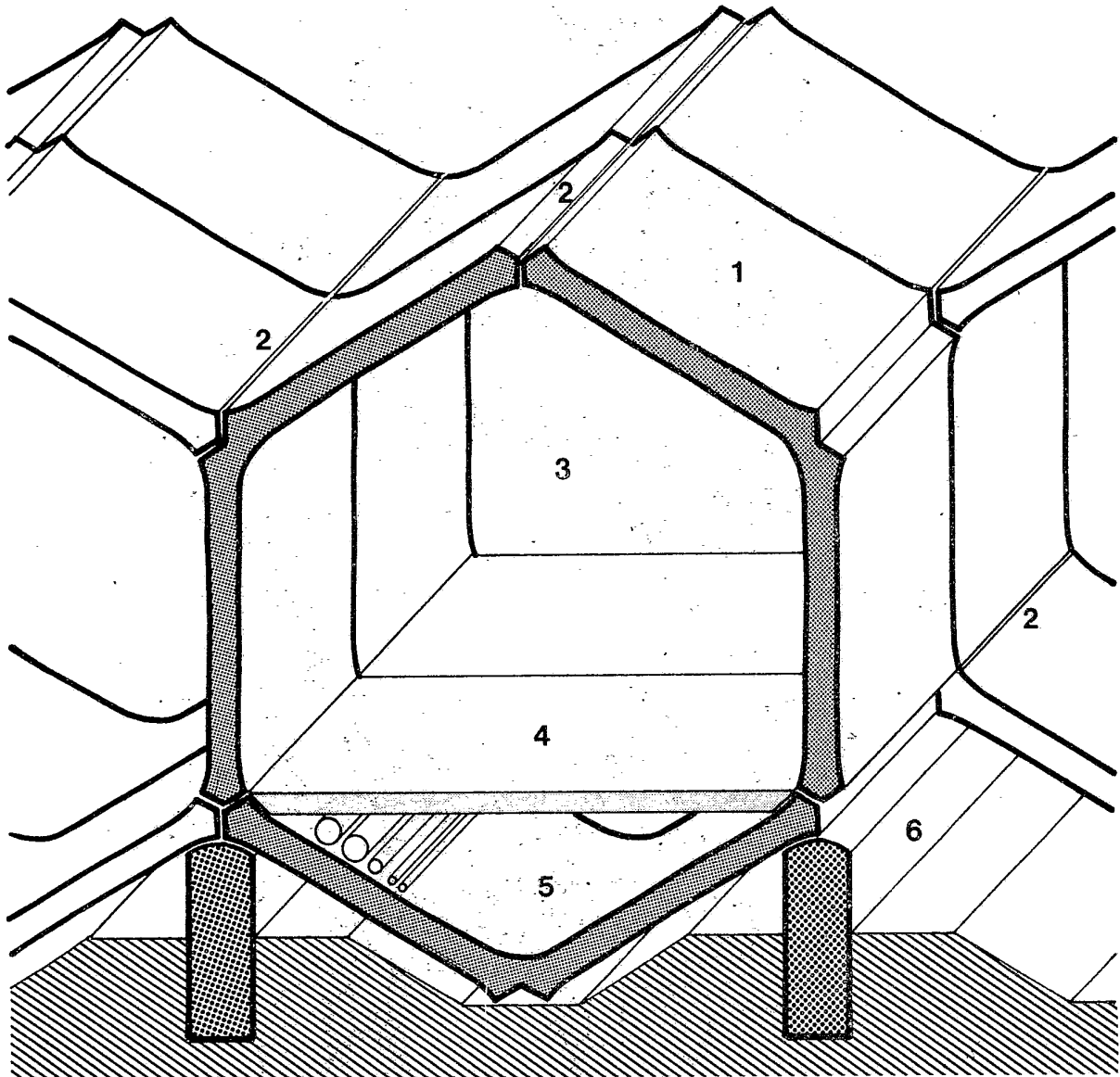
Ein wabenartiger Raum setzt sich aus drei gleichen Wabenelementen zusammen, dadurch ist eine statisch günstige Dreigelenkigkeit gegeben.

Durch die unterschiedliche Aufstellungsmöglichkeit dieser Elemente auf einem Sechseck-Aufrißraster ist eine vielfältige Gebäudeausbildung möglich.

Die Länge der wabenartigen Räume richtet sich nach der Anzahl der hintereinander gestellten Elemente.

Außerdem Schutz für Abwandlungen dieses Prinzips durch Verwendung ungleicher Elemente z.B. bei Schaffung abgeflachter Sechseckräume.

KONSTRUKTIVER AUFBAU



- | | | | |
|---|---|---|---|
| 1 | BETONELEMENT | 5 | RAUM FÜR VER- UND
ENTSORGUNGSLEITUNGEN, BE- UND
ENTLÜFTUNG, (FUSSBODEN-)HEIZUNG |
| 2 | VERBINDUNGSFUGE | 6 | STREIFENFUNDAMENTE |
| 3 | KONVENTIONELL ZU
UNTERTEILENDER NUTZRAUM | | |
| 4 | BODENPLATTE | | |

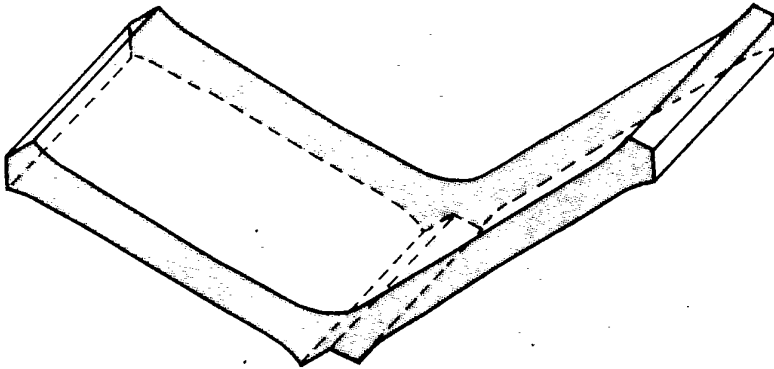
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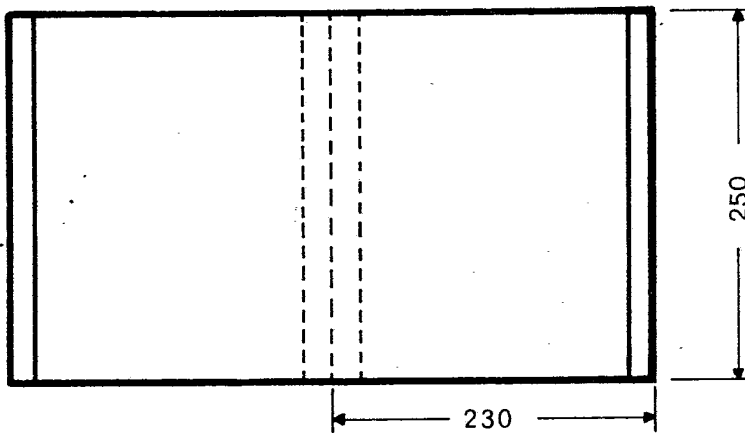
WABENELEMENT

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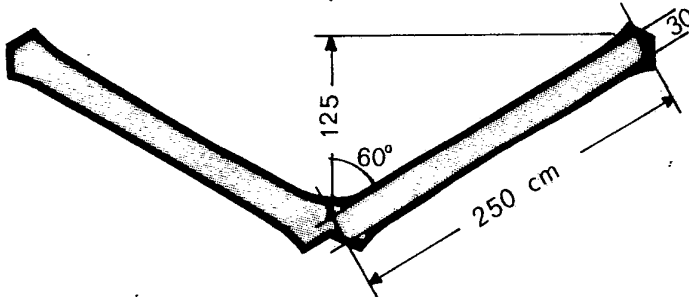
- 5 -



ISOMETRIE



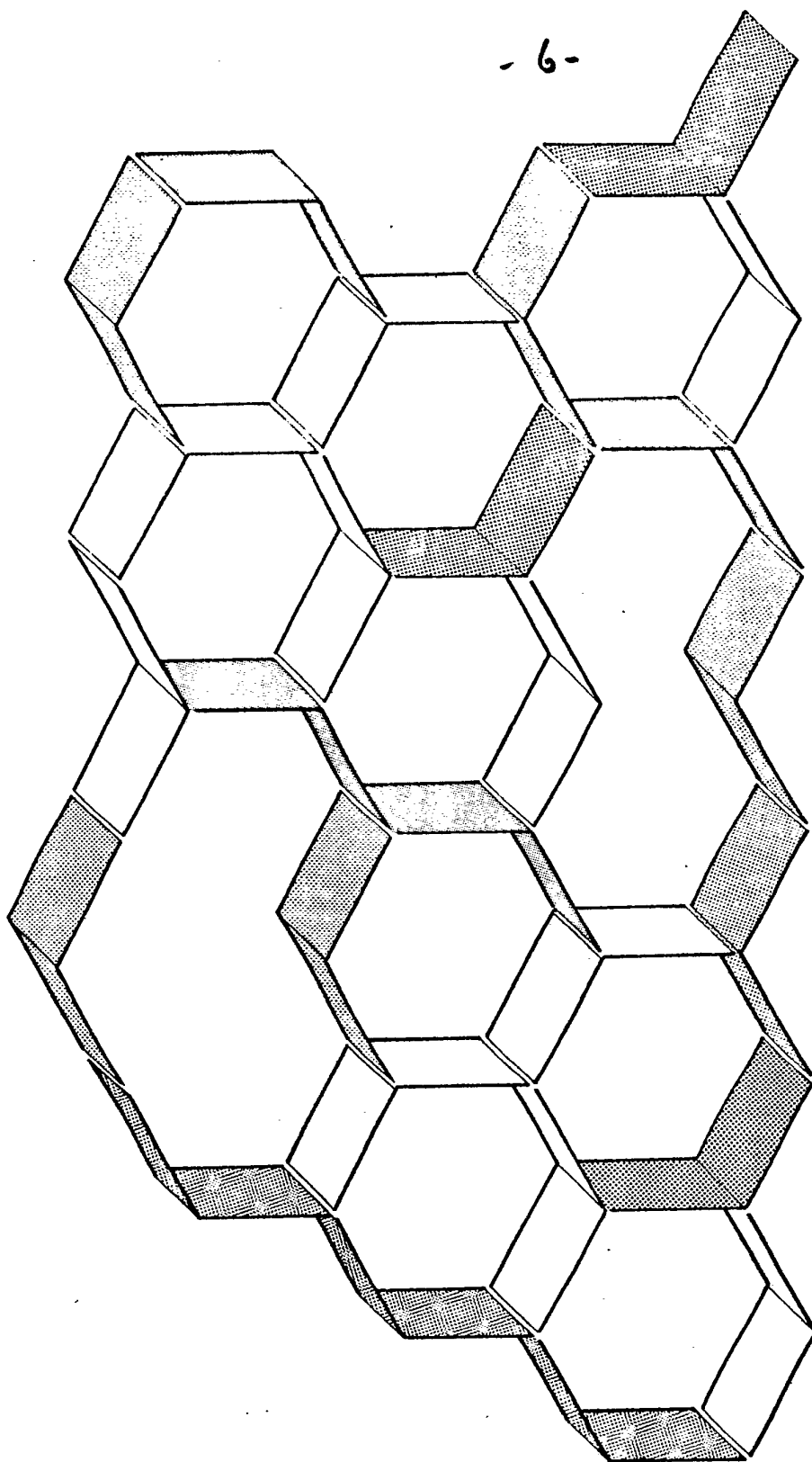
GRUNDRISS



AUFRISS

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NACHGEREICHT

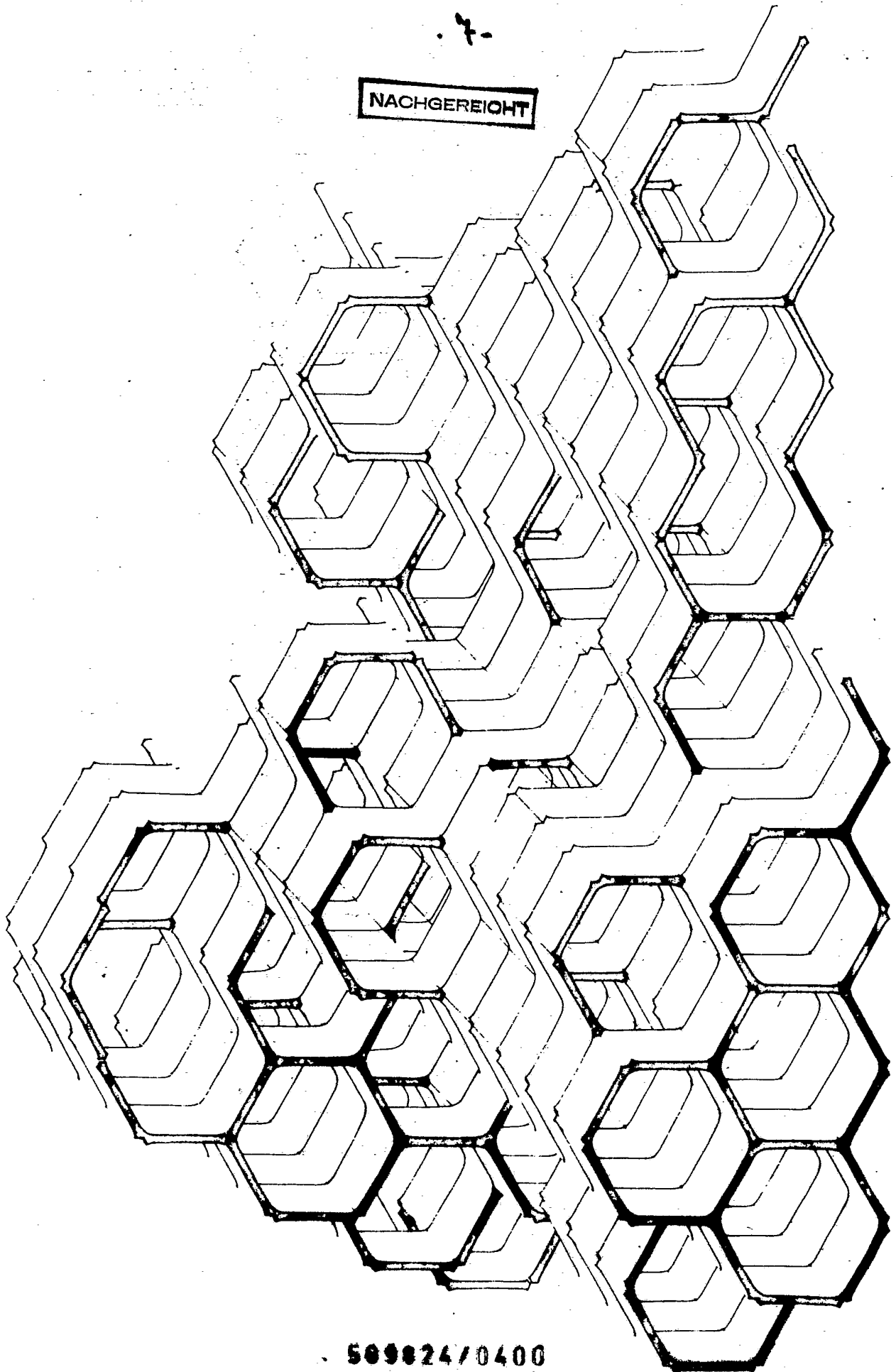


Schnitt durch ein Gebäude
Darstellung unterschiedlicher Steilungsmöglichkeiten der Elemente

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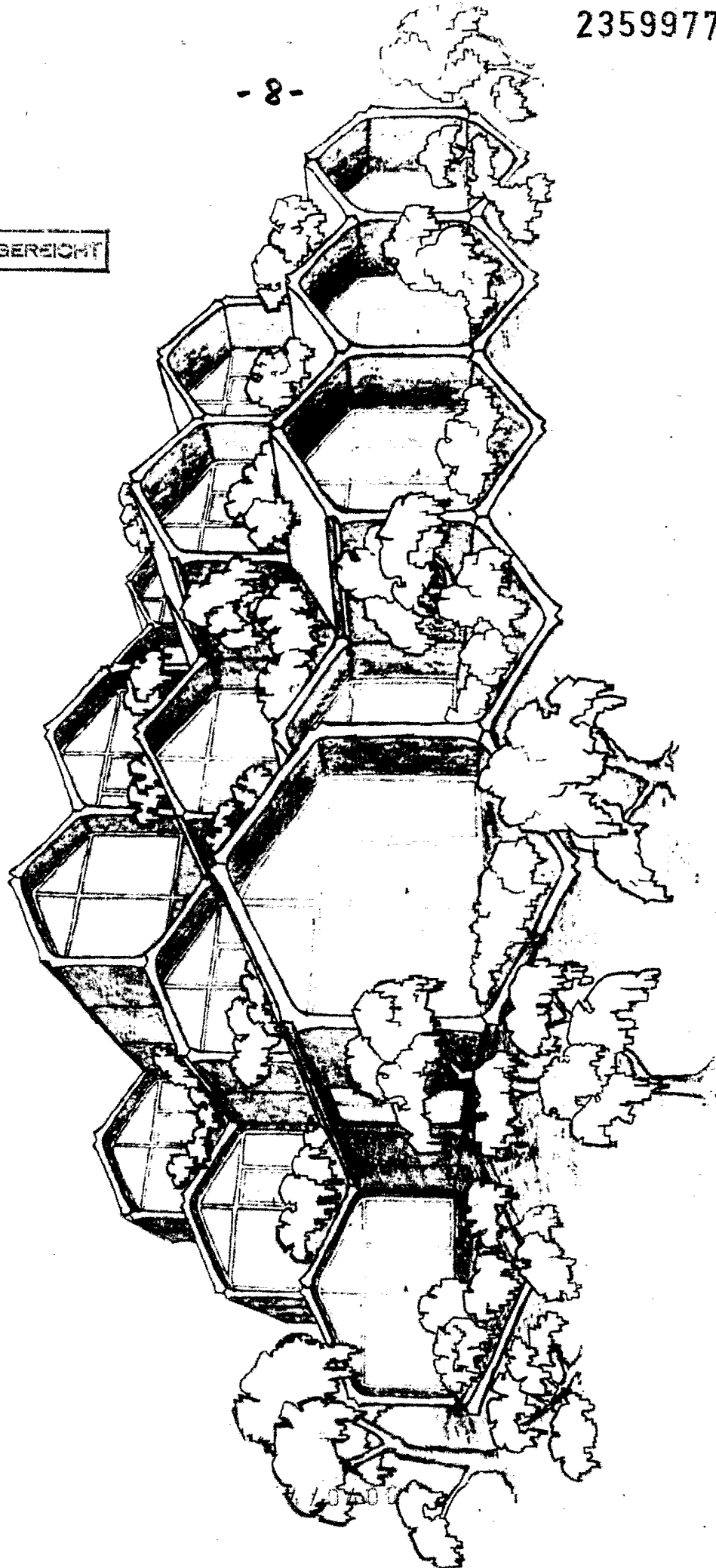
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NACHGEREICHT



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NACHGEREICHT



Notice

This translation is machine-generated. It cannot be guaranteed that it is intelligible, accurate, complete, reliable or fit for specific purposes. Critical decisions, such as commercially relevant or financial decisions, should not be based on machine-translation output.

DESCRIPTION DE2359977

Description Title of invention:

Beschreibung Bezeichnung der Erfindung:

Honeycomb construction system Application:

Wabenelement-Bausystem Anwendungsgebiet:

Industrial building state of the art and criticism:

Industrielles Bauen Stand der Technik und Kritik:

While there are already a large number of building systems that are applicable for the Wohnungsbau, but consider the hardly the needs of users.

Zwar gibt es bereits eine grosse Anzahl von Bausystemen, die für den Wohnungsbau anwendbar sind, die aber kaum die Bedürfnisse der Benutzer berücksichtigen.

Moreover, they are different because of their variety

Ausserdem sind sie aufgrund ihrer Vielzahl unterschiedlicher

Elements uneconomical.

Elemente unwirtschaftlich.

Buildings that are to meet user needs and also enable dense colonization such.

Gebäude, die den Bedürfnissen der Benutzer gerecht werden und ausserdem eine verdichtete Besiedelung ermöglichen, wie z.

B, terrace houses, created still costly using conventional construction methods.

B, Terrassenhäuser, werden nach wie vor kostspielig in konventioneller Bauweise erstellt.

Task:

Aufgabe:

The invention has the object to create a new residential structure that makes it possible to provide at ver-compacted Bauweis --- each resident their own free space available, which is in the construction of "locative barracks still not taken into account.

Der Erfindung liegt die Aufgabe zugrunde, eine neue Wohnstruktur zu schaffen, die es ermöglicht, bei ver dichteter Bauweis---jedem Bewohner seinen eigenen Freiraum zur Verfügung zu stellen, was bei dem Bau von "Miets- kasernen nach wie vor nicht berücksichtigt wird.

It is an alternative to today dominant "single-family home to be created in the countryside, which is no longer responsible because of the consequent urban sprawl.

Es soll eine Alternative zum bis heute dominierenden "Einfamilien häuschen im Grünen geschaffen werden, das aufgrund der dadurch erfolgenden Zersiedelung nicht mehr zu vertreten ist.

In addition to creating the living room should be financially viable, which necessarily leads to a

Industrialization, which is stronger than before streamlines common z.

Ausserdem soll der zu schaffende Wohnraum finanziell erschwinglich sein, was zwangsweise zu einer Industrialisierung führt, die stärker als bisher üblich rationalisiert ist, z.

For example, by reducing the different elements on a few components determining finished parts.

B. durch Reduzierung der unterschiedlichen Bauelemente auf wenige systembestimmende Fertigteile.

Solution:

Lösung:

The developed construction system provides the living qualities of a

Das entwickelte Bausystem bietet die Wohnqualitäten eines

Detached house at the same time dense and thus space-saving construction.

Einfamilienhauses bei gleichzeitig dichter und somit raumsparender Bebauung.

The Wohnqualitäten are in particular given by this terraced design that everyone

Die Wohnqualitäten sind insbesondere durch die terrassierte Bauweise gegeben, die jeder

Apartment adequate clearance assigns (Drawing 5).

Wohnung einen angemessenen Freiraum zuordnet (Zeichnung 5).

The shape and the element mesh has been able to offer an extremely economical solution, which is based in particular on the fact that the entire bodyshell only from the repeated addition of a single concrete element is created (Ze. 4).

Durch die Formgebung und die Elementierung ist es gelungen, eine extrem wirtschaftliche Lösung anzubieten, was insbesondere auf der Tatsache beruht, dass der gesamte Rohbau nur aus der wiederholten Addition eines einzigen Beton elementes erstellt wird (Ze. 4).

This means that for

Das bedeutet, dass zur

Production hierfür only one form work is necessary.

Produktion hierfür nur eine einzige Schalungsform notwendig ist.

The developed concrete element (Ze. 1) is 1/3 of a honeycomb-like tube.

Das entwickelte Betonelement (Ze. 1) ist 1/3 einer waben artigen Röhre.

The element is designed so that with him - through different formation - differentiated

Das Element ist so ausgebildet, dass sich mit ihm - durch unterschiedliche Aufstellung - differenzierte

Make rooms can (Ze. 3).

Räume bilden lassen (Ze. 3).

The element can be host cally produce can be stored space-saving and can be transported and assembled easily.

Das Element lässt sich wirtschaftlich produzieren, kann platzsparend gelagert werden und problemlos transportiert und montiert werden.

In the

Bei der

Mounting the elements connected by steel fittings.

Montage werden die Elemente durch Stahlverschraubungen miteinander verbunden.

Which exist between the elements of the joint to be sealed (Ze. 2 point 2).

Die zwischen den Elementen bestehenden Fugen werden abgedichtet (Ze. 2 Punkt 2).

A honeycomb cell of three elements is due to their

Eine Wabenzelle aus drei Elementen ist aufgrund ihrer

Dreigelenkigkeit stabil.

Dreigelenkigkeit in sich stabil.

Establishing a building are only strip foundations necessary (Ze. 2 Pu. 6), to which the honeycomb elements that the

Zur Gründung eines Gebäudes sind lediglich Streifenfundamente notwendig (Ze. 2 Pu. 6), auf die die Wabenelemente, die die

Represent space base, are placed.

Raumunterseite darstellen, gelegt werden.

In (2 Ze. Pu. 1) results in a living room with a roof-like ceiling.

Darüber entsteht ein Wohnraum mit dachartiger Decke (Ze. 2 Pu. 1).

The floor forming an inlaid floor plate (Ze. 2 Pu. 4).

Den Fuss boden bildet eine eingelegte Bodenplatte (Ze. 2 Pu. 4).

The resulting space is below this plate for supply and disposal lines, ventilation, (floor)

Der unterhalb dieser Platte entstehende Raum wird für Ver und Entsorgungsleitungen, Be- und Entlüftung, (Fussboden-)

Heating etc. (Ze. 2 Pu. 5).

Heizung usw. verwendet (Ze. 2 Pu. 5).

The resulting usable space can be divided conventionally (Ze. 2 Pu. 3).

Der entstandene Nutzraum kann konventionell unterteilt werden (Ze. 2 Pu. 3).

The space boundary at both ends of the tube forms a used glass wall (Ze. 5).

Die Raumbegrenzung an beiden Enden der Röhre bildet eine eingesetzte Glaswand (Ze. 5).

The building can be accessed by ramps and paths from the outside.

Das Gebäude kann durch Rampen und Wege von aussen erschlossen werden.

For element producing heat-insulating lightweight concrete is provided.

Zur Elementherstellung ist wärmedämmender Leichtbeton vorgesehen.

Other materials, such as, B, plastic, could come ip consideration in the future also.

Andere Materialien, wie z,B, Kunststoff, könnten in ferner Zukunft ebenfalls ip Betracht kommen.

Other possible applications of the honeycomb element: tunnel; Building by adding the elements in the plane on hexagonal grid layout; Silo construction.

Weitere Anwendungsmöglichkeiten des Wabenelementes: Tunnelbau; Gebäude durch Addition der Elemente in der Ebene auf Sechseck-Grundrissraster; Silobau.



US 20110061336A1

(19) **United States**(12) **Patent Application Publication****Thomas**(10) **Pub. No.: US 2011/0061336 A1**(43) **Pub. Date: Mar. 17, 2011**

(54) **BUILDING SYSTEM, CONCRETE OR OSB, POUR MOLDED OR PRESSED MOLDED, COMPOSITE PANELS, TRUSSES, AND PRODUCTS, WITH ENGINEERING METHODS AND FASTENERS, AND RELATED TRANSPORTATION, ERECTION, AND MATERIALS PROCESSING EQUIPMENT**

(76) Inventor: **Michael Robert Thomas**, N. Ft. Myers, FL (US)

(21) Appl. No.: **12/717,492**

(22) Filed: **Mar. 4, 2010**

Related U.S. Application Data

(60) Provisional application No. 61/157,328, filed on Mar. 4, 2009.

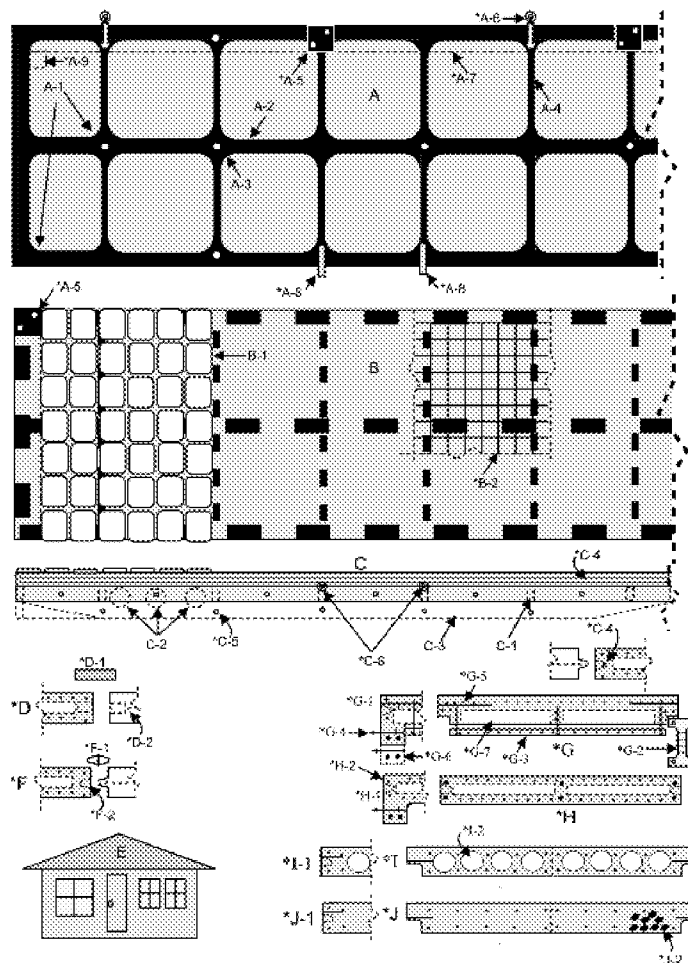
Publication Classification

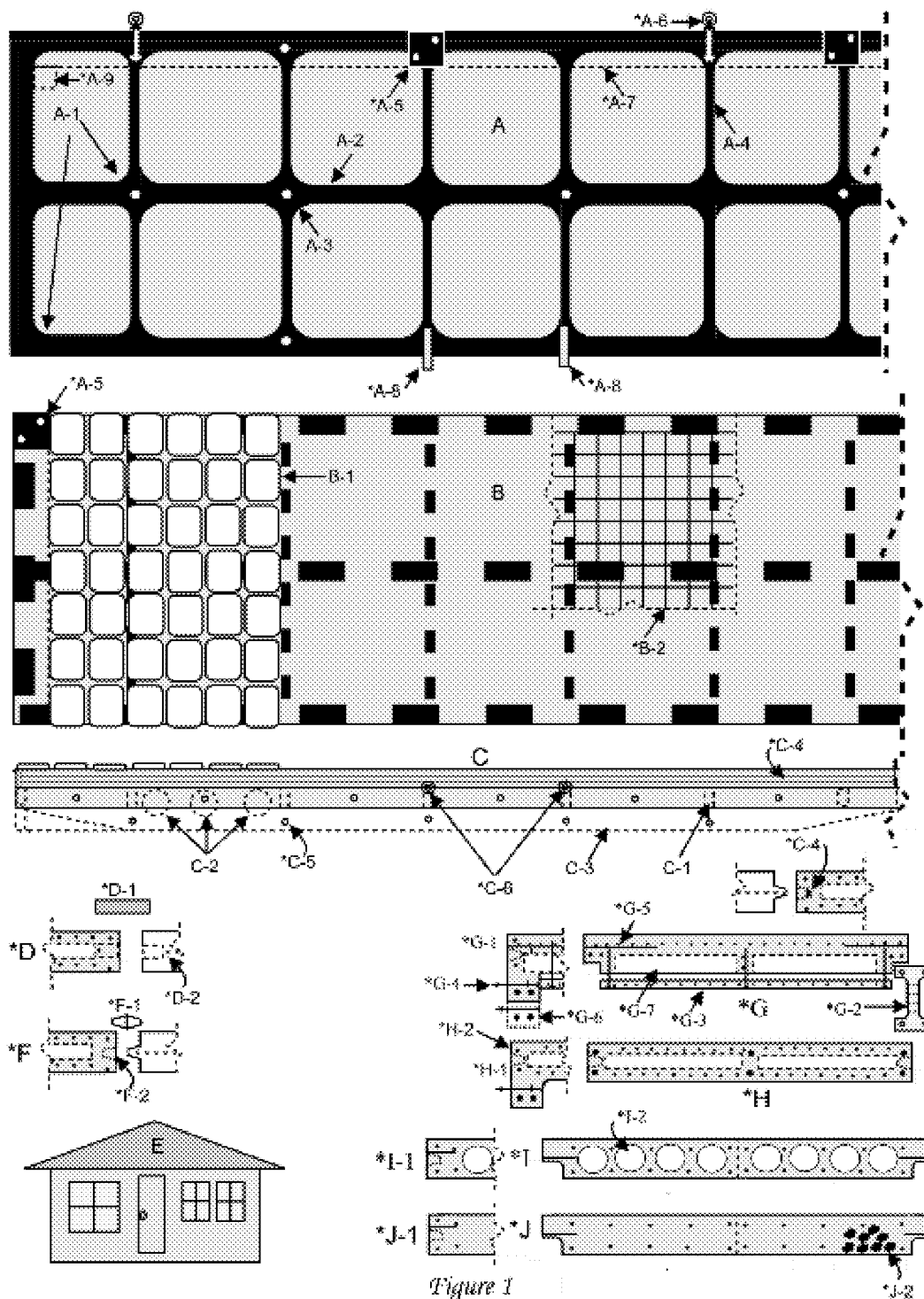
(51) **Int. Cl.**
E04B 1/00 (2006.01)

(52) **U.S. Cl.** **52/745.19**

(57) ABSTRACT

Franchised Building Construction System including Factory Concrete Yard or Site Built Semi Trucked Poured or Pressed Gang Molded Components made of Insulated Pumice and/or Styrofoam and/or Fiberglass Concrete or OSB Compositions, Trusses, Floor, Ceiling, and Wall Panels, 4 to 10 ft. Wide by 2 to 80 ft. Long, also New Component Connecting Fasteners, also Concrete and Asphalt Roofing Materials, Rolls and Sections, Poured or Pressed Composite Mobile Homes, Single and Double Wide, also Dimensional Building Materials including Flooring, Siding, and Framing, also Poured or Pressed Sheds, Doors, Windows, Furniture and Cabinets, also related Equipment including a Wire Pulling Rack System, Gantry Crane Mounted on a Truck, Rail Car, or Semi Trailer, with Telescoping Mast and Boom, Elevating Boom, Hydraulic Stabilizers, Pumice Concrete Composite Mixtures and Usages, also a Crane for Rolled Roofing Material Delivery and one for Tree Service and Selective Cut Cellulosic Building Materials Harvesting.





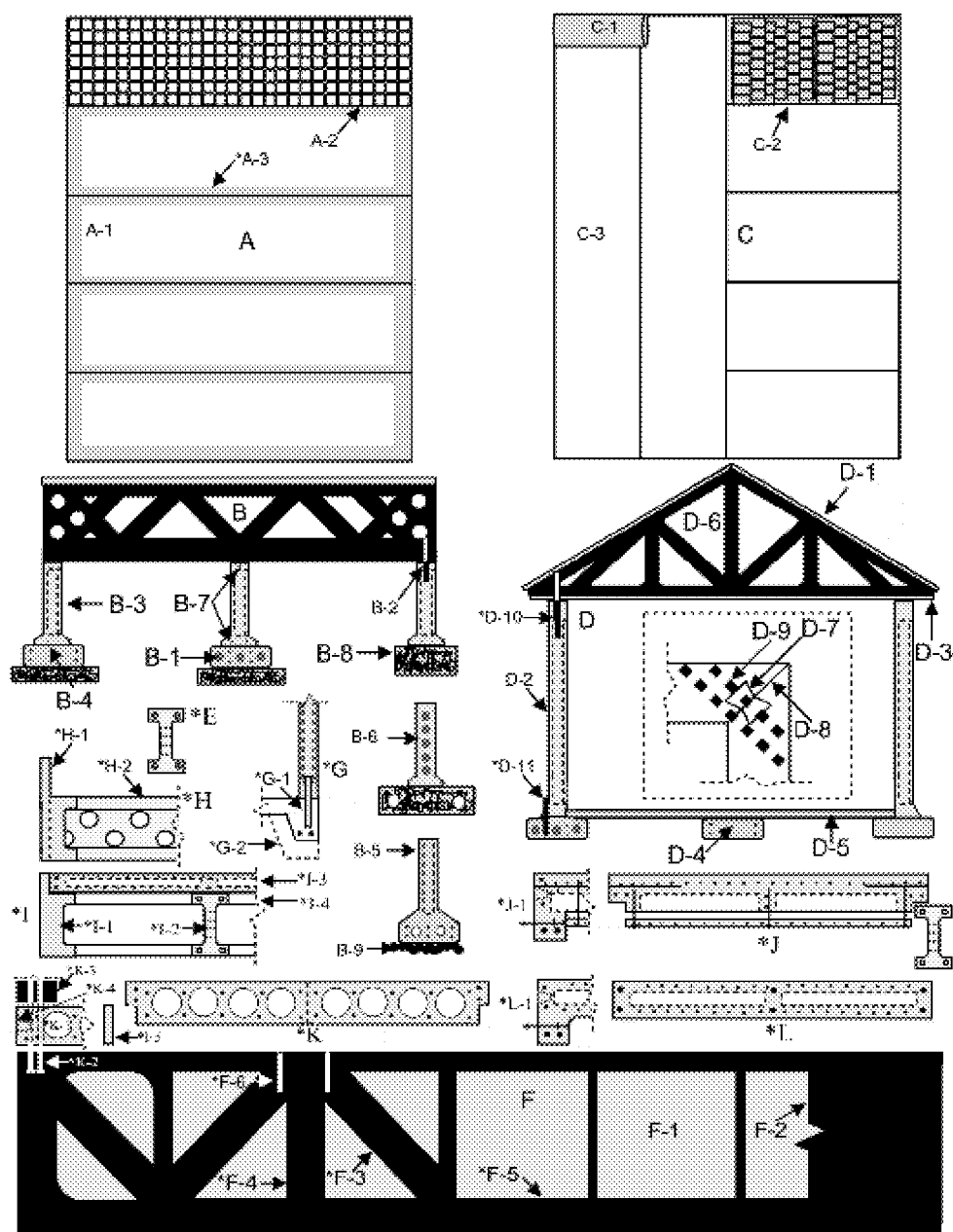


Figure 2

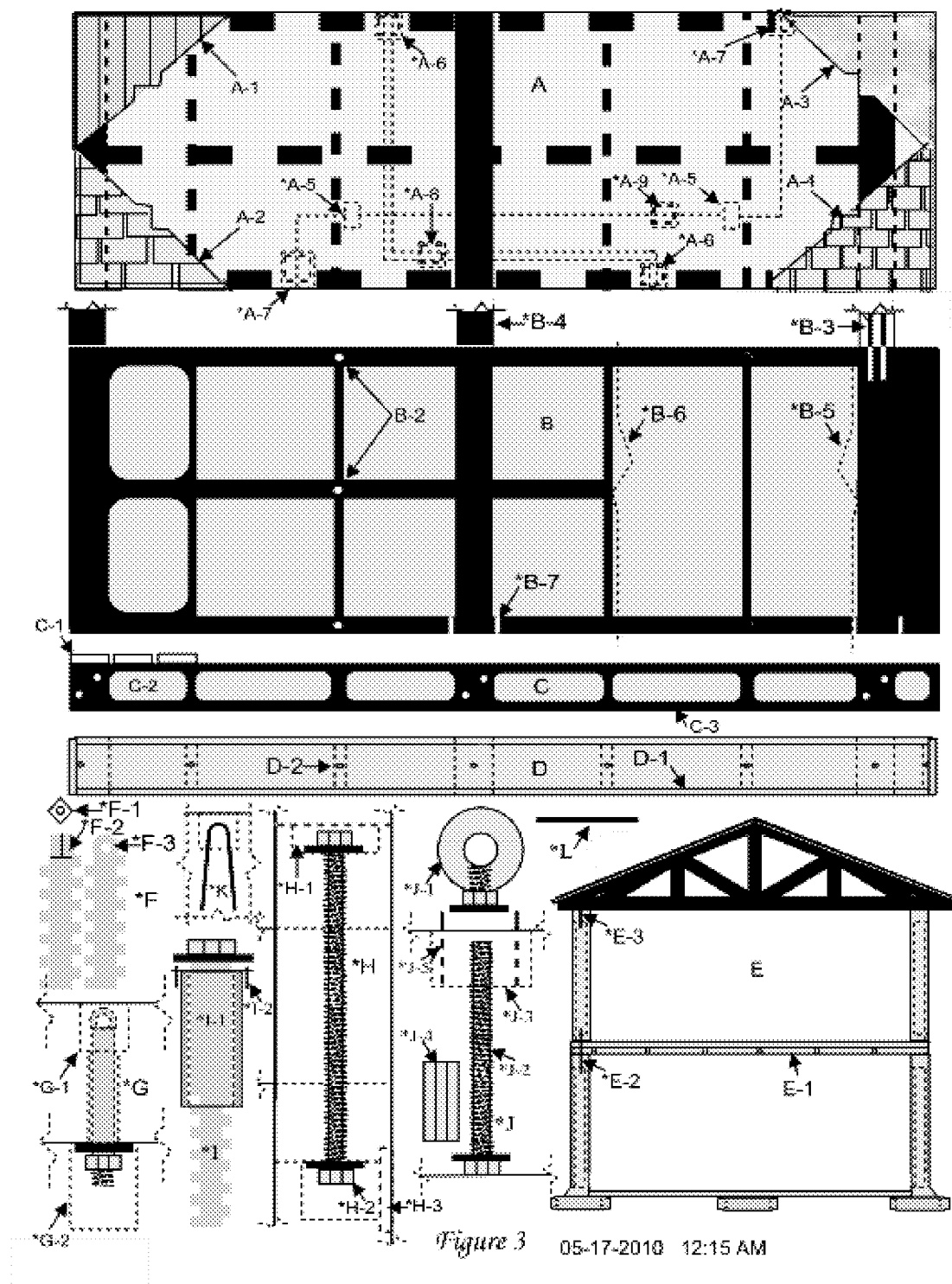


Figure 3

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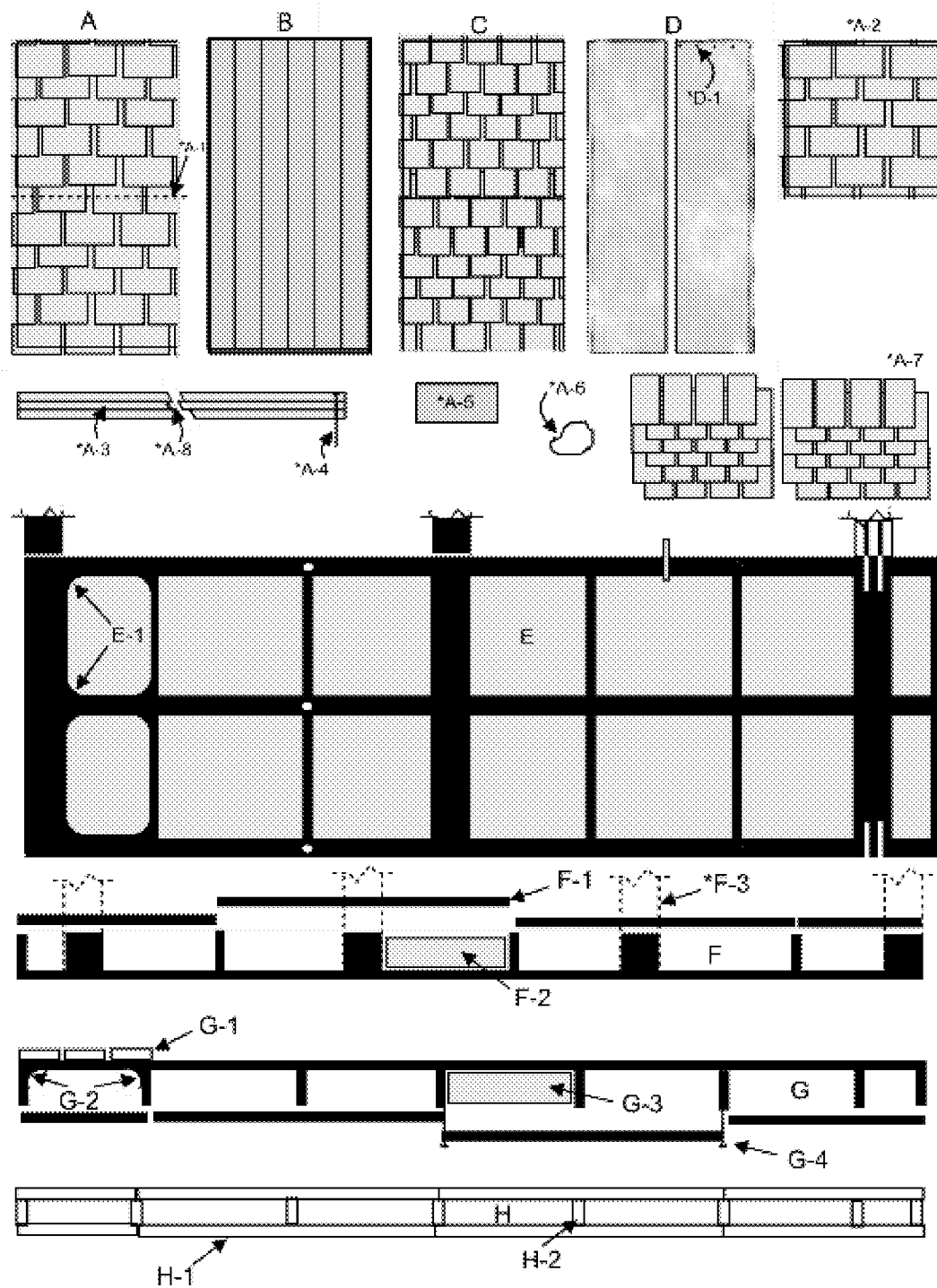
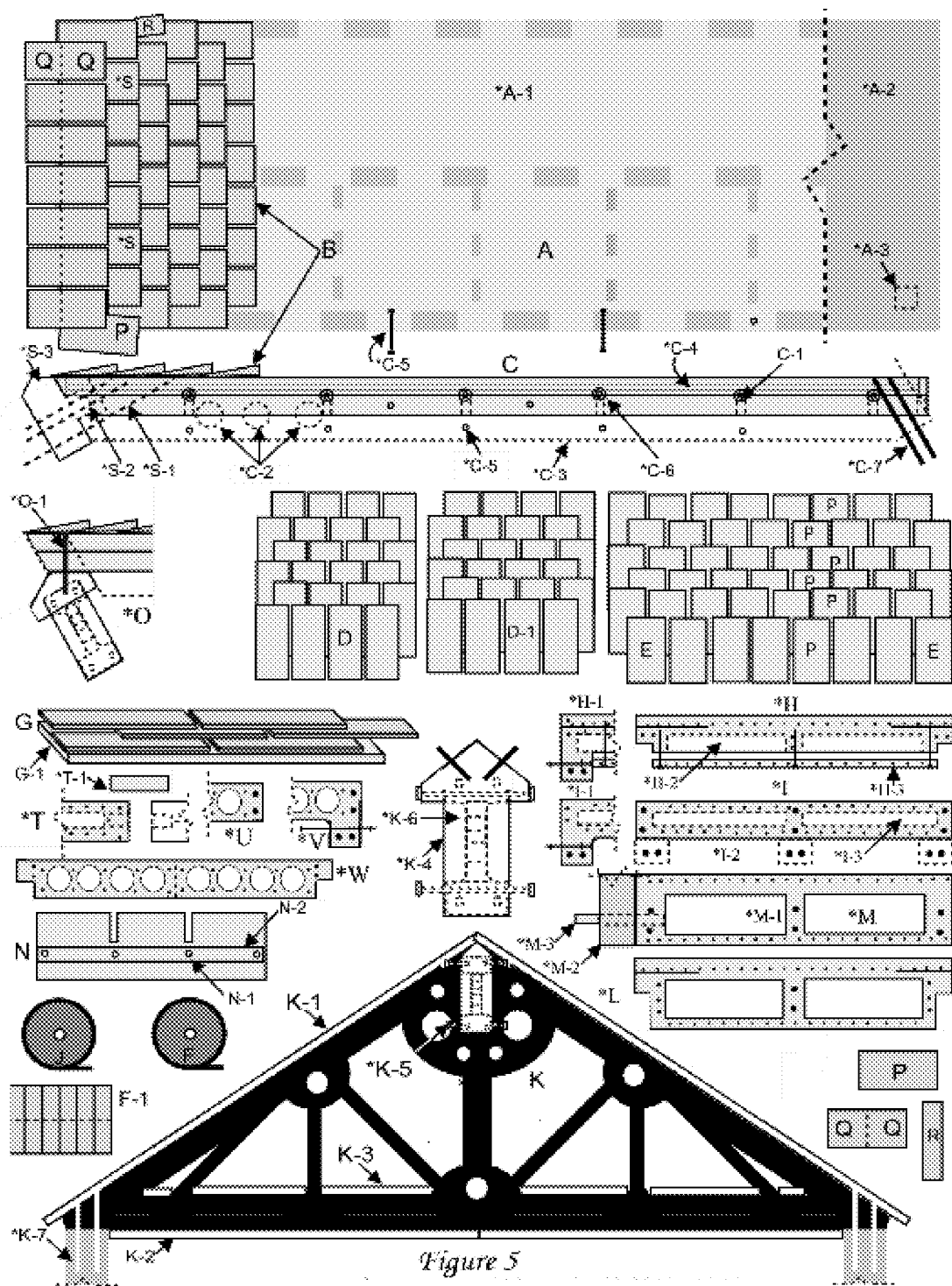


Figure 4



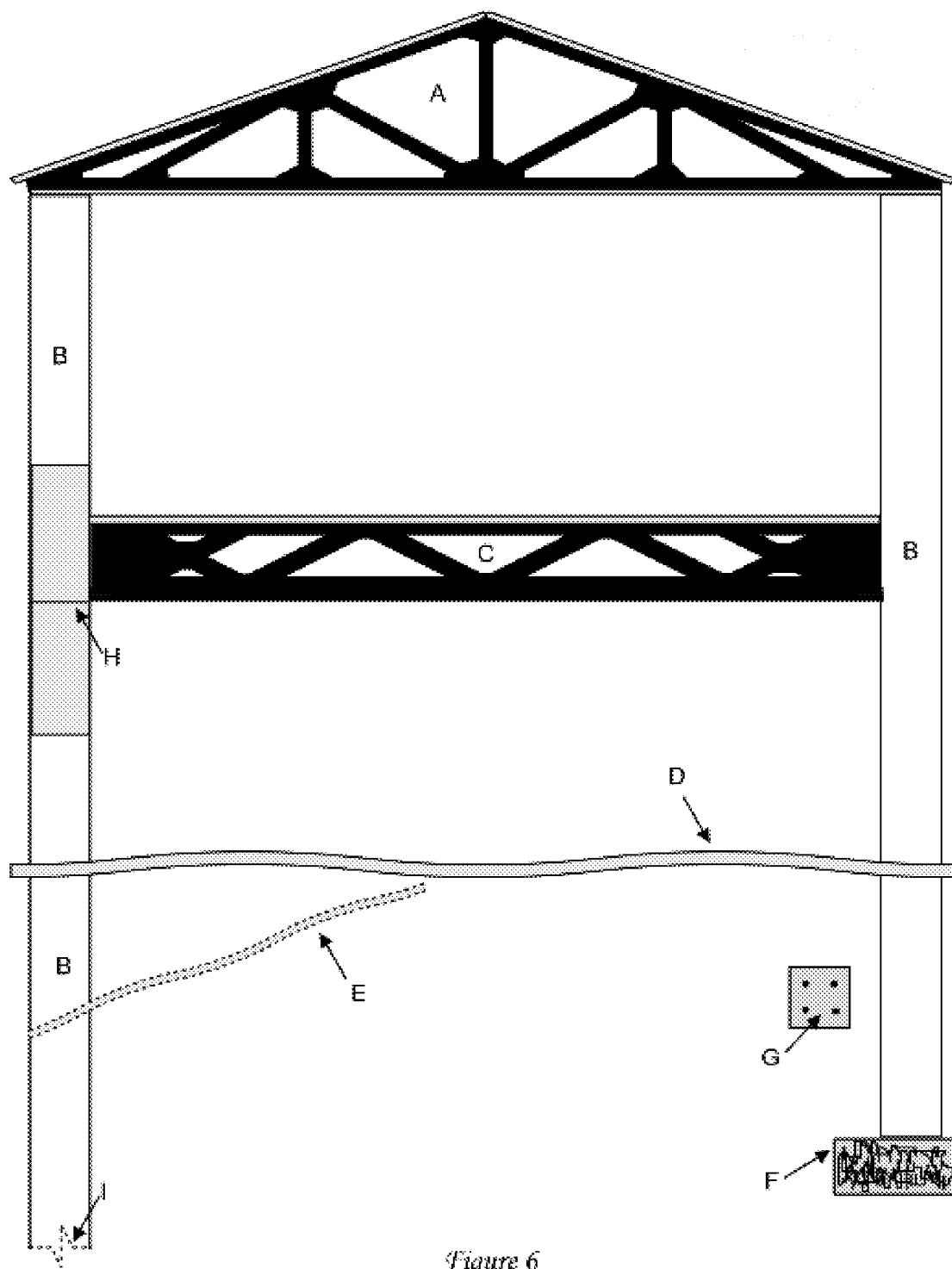


Figure 6

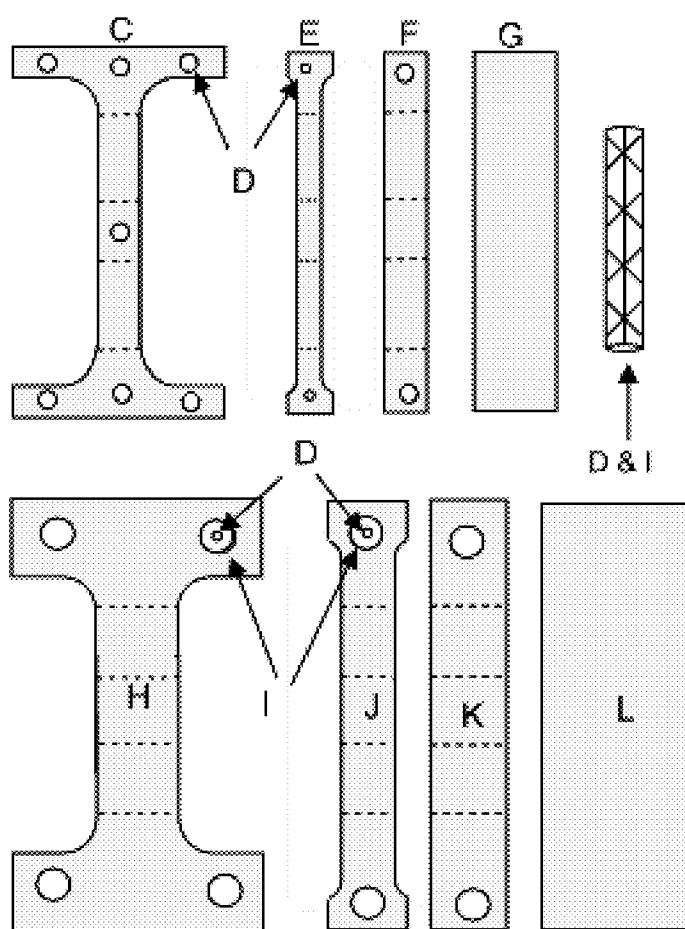
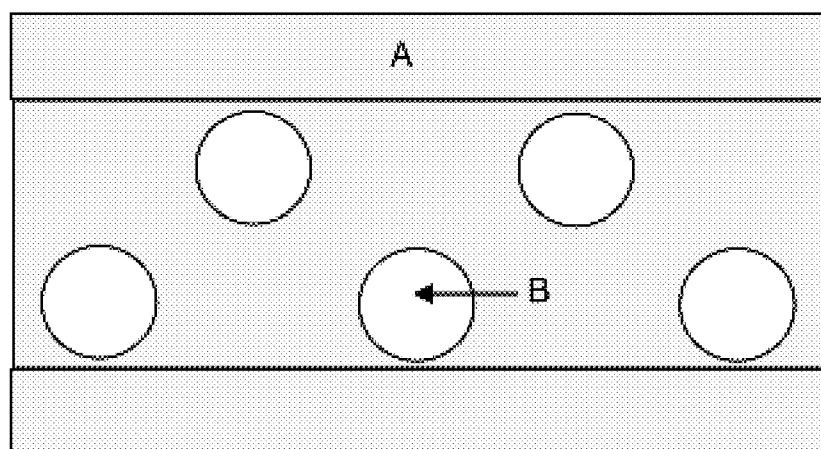


Figure 7

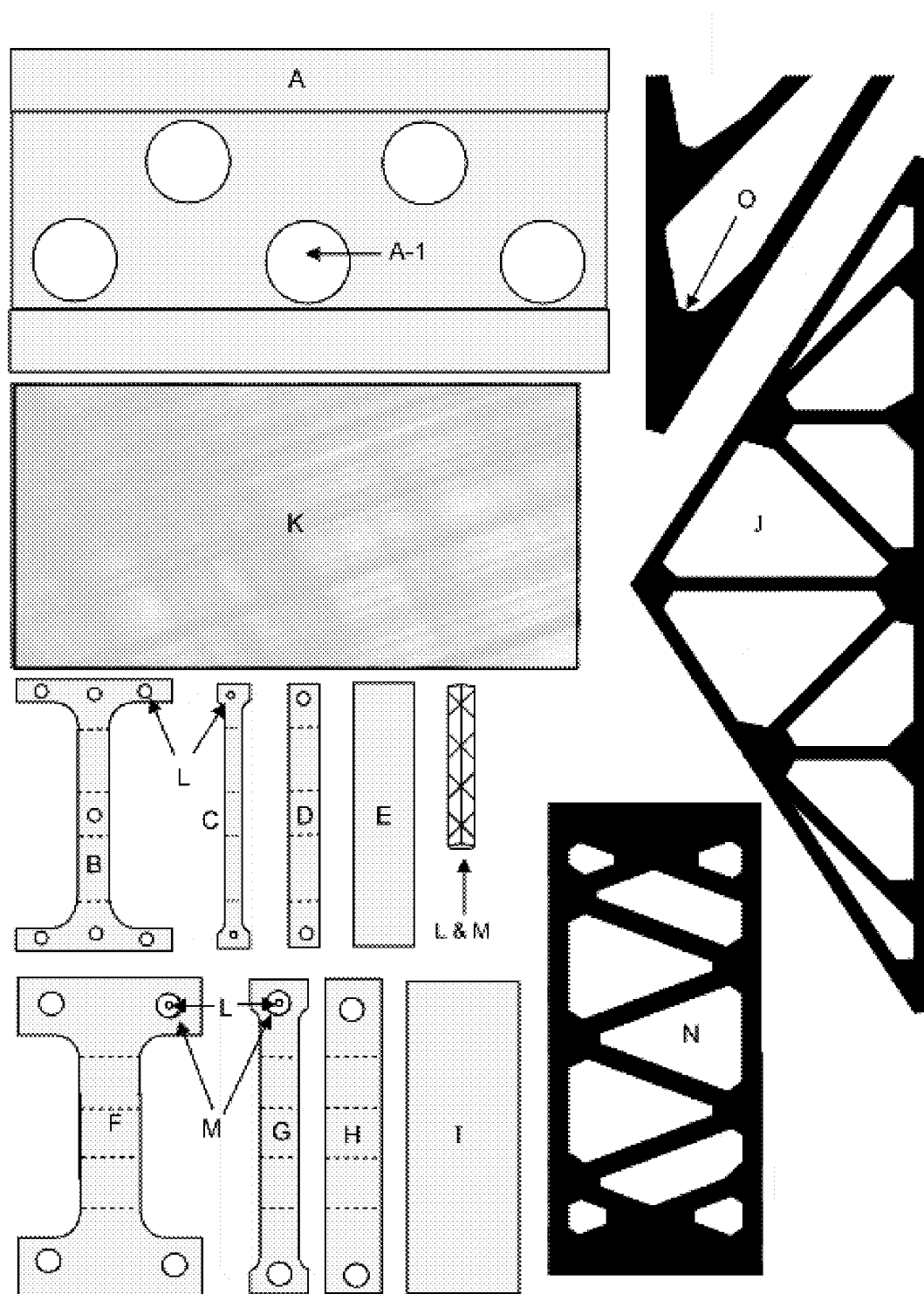


Figure 8

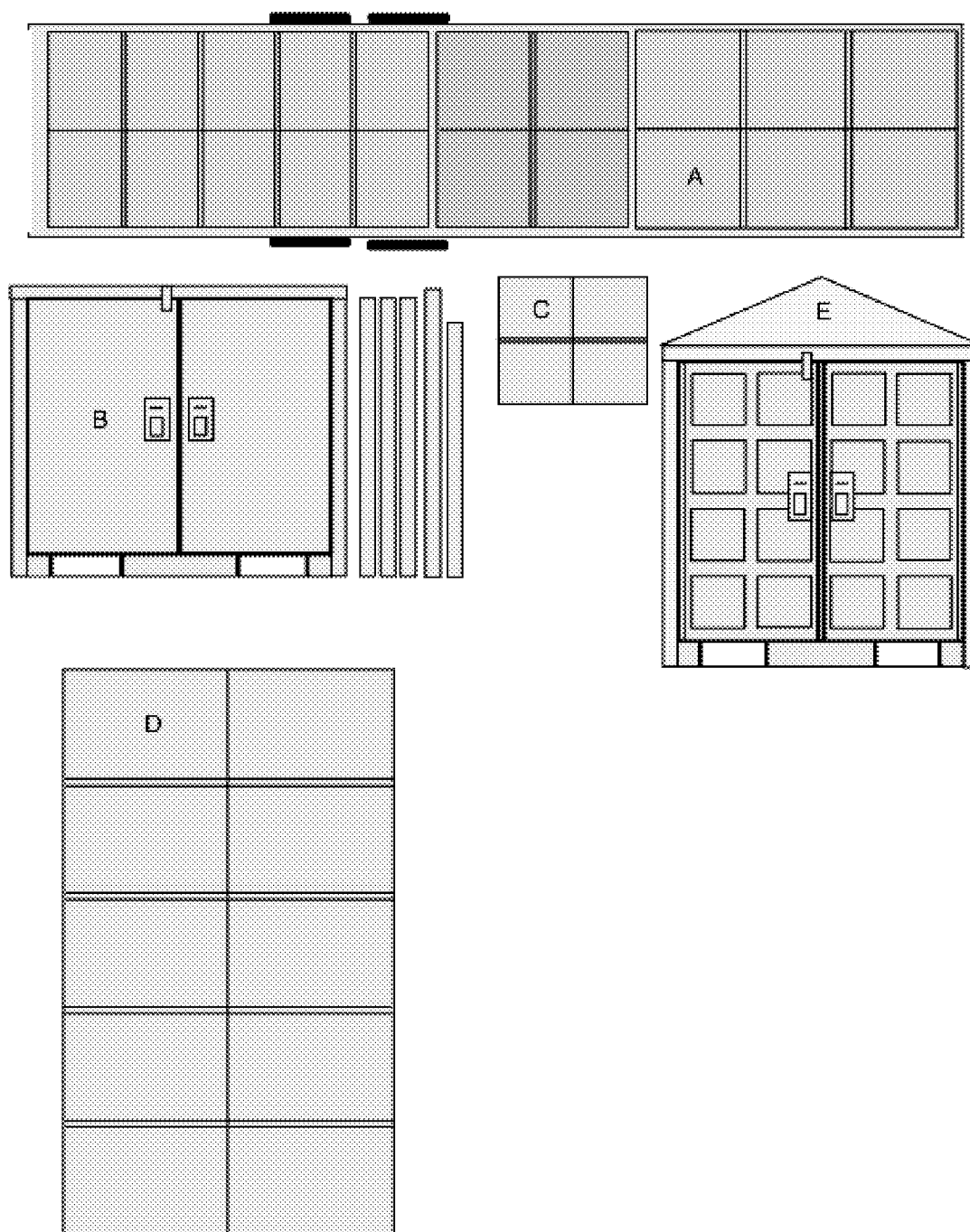


Figure 9

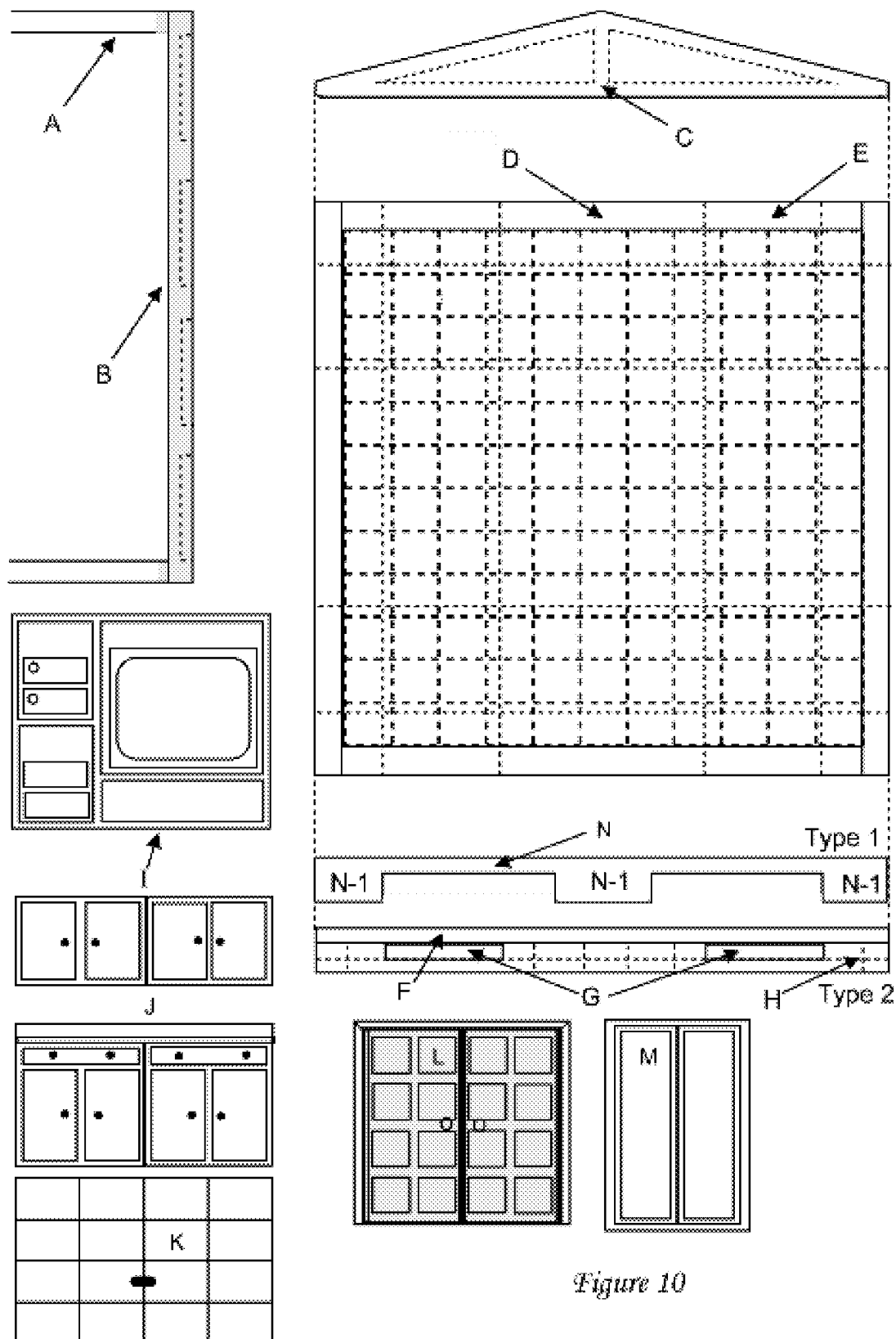
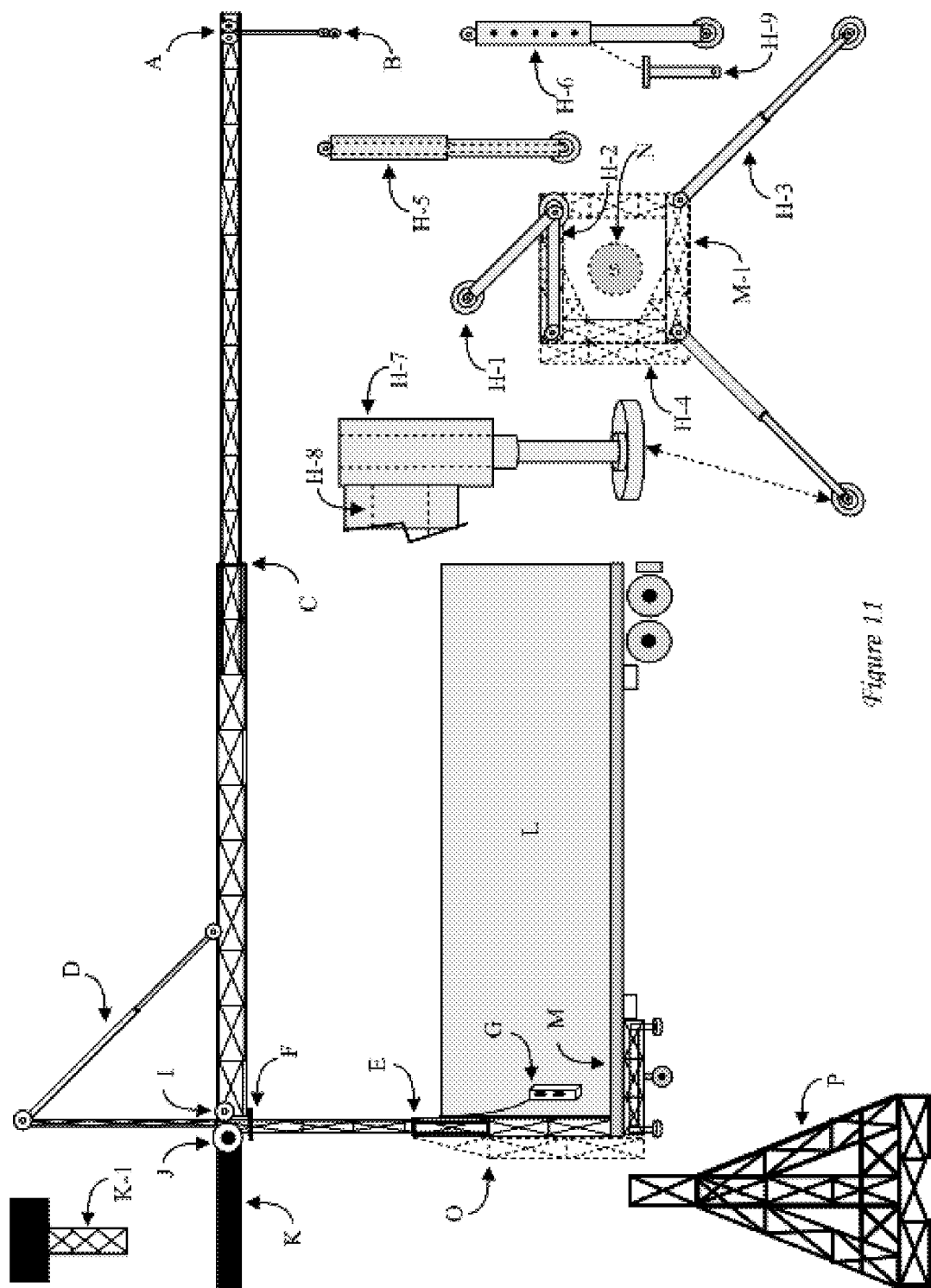


Figure 10



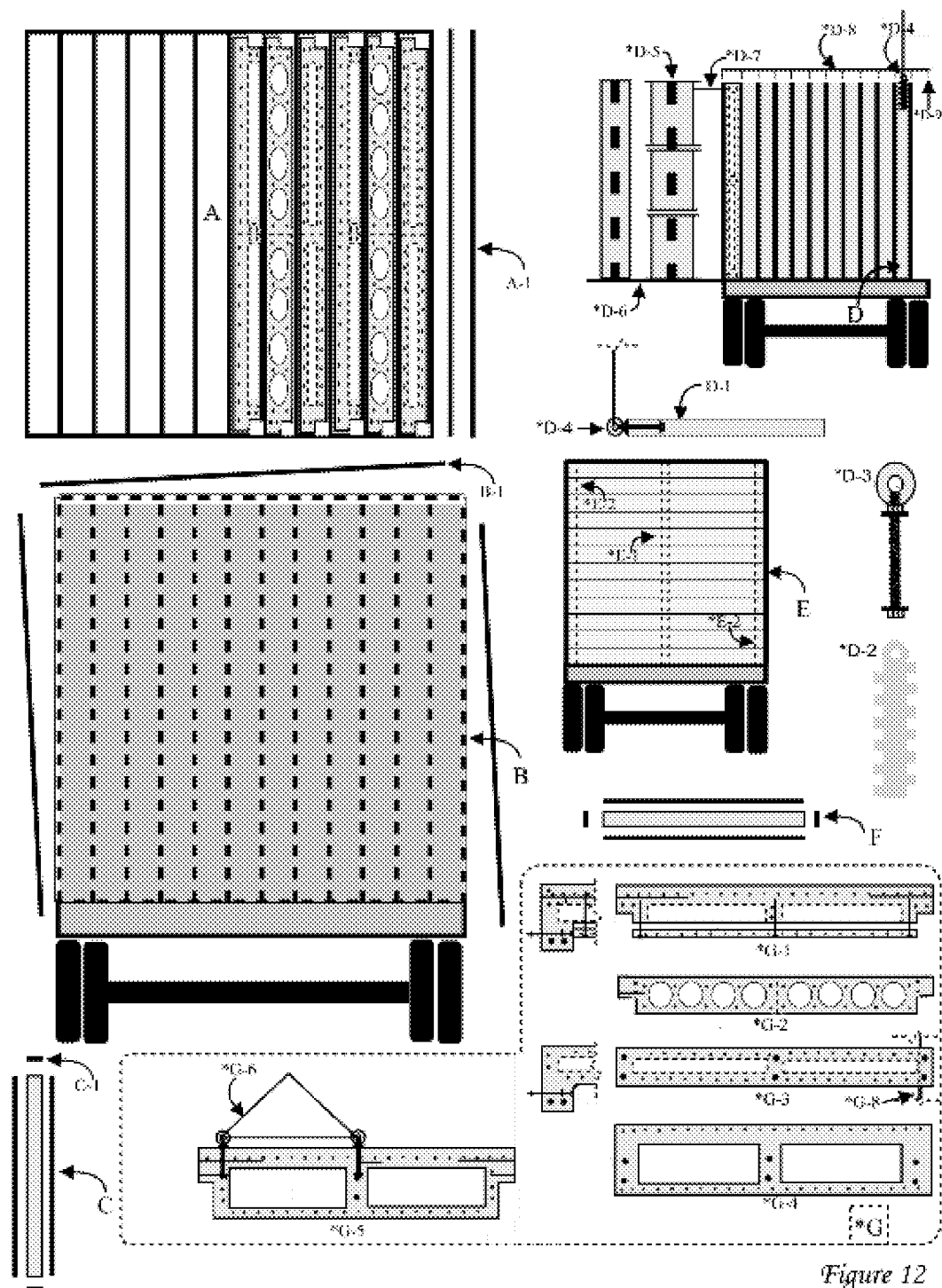


Figure 12

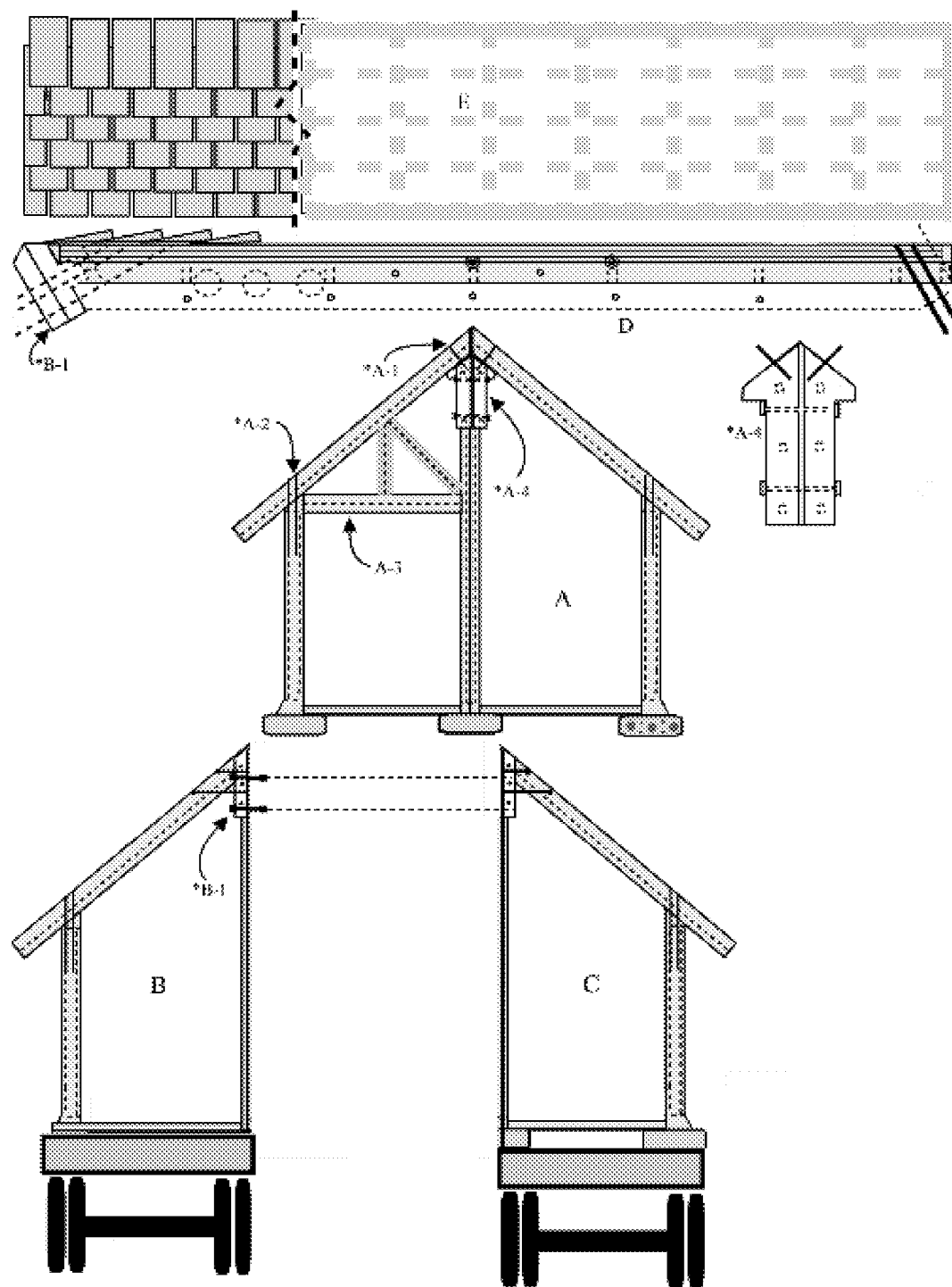


Figure 13

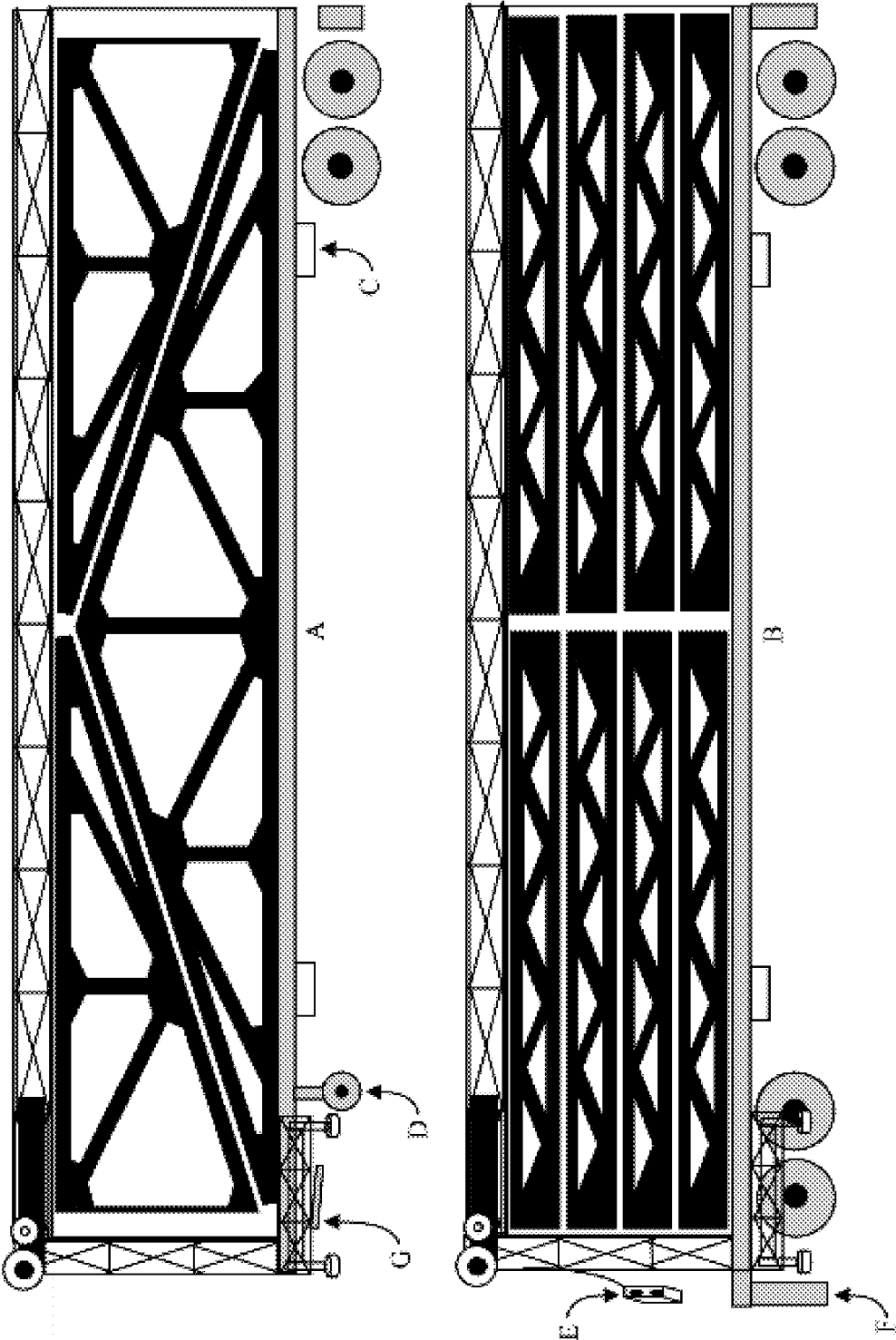


Figure 14

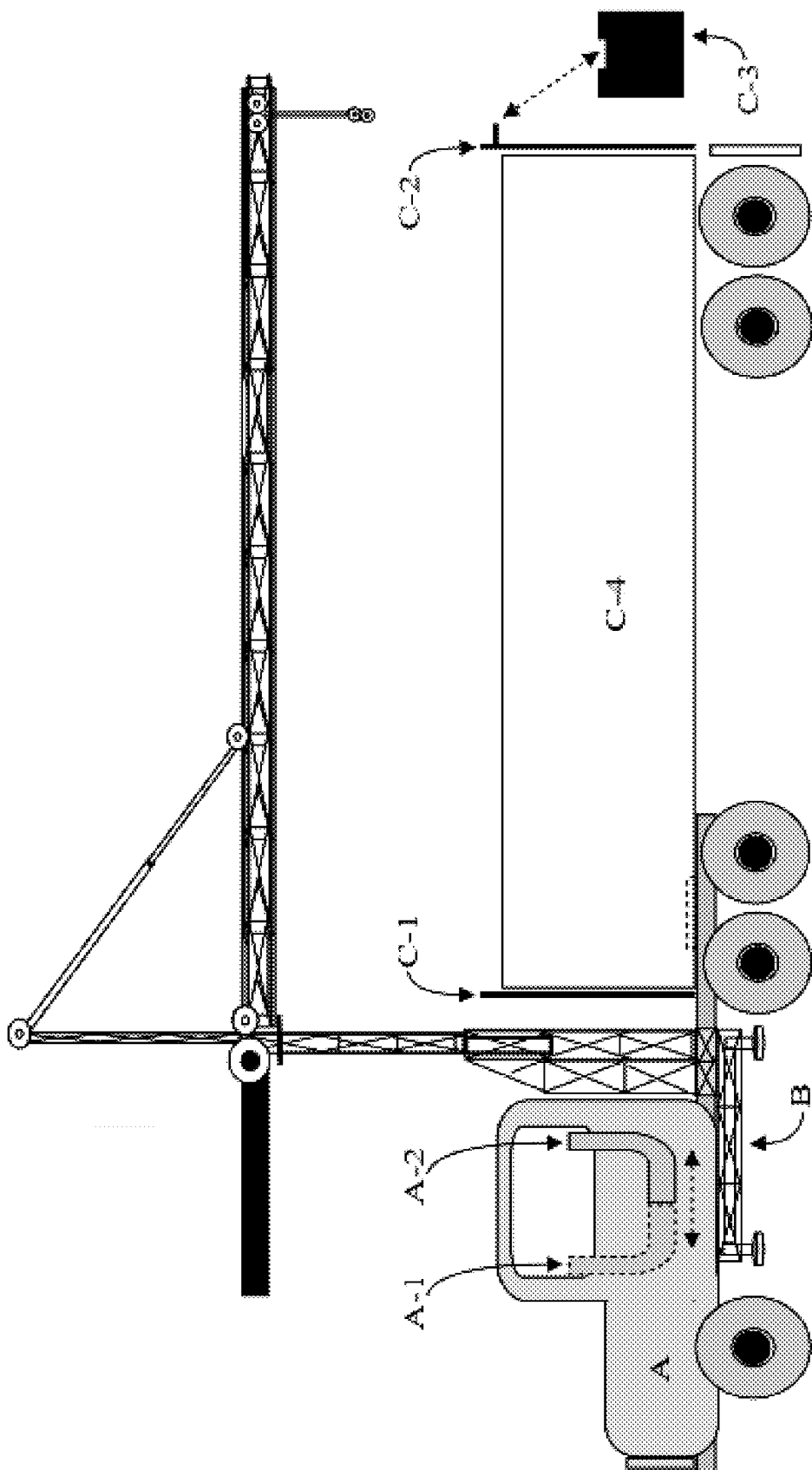


Figure 16

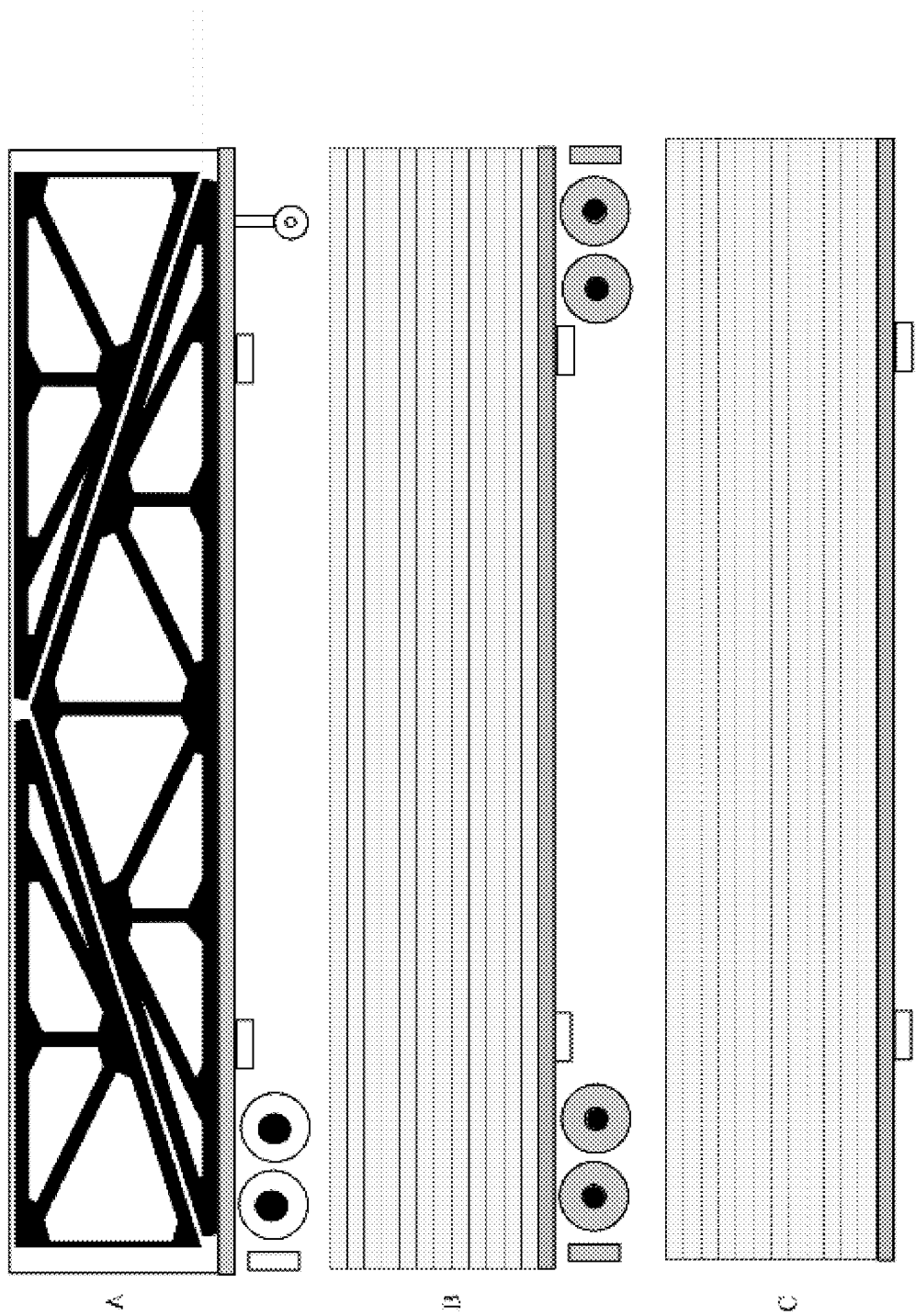
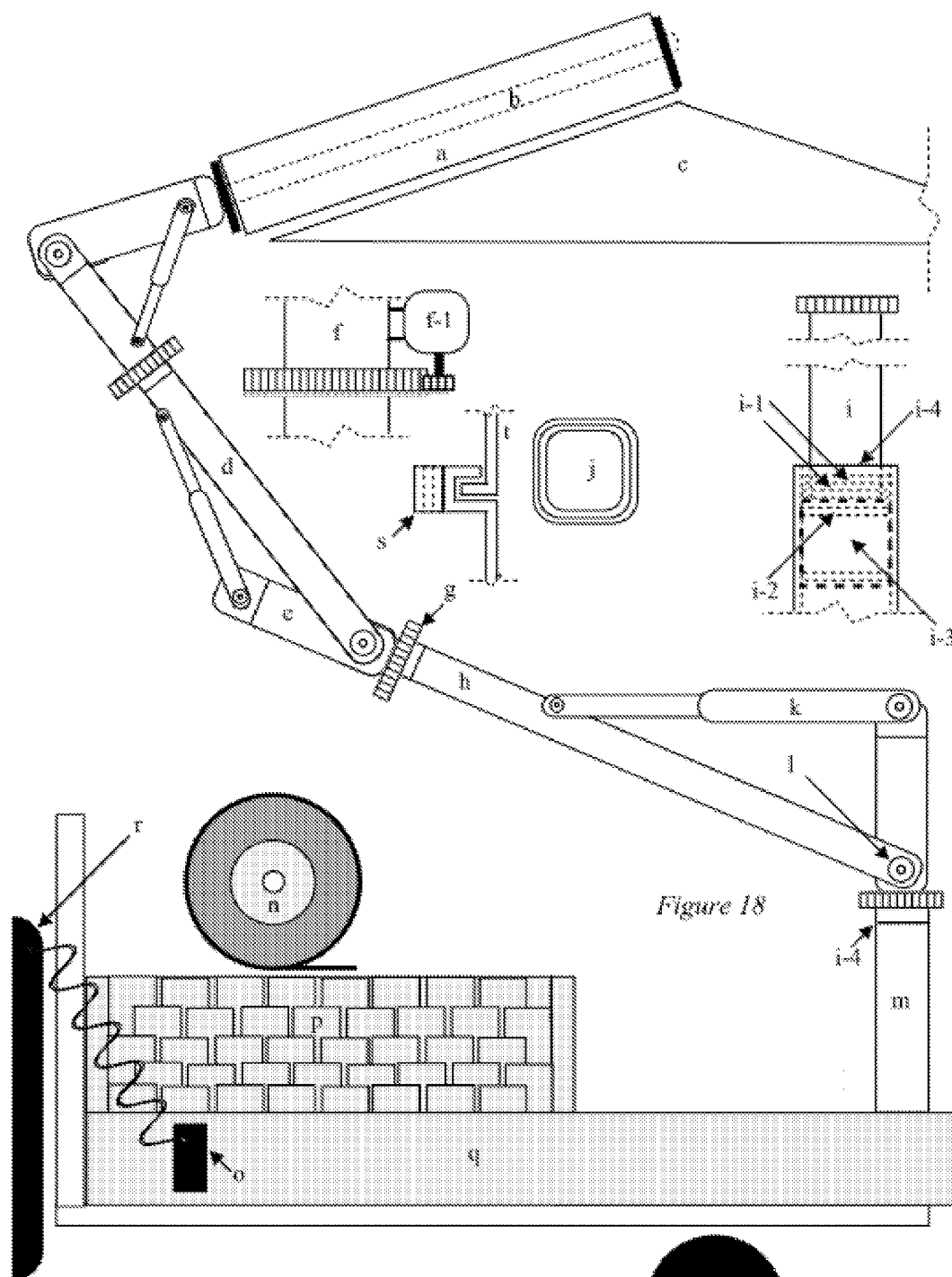
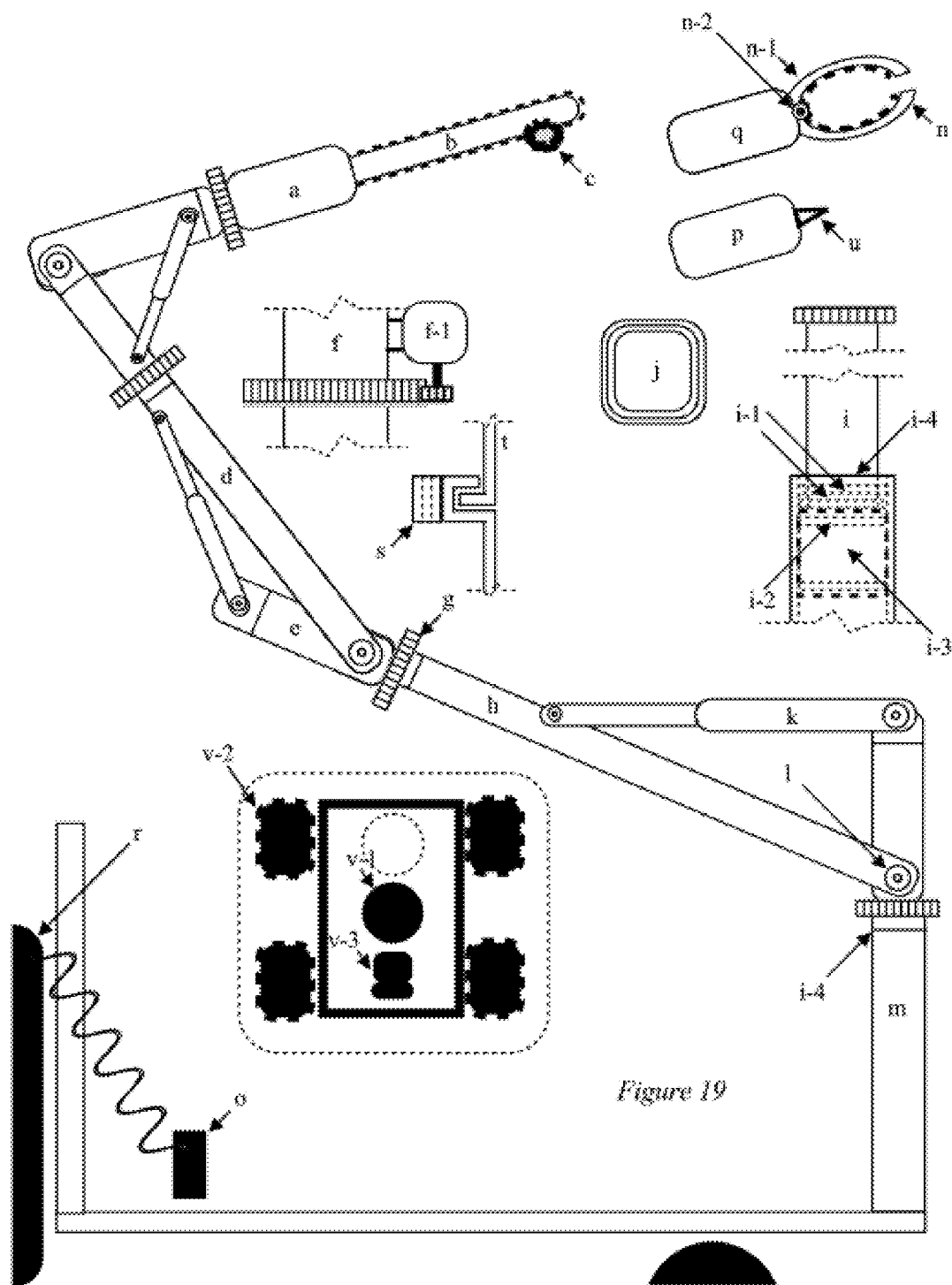


Figure 17





**BUILDING SYSTEM, CONCRETE OR OSB,
POUR MOLDED OR PRESSED MOLDED,
COMPOSITE PANELS, TRUSSES, AND
PRODUCTS, WITH ENGINEERING
METHODS AND FASTENERS, AND RELATED
TRANSPORTATION, ERECTION, AND
MATERIALS PROCESSING EQUIPMENT**

DRAWING DESCRIPTIONS AND
SPECIFICATIONS NUMBERED

[0001] FIG. 1A. Bottom View of Floor Panel Concrete Composite One Piece Factory Pre-cast or OSB Improved Construction or a Combination of Both, Poured or Pressed Factory Built Crane Set Floor, with Styrofoam Block Filled Insulation Cavities, Panel Dimensions 8' to 9' Wide x 48' Long or Longer in Multiple Pieces, 5" to 9" Thick, Poured or Molded as One Continuous Piece or Floor Joist Section, Bottom View, Residential/Light Commercial Housing, Concrete Composite or OSB Improved Construction or a Combination of Both, all components of the system will have Embedded Cables, Wires, or Re-bars, as shown by dots in some figures including FIG. 7, items D and I, Factory Built Panels, 4' to 9' Wide by 2' to 48' Long or Longer in Multiple Pieces Semi Trucked or Site Built Crane Erected Construction. A-1. Side View Exterior of Strength Improving Radius Corners, All Corners of Entire Panel. A-2. Double Thickness Main Beam, Also Side Beams All Four Sides, Approx. 3"x3" Studs and Plates, Integrated Factory or Jobsite Precast Construction. A-3. Lifting Holes for Mobile Crane during Assembly, 2 to 8 Places as Needed, Top, Center, or Bottom Locations. A-4. 1.5" to 3" Thick Molded Studs with reinforcing wires. A-5. Vertical Solid Wall Columns as shown in FIG. 3, Item B. A-6. Lifting Bolt for Floor Section Movement as shown in FIG. 3, Items F through J, Two to Four Places. A-7. Vertical Building Exterior Wall Line as shown in FIG. 3, Item C. A-8. Wall, Floor, and Ceiling, Section Joint Leveling Equalizer Pegs as shown in Items D-1 and F-1, also shown as a Side View as Item C-6. A-9. Electrical Junction Box molded in place and strategically placed anywhere on the panel for shortest and easiest access after erection electrical wiring completion.

[0002] B. Top View of Floor Panel Concrete Composite One Piece Factory Pre-cast or OSB Improved Construction or a Combination of Both, Injection Molded Factory, Crane Set, with Styrofoam Block Filled Insulation Cavities, Poured or Molded as One Continuous Piece or Floor Joist Section for Residential/Light Commercial Housing, Concrete Composite or OSB Improved Construction or a Combination of Both, Injection Molded Factory Built Panels. B-1. Ceramic Tiles or Various other Textures and Patterns, Integrated Factory Precast All-in-One Poured or Injection Molded Panel Construction. B-2. Galvanized Reinforcement Welded Wire, various wire diameters and spacing depending on span, also larger size wire cables shown as larger dots shown in FIG. 1, as items D, H, I, and J.

[0003] C. Side View of Floor Panel Concrete Composite Integrated Factory Pre-cast All-in-One Panel Construction. C-1. Poured all-in-one studs as shown in FIG. 1, item a-4. C-2. Lightening for concrete savings. C-3. Extended beam, three locations, FIG. 1, Items A-2, being the center location of three, as necessary for load bearing, also shown in Items I-1 and J-1. C-4. Angle Tongue and Groove Section Leveling Joint with Plastic Roof Cement Type Sealer at the Bottom of the Groove. C-5. Cross Bolt Holes for section to section

connection, also shown in Items I-1 and J-1. C-6. Wall, Floor, and Ceiling, Section Joint Leveling Equalizer Peg Holes as shown in Item A-8.

[0004] D. Intersection of Two Main Sections showing a Section-to-Section Leveling Method.

[0005] D-1. Peg Shaft of Various Construction including No. 5 and Larger Rebar, also Concrete Encased Rebar Billets, also Aluminum or Steel Pipe Sections. D-2. Equalizing Peg Holes, both sides, for Peg Insertion.

[0006] E. Front View of a Pre-fabricated Housing Construction Method for Constructing Standard Economy Types to Mansion Custom Construction Including Modifying any of the Component's Length, Width, Height, Thickness, to Produce Custom Housing Construction Affects such as; Arches, Concrete Decorator Bands, Front Porch Enclosures and Complex Roof Designs including Dormers, Multi-Hip or Gable Complex Constructions, Attached and Semi-attached Guest Houses, Pooled Court Yards, Pier Home Construction, etc.

[0007] F. Intersection of Two Main Sections showing a Section-to-Section Leveling Method. F-1. Angled Peg or Peg Shaft of Various Construction including No. 4 and Larger Rebar, both sides for Peg Insertion, also Concrete Encased Rebar Billets, also Aluminum or Steel Pipe Sections. F-2. Equalizing Angled Male and Female Precast Connection Holes and Peg Centers of No. 4 and Larger Rebar.

[0008] G. End View Main Flooring Panel with Built-In Beams on Both Sides, Rebar and/or Steel Wire Reinforced, 4' to 4' 6" Wide or 8' to 9' Wide by up to 48' plus Long by 4" to 12" Thick, 3" Wide Minimum Ledge. G-1. Cutaway View of Full Size Flooring Panel having two edge sections that extend below the main portion of the panel to form a built-in beam type support for spanning longer distances, exterior side surfaces may contain embedded exterior decorative finishes as shown in FIG. 3, item A. G-2. I-Beam for Ledge Set Main Panel Flooring System as shown in FIG. 2, items H and I. G-3. Attached Precast Concrete Panel or Drywall for insulation containment and fire protection with three fasteners, Tap-con or Mold Set Plastic Inserts. G-4. Main Panel to Main Panel Bolts as also shown in FIG. 1, item C-5. G-5. Steel Reinforcing Bar, each side, 2' or 4' on center to prevent ledge breakage. G-6. Extended length beam support for increased clear span for use in panels G-1 and H-1. G-7. Insulated with Styrofoam Blocks or Fiberglass Bats.

[0009] H. Cutaway View of Full Size Flooring Panel having two edge sections that extend below the main portion of the panel to form a built-in beam type support for spanning longer distances, exterior side surfaces may contain embedded exterior decorative finishes as shown in FIG. 3, item A. H-1. End View Main Flooring Panel with encased insulation, Styrofoam, Pumice, or Vermiculite.

[0010] I. End View Main Flooring Panel Concrete Composite Round Hollow Core Lightening Cavity Integrated Factory Precast All-in-One Panel Construction with radius ledges, 3" wide. I-1. End View Main Flooring Panel with Round Hollow Core Lightening Cavities with squared off edges, with Styrofoam Block, Styrofoam Bead or Fiberglass Core Insulation Filling. I-2. Individual Round Hollow Core Cavity with or without Styrofoam Insulation Beads for manufactured billets that are inserted after precast manufacture.

[0011] J. End View Main Flooring Panel Filled Core with squared off edges, 3" Minimum Wide Ledges. J-1. End View Main Flooring Panel Filled Core with squared off edges. J-2. Mixture of Concrete and/or OSB Composite Formulas

including Insulating Aggregates including Pumice, Stone, Vermiculite or other Stone Based Minable Insulators, or Styrofoam Beads ($\frac{1}{8}$ " to $\frac{3}{4}$ "), specific strengths and ingredient mixtures to be determined by chemist and/or engineering study.

[0012] FIG. 2A. Top View of Floor Panels for Entire Building Concrete Composite Integrated Factory Pre-cast All-in-One Panel Construction, Molded Sectional Styrofoam Insulated or Round Lightening Cavity Type Construction Styrofoam Insulated, 9' Wide $\times$ 12' to 48' Long, in Site Built Construction, panels can be the full width and length of the building if formed on slab then lifted off through multiple lift holes as shown in FIG. 3, item B-2. A-1. Top View of Floor Panel Full Length of Building up to 48' Long or Longer in Multiple Piece Foundations. A-2. Top View of Floor Panel Shown with Ceramic Tiles installed or Stamped or Molded Integrated Factory Pre-cast All-in-One Composite Concrete. A-3. I-Beam under Floor Support System with Band Boards as shown in FIG. 1, Items I-1, I-2, H-1, H-2, or Thickened Edge Floor Panel with Band Boards covering end as shown in items J-1 and L-1, and Item H-1 Band Board only.

[0013] B. Side View of Long Span Floor Truss to 48' Long or Longer, 4' to 4'6" or 8' to 9' O.C. Concrete Composite Factory Pre-cast All-in-One Construction with Embedded Cables, Wires, or Re-bars, as shown in FIG. 7 (D and I), 10" to 3' $\times$ 12' to 48 ft., Poured or Blow Molded Construction. B-1. End View of Round Lightening Cavity Factory Pre-cast Footers with Factory Pre-cast Stem Wall on Top as a Separate Piece. B-2. Truss to Foundation Wall Connecting Hardware as shown in FIG. 3, items F through J. B-3. End View of Large Block Styrofoam Filled Insulation Cavities as Shown in Side View of FIG. 5(F), Also Integrated Flared Load Bearing Stem Wall Base for Weight Distribution, 16 to 24 inches or larger depending on load weight bearing. B-4. End View of Stem Wall Concrete Composite Integrated Factory Pre-cast All-in-One Construction, 1' to 6' High. B-5. Side View of Footer Stem Wall Combination All-in-One Factory Pre-cast with Double Square Footer Lightening Cavities and Insulated Square Core Blocks as shown in Top View of B-5. B-6. Side View of Stem Wall Round Lightening Cavity with or without Pre-cast Stem Wall. B-7. End View of Footer Wall with Re-bar, Cable, or Wire, Placement 4 Places as shown in FIG. 7, Items D and I. B-8. End View of Deep Gravel Bed for Footer Drainage. B-9. 4A or 6A Limestone Gravel Footer Base that is raked level.

[0014] C. Top View of Roof Panels for Entire Building Concrete Composite Integrated Factory Pre-cast All-in-One Panel Construction, Molded Sectional Styrofoam Insulated or Round Lightening Cavity Type Construction Styrofoam Insulated, 9' Wide $\times$ 12' to 48' Long. C-1. Rolled Roofing Product as Shown in FIG. 5, Items K, E, and G. C-2. Roof Panels Asphalt Shingle Construction, 4' $\times$ 4', Interlocking as Shown in FIG. 5, Items D, with or without Single Shingles as Shown in FIG. 5, Item I, or Roof Panel Shown in FIG. 5, Items A-2 and B, Factory Pre-cast All-in-One Composite Concrete Molded or Stamped Various Textures such as Imitation Cedar Shake or Slight Roof or Rustic Dimensional or Standard Shingles. C-3. Top View Roof Panels Full Length of Building up to 48' Long Single Panel or Any Length in Longer Multiple Piece Panels.

[0015] D. Front View of Footer and Panel Foundation Construction, D-1 Side View of Roof Panels, in place two places as shown in FIG. 2, Item C. D-2. Pre-fabricated Panel Wall Sections Molded Styrofoam Filled as shown in FIG. 3, Items

A, B, and C, or One Side Poured Form and 4' $\times$ 8', Panel Construction as shown in FIG. 4, Items E, F, G, and H, or Round Lightening Cavity Panel Construction as shown in FIG. 3, Item G. D-3. Ceiling Panel Construction as shown in FIG. 5 Items J-2, O, and P, or Round Lightening Cavity Panel as shown in FIG. 5, Item M. D-4. Poured Footers with 6A Gravel Base or Factory Pre-cast Footers without 6A Gravel Base with or without Round Lightening Cavity Holes and Reinforcement Bars or Cables as Shown in FIG. 2, Item B-1, used as a Center Point for 9' Wide Factory Pre-cast Concrete Composite Panels. D-5. Factory Pre-cast Panels as shown in FIG. 2, Item A. D-6. Factory Pre-cast Trusses designed to accept Factory Pre-cast Panels for Roof and Ceiling with Reinforcement Cables, Wires, or Re-bars, as shown in FIG. 7, Items D and I. D-7. Concrete Wedge Block Fastener for Crane Setting of Vertical Wall and Foundation Sections, two places, one at the top and one at the bottom of high walls, 12-24" long Wedge Block, one side can be precast in place. D-8. 45 Degree Angle Wall End Line, two sides butted together for final attachment, these type of corners can be used in all types of concrete construction including tilt-up and multi-story tilt-up and road related construction. D-9. Pre-Drilled Bolt Holes, molded counter sunk at the ends of the holes, placed horizontally at a 45 degree angled corners along the wall or other fasteners shown and described FIG. 3, items F through J, as necessary, every 16-24". D-10. Truss to Side Wall Connecting Hardware as shown in FIG. 3, items F through J. D-11. Footer to Side Wall Connecting Hardware as shown in FIG. 3, items F through J.

[0016] E. End View of Floor Support I-Beam to 48' Plus Length, 4' to 4' 6" O.C. or 8' to 9' O.C., Concrete Composite Factory Pre-cast All-in-One Construction as shown in FIG. 2, items H-2 and I-2 with Embedded Cables, Wires, or Re-bars, as shown in FIG. 7, Items D and I, 6" to 3' $\times$ 12' to 48 ft., Poured or Pressed Construction, also shown as a side view in FIG. H.

[0017] F. Front View with Cutaway Section of a Foundation Stem Wall or Basement Wall Composite Concrete Construction, 1' to 8' High $\times$ 12' to 48' Long or Longer in Multiple Sections as shown in FIG. 2, Items B-3, B-5, B-6, D, and G. F-1. Insulation Cavities for Fiberglass or Styrofoam Insulation. F-2. Interior Center Filled Styrofoam Construction covered with molded concrete layers on both sides as shown in FIG. 3, items A, B, and C, or FIG. 4, items E and G. F-3. 15 to 45 Degree Angle Weight Distribution Square Concrete Reinforcing Member for Wall and Roof Weight Transfer, square poured all-in-one with rest of the wall. F-4. Increased Size Reinforcing Member for Wall and Truss Weight Bearing. F-5. Footer Base Various Widths, Depths, and Configurations, as shown in items B-1, B-4, B-5, B-6, D, and G. F-6. Wall and/or Floor to Foundation Wall Fasteners as shown in FIG. 3, items F through J.

[0018] G. Monolithic Poured Slab and Precast Footer, Basement, or First Story, Wall Intersection Connection Area without built-in footer. G-1. Concrete Fastening Devices Imbedded or Screw-In Type as shown in FIG. 3, items F through J. G-2. Enlarged Depth and Width Footer Area as needed for increased weight bearing areas associated with roof weight bearing distribution or long span window or door opening as shown in FIG. 2, items F-3 and F-4.

[0019] H. Side View of an Intersection of an I-Beam with a custom molded band board and beam molded combination configured building structural member shown as items E and I-2. H-1. Channel Shaped Beam with Molded in Band Board for use with floor sectional slabs shown as items J, K, and L.

H-2. Side View of I-Beam, minimum 3" wide for double 3" ledge set or flat for full floor panel construction.

[0020] I. End View of an I-Beam Floor, Truss, and Panel, System. I-1. Channel Shaped Beam with Molded in Band Board for use with floor sectional slabs shown as items J, K, and L. I-2. End View of an I-Beam 4' to 4' 6" or 8' to 9' O.C. with 4' 6" shown with thin slab, item I-3. I-3. 4' to 4' 6" Thin Slab, 5" to 8" Thick, shown as items J, K, L, or FIG. 1, items J or J-1. I-4. Front View of a Band Board and Beam Combination shown as item H-1. I-5. Band Board, Floor Panel Only Width with matching textures for exterior siding and/or footer texture as shown in FIG. 3, items A-1 through A-4.

[0021] J. End View Main Flooring Panel Rebar and/or Steel Wire Reinforced, 4' to 4' 6" Wide or 8' to 9' Wide by up to 48' plus Long by 4" to 12" Thick, 3" Wide Minimum Ledge.

[0022] K. End View Main Flooring Panel Concrete Composite Round Hollow Core Lightening Cavity Integrated Factory Precast All-in-One Panel Construction with radius ledges, 3" wide. K-1. End View Main Flooring Panel with Round Hollow Core Lightening Cavities with squared off edges, with Styrofoam Block, Styrofoam Bead or Fiberglass Core Filling Insulation. K-2. Footer Slab Wall Connection Fastener as shown in FIG. 3, items F through J. K-3. Bottom Cutaway View of Full Height Wall Panel with two bolts protruding through bottom poured or pressed sill plates. K-4. Side Floor Panel Surface with Decorative Textures to match walls or foundation footer including those shown in FIG. 3, items A-1 through A-4. K-5. Band Board Slab Height Only with Decorative Textures to match side walls as shown in FIG. 3, items A-1 through A-4.

[0023] L. End View Main Flooring Panel with encased insulation, Styrofoam, Pumice, or Vermiculite. L-1. Cutaway View of Full Size Flooring Panel having two edge sections that extend below the main portion of the panel to form a built-in beam type support for spanning longer distances, exterior side surfaces may contain embedded exterior decorative finishes as shown in FIG. 3, item A.

[0024] FIG. 3A. Exterior Side View of Factory Pre-cast Concrete Composite Stud Wall with Various External Textures and Finishes, Poured, Injection Molded, or Press Stamped, 8' to 9' High×2' to 48' Long or Longer in Multiple Pieces, 5" to 9" Thick, with Electrical or Plumbing Junction Boxes molded in place and strategically placed anywhere on the panel for shortest and easiest access after erection electrical wiring and plumbing completion as shown in FIG. 3, items A-5 through A-8. A-1. T-111 Plywood Board Baton or Reverse Board Baton, A-2. Cedar Shake Shingle, Slate, or Stone, Textures, A-3. Smooth Textures like Stucco or Skip Coat, A-4. Bricks, Large and Small. A-5. Electrical Box pre-mounted and prewired before pouring mold. A-6. Plumbing Imbedded in Styrofoam End Termination Block and duct taped over or Styrofoam filled for concrete invasion avoidance. A-7. Styrofoam Block with Imbedded Electrical Wires, Styrofoam to be removed after molding or pressing, for a connection to other junction boxes mounted in ceilings, floors, or walls. A-8. Plumbing Junction Box Styrofoam Block Filled with shutoff and couplings inside. A-9. Wall Recessed Mold Attached Electrical Junction Box, duct taped or Styrofoam filled for poured material leakage elimination.

[0025] B. Side View with Cutaway of a Stud Wall with Styrofoam Blocks in Place. B-1. Radius Corners Added for Strength and Radius Cornered Styrofoam Block to Allow the Radiuses to Form. B-2. Wall Lifting Holes for transitioning flat laying panels to vertical position using a sliding circular

cable or nylon strap, 2 to 4 places along wall as necessary. B-3. Concrete Truss End with Two Truss to Wall Fasteners with Dual Purpose Molded Holes for vertical mold breaking and also permanent truss to wall fastening as shown in FIG. 3, items F through J. B-4. Truss End Sections 4' to 4' 6" O.C. or 8' to 9' O.C. with Supporting Molded All-in-One Wall Column Underneath Each Truss. B-5. Cutaway View showing Open Insulation Cavities and Molded Stud Wall on the left and Solid Poured Wall to the right. B-6. Full Height Insulation Cavities for wall construction or possibly 4' to 4' 6" floor or truss construction. B-7. Double Fasteners for Floor to Stem Wall Connection, also shown in FIG. 2, item F-6.

[0026] C. Top View Cutaway of a Factory Pre-cast Concrete Composite Stud Wall. C-1. Various Exterior Textures as described in FIG. 3, items A-1, A-2, A-3, and A-4. C-2. Styrofoam Block or Composite Insulating Stone Aggregate Cement Mixtures with or without Styrofoam Bead Insulation with Rounded Edges for Wall Structural Strength Improvement. C-3. Interior Wall Finish Smooth or Interior Textured Factory Pre-cast or Site Applied Finish Treatments.

[0027] D. Top View of an Injection or Vertical Poured Mold for Wall Assemblies, Six Sided Individually Molded or Two-in-One Sided Gang Molded for Factory Pre-cast or Site Built Wall Panels, Floor Panels, Ceiling Panels, Roof Panels, Foundation Panels, Foundation Footers, Pitched and Flat Trusses, Pilings, Beams, and Boards, Molds for all concrete composite components in this provisional filing are essentially the same as this injection mold or fill mold, Gang Mold shown in FIG. 12. D-1. Six Sided Oiled Metal or Plywood Mold. D-2. Injection Molding Holes, One Each Stud Top and Bottom Side.

[0028] E. Front View of a Two Story Concrete Composite Insulated Factory Pre-cast Residential or Small Commercial Construction. E-1. Side View of Floor Panel Concrete Composite One Piece Factory Pre-cast or OSB Improved Construction or a Combination of Both, Injection Molded Factory Built Crane Set Floor, with Styrofoam Block Filled Insulation Cavities, Panel Dimensions 8 to 9' Wide×48' Long or Longer in Multiple Pieces, 5" to 9" Thick, Poured or Molded as One Continuous Piece or Floor Joist Section. E-2. Fasteners Wall Floor Wall Combination.

[0029] F. Coarse ACME Thread Greased Pot Metals or Nylon Fastener Bolt for removal after molding and replacement with other coarse ACME thread fasteners such as FIG. 3, items G or I, for permanent construction, 1/4" diameter to 2 1/2" diameter times lengths to 3'. F-1. Top View of a Square Shaped Fastener Bolt Head for removal or driving with threaded holes through for use with FIG. 3, items H or J, this fastener can also be casted with a center rebar encased in high strength concrete. F-2. Side View of a Square Head Coarse ACME Thread Fastener Bolt. F-3. Coarse ACME Threaded Fastener Bolt for Wall Crane Lifting or Mold Break-Free with molded-in or cast-in loop made from materials such as cast pot metals or nylon or high strength looped rebar reinforced concrete as shown in item K.

[0030] G. Coarse ACME Thread Fastener Removable, Greased Pot Metal or Steel Multi-Strand Reinforced Threaded Nylon with Looped Head for Wall Crane Lifting or Mold Break-Free. G-1. Concrete Recessed Styrofoam Block installed in mold before concrete or composite casting. G-2. Styrofoam Block installed in mold before concrete or composite casting allowing access for washer and coarse ACME thread nut removal shown on the bottom end of FIG. 3, item

G, block may be located in the top of the bottom of the secondary joining structural member, top locating shown in this drawing.

[0031] H. Steel Threaded Rod Section, $\frac{3}{4}$ " to $1\frac{1}{2}$ " in diameter, 6" to 5' in length, with washers and nuts or washer/nut all-in-one assembly, shown installed connecting a main floor panel section and two wall sections shown as item E-2. H-1. Manufactured Specific Size Styrofoam Block with corresponding nut/washer recess installed in mold previous to pouring for top nut access as shown in FIG. 3, item E-3, and also shown and described in FIG. 3, items J-3 and J-5, and also items G-1, G-2, and K. H-2. Nut/Bolt and Styrofoam Manufactured Block for side wall nut access for exterior or interior poured wall use as shown in FIG. 3, items E-2 and E-3. H-3. Cover Plate with Matching Texture Molded Cement Cover for visible bolt access holes in interior or exterior sidewall, adhesive glued in place and blended to hide appearance where necessary.

[0032] I. Manufactured ACME Thread Hex Head Bolt with or without Built-In Washer, Metal, Nylon, or Rebar Reinforced High Strength Concrete. I-1. Molded Manufactured Plastic Concrete Excluding Mold Sleeve for Bolt with attached fasteners and flange. I-2. Plastic Sleeve to Mold Threaded Bolt through Fasteners, also usable in a metal or high strength precast concrete version with smooth interior sleeve or interior and exterior ACME threads.

[0033] J. Fully Threaded or Partially Threaded Concrete Imbedded Bolt for threaded rod section with nut/washer attached for permanent molded-in wall construction for use in walls, floors, and trusses, as a connection beam for other structural members for breaking apart or lifting side panel sections. J-1. Cast Metal Loop for crane hook insertion with nut and washer cast all-in-one and a threaded hole through the center to accept threaded rods, $\frac{3}{4}$ " to $1\frac{1}{2}$ " in diameter. J-2. An Imbedded Bolt with bolt head and washer manufactured all-in-one for high pull strength breakage resistance. J-3. Factory Pre-Manufactured Styrofoam Block with holes for rod insertion and holes for fastener installation to mold previous to pouring. J-4. Connecting Nut in various size $\frac{3}{4}$ " to $1\frac{1}{2}$ ", bolt length double the width for connecting concrete imbedded bolts to other structural panels and components.

[0034] K. Pre-Bent Rebar imbedded in Manufactured Styrofoam Block with mold attaching bolt for use in separating molded sections and crane lifting and erection of panel sections as shown in FIG. 3, items J-3 and J-5.

[0035] L. Cross Checked Rebar Section, No. 4 to No. 6, used in conjunction with molded or drilled holes, greased mold plugs shown as items F-2 and F-3 are inserted in main panel molds previous to pouring then after dried and assembly of structure component to component connections are made by removing the greased plug then inserting the rebar connecting the two components and pouring high strength concrete mixture for permanent high strength strong fastener bond.

[0036] FIG. 4A. through D. Front View of OSB or Factory Pre-cast Concrete Composite Panels with Concrete with Embedded Mesh Wire, 4' Wide $\times$ 8' or 9' High $\times$ 1" to 2" Thick, Stud Wall with Various External Textures and Finishes, Poured, Injection Molded, or Press Stamped, 8' to 9' High $\times$ 2' to 48' Long or Longer in Multiple Pieces, 5 to 9" Thick, pre-drilled standard squared edges or built-in seal tongue and groove or over lapping/under lapping texture extended overlap or individually pieced textured surface overlap pieces with tongue and groove, with all features described in items

A-1 through A-8. A. T-111 Plywood Board Baton or Reverse Board Baton. A-1. 4' $\times$ 4' Precast Masonry Panel with or without overlapping edges as shown as item A-7, or inserted single object seam cover pieces shown as items A-5 and A-6. A-2. 4' $\times$ 4' Concrete Panel with tongue and groove edges as shown in FIG. 4, item A-3. A-3. Panel Edge Tongue and Groove with Bottom Seal shown as gray. A-4. Pre-drilled Recessed Head Fastener Holes, fasteners shown in place including tap cons for concrete or hex head wood screw fasteners. A-5. Individual Textured Concrete Seam Cover Pieces for matching two panel sections together as shown in FIG. 5, item P. A-6. Stone Texture Piece, Individual Textured Concrete Seam Cover Pieces for matching two panel sections together as shown in FIG. 4, items A, B, and D. A-7. Two 4' $\times$ 4' Panel Sections of Adjoining Precast Masonry with overlapping/under lapping edges. A-8. 30-45 Degree Angle Tongue and Groove Panel Edges, with asphalt based plastic cement sealers installed on top and bottom edges of each 4' $\times$ 4' panel for water shedding.

[0037] B. Cedar Shake Shingle, Slate, or Stone, Textures.

[0038] C. Smooth Textures like Stucco or Skip Coat.

[0039] D. Bricks, Large and Small. D-1. Two 2' $\times$ 8' Manufactured Concrete Composite or OSB Panels.

[0040] E. Side View with Cutaway, Both Sides Removed, of a Stud Wall, Concrete Composite with Styrofoam Blocks in Place, 6" to 12" Wide $\times$ 8', 9', or 10' High, 48' Plus Long, 1" to 2" thick concrete per side. E-1. Radius Corners Added for Strength and Radius Cornered Styrofoam Block to Allow the Radiuses to Form.

[0041] F. Top View with Top Plate Removed of a Stud Wall, Interior Wall Combination, Concrete Composite Molded, 6" to 12" Wide $\times$ 8', 9', or 10', High, 1" to 2" Thick Concrete per Side, up to 48' Plus Long, with Exterior Panels Separate. F-1. Interior 4' $\times$ 8' Separated Wall Panel as shown in FIG. 4, Item D. F-2. Fiberglass or Styrofoam Block Insulation with Square or Rounded Edges for Wall Structural Strength Improvement.

[0042] G. Top View with Top Plate Removed of a Stud Wall, Exterior Wall Combination, Concrete Composite Molded, 6" to 12" Wide by 8', 9', or 10', High, 1" to 2" Thick Concrete per Side, up to 48' Plus Long, with Exterior Panels Separate, Integrated Factory Precast, Injection Molded, Pour Molded Textures or Stamped Wet Concrete Textures. G-1. Exterior Poured Concrete or Pressed OSB Structural Member and Exterior Wall with Exterior Textures Poured then Stamped or Molded All-in-One with Exterior Wall as shown in FIG. 4, Items A, B, C, and D. G-2. Molded Radiuses for Additional Wall Strength. G-3. Fiberglass Bat or Styrofoam Block Insulation with Square or Rounded Edges for Wall Structural Strength Improvement, Molded with Pull-out Individual Cavity Mold Blocks for Fiberglass Insulation. G-4. 4' $\times$ 8' Interior Composite Concrete Panel or Drywall as described in FIG. 4, item D, with Interior Finishes.

[0043] H. Top View of Wall Assembly Wood, Metal, or Concrete or OSB Composite, Studs with Top and Bottom Plates Removed, Assembled Parts Consisting of 4' $\times$ 8' Interior Panels, Exterior Panels, and 2' $\times$ 4" $\times$ 8' or 9' Studs as shown in FIG. 7, Items A through L, Constructed of Concrete Composites or Oriented Strand Board Pre-Drilled Panels and Stud Wall Assembly as shown in FIG. 8, Items A and C through L. H-1. Interior and Exterior Panels as shown FIG. 4, Items A through D. H-2. Wall Panels 4' $\times$ 8' or 9', Both Sides, as described in FIG. 4, Items A, B, C, D, F-1, and G-4.

[0044] I. Side View of FIG. 4, Items F and G, also with Separate Stud Wall and Pre-cast or Site Poured Footer.

[0045] J. Side View of FIG. 4, Item H, also with Separate Stud Wall and Pre-cast or Site Poured Footer.

[0046] FIG. 5A. Top View of a Pitched or Flat Roof Panel shown as Floor Panels in FIG. 1, Items A through J, and shown in FIG. 5, Item K-1, 8' to 9' Wide by 12' to 48' Long or Longer in Multiple Pieces, Factory Pre-cast Integrated Concrete Composite or OSB Improved Construction or a Combination of Both, Injection Molded Factory Built, Crane Set, with Styrofoam Block Filled Insulation Cavities, 6" to 10" Thick, Poured or Injection Molded in One Continuous Piece or Floor Joist Section, Bottom View, Residential/Light Commercial Housing. A-1. Top Section showing no cross members for continuous length insulation cavity as shown in FIG. 5, items W, X, Y, Z, and AA. A-2. Precast Roof Panel without molded all-in-one shingles and described in item B, Flat Roofs should be used in conjunction with standard wide rolled roofing, item J, without textures, hot mopped sealed, Pitched Roofs are also used in conjunction with item J when item A is poured without textured shingles mold. A-3. Electrical Junction Box molded in place and strategically placed anywhere on the panel for shortest and easiest access after erection electrical wiring completion.

[0047] B. Textured Roofing Designs Heights of 1/4" to 1 1/2" Imbedded during Injection Molding or Imprint Molding of One Piece Flat Roof Panel, or Integrated and Molded by Pouring into Textured Surface Vertical Ganged Molds as shown in FIG. 12, Roof Panel with Various Textures such as; Cedar Shakes, Roof Tile, Slate, Rustic Shingles, Standard Shingles, etc., with Moisture Resistant Glazed Surface, or Coated with Poly-urethane, or Latex, or Spray Painted with Colored Asphalt Emulsification, or Regular Asphalt Emulsification Spray with Colored Roof Granules.

[0048] C. Side View of Roof Panel shown in FIG. 5, Item A, showing a Dividing Line in Half to allow a Minimum 3" Wide Weight Resting Seat on the Truss on Each Side of the Factory Precast Panel shown as items X, Z, and W, 4' to 9' Wide in Truss Set Houses or Full Structure Length in Site Built Construction. C-1. Precast Integrated All-in-One Piece Reinforcement Studs, Side View as shown in Top View of FIG. 5, Item A. C-2. Lightening Holes for Material Savings as shown in FIG. 7, Item A-1. C-3. Extended Continuous Poured Roof Panel and Molded Side and/or Center and Side Beam shown as items X-1, Y-1, and Y-2. C-4. Tongue and Groove Molded in Seal Area with Asphalt Plastic Roof Cement Factory Installed Seal at the Bottom of the Groove. C-5. Molded Bolt Holes for Panel-to-Panel Connection, Bolt Pattern in High and Low Location shown as a protruding bolt in items X-1, Y-1, and B, and also shown in a top view as item A as C-5. C-6. Wall, Floor, and Ceiling, Section Joint Leveling Equalizer Peg Holes shown as Items A-8, F-2, and D-2. C-7. As shown in FIG. 3, items F through J, Fasteners for securing roof panel to roof truss or side wall as shown in FIG. 5, items K-7 and K-8, also shown in FIG. 3, item B-3, and FIG. 2, item B-10, and FIG. 1, item A-5.

[0049] D. Fit Together Roofing Tile Sections Constructed of Concrete Composites and Installed on Plywood Roofs, Two Halves Fitted Together as Shown in FIG. 5, Item E Sizes 2'x4', 4'x4', and 4'x8'. D-1. Interlocking Imitation Shingle Sections, 4'x4', Textures can include Rustic Dimensional, Cedar Shake, Tile, Slate, etc. or Standard Shingle Sections 300 lb. per sq. Min. Fiberglass Core Asphalt Shingles Double Thickness Sealed Together Under Lapping/Overlapping used

in Conjunction with FIG. 5, Item P, Roller or Spray Applied Adhesive Attachment Method, Adhesive Comprised of Plasticized Asphalt Emulsification or other Compositions.

[0050] E. Overlapping 4'x4' Sections of Interlocking Imitation Shingles with Single Shingles installed to join the sections together as described FIG. 5, Items B and P, with Imitation Textured Surfaces such as Dimensional Rustic, Cedar Shake, Tile, Slate, etc., or Standard Shingle Sections as Shown in FIG. 5, Item D, including 300 lb. Min. Asphalt Plastic Cement Sealer to Prevent Water Leakage, Roller or Spray Applied Adhesive Attachment Method, Adhesive Comprised of Plasticized Asphalt Emulsification or other Compositions.

[0051] F. Side View of Rolls of Asphalt Roof Shingle Caps, Standard and Rustic Three Tab, Pre-cut Factory Constructed Overlapping in Attached Rows, F-1 Top View of FIG. 5, Item F.

[0052] G. Side View of Roofing Shingles Constructed of Reinforced Concrete Composites Factory Injection Molded or Pour Molded Pre-cast Installed on Plywood Roofs, with Imitation Shingle Textures such as; Dimensional Rustic, Cedar Shake, Tile, Slate, etc., with Pre-Formed Nail Holes located in the same recommended locations as present asphalt shingles as shown in FIG. 5, Items N and N-1, with Moisture Resistant Glazed Surface, or Spray Painted with Colored Asphalt Emulsification or Plasticized Asphalt Emulsification with or without Sprayed Color Granular Roofing Stones, or Coated with Poly-urethane, or Latex. G-1 Plywood Roof Base with or without Sealed Rolled Roofing.

[0053] H. End View of Roof or Ceiling Panel as shown in FIG. 5, Items K-1, K-2, or K-3, 8' to 9' Wide or 4' to 4'6" Wide by 12' to 48' Long or Longer in Multiple Pieces, Factory Pre-cast Integrated Concrete Composite or OSB Improved Construction or a Combination of Both, Injection Molded Factory Built, Crane Set, with Styrofoam Block Filled Insulation Cavities, 3" to 5" Thick, Poured or Injection Molded in One Continuous Piece or Floor Joist Section Residential/Light Commercial Housing. H-1. End View Main Flooring Panel, identical to item H except with Built-In Beams on Both Sides, Rebar and/or Steel Wire Reinforced, 4' to 4'6" Wide or 8' to 9' Wide by up to 48' plus Long by 4" to 12" Thick. H-2. Styrofoam or Fiberglass Insulation, 4" to 12" Thick by approx. 1'6" to 2' or 3'6" to 4' Wide by 48' Long or Longer Sections, or Manufactured Panels made of light stone composite such as pumice or vermiculite with or without Styrofoam bead mixture.

[0054] H-2. Fiberglass Insulation Installed in Mold Voids after Injection Molded. H-3. Ceiling Textures Finishes Injection Molded Textures or On-Site Installed, Concrete Mesh Reinforcement Wire designated by Individual Dots in All End View Drawings, with underside fastener attached panel.

[0055] I. End View of Roof Panel for use with or without trusses to Set on Top of the Trusses in this version and without trusses in the version shown as item I-1. I-1. Cutaway View of Full Size Flooring Panel for use with Flat or Vaulted Ceilings or Roofs having two edge sections that extend below the main portion of the panel to form a built-in beam type support for spanning longer distances, exterior side surfaces may contain embedded exterior decorative trim and end finishes. I-2. Extended length beam support for increased clear span for use in panels shown as items I-2 and V. I-3. Styrofoam or Fiberglass Insulation, 4" to 12" Thick by approx. 1'6" to 2' or 3'6" to 4' Wide by 48' Long or Longer Sections, or Manufac-

tured Panels made of light stone composite such as pumice or vermiculite with or without Styrofoam bead mixture.

[0056] J. End View of Asphalt Rolled Roofing with Imitation Shingle Textures such as; Dimensional Rustic, Cedar Shake, Tile, Slate, etc., 2' to 20' Wide, Rolls applied on Plywood Pitched Residential or Small Commercial Roofs, 300 lb. per sq. ft. min. weight, Roller or Spray Applied Adhesive Attachment Methods, Adhesive Comprised of Plasticized Asphalt Emulsification or other Compositions.

[0057] K. Concrete Composite Pitch Roof Truss 9 ft. O.C., 3" to 6" Wide or Two Places at the end of structure in the functional main I-beam version shown as items S-3 and O, Various Configurations as shown in FIG. 7, Item A and FIG. 2, Item D, shown with Various Concrete Composite Panels Installed. K-1. Roof Panel Installed Position as shown in the Side View of FIG. 5, Item C, also shown in end views as items H, H-1, I-1, L, M, W, U, and V. K-2. Ceiling Panels, Bottom Edge, as shown in FIG. 5, Items H, L, and W. K-3. Ceiling Panels Top Edge as shown in FIG. 5, Items H, L, or W. K-4. Poured Solid Square Concrete Beam for truss anti-racking strength. K-5. Truss to Beam Fasteners, two places into beam each location shown as items I, K, and F-2. K-6. Concrete or Composite I-Beam with extended top and bottom thickness to accommodate cross bolting as shown in FIG. 5, item K-5, and in FIG. 7, items A and B. K-7. Truss and Side Wall Connecting Fasteners as shown in FIG. 3, items F through L, and item E-3.

[0058] L. End View of Roof or Ceiling Panel for use with Trusses with Extra Thick Insulation with or without Various Roof Surface Textures including FIG. 5, Items B, D, D-1, E, and G, with insulations previously described in items H and I. L-1. Fiberglass Insulation Installed in Mold Voids after Injection or Pour Molded, 4" to 12" Thick by approx. 1'6" to 2' or 3'6" to 4' Wide by 48' Long or Longer Sections.

[0059] M. End View of Roof Panel for use without Trusses for Flat or Vaulted Ceilings or Roofs with or without Various Roof Surface Textures including FIG. 5, Items B, D, D-1, E, and G. M-1. Full Imbedded Styrofoam Blocks, 4" to 12" Thick by approx. 1'6" to 2' or 3'6" to 4' Wide by 48' Long or Longer Sections, or Fiberglass Insulation or Manufactured Panels made of light stone composite such as pumice or vermiculite with or without Styrofoam bead mixture. M-2. Side View Truss, Roof, or Floor. M-3. Inserted Rod, Rebar Fastener, or Tubing as shown in FIG. 5, items T-1 and C-6, extending out in order to insert into second roof or floor panel for sturdy connection.

[0060] N. Top View of Individual Roofing Shingle Constructed of Concrete Composites Factory Injection Molded or Pour Molded Pre-cast Installed on Plywood Roofs. N-1. 4 Pre-Formed Nail Holes located in the same recommended location as present asphalt shingles. N-2. Asphalt Seal Down Strip with Plastic Pull Tabs.

[0061] O. Vaulted Ceiling Decorative Finished Pitched Roof Main I-Beam with molded-in main panel rest top section. O-1. Fasteners Rebar or Cast Pot Metal Bolt Roof Panels to I-Beam as shown in FIG. 3, items I and J.

[0062] P. Top View of a Full Single Shingle to be constructed of Concrete Composite or Asphalt for Splicing Panel Sections as shown in FIG. 5, Items B, E, D, D-1, G, and J.

[0063] Q. Top View of Asphalt or Concrete Composite Roofing Individual Pre-bent Ridge Caps with Textures such as; Dimensional Rustic, Cedar Shake, Tile, Slate, etc.

[0064] R. Top View of Elongated Half Section of Single Shingle for use in forming Roof Drip Edges as shown in FIG.

5, Items R, B, and R and Single Piece Squared Half Sections of Single Shingle for Roof Crest.

[0065] S. Molded Fastener Holes for Main Beam Vaulted Ceiling Fastener use, 2' O.C. shown as item O-1. S-1. Vaulted Ceiling Lower Bolt Long Length Fasteners through Panel Beam and Panel as shown in FIG. 3, item H. S-2. Vaulted Ceiling Upper Bolt Long Length Fasteners through Panel Beam and Panel as shown in FIG. 3, item H. S-3. Vaulted Ceiling Main I-Beam as shown in item O.

[0066] T. Plastic Sleeve Formed Holes, Two Places for Aligning Panel Height and Width as shown in item C-6. T-1. Panel to Panel Leveling and Connection Method using round solid rebar or steel pipe section or concrete and inserted rebar billet or poured rebar billet as shown and described in FIG. 3, items L and H-2.

[0067] FIG. 6 Driven or Auger Drilled Full Structure Height Piling House with Factory Pre-cast Concrete Composite Panel and Truss Construction Components, 9' Wide Panels, Pilings, and Trusses, up to 48' foot Long Semi Tractor Trailer Hauled-In, Hurricane Storm Surge Resistant Ocean Front or Mud Slide Resistant, Single or Multi-Story Living Areas also Garage Level feasible on Concrete Floor Trusses.

[0068] A. Concrete Composite Truss 9 ft. O.C. as described for FIG. 5, Item K.

[0069] B. Square Concrete Pilings up to 48' Long, 12"x12" to 24"x24", with a minimum of 4 Galvanized Re-bar.

[0070] C. Side View of Floor Truss 9 ft. O.C. Concrete Composite Factory Pre-cast All-in-One Construction with Embedded Cables, 10" to 3'x12 to 48', Poured or Blow Molded Construction.

[0071] D. Ground Level or Beach Sand.

[0072] E. Radical Slope or Land Slide Danger Lot in Mountainous View Real Estate Areas.

[0073] F. Augured Crane Packed Small and Large Stone Gravel Footer.

[0074] G. End View of Concrete Composite Piling with Concrete Reinforcing Re-bars, Four 4 Places.

[0075] H. Side View of a 0.25" to 0.5" Thick, 24" to 48" Long, Galvanized Steel Square or Round Sleeve Piling Coupling, by 12" to 24" Width used in conjunction with up to 48' Long Concrete Composite Pilings for Deep Augured Footing Installation.

[0076] I. Square Driven Pointed Concrete Pilings extends below Soil Level up to 48' with Gravel Footer Installed at the Bottom of the Piling as described in FIG. 6, Item F.

[0077] FIG. 7 Construction Member Configurations, Standard Dimensional Lumber Sizes or Custom Commercial, of Concrete Composite or Improved Oriented Strand Board or a Combination of the Two, Widths 1" to 3' by 6" to 10' High for Bridge and Home and Commercial Building Construction.

[0078] *The drawings contained in FIG. 7 of this application are also contained in my provisional utility patent application 61/148,135 Composite Building Materials, Sheds, and Transportation Containers.

[0079] A. Stud or Beam with Lightening Holes.

[0080] B. Material Conserving Beam Lightening Holes, 1/3 of beam volume max., molded or cut, also to accommodate plumbing, wiring, or gas piping.

[0081] C. Thin Configuration I-Beam made from pressed or molded high strength resins, polymers, glues, cement, sand, limestone, wood splinters and/or OSB.

[0082] D. Steel Galvanized or Stainless Steel Cross Checked Solid Wire or Reinforcing Bars.

[0083] E. Thin I-Beam or Lightened Stud.

[0084] F. Standard Stud or Dimensional Building Member.
 [0085] G. Thick Version Structural Building Member, lower quality strength materials.

[0086] H. Thick Configuration I-Beam.

[0087] I. Nylon Coated Cross Checked Wire or Reinforcing Bars.

[0088] J. Thick Configuration Structural Building Member.

[0089] K. Thick Version Structural Building Member, lower quality strength materials.

[0090] L. Thick Version Structural Building Member, lower quality strength materials.

[0091] FIG. 8A. Side View of Beams, Joist, Trusses, Wall Studs, and Plates, constructed of Material-1 Oriented Strand Board (OSB) Improved as used in FIGS. 1 through 10, or Material-2 Concrete Composite as used in FIGS. 1 through 10, or Material-3 Concrete Composite and OSB Combination Products, as used in FIGS. 1 through 10. Cross Holes for Plumbing and Electrical will be bored by Automatic Machines or Molded-In during Truss, Beam, or Board Pressure Pressing

[0092] B., C., D., and E. Thin Type Full I-Beam or H-Beam Configuration for Shorter Spans or when using Higher Strength Materials such as Concrete Composites used for House Piers, Composed of Concrete Composite, Organized Strand Board, or a Combination of Organized Strand Board and Concrete Composite, the descriptions of items F through I are identical to those in items B through E.

[0093] F. I-Beam for Longer Spans or for Weaker Materials such as Standard Organized Strand Board, Thick Construction as shown in items F, G, H, and I, for Longer Spans and Weaker Density. Materials such as; OSB.

[0094] G. Partial I-Beam, Reduced Material Usage as Opposed to Rectangle Organized Strand Boards or Concrete Composite Strand Boards.

[0095] H. Solid Board, Rectangle Organized Strand Boards or Concrete Composite Strand Boards or Combination Boards using Both Materials.

[0096] I. Organized Strand Board or Concrete Composition or Combination with Reinforcing Cables Treated Coated Wood Joist Band Boards and Center Main Beam Boards 1½" or 3" wide×8", 10", and 12", with or without Weather Proofing Treatments and Coatings as Described in Provisional Patent Application No. 61120582.

[0097] J. Roof Truss, Howe, Fink, or other Truss Configurations, Residential or Commercial, Organized Strand Board and Concrete Composite Combination or Concrete Composition with Various Reinforcement Methods described in items I and M. with Enlarged Joist Intersection Areas for Strength as shown with Identical Material Composition.

[0098] K. 4'×8' Sheet Goods of Oriented Strand Board with Improved Exterior Grade Glue Construction and/or the Addition of Epoxy Resin Composition for use in Floors, Ceilings, and Siding, 24" on Center ⅞" to 1¼" Thickness. Multi-Material Coated, as describe in Claims, All Four Edges and Both Sides for Water Resistance and Protection. Also created is Concrete Composite Sheet Goods and Concrete Composite and Organized Strand Board 4 ft. by 8 ft. Building Panels. Also the use of Fiberglass Nylon and/or Plastic Sheets, Strips, or Strands for Exterior or Interior Reinforcement in these and other Products Listed in this Patent

[0099] I. Re-enforcement Multi-Strand Twisted Cables or Solid Single Strand Cross Checked Wire or Solid Cross Checked Re-Bars, Stainless Steel Nylon Cross Checked or

Galvanized Coated, Large and Small depending on Beam Dimensions, Loads, and Material Composition and in Numbers from 0 to 20 per Beam.

[0100] M. Nylon Cables, Solid or Stranded, or Nylon Molded Cross Checked Coated Steel Cable or Wire.

[0101] N. Flat Truss or Main Beam Truss Configurations, Solid Composite Material Centered Beam or Vacant Space as shown, Residential or Commercial, Organized Strand Board and Concrete Composite Combination or Concrete Composition with Various Reinforcement Methods describe in l. and m. with Enlarged Joist Intersection Areas for Strength as shown with Identical Material Composition

[0102] O. Improved Strength Molded Truss Intersections

[0103] *All sheds, cabinets, furniture, windows, and doors, described in FIGS. 9 and 10 are made from molded concrete or molded OSB composites as described in this patent.

[0104] FIG. 9A. 48 ft. Flatbed Semi-Trailer with 3 Composite Storage Sheds Injection Molded Pre-Cast with 2 inch Thickness Walls of Various Lengths with 6 inch Skid Shed Bases as described in Claims Section, Sheds of Various Sizes from 9 ft. 3 in. W×4 ft. L by 4 ft. W to 12 ft. L by 24 ft. W and having various Siding Textures as described in FIG. 9, item E, the front doors, and FIG. 10, item B, recessed panels or various treatments such as imitation T 111, shakes, reverse board and batten, bricks, etc.

[0105] B. 6 Piece Construction Pre-Cast or Molded Sheds, Flat Roofed Commercial Type.

[0106] C. Sheds of Various Sizes from 9 ft. 3 in. W×4 ft. L by 4 ft. W to 12 ft. L by 24 ft. W and having various Siding Textures as described in FIG. 10, Item B.

[0107] D. Sheds of Various Sizes from 9 ft. 3 in. W×4 ft. L by 4 ft. W to 12 ft. L by 24 ft. W and having various Siding Textures as described in FIG. 10, Item B.

[0108] E. Three Piece Poured Composite Concrete Shed Consisting of Two Poured Composite Opening Door Pieces and 1 Main Poured Pre-Cast Concrete Composite, various lengths, widths, and heights, having various Siding Textures as described in FIG. 10, Item B.

[0109] FIG. 10A. 4 Piece Shed, Factory Injection Molded Pressed OSB or Molded Concrete Composites with Sides butted together.

[0110] B. Shed Side Panel with molded indented squares shown, also moldable in a variety of configurations, such as; Cedar Shake, Boarded Batten, Reverse Boarded Batten, Lap Board, Stucco, T 111, made to match the siding material on the house for esthetic and code enforcement acceptance.

[0111] C. One Piece Molded Roof, OSB, Concrete Composite, or a Combination of Materials with or without Exterior Coatings.

[0112] D. Four Shed Side Walls shown in place around a fork lift able shed floor, 6 in. plus thick

[0113] E. Four Fork Lift Holes, two from each direction, completely through the floor section of the Shed, minimum 2" width and minimum total floor width of 6 inches.

[0114] F. One Piece Molded Shed Floor, Solid Top 2" Layer shown.

[0115] G. Two Slots for Forklift Forks.

[0116] H. 2" Wide Honeycomb Grid, bottom 4 inches of the Shed Floor for the purpose of material conservation lightening

[0117] I. Entertainment Center constructed from factory injection molded chip board composite materials, also conceived is the invention of concrete composite tables, chairs, dressers, night stands, chest of drawers, coffee tales, end

tables, cabinets, office furniture, dining room furniture, china cabinets, outdoor storage cabinets, garage storage cabinets, gun cabinets, security storage cabinets, safes, indoor and outdoor patio furniture and benches.

[0118] J. Manufactured Kitchen Cabinets and Counter Tops made of Concrete Composites or Chip Board Composite Construction, Upper and Lower Cabinets with Counter Top Built-In Back Splash 4" High.

[0119] K. Garage Door constructed of 2" Wide made of Concrete Composites or Chip Board Composites Construction for Hurricane Resistance.

[0120] L. Double Entrance Doors for Residential or Commercial made of Concrete Composites or Chip Board Composite Materials. Also Interior Residential, Solid Core Molded Composite Doors

[0121] M. Residential and Commercial Windows with Concrete Composite or Chip Board Composite Frames and Casements

[0122] N. Skid Type 1, attached to shed or container or independent construction, 4'x4'x6" skid for Sheds or Containers constructed of Concrete Composites, Steel, or Plastic. N-1. Nine Weight Bearing Foundation Piers, One on Each of Four Corners, One at Each of Four Skid Side Centers, and One in the Exact Center of the Skid.

[0123] O. Skid Type 2 (Attached to Shed or Container or Independent Construction): 4 ft. by 4 ft. by 6 in. Skid for Sheds or Containers constructed of Concrete Composites, Steel, or Plastic.

[0124] FIG. 11 Gantry Crane, Semi Trailer Mounted, Mobile Self Loading and Unloading, 180 Degree Swing, Hydraulic Cylinder Operated and Extended, Cable Boom, used for Molded Modular Concrete Building Components Construction and Movement

[0125] A. Load Positioning Carriage Double Wheeled Cable Operated.

[0126] B. Crane Hook and Pulley Assembly.

[0127] C. Crane Boom Extension/Contraction Beginning.

[0128] D. Crane Boom Height Increasing and Decreasing Power Cylinder.

[0129] E. Telescopic Crane Boom Base Extension/Contraction Start Point.

[0130] F. Dual Base Plate for 180 Degree Crane Rotation.

[0131] G. Tethered Control for Hydraulic and Electrical Motor Operation.

[0132] H-1. Ground Pad Equipment Stabilizer (Hydraulically or Manually Operated) Partially Swung Out, Side View shown in Item H-7.

[0133] H-2. Ground Pad and Stabilizer Arm (Hydraulically or Manually Operated) Shown in the Retracted Position for Transportation.

[0134] H-3. Ground Pad and Stabilizer Arm Assembly shown in Fully Extended 45 Degree Angled Position, Hydraulically shown as Item H-5 or Manually Operated shown as Item H-6.

[0135] H-4. Crane Tower Assembly Top View as shown in Side View of Item O.

[0136] H-5. Detached Hydraulic Crane Stabilizer Base Swing Arm showing an Exterior Rectangular Square Tubing Covering as shown as Item H-7 and an Internal Hydraulic Power Cylinder for Automatic Operation.

[0137] H-6. Detached Crane Stabilizer Base Swing Arm showing an Exterior Rectangular Square Tubing Covering as shown as Item H-7, Drilled Pin Holes with Drilled Cross Pin for Extension and Contraction of Stabilizer.

[0138] H-7. Ground Pad and Stabilizer Arm Side View, Square Tubing Encased Power Cylinder attached to H-8.

[0139] H-8. Rectangular Steel Tube with Encased Power Cylinder as shown as Item H-5

[0140] H-9. Safety Bolt Anti-Movement with Drilled Cross Hole for Cotter Pin Insertion, Cable attached for Loss Prevention.

[0141] I. Hinge Pivot Pin also located at Both Ends of Item D.

[0142] J. Cable Spooler Double Mounted Side by Side and Motor for Crane Boom Lateral Movement.

[0143] K. Fixed or Extendable Stationary Counter Weight various Lengths, Widths, or Heights. K-1. 'T' Shaped Counter Weight Assembly, Extendable or Stationary

[0144] L. Flat Bed Semi Trailer Loaded with Concrete Molds as shown in FIG. 12 All Items.

[0145] M. Crane Base permanently attached to Semi Trailer Frame. M-1. Crane Base Mounted under Semi Trailer attached to Crane Tower on the Left Side Drawing with Four Extending Stabilizers.

[0146] N. Semi Tractor Trailer Ball and Hitch Plate.

[0147] O. Frame Telescoping Optional Bracing as Needed.

[0148] P. Front View Crane Telescoping Trailer Mounted Bracing.

[0149] FIG. 12 Various Pre-Cast Concrete Component Ganged or Individual Molds Configurations including Floors, Walls, Ceilings, Beams, Foundation Walls, Floor and Roof Trusses, Sheds, Furniture, Windows, Cabinets, 4'x4' and 4'x8' Panels, Shingles, Dimensional Lumber Products, etc., Mold Construction, Component Casting, and Mold Tear Downs, for Factory or Semi Truck Pouring

[0150] A. Eleven Section Multi-Cavity Molds, Concrete Composite, Multiple Ganged Pour Molds for Various Types of Concrete Components as shown in FIG. 12 Items G-1 through G-4, also shown FIG. 1 Item A Floor Panels, also shown in FIG. 2 Item B-2 Floor Trusses, also shown in FIG. 2 Item B-3 Footer Wall, also shown FIG. 2 Item D-2 Flared Base Wall, also shown in FIG. 2 Item D-4 Footer, also shown in FIG. 3 Items A and B Wall Panels, also shown in FIG. 5 Item K Concrete Composite Roof Truss, also shown in FIG. 5 Item K-1 Ledge Set Roof Panel, also shown in FIG. 5 Item K-3 Ledge Set Ceiling Panel, also shown in FIG. 5 Item K-2 Non-Ledge Set Ceiling Panel, Also Included; All other Concrete Composite Components contained in the Original Provision Filing of this Application. A-1. One to Twenty Five Section Multi-Cavity Poured Concrete Molds, 1" to 12" Thick by 8' to 10' High by 2' to 50' in Length, Mold Plates removed from the Front and Rear of Gang Mold A.

[0151] B. End View of Mold Carrying Semi Trailer shown with Front and Rear Panel as shown in FIG. 12 Item A-1. B-1. Removable Exterior Mold Panels, Three Places.

[0152] C. Four Piece Individual Concrete Composite Component Mold with Concrete Component Inside. C-1. Individual Mold Top and Bottom for Factory or Job Site Construction and Pouring

[0153] D. End View of Mold Carrying Semi Trailer with Front and Rear Mold Plates Removed. D-1. Concrete Composite Single Component detached from Multi-Cavity Molds.

[0154] D-2. Coarse ACME Threaded Fastener Bolt for Wall Crane Lifting or Mold Break-Free with molded-in or cast-in loop made from materials such as cast pot metals or nylon or high strength looped rebar reinforced concrete as shown in FIG. 3, item K. D-3. Fully Threaded or Partially Threaded

Concrete Imbedded Bolt for threaded rod section with nut/washer attached for permanent molded-in wall construction for use in walls, floors, and trusses, as a connection beam for other structural members for breaking apart or lifting side panel sections as shown in FIG. 3, item J, Cast Metal Loop for crane hook insertion with nut and washer cast all-in-one and a threaded hole through the center to accept threaded rods, $\frac{3}{4}$ " to $1\frac{1}{2}$ " in diameter as shown in FIG. 3, item J-1, An Imbedded Bolt with bolt head and washer manufactured all-in-one for high pull strength breakage resistance as shown in FIG. 3, item J-2. D-4. Fastener with Crane Hook Cable and Single Molded Component for stacking on item E semi-tractor component stack. D-5. A Wire Rack of Spools of Various Wires as shown in end view dots and lines of FIG. 12, item D, and Plumbing as shown in FIG. 3, item A, including galvanized small and large gauge single strand with or without raised cross checked or nylon coated cross checked or twisted multiple strand or new UF electrical wires or soft copper plumbing or flexible plastic plumbing security, television, or telephone wiring, stereo speaker wire, also full height rolls of galvanized welded wire for easy pulling across each mold length. D-6. Wire Rack Extendible Base with or without Top Plate. D-7. Individual Strands of Wire being pulled the full length of each individual panel or being pulled and used as necessary inside of each panel as required. D-8. Double Faced Mold Spacing Bar, two or more places along the length of each panel mold as necessary. D-9. Rotating Threaded Bolts in drilled holes corresponding to threaded nuts welded into the top of each mold top and bottom, two or more places for exact mold width spacing.

[0155] E. Factory Pre-Cast Stacked Concrete Composite Components 8' to 10' High by 90" Wide Maximum shown with 2" Wide Square Tubing or Nylon Strap Mold Shipping Containment Banding. E-1. 4'x4'6" Concrete or OSB Panels. E-2. Rebar inserted through pre-molded holes in each panel and every 10' along the panel as shown in FIG. 12, items G and H, to stabilize the truck load of panels for load shifting resistance.

[0156] F. Four Piece Factory Single Mold Concrete Component

[0157] G. Various Molded Panels for floors, wall, ceilings, roofs, footers, and beams, as shown in FIGS. 1 through 10, 12, 13, 14, and 17. G-1. End View Main Flooring Panel with Built-In Beams on Both Sides as shown and described in FIG. 1, item G. G-2. End View Main Flooring Panel Concrete Composite Round Hollow Core Lightening Cavity Integrated Factory Precast All-in-One Panel Construction with radius ledges as shown and described in FIG. 1, item I. G-3. Cutaway View of Full Size Flooring Panel having two edge sections that extend below the main portion of the panel to form a built-in beam type support for spanning longer distances as shown and described in FIG. 1, item H. G-4. End View of Roof Panel for use without Trusses for Flat or Vaulted Ceilings or Roofs with or without Various Roof Surface Textures as shown and described in FIG. 5, item M. G-5. End View of Roof or Ceiling Panel for use with Trusses with Extra Thick Insulation with or without Various Roof Surface Textures including FIG. 5, Items B, D, D-1, E, and G, with insulations previously described in FIG. 5, items H and I, and shown and described in FIG. 5, item L. G-6. Panel Lifting Method for Vertical to Horizontal or Horizontal to Vertical Panel Elevation, Looped Cable and Crane Hook Setup allows sliding cable to gently transition between horizontal and vertical, also shown in FIG. 3, item B-2.

[0158] FIG. 13 Factory Built Concrete Composite Housing, Semi Truck Delivered in Completed Sections, 12' to 16' Wide by 32' to 80' Long, Single Wide or Double Wide, Modular Housing

[0159] A. Two Section Concrete Composite Modular Home Shown Assembled.

[0160] A-1. Fasteners Rebar or Cast Pot Metal Bolt Roof Ledge Set Roof Panel Slabs to I-Beam as shown in FIG. 3, items I and J. A-2. Fasteners Slab Set Roof to Wall Connection as shown and described in FIG. 5, items C-7 and K-7. A-3. Truss Section of Housing, Partial or Full Length of Trailered Module for use on One Module or Both Sides depending on Layout or Customer Preferences. A-4. Split Concrete Beam with joining together fastener bolts.

[0161] B. Prefabricated Housing Half Section sitting on a Transportation Trailer. Also not shown are Footers or Stem Wall Footers constructed separately either Site Built Component Stem Wall System or Site Poured Footers with Site Poured Stem Walls or Component Factory Stem Walls as described in this Original Provisional Patent Application 61/157/328 FIG. 2 Items B-3 and B-4.

[0162] C. Prefabricated Housing Half Section with Footers attached sitting on a Transportation Trailer

[0163] D. Side View of Roof Panel shown in item drawing, or Floor Panel, or Wall Panel, Ledge Set, Beam Set, Truss and Ledge Set, or Truss, Ledge, and Beam, Set, as shown in FIGS. 1, 2, 3, 4, 5, and 7. D-1. Concrete Main Beam divided in half for Vaulted Ceiling.

[0164] E. Top View of Roof Panel shown in item drawing, or Floor Panel, or Wall Panel, Poured or Pressed One Piece Molded Full Length and Width for Concrete Composite or OSB Pressed or Molded Mobil Homes, 12' to 16' Wide or 24' to 32' as a Double Wide by 30' to 80' Long.

[0165] FIG. 14 Concrete Composite Molded Components loaded on a Semi Trailer and Rail Car with detachable Self Contained Gantry Crane with Telescoping Sections and Ground Pad Equipment Stabilizer, with or without Multiple Gang Molds in place. These Molded Components can also include Concrete Composite Fencing Products as described in my Provisional Patent Application 61/218,595 or Concrete Composite Sheds as described in my Provisional Patent Application 61/148,135 FIG. 2 or any other Presently Transported Cargos.

[0166] A. Semi Trailer showing Roof Trusses and Half Trusses as described in FIG. 2 Item D-6.

[0167] B. Rail Car showing Floor Trusses, Side by Side Double Rows, as described in FIG. 2 Items E and B-2.

[0168] C. Wide Forklift Slots for Inter Factory Cement Plant Yard Movement or Setting Up Interchanges between Semi Trailer, Railroad, or Ocean Cargo Conversion.

[0169] D. Temporary Wheels for Detached Semi Trailer

[0170] E. Tethered Crane Control Panel.

[0171] F. Railroad Crane Hitch Extension and Coupling.

[0172] G. Semi Trailer Crane Hitch Extension and Coupling.

[0173] FIG. 15 360 Degree Gantry and Horizontal Yard Crane Combination, Telescoping Height and Length, Electric Motor Gear Driven Extending Sections, Reward Sliding Crane Tower Truck Mounted.

[0174] A. Gantry Crane Telescoping Section with or without Secondary Internal Gantry Crane Section to Extend the Crane Length to 150', Second and Third Square Ring of End View Item P.

- [0175] B. Main Stationary Gantry Crane Section, Non-Telescoping, Largest Diameter Crane Section of End View Item P. B-1. Gantry Crane Section Partial expanded to show Gear and Track shown in Items Q, 6, and R.
- [0176] C. Crane Operator Cab preferred Front Position. C-1. Crane Operator Cab Rear Configuration for Improved Truck Load Carrying Capacity.
- [0177] D. Hydraulic Power Cylinder for Raising and Lowering Angled Crane Height working in conjunction with Pivot Point, Item O.
- [0178] E. Cable Spoolers.
- [0179] F. Gantry Crane Counter Weight Balance Crane Extension Section, Smallest Square Ring of End View Item P.
- [0180] G. Counter Weight for Gantry Crane Extensions A and B.
- [0181] H. Crane Supports with Pivot Pin Ends, Removable.
- [0182] I. Operator Truck Cab, Square Tube X Design Reinforced, Same as Truck Frame, Welded together with Item U.
- [0183] J. Crane Supports with Pivot Pin Ends, Removable, Opposite Direction Bracing as Item H.
- [0184] K-1. Manual or Remote Controlled Tandem Slide by Electric Motor Rail and Gear Operated. Crane Stabilizer Pad and Telescoping Assembly, Four Places, 40' Distance between all Pads as shown in FIG. 11 Items H-1 through H-8.
- [0185] K-2. Manual or Remote Controlled Tandem Slide by Electric Motor Rail and Gear Operated Crane Stabilizer Pad and Telescoping Assembly, Four Places, 40' Distance between all Pads as shown in FIG. 11 Items H-1 through H-8.
- [0186] L. Pivot Plate 360 Degrees.
- [0187] M-1. Crane Base Rear Sliding with Crane Attached.
- [0188] M-2. Crane Base and Tower in Rear Position Partial Phantom View with Cut Line
- [0189] M-3. Bi-Directional Slide Path Arrow showing path of Crane Tower Movement
- [0190] N. Horizontal Crane Tower with Entire Top Removed including Telescoping Sections and Operator Cab.
- [0191] O. Pivot Point Circular Pin for Main Crane Boom.
- [0192] P. End View of Retracted Telescoping Crane Boom Sections including Counter Balance Boom or End View Retracted Telescoping Crane Height Extending/Lowering Tower, 3 or 4 Sections up to 36', Crane Lengths from 50' to 75' per Section
- [0193] Q-1. Gear and Track for Secondary Extension Crane Section as shown as Items Q-6 and R
- [0194] Q-2. Gear and Track for Counter Weight Extension Crane Section as shown as Items Q-6 and R
- [0195] Q-3. Gear and Track for Crane Height Extending/Lowering Tower as shown as Items Q-6 and R
- [0196] Q-4. Gear and Track for Rear Sliding Tower Base with attached Telescoping Crane Tower
- [0197] Q-5. Gear and Track for Third Extension Crane Section as shown as Items Q-6 and R
- [0198] Q-6. Electric Motor Driven Gear, 5 Places as shown in Items Q-1 through Q-5
- [0199] R. Gear Track Extending the Length of each Crane Tower Section
- [0200] S. Crane Height Extending/Lowering Telescoping Tower Sections as shown in Item P
- [0201] T. Square and Rectangular Tube Steel Welded Truck Frame, 50' to 100' Long depending on Road Regulations
- [0202] U. Crane Rest and Cargo Stop
- [0203] U-1. Rear View Crane Rest and Cargo Stop welded to Reinforced Cab Frame, Item I
- [0204] FIG. 16 Crane Telescoping Gantry Semi Tractor Mounted as shown in FIG. 11.
- [0205] A. Semi Tractor Operator Cab and Crane Operation Cab with High Visibility Glass Top and Rear Window. A-1. Semi Tractor Operator Seat in the Crane Operating Position. A-2. Semi Tractor Operator Seat in the Tractor Trailer Driver's Position.
- [0206] B. Telescoping Arm Crane attachment Frame attached to Truck Frame.
- [0207] C-1. Cargo Stop Plate (Removable) and/or Mold End Plate for Multi-Cavity Concrete Component End Plate.
- [0208] C-2. Cargo Stop Plate Crane Rest Combination and/or Mold End Plate for Multi-Cavity Concrete Component End Plate.
- [0209] C-3. Semi Trailer End Plate (Crane Rest).
- [0210] C-4. Multi-Cavity Concrete Molds or Other Cargo including everything carried by Truck.
- [0211] D. Elevating Boom Angle, Telescoping Gantry Crane Boom (360 Degree Rotational Pivoting).
- [0212] E. Remote Controlled Crane Control Panel, Switchable Mode from Cab Operator to Remote Ground Operator.
- [0213] FIG. 17 Concrete Composite Molded Component loaded on a Semi Trailer and Rail Car with or without Multiple Gang Molds in place.
- [0214] A. Concrete Composite Trusses and Truss Half Sections with or without Molds attached, 6" to 12" Wide per Truss.
- [0215] B. Rail Flat Car with Horizontally Stacked Concrete Composite Molds, Molded Products, or Molds with Molded Products inside the Molds.
- [0216] C. Ocean Cargo Enclosed Shipping Container with Horizontally Stacked Concrete Composite Molds, Molded Products, or Molds with Molded Products inside the Molds.
- [0217] FIG. 18 Difficult Delivery Rolled Roof Remote Controlled Crane truck mounted and has three geared motor driven pivoting sections with hydraulic cylinders remote controlled for delivering roofing or any use requiring precision delivery.
- [0218] A. Rolled roof shingles, carpet, or other loads.
- [0219] B. Center rod for lifting rolls of materials.
- [0220] C. Building pitched roof.
- [0221] D. Stationary arm with a 360 degree rotating pivot as shown in FIG. 18, item F, with or without one or two sectional internal hydraulic cylinders as shown in FIG. 18, items I and J.
- [0222] E. Stationary arm with or without hydraulic cylinders as shown in FIG. 18, items I and J.
- [0223] F. Pivoting Joint with external ring attachment areas. F-1 Electric motor with internal or external reduction gears and geared sprocket mounted on the motor shaft for 360 degree rotational crane arm operation.
- [0224] G. 360 degree rotating plate pivoting sectional arm joint gear, remote controlled electric motor activated, located three places along extended crane arm, as shown in FIG. 18, item S.
- [0225] H. Stationary arm with a 360 degree rotating pivot as shown in FIG. 18, item F, with or without one or two sectional internal hydraulic cylinders as shown in FIG. 18, items I and J, shown in three places along crane arm.
- [0226] I. Side view of a rounded edges square tube precision hydraulic power cylinder and crane arm combination showing piston rod extended out of a two stage power cylinder for use in locations such as items H, C, or K, crane arm sections.

[0227] I-1. Piston body packing's and milled grooves of square hydraulic cylinder and crane arm combination.

[0228] I-2. Piston cylinder packing's and milled grooves for rounded edges of the precision square tube power cylinder.

[0229] I-3. Square power cylinder piston with rounded edges shown in full extended position connected to a piston rod and crane arm combination, item I.

[0230] I-4. Power cylinder stage separation line for single or double stage power cylinder shown along crane arms in seven places.

[0231] J. End view of a crane arm section with a rounded square tube power cylinder and crane boom combination inside and a square exterior and a two stage power cylinder interior with hydraulic oil filled interior.

[0232] K. Power cylinder, single or double stage, one each crane section arm.

[0233] L. Pin pivoting joint.

[0234] M. Base stationary crane arm.

[0235] N. Side view of extra wide rolls of rolled roofing, 6' to 30'.

[0236] O. Remote control for crane operation including motors and hydraulic cylinder operation.

[0237] P. Rolls of simulated shake shingles.

[0238] Q. Standard rolls of rolled roofing, carpet, linoleum, etc.

[0239] R. Truck cab.

[0240] S. Side cutaway view of a gear ring as shown in items f and g, attached to item T.

[0241] T. Two piece 360 degree circular rotating crane arm joint bolted to gear ring, item S.

[0242] FIG. 19 Difficult Delivery or Chain Saw and Claw Remote Controlled Single or Double Arm Crane truck mounted and has three geared motor driven pivoting sections with hydraulic cylinders remote controlled for delivering roofing or any use requiring precision delivery.

[0243] A. Electric chain saw motor and gears attachment for multi-sectional hydraulic crane as shown in FIG. 18, external cord and power source operated (not shown).

[0244] B. Blade and chain of electric chain saw assembly.

[0245] C. Tree limb or branch.

[0246] D. Stationary arm with a 360 degree rotating pivot as shown in FIG. 18, item F, with or without one or two sectional internal hydraulic cylinders as shown in FIG. 18, items I and J.

[0247] E. Stationary arm with or without hydraulic cylinders as shown in FIG. 18, items I and J.

[0248] F. Pivoting Joint with external ring attachment areas. F-1. Electric motor with internal or external reduction gears and geared sprocket mounted on the motor shaft for 360 degree rotational crane arm operation.

[0249] G. 360 degree rotating plate pivoting sectional arm joint gear, remote controlled electric motor activated, located in four places along extended crane arm, as shown in FIG. 18, item S.

[0250] H. Stationary arm with a 360 degree rotating pivot as shown in FIG. 18, item F, with or without one or two sectional internal hydraulic cylinders as shown in FIG. 18, items I and J, shown in three places along crane arm.

[0251] I. Side view of a rounded edges square tube precision hydraulic power cylinder and crane arm combination showing piston rod extended out of a two stage power cylinder for use in locations such as items H, C, or K, crane arm sections.

[0252] I-1. Piston body packing's and milled grooves of square hydraulic cylinder and crane arm combination.

[0253] I-2. Piston cylinder packing's and milled grooves for rounded edges of the precision square tube power cylinder.

[0254] I-3. Square power cylinder piston with rounded edges shown in full extended position connected to a piston rod and crane arm combination, item I.

[0255] I-4. Power cylinder stage separation line for single or double stage power cylinder shown along crane arms in seven places.

[0256] J. End view of a crane arm section with a rounded square tube power cylinder inside and a square exterior and a two stage power cylinder interior.

[0257] K. Power cylinder, single or double stage, one each crane section arm.

[0258] L. Pin pivoting joint.

[0259] M. Base stationary crane arm.

[0260] N. Limb claw, single piece, lower jaw with teeth, gear operated inside item Q, single jaw passes through center top jaw for pinching action in conjunction with leverage pivot bolt, item N-2.

[0261] N-1. Limb claw, double piece, top jaw with teeth, gear operated inside item Q.

[0262] N-2. Leverage pivot point bolt through upper and lower jaws for electric motor clamping leverage pressure.

[0263] O. Remote control for crane operation including motors and hydraulic cylinder operation.

[0264] P. Electric spray motor for painting, corded with electric power and liquid paint feed tube from ground location, attaches in the same position as items A and B, chain saw.

[0265] Q. Limb claw and gear box for crane, attaches in the same position as items A and B, chain saw.

[0266] R. Truck cab.

[0267] S. Side cutaway view of a gear ring as shown in items F and G, attached to item T.

[0268] T. Two piece 360 degree circular rotating crane arm joint bolted to gear ring, item S.

[0269] U. Spray paint nozzle

[0270] V. All terrain vehicle for line men common bucket lift crane or multi-purpose difficult delivery chain saw and claw or painting remote controlled single or double arm crane with four hydraulically extending stabilizers as shown in FIG. 11, items H-1 through H-9, and item M-1

[0271] V-1. Crane Mast, Single or Double for Chain Saw or Chain Saw and Claw

[0272] V-2. All terrain nobby tires, four places.

[0273] V-3. Operator and hydraulic controls.

SUMMARY

[0274] The new building construction system is factory built then shipped by semi flat bed and tractor or boxed semi trailer. The components are stacked up and laid flat to accommodate maximum loading. The 9 ft. wide system of molded concrete composite trusses and insulated panels, for floors, walls, ceilings, and foundations, formed together to create a crane quick erected house or small commercial building and is designed around the maximum width allowable for standard road transportation. The new system incorporates material improvements and new product creations and usages. The new housing system involves the use of potentially three new materials for the construction of all components except where moisture would be a problem with the wood composition. The

first one is concrete composites comprised of Type M Cement with improved epoxies and resins, sand, 6A to 24A limestone, and fiberglass reinforcement strand, Styrofoam beads can also be added to improve insulating ability. The second material is Oriented Strand Board improved with epoxies and resins and also the use of splintered, chipped, or shaved wood, and sawdust, compression molded to form the components of the building. The third product is a combination of the two. The new roofing materials include quick install rolls in asphalt products, panel sections and concrete composites in panel sections, individual shingles, and all-in-one roof panel structural members and sheeting combinations. Also included is a new concrete composite deep piling residential and small commercial construction method with piling splicing. Also, a difficult delivery rolled roof remote controlled crane truck mounted. The new system involves home and light commercial building products including trusses, beams, and sheet goods, for new building construction. The system also includes new construction materials for doors, windows, and cabinets, and household furnishings. The system also includes new materials and methods for the construction of sheds. Materials involved the construction of the sheds can also be used as a pouring material for the construction of poured wall homes and tilt up residential construction. The new prefabricated housing uses a choice of 3 new types of materials depending on economics and availability of the geographic area to construct homes. The system incorporates a combination of new and existing concepts including factory pre-formed stem wall and floor sections, trusses, and roof and ceiling sections, also tilt up slab constructed wall sections are shown for standard or large custom homes and small commercial construction. The new concrete OSB composite sheds and small containers in one piece, three piece, and six piece, versions, factory molded pre-cast will allow for reduced non-existent assembly time and facilitate reduced storage and transportation space for either new or disassembled small containers and sheds. Also, a chain saw and claw remote controlled single or double arm crane truck mounted. The new building construction system contains a new crane type that combines the advantages of gantry with telescoping sections and vertical boom angling and long distances traversing with improved portability ease. The crane swivels 360 Degrees and has a 'T' shaped or square shaped retractable/extendable counter weight. The three or four sectional telescoping mast has a hydraulic cylinder to raise or lower the boom angle. The sectional boom and mast have electric motor driven gears and geared rail for extending and contracting sections. The crane is controlled by an attached tethered control panel, or by a dual controls truck cab, or by a wireless remote. In the long frame truck version, the retracted crane slides to the rear of the truck in order to facilitate full cargo loading capabilities of the vehicle. Tandem slide by electric motor rail and gear operated stabilizer pads and rear position changing crane operator cab also help facilitate full cargo loading. The crane lower has 4 swing-out hydraulically operated stabilizer arms with hydraulically operated horizontal foot pads. Ganged together concrete molds that are massed produced by pouring all at once with removable full top, side, bottom, and end, plates, for various concrete composite products that are factory produced or concrete ready mixed yard produced and transported by rail car, truck, cargo container, or semi trailer. Then crane hoisted into position on the job site. Assembled factory housing half or one third house width sections transported and job site crane set with or without

interlocking trusses and concrete footers. Concrete Composite Mixtures and Existing Materials in the Original Filing will be updated to include the use of Volcanic Pumice Aggregates and Crushed Volcanic Aggregates.

[0275] Purpose or Usefulness

[0276] The new crawl space construction method will eliminate the necessity of large volumes of fill sand being dump trucked to individual home sites instead of the present fill sand and concrete monolithic poured slab and footer methods.

[0277] The new system will reduce construction cost by mass production of factory built components.

[0278] The new system will reduce start to finish construction time, basic erection occurs in one day.

[0279] The new system will reduce construction cost by reduced labor cost allowing for more economical cost to consumers.

[0280] The new system will allow more families to qualify for home loans because of the reduced cost of construction and improved ability to keep up with their payments.

[0281] The new system will have improved hurricane and tornado wind resistance as opposed to wood frame construction methods.

[0282] The new system will have improved termite and ant damage resistance as opposed to wood construction.

[0283] The new system in the concrete version will improve fire resistance to reduce the loss of human life and structure.

[0284] The new concrete roof system will eliminate the need to replace asphalt shingle roofs.

[0285] The new land slide resistant construction will eliminate custom homes from being swept down hillsides.

[0286] The new hurricane resistant construction will eliminate custom homes from being undermined in the event of hurricane shifted sand.

[0287] The new pre-cast footer and slab construction allows construction in remote areas where ready mix concrete delivery is unavailable.

[0288] The new concrete composite building construction system will eliminate the cutting of live trees that produce oxygen and help retain soil moisture.

[0289] The new concrete composite building construction system will allow economical construction in areas where there is no lumber resource available.

[0290] The new system will reduce carbon emissions and wasted fuel from construction traffic associated with the job site and provide long term employment at the factories with reduced commuting distances for employees.

[0291] The new lumber products described in this patent will further advance building construction methods resulting in reduced initial costs of the new materials as compared with existing materials.

[0292] The concrete composite construction will result in improved building weight or hurricane and wind resistance.

[0293] The new building products, concrete composites will reduce the long term demand for lumber therefore allowing for fewer trees to be cut, allowing more oxygen for humans to breathe and to create a more natural earth environment (Green Friendly).

[0294] The new building products will help to utilize presently unusable for construction wood that is normally wasted by leaving it lay after being cut or dying of various causes and

not being harvested for lumber production because of too small of a diameter or non-straight or low quality species or diseased.

[0295] The new product will help to save the rain forest from being cut down by reducing the demand for rain forest lumber products. Dwindling wood supplies combined with increased demand for housing as the population grows will likely dictate the use of this product now or in the future.

[0296] The system will also help to reduce fire hazard associated with solid all wood product building materials leading to a reduction of deaths, injuries, and related property damage. Consumers will also be rewarded with reduced insurance premiums from insurance companies.

[0297] The new construction materials will help to allow economical single family construction in areas where lumber resources are scarce or non-existent like desert and scrub brush areas.

[0298] The new concrete composite sheds will reduce manufacturing labor cost and result in consumer savings at the retail level. Ease of construction in the multiple piece versions of the sheds will allow for easy flat storage and shipping and in the 1 piece version will allow strength, durability, and weight, to resist hurricanes and winds associate with interstate transportation. The concrete version will be rot resistant resulting in improved longevity.

[0299] The new housing system is superior to anything existing at the present therefore it constitutes improvement on the existing as all the products contained in this filing also do and will become the preferred consumer product in the areas of low price, durability, and transportability.

What is claimed is:

1. Claimed is the invention of a new system of factory and site built complete quick erect construction using either concrete or pressed wood for residential homes and small commercial buildings. The system is comprised of the following components;

- (a) Economical factory molded concrete composite road and rail transportable sectional residential buildings and small commercial buildings including floor, wall, ceiling, roof slabs, and foundation trusses roofs and floors.
- (b) The use of the following materials for the potential construction of panels, trusses, beams, studs, and footers and foundation walls, including; fiberglass strands and mats, nylon strands, sand, roofing stone size granules, pea size crushed stone, Styrofoam bead, Type M Portland cement, concrete mesh wire, concrete re-bars, nylon coated wire, re-bars, and wood splinters mechanically processed.
- (c) Slab on site construction tilt up construction method for houses and small commercial buildings and the right to restrict or deny the usage of this method for commercial use of all of the inventions pertaining to concrete or concrete composite construction contained in this non-provisional filing.
- (d) Residential and small commercial full span factory pre-cast steel reinforced concrete composite floors in new configurations as shown in FIG. 1.
- (e) Pre-cast concrete composite injection molded or molded panels for floors with (small or) large insulation spaces for imbedded Styrofoam or fiberglass installed after mold insert removal as shown in FIG. 1, items A, B, C, G through G-7, H through H-2, J and J-1, and I through I-2, also FIG. 2, items I through I-4.

- (f) Radius corner concrete composite floor panels for added strength as shown in FIG. 1, item a-1.
- (g) Double thickness concrete main beams, side beams, and ends, for high panel strength during crane lifting as shown in FIG. 1, items A-2 and C-2.
- (h) Factory installed ceramic tiles and factory stamped imitation floor tiles, molded or injection molded, or stamped, all-in-one or installed after erection construction at the time of concrete composite pouring of entire panel as shown in FIG. 1, item B-1.
- (i) Ledge floor panels for truss setting as shown in FIG. 1, item C-1.
- (j) Pre-cast concrete composite injection molded panels with concrete mesh reinforcement wire with various spacing and wire thicknesses depending on span length as shown in FIG. 1, item F-1.
- (k) Tapered triple beams for all panels, roof, floor, and ceiling, with material saving weight lightening holes as shown in FIG. 1, item C-2, extendable precast concrete beams as needed for additional weight bearing as shown in FIG. 1, item C-3.
- (l) Pre-cast concrete composite injection molded pressed or poured panels with or without pre-formed ledges for weight bearing support on roof or floor trusses as shown in FIG. 1, item F-4.
- (m) Insulated cores for pre-cast concrete composite injection molded panels filled with injected solidified in place Styrofoam, loose fill bead Styrofoam, or loose filled fiberglass, as shown in FIG. 1, items g-1 and H-1.
- (n) Residential or small commercial stem wall and foundation concrete composite flooring panels as shown in FIG. 2, items A, C, B-2, and B-3.
- (o) Semi trucked full length floor panels for use with or without floor trusses, factory pre-cast concrete composite for houses and small commercial buildings and the combination of end-to-end extensions past 48 ft. long plus in additional sections for large custom homes as shown in FIG. 2, items A-1 and C-3.
- (p) Factory pre-cast concrete composite footers as shown in FIG. 2, items b-1, b-4, B-3, B-5, B-6, B-9, D-4, G, G-1, and G-2.
- (q) Lightening holes in concrete footers as shown in FIG. 2, item B-1.
- (r) Concrete composite roof and floor trusses used in conjunction with factory concrete composite floor and wall sections as shown in FIG. 2, items B-2 and D-7, FIG. 3, item E, FIG. 5, item K, and FIG. 7, item A.
- (s) Combination of stem wall and flared tapered footer, poured all-in-one shown as items B-5, Styrofoam encased insulated or fiberglass insulated with one side attached panels as shown in FIG. 2, items B-3, B-5, B-6, D-6, and F.
- (t) Solid pre-cast footers, also shown in FIG. 2, item D-4, if FIG. 2 (D-4).
- (u) Hollow core insulated footer as shown FIG. 2, items B-3 and F.
- (v) Combination footer and stem wall factory pre-cast all-in-one as shown in FIG. 2, item B-5.
- (w) Round lightening holed concrete composite footers or walls with horizontal or vertical circular insulation cavities, also shown in FIG. 3, items D and E, FIG. 2, item D-2, and FIG. 4, items F, G, AND H, Also claimed is the invention of gravel beds under walls with plastic tiles for

- foundation drainage including full height basement walls as shown in FIG. 2, item B-6.
- (x) 6A limestone gravel for footer beds used in conjunction with pre-cast flared footers and pre-cast footers for easy leveling of these items as shown in FIG. 2, item B-8.
- (y) 4A or 6A Thin Crushed Limestone Footer Base, 4" Thick Racked Level
- (z) Concrete composite factory pre-cast roof panels for small commercial buildings as shown in FIG. 5, items A and K-1.
- Full length roof panels, factory pre-cast concrete composite for houses and small commercial buildings and the combination of end-to-end extensions past 48 ft. long for large custom homes as shown in FIG. 5, items A and K-1.
- (a-a) Prefabricated footer and slab method of construction as shown in FIG. 2, item D.
- (a-b) Factory pre-cast concrete composite wall sections with integrated footer as shown in FIG. 2, item D-2.
- (a-c) Factory pre-cast concrete composite insulated welded wire reinforced ceiling panels as shown in FIG. 5, items A, H through H-3, I through I-3, L, M through M-1, and K-1.
- (a-d) Center floor weight bearing footers for reduced thickness factory pre-cast paneled as shown in FIG. 2, item D-4.
- (a-e) Reduced thickness factory pre-cast panels used in the no-crawl-space construction method as shown in FIG. 2, item D-5.
- (a-f) Concrete composite stem walls as shown in FIG. 2, item F.
- (a-g) One piece factory injection molded pre-cast concrete composite walls with multiple choice interior/exterior textures as shown in FIG. 3, item A.
- (a-h) 8 ft. high and custom upscale residential 9 ft. high pre-cast factory trucked in concrete composite walls as shown in FIG. 3, item A.
- (a-i) Pre-cast single piece wall sections as shown in FIG. 3, item A.
- (a-j) Two or three story buildings of the same construction as described in this patent application.
- (a-k) Shake shingle siding constructed of all presently available materials and those materials contained in this patent application and shown in FIG. 3, item A-4.
- (a-l) A-2 claimed is the invention of all-in-one formed concrete walls with exterior and interior molded or stamped textures as shown in FIG. 3, items A-1 through A-4.
- (a-m) Concrete Styrofoam encased factory pre-cast walls as shown in FIG. 3, item C-2.
- (a-n) Rounded corner Styrofoam blocks for increased wall strength as shown in FIG. 3, C-2
- (a-o) Triple beam integrated wall strengthening and six holed panel lifting method as shown in FIG. 3, item B.
- (a-p) Wall molds, floor molds, roof panel molds, footer molds, truss molds, 4'x8' panel molds, and concrete composite shingle molds as shown in FIG. 3, item D.
- (a-q) Two story factory prefabricated concrete composite housing as shown in FIG. 3, item 3-E.
- (a-r) Pre-cast factory molded concrete, OSB, or splinter OSB, fiberglass insulated walls, floors, roofs, trusses, ceilings, foundations, and footers, as shown in FIGS. 1 through 6, and FIG. 8.
- (a-s) 4' by 8' or 9' panels in various interior/exterior textures as shown in FIG. 4, item f-1, and items A, B, C, and D.
- (a-t) Factory molded pre-cast one sided walls used in conjunction with various interior or exterior concrete composite 4' by 8' or 9' panels for the other side as shown in FIG. 4, items F and G.
- (a-u) Double sided 4' by 8' or 9' panel walls used in conjunction with concrete, wood, composite OSB, or metal, wall studs as shown in FIG. 4, item H.
- (a-v) Separate pre-cast factory built walls and footer with no flares as shown in FIG. 4, items J and I.
- (a-w) Factory pre-cast concrete roof panels with truss setting ledges as shown in FIG. 5, items H, L, and.
- (a-x) Factory concrete composite pre-cast panels molded or stamped with or without textured roofing material imitations as shown in FIG. 5, item b.
- (a-y) Exterior waterproofing sealed concrete composite roof panels and factory or on-site applied sprays as described in FIG. 5, items B, D, and G.
- (a-z) Integrated pre-cast strengthening studs concrete composite all-in-one injection molded or molded strength improving and panel lightening and insulation accommodating building panels as shown in this patent, FIG. 5, item C-1.
- (b-a) Large sectional pre-cast concrete composite shingle sections and staggered interlock overlapping, 1'x4', 2'x4', and 4'x4', rapid install sections as shown in FIG. 5, item D.
- (b-b) Asphalt shingle sections and staggered interlock overlapping, double layered main body, 1'x4', 2'x4', and 4'x4', all-in-one factory pre-assembled rapid install sections as shown in FIG. 5, item D-1.
- (b-c) Individual piece splicing method of joining sections of factory asphalt and concrete composite roofing panels as shown by shingles marked with the letter P in FIG. 5, item E.
- (b-d) Rolls of asphalt roof caps, 12" to 18" wide, as shown in this patent, FIG. 5, item F.
- (b-e) Concrete composite shingles in various configurations including standard three tab shingles, with various textures such as; rustic dimensional, cedar shake, slate, etc., also the conception of two to four through six tab shingles as shown in FIG. 5, item G.
- (b-f) Lightened weight and thickness ceiling panels for ceiling applications as shown in FIG. 5, items H, K-2, and K-3.
- (b-g) Cavity molded fiberglass insulation or pre-cast in place Styrofoam block insulation cavities poured or injection molded all-in-one ceiling panels as shown in FIG. 5, item L-1.
- (b-h) Factory pre-cast ceiling or roof panels molded in place with embedded Styrofoam or fiberglass insulation as shown in FIG. 5, items H, I, L, M, and W, and FIG. 1, items J and J-1.
- (b-i) Interlocking shingles in rolled form as described FIG. 5, item D-1, and roll sizes from 1' to 25' wide and lengths of up to 500' as shown in FIG. 5, item J.
- (b-j) Concrete composite vaulted ceiling trusses as shown in FIG. 13, items A, B, and C.
- (b-k) 9 ft. 0 truss spacing used in conjunction with the new concrete composite construction system as an economical improvement to 24 inch spacing as shown in FIG. 5, item K-1.

- (b-l) Pre-cast concrete composite injection molded panels for ceiling applications, upward mounted installation as shown in FIG. 5, item K-2.
- (b-m) Pre-cast concrete composite injection molded panels for ceiling applications, downward mounted as shown in FIG. 5, item K-3.
- (b-n) Pre-cast concrete composite injection molded panels for roof installation as shown in FIG. 5, items A, B, C, L, and M, and shown installed in FIG. 5, item K-1.
- (b-o) Pre-cast concrete composite injection molded panels for ceiling applications and also the concept of lightened weight and thickness ceiling panels for ceiling applications as shown in FIG. 5, item H.
- (b-p) Factory pre-cast all-in-one roof panels as shown in FIG. 5, items A, C, H, I, L, M, U, and V.
- (b-q) Cavity molded fiberglass insulation or pre-cast in place Styrofoam block insulation cavities poured or injection molded all-in-one roof panels as shown in FIG. 5, item G.
- (b-r) Circular core roof or ceiling panels with insulated core, loose fill or expanded polystyrene molded in place wet as shown in FIG. 5, item M.
- (b-s) Concrete composite shingles with fiberglass core, mat, or strand, construction, 300 to 600 lbs. per sq. ft. as shown in FIG. 5, item N.
- (b-t) Pre-cast pre-molded concrete composite shingle nail holes in the same configuration as presently used in shingle nailing patterns as shown in FIG. 5, item N-1.
- (b-u) Asphalt seal down strips used in conjunction with concrete composite shingles as shown in FIG. 5, item N-2.
- (b-v) Interlocking single piece shingles as shown in FIG. 5, item P, used in conjunction with asphalt or concrete interlocking shingle panels as shown in FIG. 5, items B and E.
- (b-w) Pre-bent asphalt or concrete composite ready made shingle caps as shown in FIG. 5, item Q.
- (b-x) Ready made half shingles for drip edge roof completions in concrete composite and asphalt as shown FIG. 5, item R.
- (b-y) Concrete composite deep piling residential and small commercial buildings for land slide and hurricane erosion resistance construction method as shown in FIG. 6.
- (b-z) Reducing insurance cost resulting from loses incurred when land slides cause houses to become demolished as shown in FIG. 6.
- (c-a) Concrete and concrete composite structural building components including beams, floor, ceiling, and roof, trusses and joists, and structural studs, with or without the addition of Styrofoam beads, air injection, and volcanic pumice as shown in FIG. 7.
- (c-b) Concrete molded reinforced I-beam and non I-beam versions of floor, ceiling, and roof trusses and joists, and structural studs as shown in FIG. 7.
- (c-c) Wiring and plumbing material molded lightening holes, with round holes the size of up to one third the material volume for the purpose of material saving and weight reduction as shown in FIG. 7.
- (c-d) Concrete commercial and residential I-beams, studs, floor, ceiling, and roof trusses and joists, as shown in FIG. 7.
- (c-e) Nylon coated cross checked steel reinforcement wire for concrete small and large construction members as shown in FIG. 7, items D and I.
- (c-f) Thin walled, 1" to 12" thick, volcanic pumice high strength concrete mixtures containing all sizes of crushed lime stones (4A to 22A), fiberglass reinforcing fibers, sand, Type M cement, Styrofoam bead and blocks, and the usage of lightweight reinforcing wires or nylon cables as described in the Provisional Patent Application 61/148,135, FIG. 1 items K, L, and m.
- (c-g) Ultra wide concrete composite trusses, 4-36", as shown in FIG. 8, items j and n, FIG. 5, item k, and FIG. 2, items b-2,d-6, e, and f.
- (c-h) Ultra wide wood composite trusses, 4-36", as shown in FIG. 8, items j and n, FIG. 5, item k, and FIG. 2, items b-2,d-6, e, and f.
- (c-i) The usage of these volcanic pumice and concrete mixtures in residential and commercial construction.
- (c-j) The usage of composite volcanic pumice concrete mixtures in all products listed in the previous Provisional Patent Application 61/218,595 Concrete Composite Fencing Systems and the previous Provisional Patent Application 61/481,135 FIGS. 1, 2, and 3, and products in this Original Provisional Patent Application 61/157,328, All Figures.
- (c-k) The usage of volcanic pumice mixtures to produce light weight concrete.
- (c-l) The usage of composite volcanic pumice mixtures as an insulated concrete material.
- (c-m) The usage of composite volcanic pumice mixtures is the construction of residential and commercial buildings.
- (c-n) Concrete wedge block fastener, single precast molded with the wall or double sided insertable block for insert connecting together vertical concrete walls as shown in FIG. 2, item d-7. 45 degree angle wall and foundation section ends connection method as shown in FIG. 2, d-8. Bolt holes 45 degree angled for high strength connection at corner with molded recessed counter sinks at both ends, also used with new fasteners shown in FIG. 3, items F, I, and H.
- (c-o) The usage of roof sections, FIG. 5, item a, with rolled roofing products shown in FIG. 18, items p, a, and n. Also, described and shown in FIGS. 3, 4, and 5, the non-provisional patent filing Ser. No. 12/633,049.
- (c-p) Panel lifting and mold breaking fasteners shown in FIG. 1, item A-6. Also, barrel type fasteners shown in FIG. 1, items A-8, C-6, D-1, and F-1. Also, main column and beam fasteners as shown in FIG. 1, A-5.
- (c-q) Material saving and weight reduction holes, also used for plumbing and electrical access, shown in FIG. 1, item C-2, also FIG. 2, item H, and FIG. 5, item C-2.
- (c-r) Tongue and groove panel seams with sealant in bottom shown in FIG. 1, item C-4.
- (c-s) Built-in span lengthener beam for floor and ceiling panels as shown in FIG. 1, item G-6, FIG. 2, items J-1 and L-1, and FIG. 5, items H-1, I-1, and V.
- (c-t) Ledge strengthening galvanized reinforcing wire as shown in FIG. 1, item G-5.
- (c-u) Fastener attached panel insulation cover and firewall for more combustible main panel, drywall or cast concrete as shown in FIG. 1, item G3, also shown in FIG. 4, items F-1 and H-1.
- (c-v) Bolt together panels as shown in FIG. 1, items G-4 and C-5, also show in FIG. 2, items J-1 and L-1, and FIG. 5, items H-1 and I-1.

- (c-w) Complete panel insulating aggregate mixtures including vermiculite, pumice, and/or Styrofoam beads or small peanuts as shown in FIG. 1, items J, J-1, and J-2.
 - (c-x) Panel and I-Beam Flooring System as described in FIG. 2, items I and A-3.
 - (c-y) Poured or pressed building walls with built-up truss weight bearing members as shown in FIG. 3, items A, B, and C, and FIG. 1, item A-5, and FIG. 4, items E and F.
 - (c-z) Foundation wall or structural wall weight spreading reinforcement angular and vertical beam and molded-in footer plate as shown in FIG. 3, items F-3, F-4, and F-5.
 - (b-a) Plumbing and electrical installation using insulation impressing for pre-poured walls with mold faced pre-mounted boxes and Styrofoam blocks for wiring and plumbing through the wall edge termination as described in FIG. 3, items A-5 through A-9.
 - (b-b) New fasteners, greased or oiled, coarse ACME thread, hot metal, nylon, or high strength concrete encased reinforced rebar as shown in FIG. 3, items F-1, F-3, I, I-1, G, H, J, J-1, K, and L.
 - (b-c) Textured Interior/Exterior Panels, poured or stamped masonry or pressed OSB, 2'x8' and 4'x4', as shown in FIG. 4, items D and A-2.
 - (b-d) Pre-drilled or molded panel edge fastener attachment holes and/or 16" or 24" O.C. vertical stud attachment holes for all size building material panel sheet goods an example is shown in FIG. 4, items D-1 and A-4.
 - (b-e) Tongue and Groove and Weather Seal Angling Tongue and Groove Siding Building Panels including raised textured masonry and pressed OSB as shown in FIG. 4, item F-1.
 - (b-f) Seam hiding matching pattern textures individual concrete composite or OSB pieces as shown in FIG. 4, items A-4 and A-6, also shown in FIG. 5, item P.
 - (b-g) Interlocking Siding Panels OSB or Concrete Composite as shown in FIG. 4, item A-7.
 - (b-h) Molded Wall Panels with studs and weight bearing column molded in as shown in FIG. 4, item f.
 - (b-i) Molded Panels with studs and exterior molded raised finishes compatible with pre-drilled panels as shown in FIG. 4, items G-1 through G-4.
 - (b-j) Molded Dimensional Lumber or Conventional Lumber used in conjunction with exterior and interior masonry textured panels as shown in FIG. 4, item H-2.
 - (b-k) Concrete Main I-Beam with connecting fasteners used in conjunction with building trusses and for lateral truss racking strength as shown in FIG. 5, item K-5.
 - (b-l) Trusses with material saving weight reduction holes and I-Beam strength wrapping as shown in FIG. 5, item K.
 - (b-m) I-Beam or Solid Beam with top side angle panel ledges molded in and pre-drilled fastener holes for roof panels as shown in FIG. 5, items K-4 and O-1.
 - (b-n) Concrete or OSB Composite Fastener Connection Methods for Panel to Beam, Truss to Wall Panel, Truss to Beam, Truss to Roof Panel, Beam to Roof Panel, and Wall Panel to Roof Panel, as shown in FIG. 5, items C-7, K-5, K-7, 5-1, S-2, and O-1.
 - (b-o) Beam to Roof Panel Connection Method as shown in FIG. 5, items S-3 and O.
 - (b-p) Panel Truss Panel through Pinned Connection Method as shown in FIG. 5, items M-2 and M-3.
 - (b-q) Multiple Ganged Two Sided Molds and Wire Spools as shown in FIG. 12, items D-5, D-6, and D-7.
 - (b-r) Multiple Mold Gang Fastener Bars as shown in FIG. 5, item D-8.
 - (b-s) Wall Panel Lifting Methods as shown in FIG. 12, item D-4, and G-6.
 - (b-t) Single Wide and Double Wide Concrete or OSB Composite Mobil Homes including Low Pitched Single Wide Roofs as shown in FIG. 13, items A through E.
 - (b-u) Split Structural I-Beam made of Concrete or OSB Composite as shown in FIG. 13, items A-4 and B-1.
 - (b-v) Back Hoe attachment for Chain Saw as shown in FIG. 19, items A and B.
2. Claimed is the invention of stick built pressed OSB wood or concrete system of associated store shelf available individual structural building products and prefabricated shed system and concrete composite furniture, cabinets, windows, and doors. These systems of products are comprised of the following:
- (a) The use of the following materials for the potential construction of panels, trusses, beams, studs, and footers and foundation walls, including; fiberglass strands and mats, nylon strands, sand, roofing stone size granules, pea size crushed stone, Styrofoam bead, Type M Portland cement, concrete mesh wire, nylon coated wire, re-bars, and wood splinters mechanically processed.
 - (b) Three new types of composite materials and methods for the construction of new five piece quick construct sheds and containers including paletted permanent concrete storage containers as shown in FIG. 9, item b.
 - (c) Three new types of composites for one piece sheds and containers and the concept of paletted sheds, concrete and wooden composites as shown in FIG. 9, item e.
 - (d) Three new types of composite sheds and outdoor garden containers in various sizes and siding and roof finishes as shown in FIGS. 9 and 10.
 - (e) Pre-cast injection molded sheds and the new methods of producing the same, 3-piece poured composite concrete sheds consisting of 2 poured composite opening door pieces and 1 main poured pre-cast concrete composite piece, various lengths, widths, and heights, having various siding textures as described in FIG. 9, items a, c, d, and e, also described in FIG. 10, items a, b, c, d, e, f, g, and h.
 - (f) New business methods including sales, rental, and container content security, regarding the new sheds and containers described in FIG. 9 including stackable retail/wholesale, rail, road, and ocean cargo,
 - (g) Franchising, the construction, transportation systems, and components, including movement by rail, road, and ocean cargo, as described in FIG. 9.
 - (h) Decoratively attractive multi-purpose residential and commercial sheds capable of long term usage in a residential setting without foundation construction as shown in FIG. 9.
 - (i) Heavy construction sheds that have improved resistance of becoming airborne during high wind situations such as hurricanes and tornados as described in FIG. 9.
 - (j) The usage of the new sheds and containers for the purpose of transportation of household goods, retail and wholesale products in conjunction with storage and shipping and in each situation described in FIGS. 5 through 11 in the provisional patent application 61/148,135

- (k) Fiberglass Nylon and/or Plastic Sheets, Strips, or Strands for Exterior or Interior Reinforcement in these and other Products Listed in this Patent.
 - (l) A new usage for recycled fiberglass building insulation as a material additive to concrete composite building materials described herein.
 - (m) New or Recycled Fiberglass Strands, thick and thin, long or short, as an additive material for manufacturing Trusses, Floor Joist, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft.×8 ft.
 - (n) Plain sided storage containers for commercial and industrial use as shown in FIG. 10, item a.
 - (o) Decorative recessed and raised embossed pre-cast concrete shed sides and various siding, roofing, and door, design treatments as shown in FIG. 10, item b.
 - (p) Pitched roof residential esthetically pleasing sheds as shown in FIG. 10.
 - (q) Pre-cast concrete composite shed trusses as shown in FIG. 10, item c.
 - (r) Quick construct sheds and containers, three, five, and six piece as described in FIG. 10.
 - (s) Skid fork lift slots, double directional shown in FIG. 10, item e.
 - (t) Honeycomb or solid top surface plastic or cast concrete for strength and light weight and the use of concrete composites and steel in skid construction shown in FIG. 10, item f.
 - (u) Forklift holes through palette, two on each of four sides, in conjunction with honeycomb or solid palette skids shown in FIG. 10, item g.
 - (v) Honeycomb type plastic or cast concrete webbing for strength and light weight shown in FIG. 10, item h.
 - (w) Three new types of composite materials and new usages and methods for the construction of residential furnishings, including bedroom and dining room, and patio furnishings and small outdoor patio sheds, and commercial applications, as shown in FIG. 10.
 - (x) Three new types of composite materials and new usages and methods for the construction of residential cabinets and countertops for kitchens, bathrooms, utility rooms, garages, and commercial applications, as shown in FIG. 10.
 - (y) Three new types of composite materials and new usages and methods for the construction of garage doors, sliding doors, and French doors, as shown in FIG. 10.
 - (z) Three new types of composite materials and new usages and methods for the construction of interior and exterior doors of all types, residential and commercial applications, as described in FIG. 10.
 - (a-a) Three new types of composite materials and new usages and methods for the construction of interior and exterior window casements and frames of all types, residential and commercial applications, as described in FIG. 10.
 - (a-b) Pre-cast injection molded sheds and 3-piece poured composite concrete sheds consisting of two poured composite opening door pieces and one main poured pre-cast concrete composite piece, various lengths, widths, and heights, having various siding textures as described in FIG. 10, items a, b, c, d, e, f, g, and h, also shown in FIG. 9, items a, c, d, and e.
 - (a-c) All-in-One pre-cast composite construction panels molding all at once structural members, finished surfaces, and insulation considerations as shown in FIG. 4, items a, b, c, and d.
 - (a-d) Styrofoam beads mixed, injected, or expanded in place, in concrete and composites as an insulating material and as a weakening material to allow nail penetration as shown in FIG. 4, item f-1.
 - (a-e) The use of wood splinters in concrete composites as a method of insulation and nail penetration.
 - (a-f) Fiberglass Nylon and/or Plastic Sheets, Strips, or Strands for Exterior or Interior Reinforcement in these and other Products Listed in this Patent Application.
 - (a-g) A new usage for recycled fiberglass building insulation as a material additive to concrete composite building materials described herein.
3. Claimed is the invention of systems associated construction erection and transportation equipment and materials procurement equipment. These systems are comprised of the following:
- (a) Portland Cement Type M Composite Building Structural Materials of all dimensions large and small, as described in the various claims contained in this application, for manufacturing Trusses, Pitched and Flat, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft.×8 ft., as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and o.
 - (b) Improved Organized Strand Board with thick or fine Fiberglass Strands with or without Epoxies and Resins as additive materials for manufacturing Building Structural Materials of all dimensions large and small; Trusses, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft.×8 ft., as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and o.
 - (c) Combined Composition of Improved Organized Strand Board and Portland Cement Type M for manufacturing Trusses, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft.×8 ft., as referred to in FIG. 8, items a and o.
 - (d) Material lightened beams allowing reduced material component sizes and resulting in increased load capacities resulting in the decreased cost of construction as described in FIG. 8, item a.
 - (e) Material lightening molded or pre-drilled access holes for plumbing and electrical as shown in FIG. 8, item a-1.
 - (f) Material savings and lightening pre-cast structural beams, solid boards, and trusses, as shown in FIG. 8, item a.
 - (g) Three new material types of composite construction beams, thin type with lightening holes and reinforcing cables as shown in FIG. 8, items b and c.
 - (h) Three new material types of composite boards, thin type with lightening holes and reinforcing cables as shown in FIG. 8, item d.

- (i) Three new material types of composite boards, thin type without reinforcing cables or lightening holes as shown in FIG. 8, item e.
- (j) Three new material types of composite beams, thick type with lightening holes and reinforcing cables as shown in FIG. 8, items f and g.
- (k) Three new material types of composite boards, thick type with lightening holes and reinforcing cables as shown in FIG. 8, item h.
- (l) Three new material types of composite boards, thick type without reinforcing cables or lightening holes as shown in FIG. 8, item i.
- (m) Three new material types of composite trusses, think or thick type with or without lightening holes, reinforcing cables, and beam construction as shown in FIG. 8, item j.
- (n) Enlarged composite material joint areas as shown in FIG. 8, items j, o, and n.
- (o) Three types of composite material 4'x8' sheetsx1" to 1.5" thick with improved glue and water resistance, also exterior sprayed with sealant in the all wood construction with or without reinforcing cables or imbedded straps as described in FIG. 8, item k.
- (p) Small size reinforcing cables for residential construction, all concrete composite products as shown in FIG. 8, item l.
- (q) Coated small size reinforcing cables for residential and commercial construction, and all products shown in FIG. 8.
- (r) Cross checked metal wire reinforcement cables, small size for residential use as described in FIG. 8, items l and m.
- (s) Cross checked nylon coated metal wire reinforcement cables, small size for residential use as described for FIG. 8, items l and m.
- (t) Cross checked solid nylon reinforcement cables, small size for residential use as described for FIG. 8, items l and m.
- (u) Composite floor and beam trusses, small and large size for residential, light commercial and large commercial as described for FIG. 8, item n.
- (v) Strength increasing radius and blend areas for composite trusses as shown in FIG. 8, item o.
- (w) Three new types of building materials. The first one being comprised of a special type of concrete comprised of 12 to 22A size crushed limestone, type M Portland cement, sand. The second one being an improved OSB compressed molded product containing epoxies and resins with or without coating as described in this claim section. The third product being a combination of the concrete mixture described above and wood splinters, chips, or shavings, used with or without 12-22A crushed limestone and sand.
- (x) Exterior Coated Improved Pressed Composite Oriented Strand Board (OSB) Combined Concrete Composite Structural Building Products and the combination of the two materials to form a third structural building material product for manufacturing Band Boards, Wood Beams, Exterior Coated from materials described in this document, 1.5" or 3" Wide for Sill Plates or Elevated Housing Main Beams where lumber is exposed to the outside elements, sizes 3'x8', 10', and 12', or in an untreated form for Enclosed Basement Main Beams and Floor Joists as described in the drawing descriptions and specifications and the drawings page as FIG. 8, items a through o.
- (y) Improved Organized Strand Board through the use of exterior plywood glues or the use of polyurethane, epoxies, and resins for better moisture resistance as described in the drawing descriptions and specifications and the drawings page FIG. 8, item k.
- (z) Organized Strand Board Trusses as described in the drawing descriptions and specifications and the drawings page FIG. 8, items n, j, and o.
- (a-a) Manufactured ready-to-use pre-coated new composite material building products, moisture, weather, and aging resistant compounds composed of urethane/polyurethane, latex paints, plastics, or recycled plastics, sprayed on to the exterior of composite building products, sheds as shown in FIG. 9, items b and e, and Exterior Doors and Windows as shown in letters l, k, and m, in FIG. 10, as shown as exterior coating products in my provisional patent application No. 61/120,582, containing the following ingredients, singularly or in combination; plastics, urethane, asphalt emulsifications, paint, latex or oil, epoxies and resins, fiberglass, new or recycled, for the composite building products describe herein and for general use in other store shelf products as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and o.
- (a-b) Improved composite OSB product 4'x8' sheet goods, letter k in the drawing descriptions, finished floor grade strand board with epoxy, PVC, plastic, or urethane coated or impregnated and/or improved exterior grade glues for moisture and swelling resistance, either a coating on the wood or impregnated into the wood fiber structure. Also, increased or decreased rates of wood compression as needed to produce the new product in increased thicknesses such as 7/8" to 1 1/4" in order to comply with the span requirement of 24" on center spacing as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and o.
- (a-c) Oriented Strand Board (OSB) Solid Floor Joyce containing Standard Rectangular Filled Form Compressed Lumber made from Concrete Composites, or Organized Strand Board, or a Combination of the two with any of the strengthening materials listed in this document as described in the drawing descriptions and specifications and the drawings page FIG. 8, items d, e, h, and i.
- (a-d) Claimed is the invention of the OSB, Concrete Composition, and Combination of the two materials as a Building Material for Truss Type Main Beam as described in the drawing descriptions and specifications and the drawings page FIG. 8, item n.
- (a-e) I-Beam Shaped OSB Floor Joist, Studs, Top and Bottom Plates, and Building Trusses as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, f, g, j, n, and o.
- (a-f) Concrete Composite Residential Building Materials as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and n.
- (a-g) Enlarged Joint Areas at Truss Intersections as described in the drawing descriptions and specifications and the drawings page FIG. 8, items n, j, and o.

- (a-h) Tapering and Radiuses Involved in Molded Building Materials as described in the drawing descriptions and specifications and the drawings page FIG. 8, item o.
- (a-i) OSB, Concrete Composite, and Combination of the two, in Wall Studs, Sill Plates, Top Plates, Band Boards, Floor Joists, Roof Trusses, Floor Trusses, and Sheet Goods, as described in FIG. 8, items a through i.
- (a-j) Cross Checked Metal Wire as a Reinforcement Material. The term cross checked refers to a raised or indented pattern similar to present concrete construction reinforcement bars capable of strengthening the tear out resistance of the wire in the event of exceeded maximum loads of the total manufactured building product, as described in the drawing descriptions and specifications and drawings page FIG. 8, items l and n, also used in the construction of products described in FIGS. 8 through 10, and all residential and commercial structural building products and furniture.
- (a-k) Portland Cement Type M Composite with thick or fine Fiberglass Strands as additive materials for manufacturing Trusses, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft. x 8 ft., as referred to in FIG. 8, items a, b, c, d, e, f, g, h, i, j, k, l, m, n, and o.
- (a-l) Improved Organized Strand Board with Imbedded Fiberglass Thick or Fine Strands with or without Epoxies and Resins as additive materials for manufacturing Trusses, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft. x 8 ft., as referred to in FIG. 8, items a through o.
- (a-m) Concrete beam lightening as shown as FIG. 8, item k, also shown in FIG. 8, items b, c, d, f, g, and h.
- (a-n) Molded pressed OSB 2"x4" studs as shown in FIG. 8, items b through i, joist, beam, and truss, lightening.
- (a-o) Nylon Coated Cross Checked Metal Wire as a Lumber Product Reinforcement Material, the term cross checked refers to a raised or indented pattern similar to present concrete re-bars capable of strengthening the tear out resistance of the wire in the event of exceeded maximum loads of the total manufactured building product as described drawing descriptions and specifications and the drawings page FIG. 8 as the interior circle portion of letters m, l, and n.
- (a-p) Multiple Strand Twist Metal Cable with Nylon Cross Checked Coating as lumber product reinforcement material for the use in products as described in drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, f, g, h, j, n, and o, and shown specifically as letters l and m.
- (a-q) Radius truss intersections, and no fasteners required molded or pressed truss intersections as shown in FIG. 8, item o.
- (a-r) Two and three story multi-family molded, pressed, and poured, construction methods for residential and commercial business and motel fire resistant and improved hurricane and tornado resistant economical construction buildings through non-flammable concrete building materials invention.
- (a-s) Increased weight and strength frame type building materials resulting in hurricane and tornado force wind destruction threshold increases related to these products due to increased weight and strength improvements.
- (a-t) Shredded recycled fiberglass as a material additive to concrete composite building materials described herein and the usage of the same for the purpose of a construction material additives for three new types of building materials described herein. These new recyclable material sources will include; boat hulls, tub and shower enclosures, spas, gasoline storage tanks, roofing shingle cores, and all other waste stream fiberglass products.
- (a-u) The use of the following materials for potential construction will include fiberglass strands, nylon strands, sand, roofing stone size granules, pea size crushed stone, wood splinters mechanically processed.
- (a-v) The use of Fiberglass Nylon and/or Plastic Sheets, Strips, or Strands for Exterior or Interior Reinforcement in these and other Products Listed in this Patent Application.
- (a-w) A new usage for recycled fiberglass building insulation as a material additive to concrete composite building materials described herein.
- (a-x) Portland Cement Type M Composite Building Structural Materials of all dimensions large and small, as described in the various claims contained in this application, for manufacturing Trusses (Pitched and Flat), Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft. x 8 ft., as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and o.
- (a-y) Improved Organized Strand Board with thick or fine Fiberglass Strands with or without Epoxies and Resins as additive materials for manufacturing Building Structural Materials of all dimensions large and small; Trusses, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft. x 8 ft., as described in the drawing descriptions and specifications and the drawings page FIG. 8, items b, c, d, e, f, g, h, i, j, k, and o.
- (a-z) Combined Composition of Improved Organized Strand Board and Portland Cement Type M for manufacturing Trusses, Floor Joists, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft. x 8 ft., as referred to in FIG. 8, items a and o.
- (b-a) Combined Composition of Improved Organized Strand Board and Portland Cement Type M with thick or fine Fiberglass Strands as additive materials for manufacturing Trusses, Floor Joist, I-Beams, Beams, Dimensional Floor Joists, Dimensional Main Beams, Dimensional Joist Bands, Dimensional Wall Studs, Sill Plates, Top Plates, Sheet Goods 4 ft. x 8 ft. as described for FIG. 8.
- (b-b) Telescoping Gantry Crane as shown in FIG. 11.
- (b-c) Vertical Extending Telescoping Gantry Crane as shown in FIG. 11.
- (b-d) Horizontally Extending Telescoping Gantry Crane as shown in FIG. 11.
- (b-e) Adjustable Angle Gantry Crane Boom as shown in FIG. 11.

- (b-f) Semi Trailer attached Gantry Crane as shown in FIG. 11.
- (b-g) Vehicle Mounted Gantry Crane as shown in FIG. 11.
- (b-h) Double Braced Construction Gantry Crane as described in FIG. 11, item o.
- (b-i) Power Cylinder Controlled Vertically Extending Telescoping Gantry Crane as shown in FIG. 11.
- (b-j) Straight Square and the 'T' Shaped Crane Boom Counter Weights as shown in FIG. 11.
- (b-k) Tethered Control Panel Gantry Crane as shown in FIG. 11.
- (b-l) 10' to 50' Extending Hydraulically Operated Equipment and Crane Stabilizer Pad and Frame Assembly as shown in FIG. 11.
- (b-m) Hydraulic Crane Stabilizer Base Swing Arm with an Exterior Rectangular Square Tube Covering and an Internal Hydraulic Power Cylinder for Automatic Operation as shown in FIG. 11.
- (b-n) Four Section Swing-Out Folding to Close Position Ground Pad Equipment Stabilizer Frame and Assembly for Cranes and Equipment, hydraulically or manually operated as shown in FIG. 11.
- (b-o) Multiple Ganged Concrete Structure Building Forms, built-up attached to form cubes for efficient pouring and transportation as shown in FIG. 12.
- (b-p) Front End, Rear End, Top, and Bottom, Mold Plates for use in Multiple Cavity Concrete Molds, in Full Width or Partial Width depending on Number of Cavities Poured, Multiple Ganged Concrete Structure Building Forms, built-up and attached together to form cubes for efficient pouring and transportation, 2 to 100 cavity width for factory use and semi trailer as shown in FIG. 12.
- (b-q) Non-Epicore Concrete Slab Transporting by Semi Trailer as shown in FIG. 12.
- (b-r) Poured on a Semi Trailer Concrete Components and shorter distance concrete ready mix plant to site delivery for reduced transportation and labor cost as shown in FIG. 12.
- (b-s) Custom Vaulted Ceiling Concrete Component Housing System as shown in FIG. 13.
- (b-t) Modular Semi Trailer Delivery of Concrete Component Housing Systems as shown in FIG. 13.
- (b-u) Footer attached Modular Concrete Component Housing System as shown in FIG. 13.
- (b-v) Slab attached Modular Concrete Component Housing System as shown in FIG. 13.
- (b-w) Non-Truss Attic Cross Bracing for Modular Concrete Component Housing Systems as shown in FIG. 13.
- (b-x) Semi Trailer and Railroad Flatbed Car Frame Mounted Self Loading/Unloading Telescoping Gantry Crane as shown in FIG. 14.
- (b-y) Semi Trailer and Railroad Flatbed Car End Mounted Self Loading/Unloading Gantry Crane as shown in FIG. 14.
- (b-z) Detachable Telescoping Gantry Crane for Both Semi Trailers and Railroad Cars as shown in FIG. 14.
- (b-a) Hitch Extensions to Facilitate the Installation of these Cranes on Existing Rail Cars and Semi Trailers as shown in FIG. 14.
- (b-b) The usage of these Cranes on New Rail and Semi Flatbed Trailers as shown in FIG. 14.
- (b-c) Truck Mounted Gantry Crane as shown in FIG. 15.
- (b-d) Full Cargo Load Carrying Truck Mounted Gantry Crane as shown in FIG. 15.
- (b-e) Rear Sliding Telescoping Crane Boom 'T' and Square Shaped Counterweights as shown in FIG. 15.
- (b-f) Rack and Gear Electric Motor Extending Cranes as shown in FIG. 15.
- (b-g) Elevated Operator Cab Tower Truck Mounted Gantry Crane as shown in FIG. 15.
- (b-h) Four Directional Braced and with Two of the Directional Braces removable for crane/truck transportation, Truck Mounted Gantry Crane with Full Load Carrying Capacity when crane is the rear retracted position as shown in FIG. 15.
- (b-i) Cargo and Crane Rest Plate as shown in FIG. 15, item u-1.
- (b-j) Semi Cab Mounted Gantry Crane as shown in FIG. 16.
- (b-k) Crane Operator and Truck Driver Combination Dual Purpose Semi Cab as shown in FIG. 16.
- (b-l) Semi Cab with Dual Operator Controls for Crane Operator and Semi Driver as shown in FIG. 16.
- (b-m) Swiveling Reversible Semi Driver/Crane Operator Seat as shown in FIG. 16.
- (b-n) Elevating Boom Angle, Telescoping Gantry Crane, 360 Degree Rotational Pivoting as shown in FIG. 16.
- (b-o) Electronic Remote Controlled Cordless Crane Operation Control Panel, Switchable Mode from Cab Operator to Remote Ground Operator, for use with all Types of Cranes as shown in FIG. 16.
- (b-p) Concrete Component Business Systems using Semi Trailers, Railroad Cars, and Overseas Shipping Containers, forming a national and international volume sales grid as shown in FIG. 17.
- (b-q) World Wide Transportation of these Molds and Products for the purpose of meeting demand in any location where it's desirable, patentable, controllable, and marketable as shown in FIG. 17.
- (b-r) Transportation of steel building forms and pre-cast concrete housing sections, horizontally and vertically stacked, by rail, semi tractor trailer, and flat container, for overseas shipping or yard storage as shown in FIG. 17.
- (b-s) 3 or 4 stage pivoting arm crane as shown in FIG. 18.
- (b-t) Rotating plate pivoting method for crane arms as shown in FIG. 18, item t.
- (b-u) Square power cylinder crane as shown in FIG. 18.
- (b-v) Multiple triple power cylinder moving sections crane as shown in FIG. 18.
- (b-w) Truck mounted multiple jointed rotating infinite position chain sawing crane with limb clamping claw and paint spraying conversion ability as shown in FIG. 19.
- (b-x) All terrain motorized vehicle mounted with one or two cranes for chain sawing and limb clamping or painting with four all terrain wheels as shown in FIG. 19, items v through v-3.
- (b-y) All terrain motorized vehicle mounted common bucket truck with bucket, arm not shown, vehicle shown in FIG. 19, item v-1.
- (b-z) All terrain motorized vehicle mounted rolled roofing difficult delivery crane as shown in FIG. 18, items a and b, and FIG. 19, item v-1.
- (c-a) All terrain motorized vehicle mounted chain saw and claw crane, single or double arm for claw operation as

shown in FIG. **19** or with less pivoting and rotational joints for economical construction.

(c-b) The usage of this crane for the purpose of harvesting trees for the production of chipped or splintered wood products for the construction of individual stick built

structural building products or molded mixtures for semi trucked quick erect sectional building components and all cellulosic products as shown in all of this patent and FIGS. **18** and **19**.

* * * * *



US005667192A

United States Patent [19]
Van Doren

[11] **Patent Number:** **5,667,192**
[45] **Date of Patent:** **Sep. 16, 1997**

[54] **CONCRETE PANEL CONSTRUCTION AND MOLD**

[75] **Inventor:** **David A. Van Doren, Hays, Kans.**

[73] **Assignee:** **Waffle-Crete International, Inc., Hays, Kans.**

[21] **Appl. No.:** **370,868**

[22] **Filed:** **Jan. 10, 1995**

Related U.S. Application Data

[63] **Continuation-in-part of Ser. No. 247,060, May 20, 1994.**

[51] **Int. Cl.⁶** **B28B 7/00**

[52] **U.S. Cl.** **249/82; 249/111; 249/155; 249/160; 249/165; 249/167; 249/168; 249/170; 249/189; 425/156**

[58] **Field of Search** **249/60, 82, 155, 249/111, 156, 160, 161, 163, 165, 167, 168, 170, 172, 189, 192; 425/156**

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Primary Examiner—Robert J. Warden

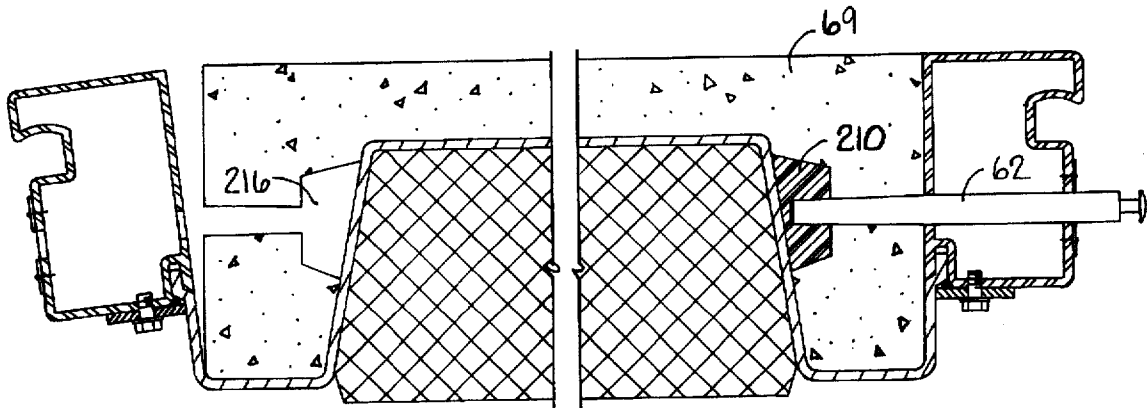
Assistant Examiner—Hien Tran

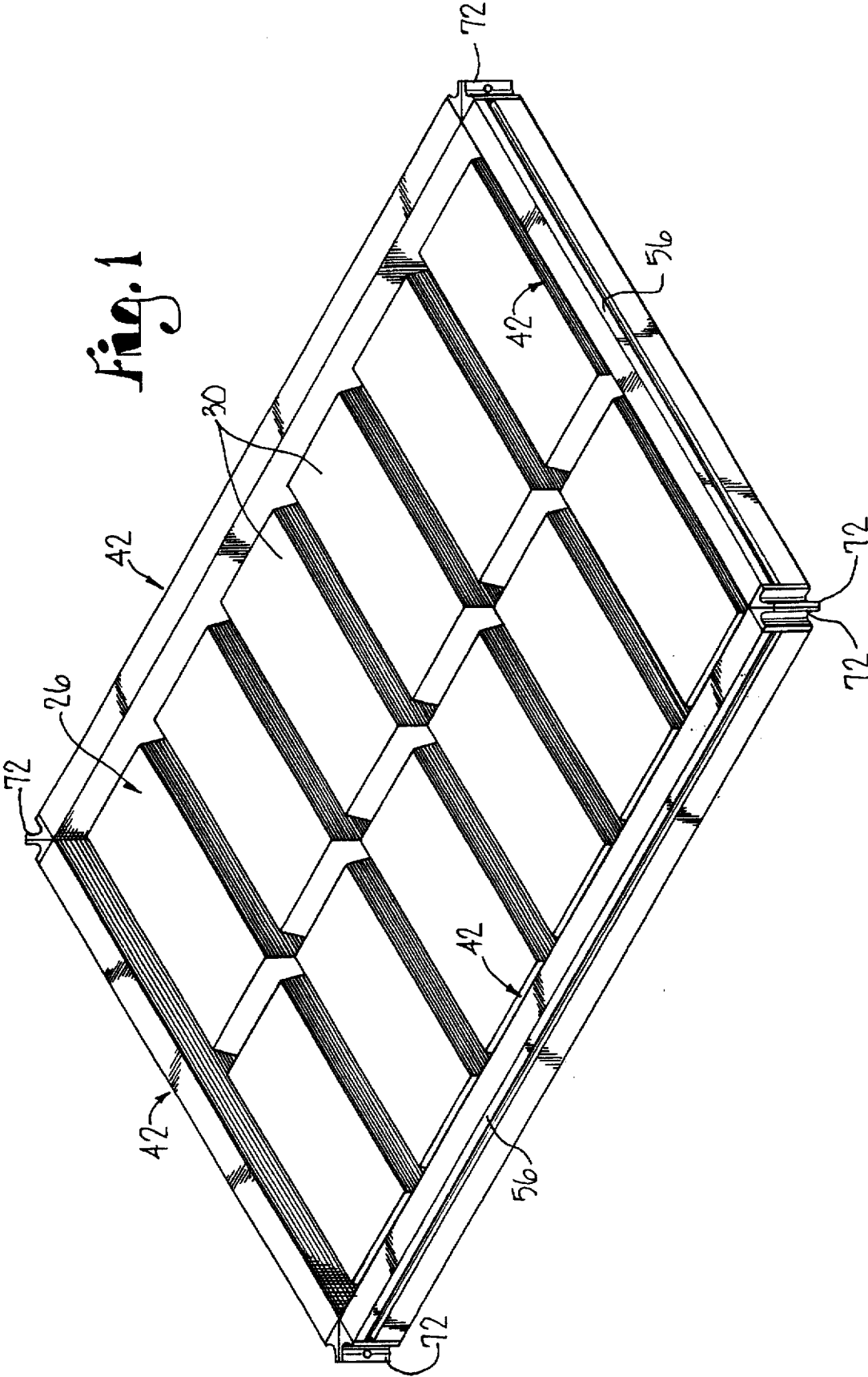
Attorney, Agent, or Firm—Chase & Yakimo

[57] **ABSTRACT**

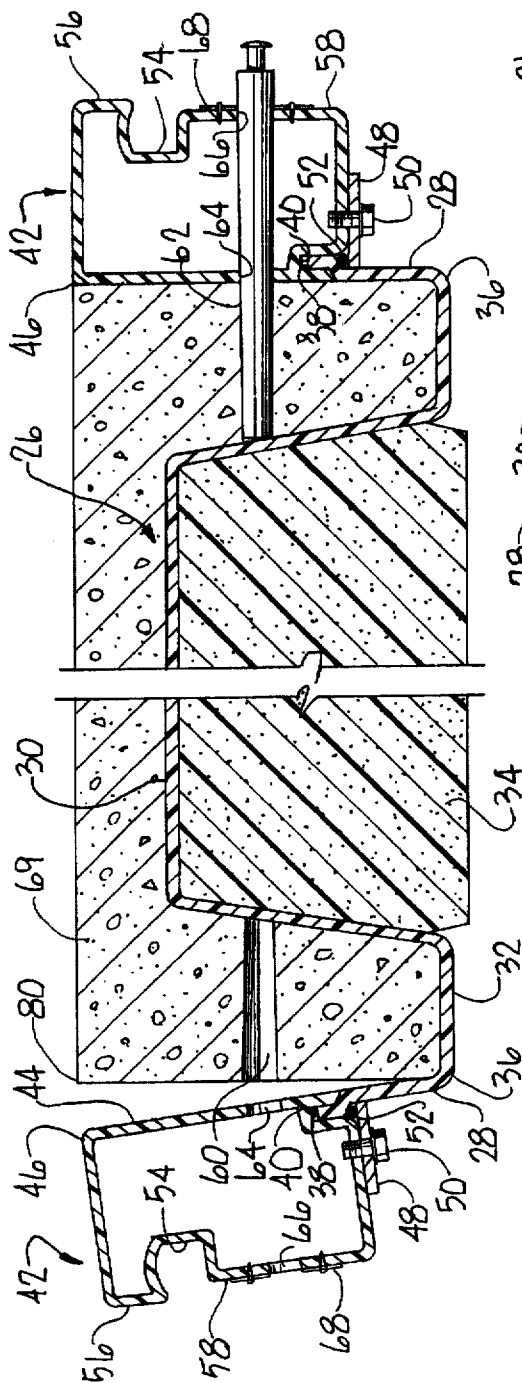
A mold especially adapted for forming precast, waffle-shaped concrete panels employs a one-piece mold body of flexible plastic sheet material to which rigid side rails are secured by tongue and groove longitudinal joints. The mold may be rapidly stripped and reset due to a hinge action provided by partial sides of the flexible body to which the rigid side rails are joined. The side rails and other structural features provide a simple mold structure that may be readily and efficiently employed for on-site production of panels. The configuration of the side rails and associated joints facilitates the replacement of a wornout mold body. A cover may be placed over the mold body while the concrete cures and automatically lifted therefrom after a predetermined time to allow the concrete to cool. Recess formers and connector covers for the panels are provided for appearance and security.

7 Claims, 10 Drawing Sheets





2.



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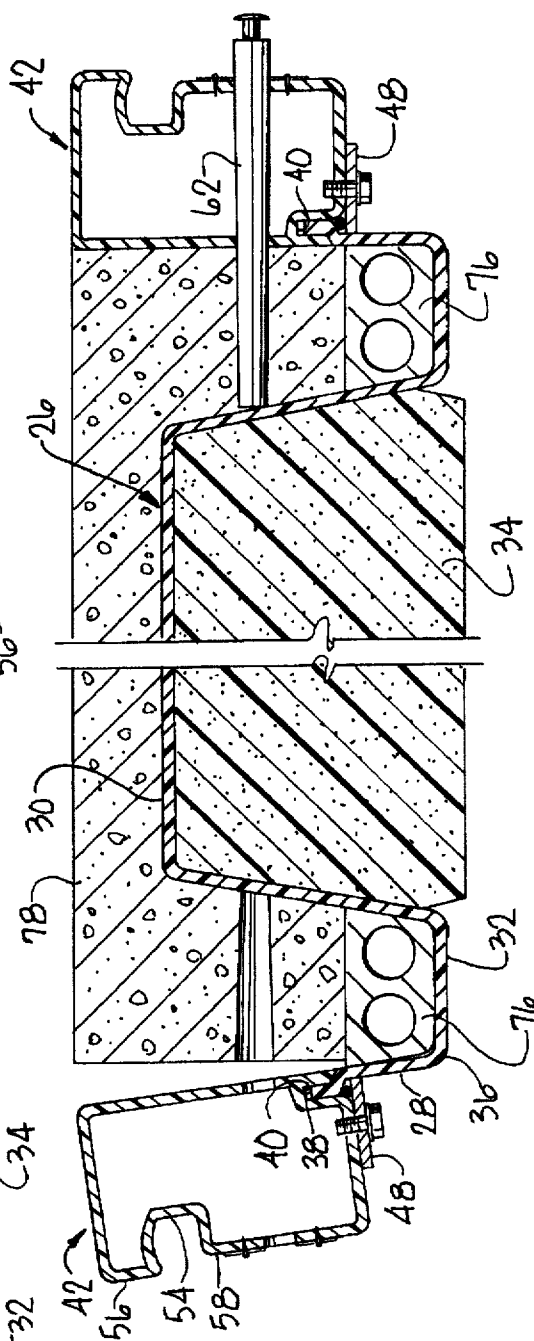


Fig. 5

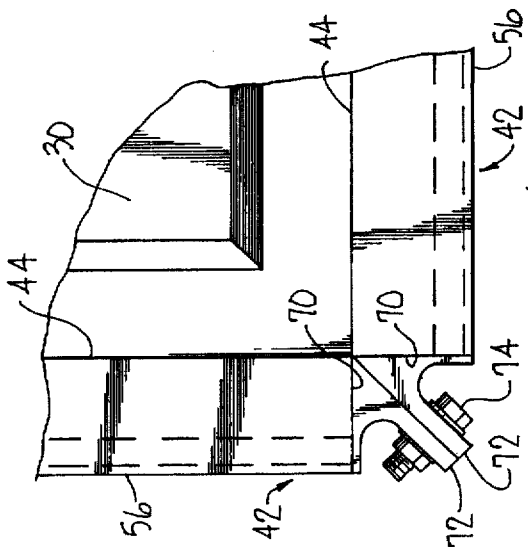
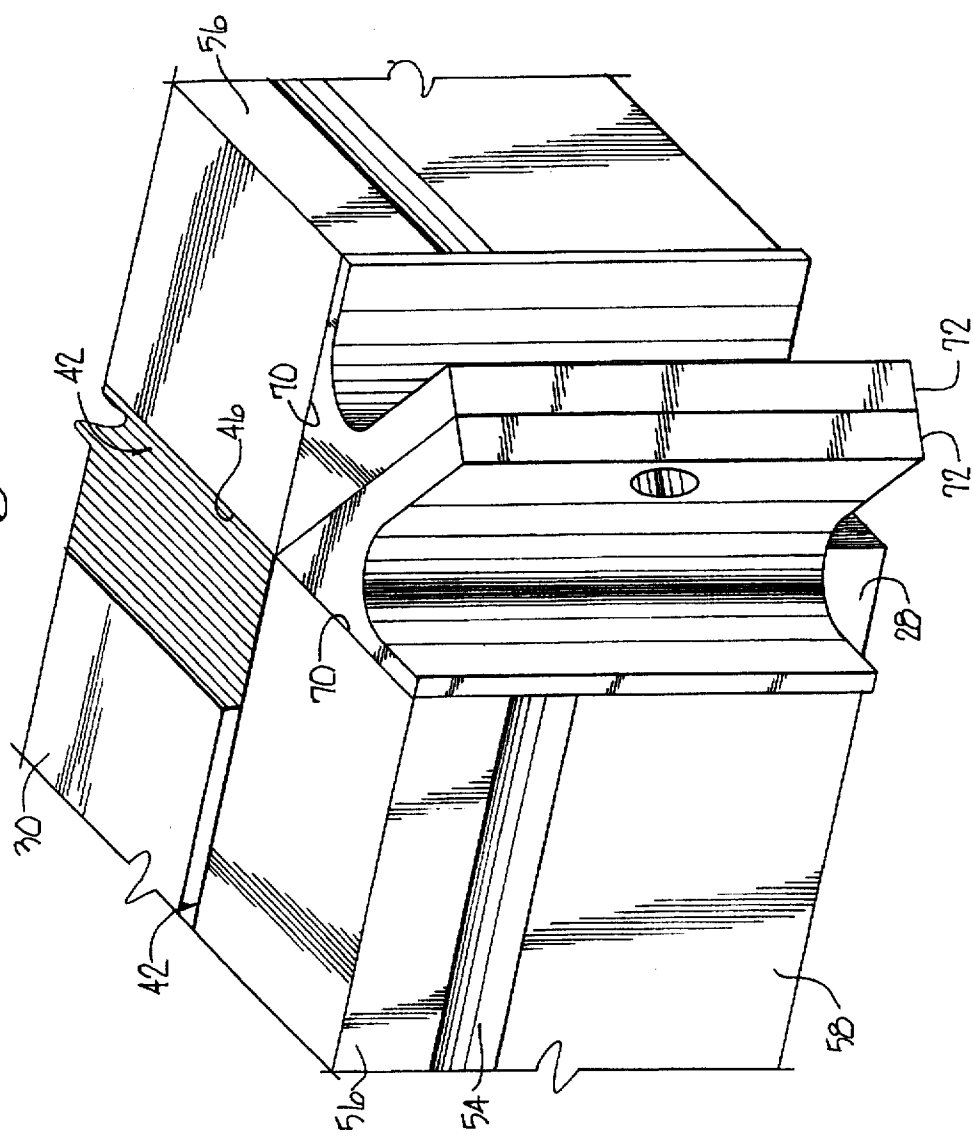


Fig. 6

Fig. 6

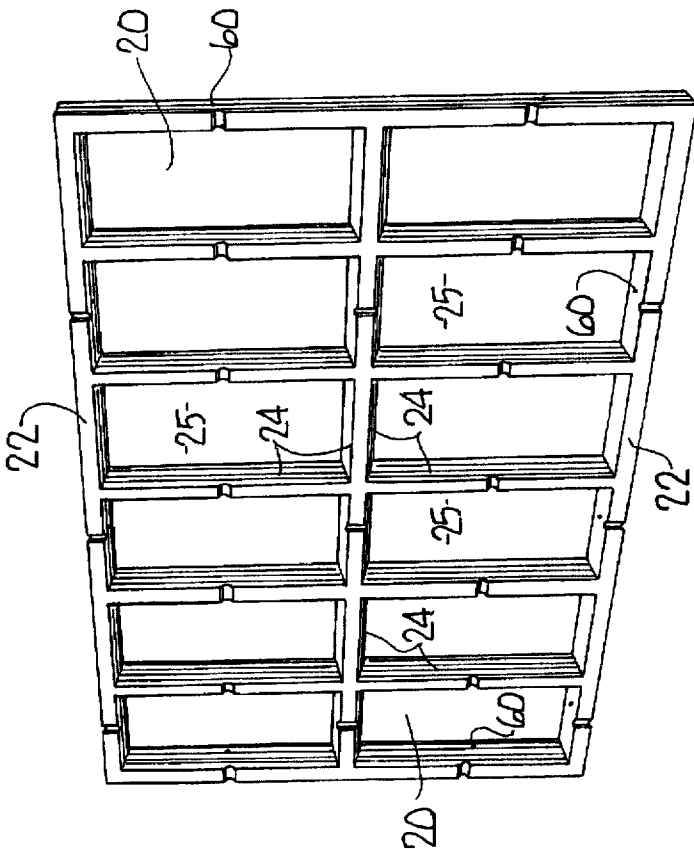
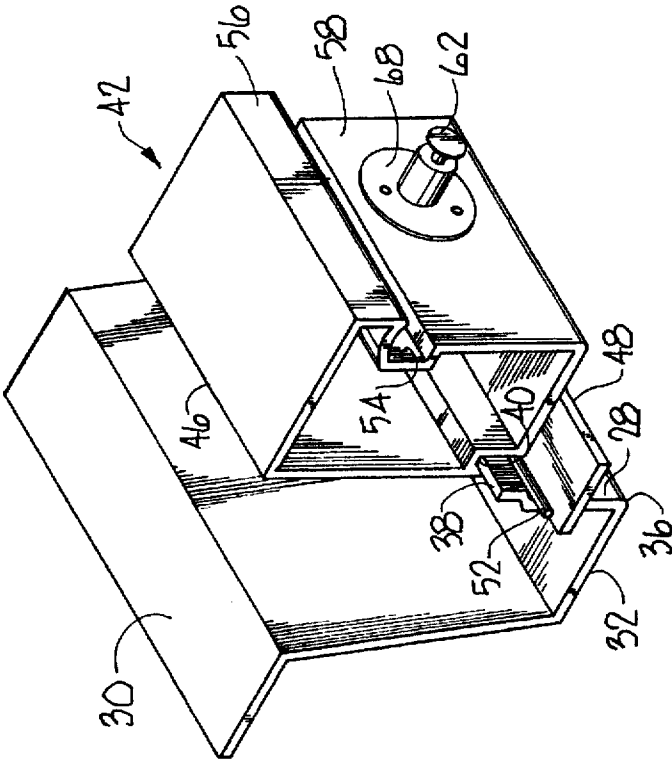


Fig. 7

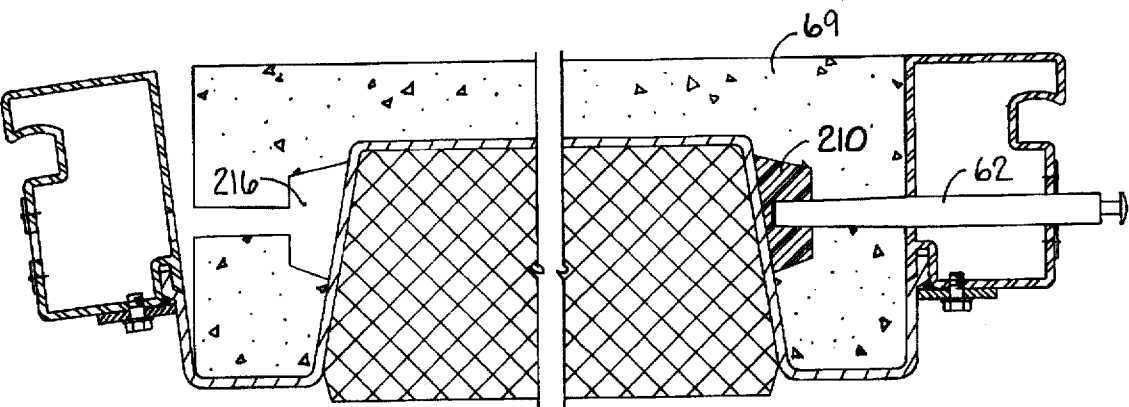


Fig. 8

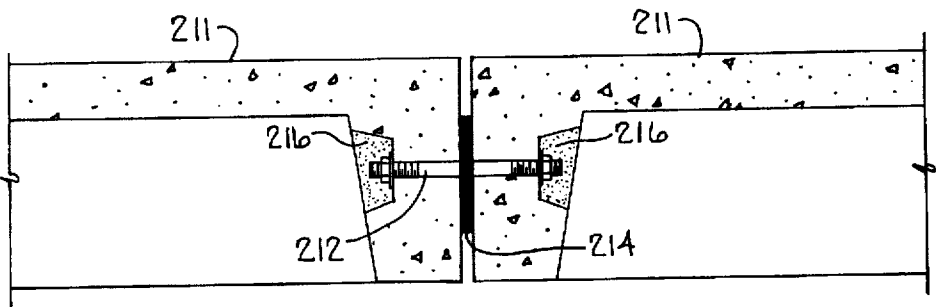


Fig. 9

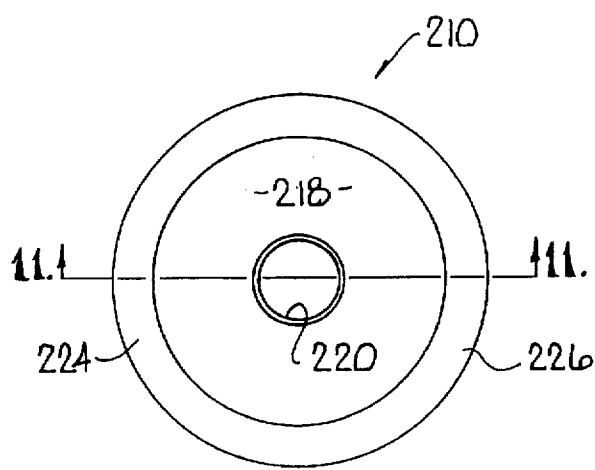


Fig. 10

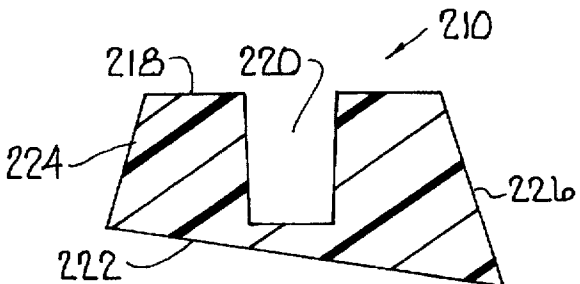
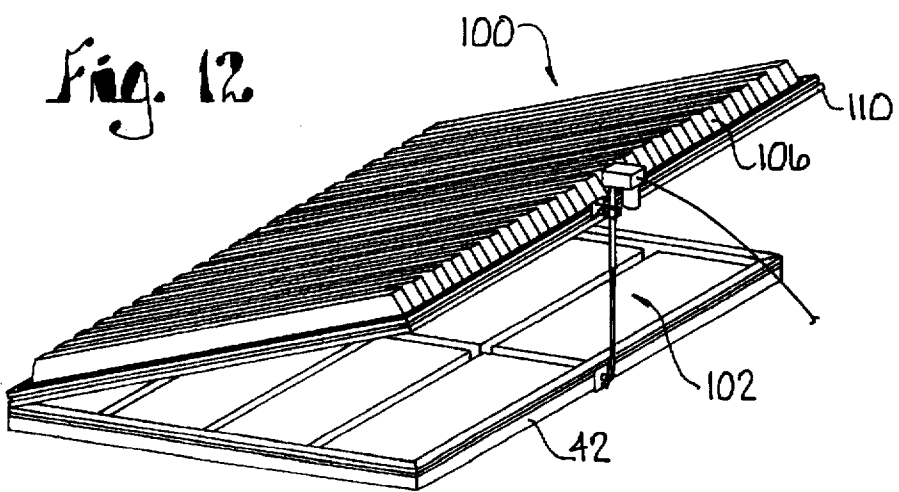
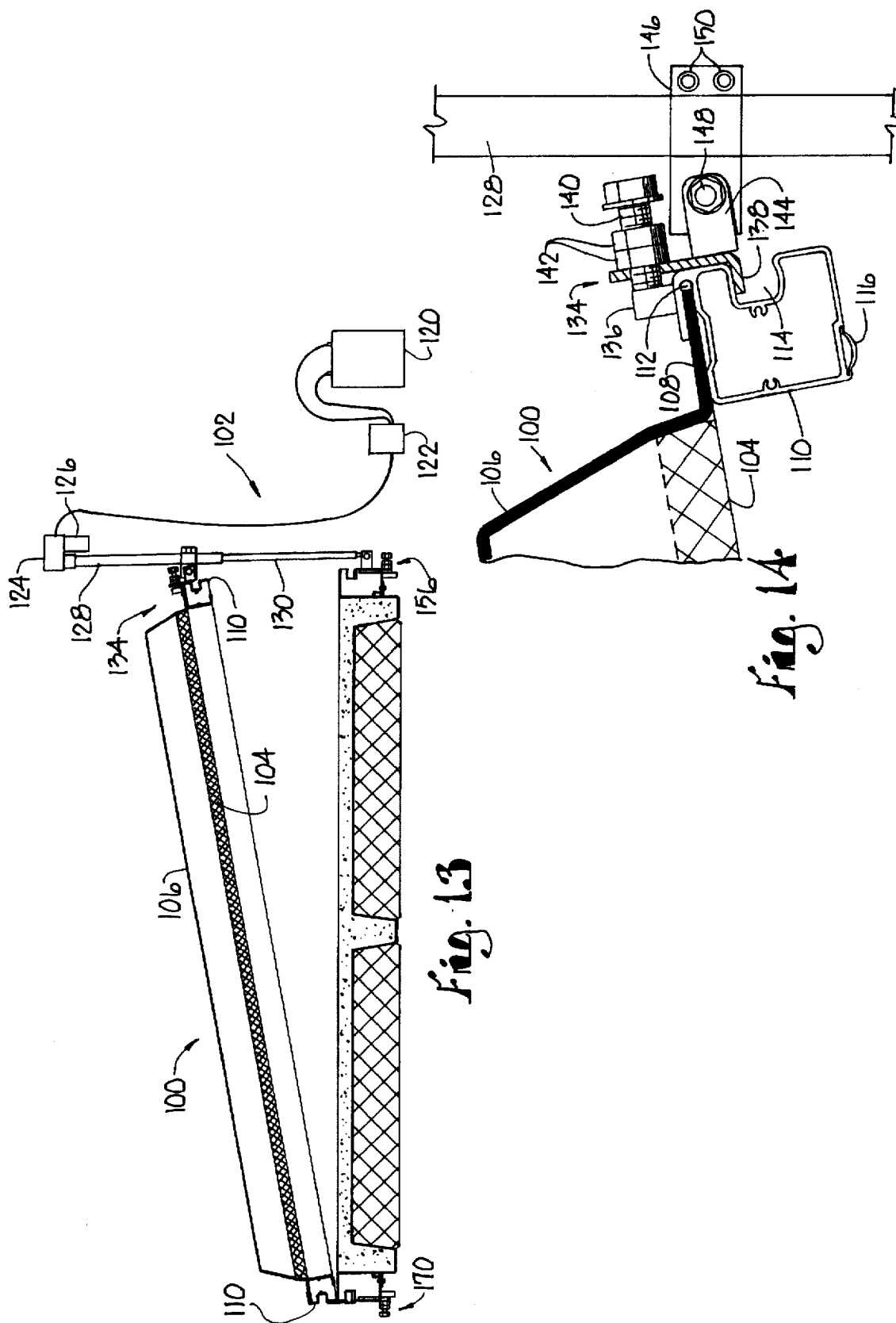


Fig. 11

Fig. 12





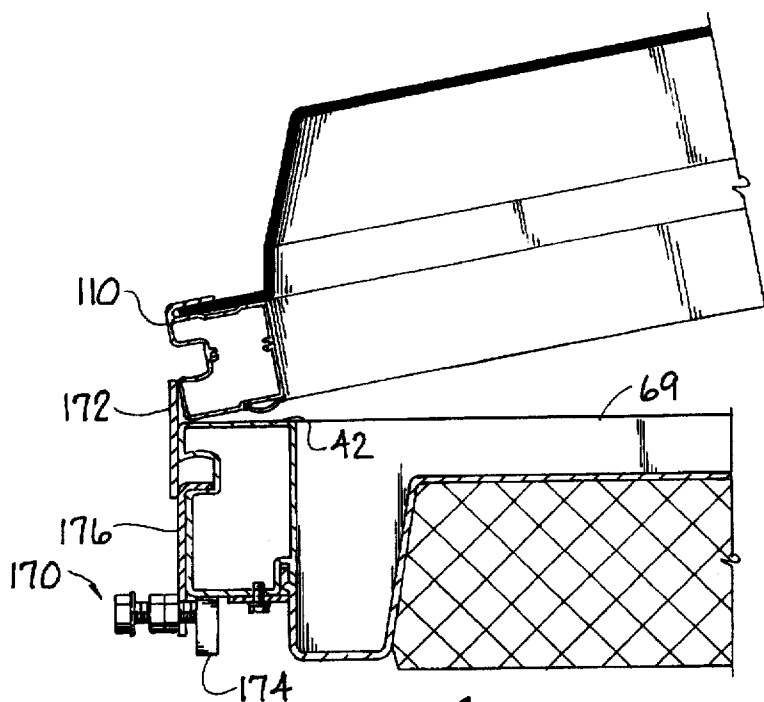
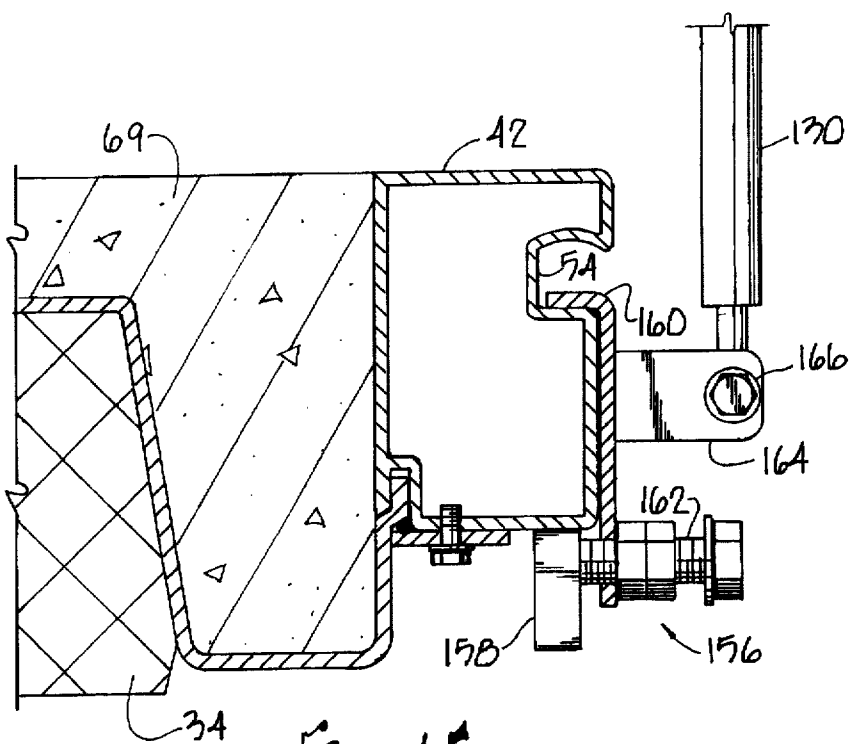


Fig. 17

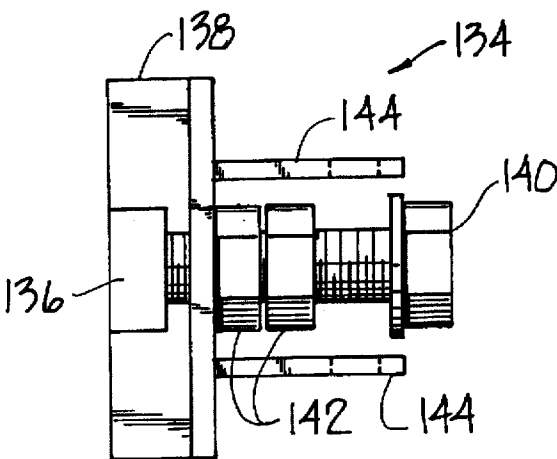


Fig. 18

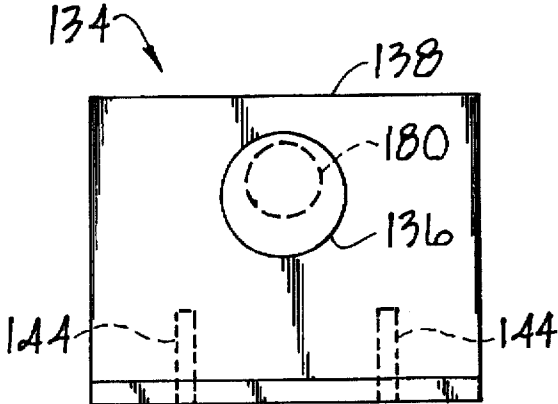
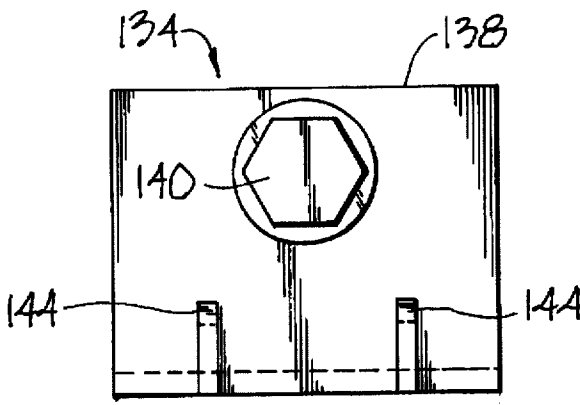


Fig. 19



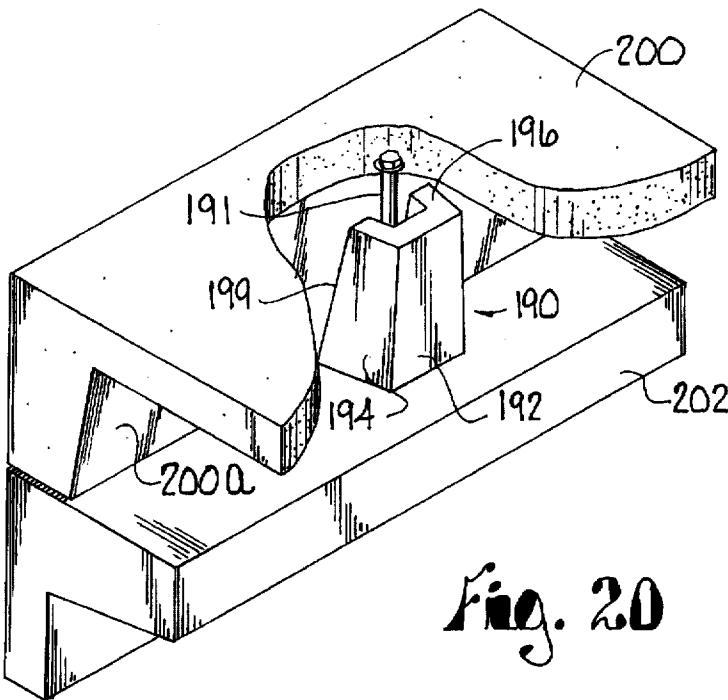


Fig. 20

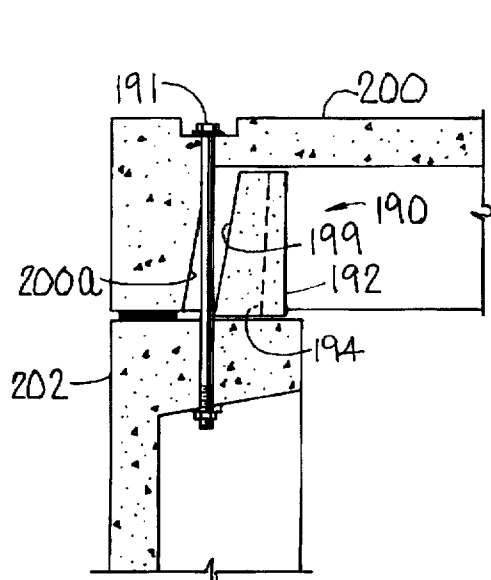


Fig. 21

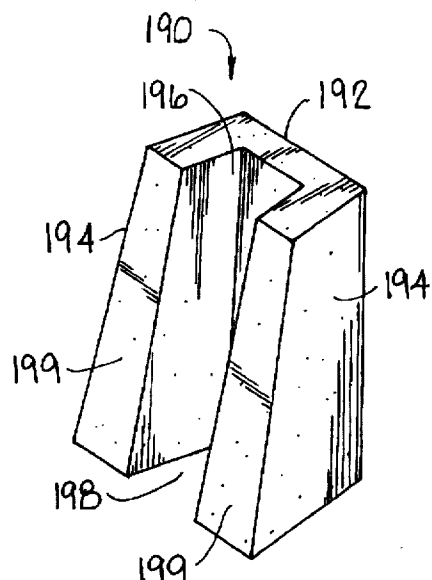


Fig. 22

CONCRETE PANEL CONSTRUCTION AND MOLD

CROSS-REFERENCE

This application is a continuation-in-part of application Ser. No. 08/247,060 filed May 20, 1994.

BACKGROUND OF THE INVENTION

This invention relates to improvements in precast structural panel construction and in the molds for forming precast panels, particularly molds of this type having the advantages of light weight and portability and rapid stripping and resetting, and which provide an improved forming system as compared to the mold construction shown and described in my U.S. Pat. No. 4,181,286, issued Jan. 1, 1980.

In precast concrete wall and floor construction and other building applications, waffle-shaped panels and slabs provide numerous advantages including a substantial saving in material, weight and money, as well as an architecturally advantageous three-dimensional configuration. In residential and commercial buildings the waffle design offers complete freedom to fully insulate exterior walls, modular window units may be inserted in the voided areas of the waffle without sacrificing wall strength, and electrical wiring and plumbing runs can be installed after the building structure is erected. Many interior load-bearing walls and ceilings need only to be painted or textured to give a pleasing and economical open beam effect. Since the skin in the voided areas is relatively thin (as compared to the structural webs or ribs of the waffle), these areas are readily penetrated with drills and saws to facilitate plumbing and mechanical and electrical work.

Furthermore, the waffle design lends itself to the use of modular precast structural units that can be formed either at an in-plant location or at the site itself. For on-site production, it is important that the molds be lightweight and portable and easily stripped and reset for rapid production. Durability, reusability and simplicity are also important since the conveniences of a plant facility and in-plant production machinery are not available. The reinforced plastic molds shown and described in the aforesaid U.S. Pat. No. 4,181,286 answered this need for lightweight, easy-to-operate molds that are particularly suited for on-site production. Although these molds have been used for years and have proven to be very satisfactory, the efficiency of forming systems of this type is enhanced when durability can be increased, simplicity of mold design is maximized, operation is improved, and the quality of the molded product is thereby enhanced.

SUMMARY OF THE INVENTION

It is, therefore, an important object of the present invention to provide an improved mold for forming precast panels which offers advantages and features not provided by the reinforced plastic mold shown and described in the aforesaid patent.

Specifically, an important object of the invention is to provide such a mold in which the sidewalls of the mold body are provided primarily by rigid side rails in direct contact with the molded product, wherein a partial wall or flap is provided at the base of each sidewall by the flexible mold body material so that hinges are formed to permit swinging movement of the sidewalls between molding positions and positions releasing the molded product after the molding process is completed.

Another important object of this invention is to provide a mold as aforesaid in which longitudinal joints between the rigid side rails and the flexible mold body material permit the same to be readily separated by simply lifting the side rails from the mold body to facilitate replacement thereof after its useful life.

A further object of this invention is to provide a mold as aforesaid having a removable cover on the mold body with a selectively operable linear actuator connected to the cover for raising the cover from a closed position on the mold body to an open position exposing the waffle panel therein and having a timer for operating the linear actuator after a predetermined curing period so that the cover is automatically raised, thereby permitting the waffle panel to cool.

Other important objects include the provision of outwardly projecting upper edge portions on the side rails which overhang the lower portions thereof to keep the mold sides clean, sharp corners on the upper inside edges of the mold sides through the use of rigid side rails rather than flexible plastic sides, corner connections which facilitate vertical separation of the side rails from the mold body when replacement is required, tapered holeformers extending through the mold sides which are simple to use and are reusable, recess formers used in conjunction with the holeformers to conceal panel connections, flexible filler pieces that may be inserted in the mold to adapt the same for the formation of a thinner molded product, and precast covers for bolts left exposed after the construction of a waffle panel building.

Other objects will become apparent as the detailed description proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the mold of the present invention utilized in the production of precast waffle panels.

FIG. 2 is an enlarged, fragmentary view (partially in elevation and partially in vertical cross-section) of the mold of FIG. 1 filled with concrete, one of the sidewalls of the mold being shown swung outwardly to release the mold from the waffle panel.

FIG. 3 is a view similar to FIG. 2 but showing filler pieces inserted in the mold to reduce the thickness of the panel.

FIG. 4 is a plan view of one corner of the mold of FIG. 1 on a reduced scale as compared to FIG. 2.

FIG. 5 is an enlarged, fragmentary, perspective view of one of the corners of the mold showing the same closed, the fastener for the end caps being removed for clarity.

FIG. 6 is an enlarged, fragmentary, perspective view showing the joint between one of the side rails and the plastic mold body and revealing the outer end of one of the holeformers, parts being broken away at the joint to show details of construction.

FIG. 7 is a perspective view of an exemplary finished waffle panel formed by the mold of FIG. 1.

FIG. 8 is an enlarged, fragmentary view (partially in elevation and partially in vertical cross-section) of the mold of FIG. 1 with a recess shown as formed after removal of the former and with a recess former shown in cross-section.

FIG. 9 is a partial view (partially in elevation and partially in vertical cross-section) of two waffle panels connected by a bolt recessed within two recesses formed by recess formers.

FIG. 10 is an enlarged top plan view of a recess former.

FIG. 11 is a cross-sectional view of the recess former taken along line 11—11 of FIG. 10.

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FIG. 12 is a perspective view of a mold body and its cover opened to its cooling position by a linear actuator.

FIG. 13 is a transverse cross-section (partially in elevation) of the mold of FIG. 12 filled with concrete and the cover of FIG. 12 opened to its cooling position by a linear actuator.

FIG. 14 is an enlarged, partial view (partially in elevation and partially in vertical cross-section) of the cover of FIG. 12 showing the clamping member connecting the cover to the linear actuator.

FIG. 15 is an enlarged, partial view (partially in elevation and partially in vertical cross-section) of the mold of FIG. 12 filled with concrete and showing the clamping member connecting the mold to the linear actuator.

FIG. 16 is an enlarged, partial view (partially in elevation and partially in vertical cross-section) of the mold and cover of FIG. 12 showing the stop member preventing displacement of the cover in its open position.

FIG. 17 is a top view of the clamping member of FIG. 14 but with the cover and linear actuator removed therefrom.

FIG. 18 is a left side view of the clamping member of FIG. 14 but with the cover and linear actuator removed therefrom.

FIG. 19 is a right side view of the clamping member of FIG. 14 but with the cover and linear actuator removed therefrom.

FIG. 20 is a perspective view of a bolt cover inserted over an exposed bolt between a roof waffle panel and a sidewall waffle panel but with the roof waffle panel broken away for clarity.

FIG. 21 is a vertical cross-section (parts shown in elevation) of the waffle panels and bolt cover of FIG. 20, showing the cover displaced to the right in a partially inserted position.

FIG. 22 is a perspective view of the bolt cover of FIG. 20.

DETAILED DESCRIPTION

Referring initially to FIG. 7, a precast waffle panel of the type produced by the mold of FIGS. 1-6 is illustrated. Such panel is a modular unit of reinforced concrete that may be employed either as a wall, roof or floor panel. Panels of this type are characterized by a relatively thin skin 20, thick structural sides 22 defining the periphery of the panel, and integral webs or ribs 24. The webs 24 are spaced apart at regular intervals to define voids 25 where the thickness of the panel resides solely in the skin 20. Manifestly, the presence of the voids 25 provides a substantial saving of material and reduction in weight, without significant sacrifice of strength due to the presence of the structural webs 24 and sides 22. A typical panel is 8 feet in its transverse dimension, 12 feet long, and 8 inches thick at the sides 22 and webs 24. With a 2-inch thickness for the skin 20, the panel utilizes less than half of the concrete used in a solid 8-inch wall, roof or floor.

Now referring to FIGS. 1-6, the mold of the present invention employs a one-piece, flexible mold body having a panel-forming component 26 and four integral, partial side elements 28. The entire mold body constituting the component 26 and side elements 28 is formed from a single sheet of flexible material, such as a thermoformed ABS plastic. In order to impart the requisite waffle shape to the molded product, the forming component 26 is provided with spaced, raised portions 30. As an example, twelve such portions 30 in two rows of six each are illustrated in FIG. 1. Each of the portions 30 gives the appearance of a platform elevated above a base lattice 32 (see FIG. 2) which forms a grid at the bottom of the mold.

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Each raised portion 30, by virtue of the use of a single piece of plastic sheet material, presents a downwardly facing cavity which is filled by a rigid plastic foam 34. This structurally reinforces the component 26 and rigidifies the raised portions 30, and also insulates the mold to assist in curing.

The two longitudinal and two transverse partial side elements 28 are pliable due to the flexible nature of the plastic sheet material and, therefore, present flaps swingable about lines of bend 36 at the merger of the side elements 28 with the outside edges of the lattice or grid portion 32 of the mold body to provide a hinge action for a purpose to be discussed. Each side element 28 terminates at an upper, free longitudinal edge 38 which is received within a complementary longitudinal groove 40 formed in a tubular side rail 42. There are two longitudinal and two transverse side rails 42 coextensive with their associated side elements 28. Each side rail 42 and associated partial side element 28, therefore, form a complete sidewall of the mold body which complements the panel-forming component 30 to impart the waffle configuration to the molded product. The side rails 42 are preferably formed from aluminum extrusions and thus present rigid box members surrounding the mold body which have sufficient structural strength to resist deformation under outwardly directed forces against the sidewalls produced when the mold body is filled with concrete. As disclosed in the aforesaid U.S. Pat. No. 4,181,286, it is important that the sides of the mold body be constructed such that outward bowing cannot occur when the mold is filled with concrete.

The longitudinal joint between each side rail 42 and its associated partial side element 28 is best shown by a comparison of FIGS. 2 and 6. A tongue and groove connection is provided, the tongue thereof being formed by the Z-shaped upper longitudinal margin of the side element 28 which presents the longitudinal edge 38. The groove 40 in the tubular extrusion comprising side rail 42 is disposed at the lower, inner corner of the rail and thus the partial element 28 and rail 42, when joined, present a continuous inwardly facing molding surface 44. It should be appreciated that surface 44 is continuous and uninterrupted from the line of bend 36 upwardly to a right-angle corner 46 of the side rail 42 which defines the inner upper edge of the rail. A retainer strap 48 is secured to the bottom of rail 42 by screws 50 to hold the mated tongue and groove components together to prevent separation thereof, a spacer rod 52 being sandwiched between the strap 48 and the Z-shaped bend in side element 28 to hold the mated joint components in place by a clamping action. Both the retainer strap 48 and the spacer rod 52 are preferably aluminum.

Each side rail 42 has a longitudinal recess 54 in its outer side which serves as a finger hold for lifting and carrying the mold and also facilitates the clamping of an insulated cover over the mold body as best seen in FIGS. 12-16 and discussed in more detail below. The outer upper edge portion 56 of the rail 42 above the recess 54 projects outwardly beyond the lower portion 58 of rail 42 below recess 54 in order to provide an overhang so that any concrete that may overflow during the molding process will not drip and adhere to lower portion 58. This keeps the mold sides clean and prevents spillage from interfering with the use of the forming system of the present invention.

The forming of holes or passages 60 (FIG. 2) in the molded product is facilitated by the use of an elongated, tapered, cylindrical holeformer 62 at locations where it is desired to form through holes 60 in the sides 22 of the waffle panel (FIG. 7) for bolts that will be employed to assemble

the finished panels into the desired structure. An inner wall opening 64 in the side rail 42 is aligned with an outer opening 66 of slightly larger diameter for the purpose of receiving the tapered holeformer 62, which may then be held in place by an annular retainer 68.

A recess former 210, as seen in FIGS. 8-11, is mounted on the interior end of each holeformer 62 at locations where recessed bolt or other connector heads within the molded product are desired, as in FIG. 9. Typically, double ended bolts, such as bolt 212, are used to connect abutting panels 211. A rigid plastic shim or spacer 214 is placed between the abutting panels to prevent the concrete from cracking due to overtightening. The bolt ends with nuts secured rest within recesses 216 with the bolt extending through both waffle panels 211 and shim 214 to thereby connect the waffle panels 211. Grout (not shown) would typically be added to fill the recesses and provide a smooth appearance, thereby totally concealing the bolt ends.

As seen in FIGS. 10 and 11, recess former 210 is generally donut shaped and may be molded from plastic; it includes a top surface 218 having a hole or aperture 220 extending axially therethrough and terminating within recess former 210. Hole 220 receives the interior end of a holeformer 62, as in FIG. 8. Bottom surface 222 of recess former 210 extends angularly between two sides 224 and 226 (as viewed in cross-section) which present an irregular frustoconical outer surface between top and bottom surfaces 218 and 222. Thus, recess former 210 tapers from bottom surface 222 to top surface 218 to provide a corresponding tapered recess 216.

Referring to FIG. 2, it may be seen that the left sidewall of the mold there illustrated is shown in a partially open position separated from a concrete panel 69 which has cured in the mold. It may be appreciated, therefore, that the sidewalls of the mold have free end edges so that the four corners of the mold can be closed when casting the panel 69 and then opened to strip the mold once the concrete is cured. FIG. 4 reveals the free end edges 70 of two of the side rails 42 at one of the corners of the mold. An end cap 72 on each end edge 70 is secured to the adjacent end cap 72 by a bolt 74 to hold the corner closed. As illustrated in FIG. 5, the end caps 72 may be composed of aluminum and welded directly to the ends of the side rails 42. It should be appreciated that each end edge 70 lies in a vertical plane and that the surface-to-surface contact of the two end caps 72 (FIG. 4) likewise occurs in a vertical plane so that a simple and strong corner connection is provided by securing the two end caps 72 with the bolt 74. Furthermore, these components do not interfere with lifting the side rails 42 vertically off of the side elements 28 when it is necessary to replace the plastic mold body.

Removable adapters 76 are shown in FIG. 3 installed in the bottom of the panel-forming component 26 in order to provide a thinner panel product 78 for lighter duty applications. The adapters 76 are flexible, PVC filler pieces and may be removed when it is desired to make the full panel 69 seen in FIG. 2. The adapters 76 would be employed, for example, to convert an eight-inch panel form to a six-inch form thereby producing the lighter, thinner panel 78.

Use of a mold of the general type disclosed herein is set forth in detail in the specification of the aforesaid U.S. Pat. No. 4,181,286 which is incorporated herein by reference as may be necessary for a full and complete understanding of the use and general operation of the mold disclosed herein. The improved forming system of the present invention, however, provides principally metal side surfaces 44 in

contact with the molded product and thus a sharp upper, outer edge 80 is imparted to the molded product by the right angle corners 46 of the side rails 42. The tapered holeformers 62 are easily installed and removed and are reusable. The mold sides are kept clean by the projecting outer upper portions 56 of the side rails.

An important advantage in day-to-day operations is the structural simplicity of the improved forming system of the present invention and the ease by which a worn-out mold body may be replaced. To close the corners of the form for molding, the sidewalls are swung on the hinges provided by the partial side elements 28 to their upright positions and the bolts 74 are inserted and secured in the end caps 72. This simple operation closes the four corners of the mold. The holeformers 62 may then be inserted as desired. Once the concrete is cured, stripping is readily accomplished by removing the four bolts 74 at the corners and pulling the four sidewalls away from the molded product. The sidewalls swing outwardly about the lines of bend 36 at the base of the side elements 28.

The longitudinal tongue and groove joints between the side rails 42 and the side elements 28 facilitate the replacement of a worn mold body. The screws 50 are loosened to remove the retainer straps 48, whereupon the side rails 42 can be simply lifted off of the plastic body sides. As the end caps 72 are welded to the side rails 42, this one operation (separation of the tongue and groove joints) disassembles all metallic components from the plastic mold body for reuse. The side rails 42 are readily remounted on a replacement mold body by attaching the side rails to the replacement body at the tongue and groove joints and securing the retainer straps 48.

Concrete, after being poured into a mold body, is preferably covered and allowed to cure for a predetermined amount of time. Thereafter, the concrete must cool. Typically, the concrete is poured into the mold body during the day-time working hours and cures into the night and early morning, at which time it is preferable to remove the cover in order to accelerate the cooling process. Workers tend to be unreliable in removing the cover from the mold body during such hours, and manual removal increases labor costs. Accordingly, providing a cover 100 (FIGS. 12 and 13) which is automatically lifted from the mold body after the proper curing has occurred is desirable.

Cover 100 is the same shape and size as its corresponding mold body. The cover 100 is formed from a single sheet of plastic material to include a base member 104 (as seen in FIGS. 13 and 14) having a thickness filled with foam insulation, longitudinally spaced ribs or projections 106 (as seen in FIGS. 12 and 13) extending outwardly from and across the width of base member 104, and an edge portion 108 (as seen in FIG. 14) extending outwardly from the bottom of the base member 104 to form the periphery of cover 100. Elongated, rigid side rails 110 (as seen in FIGS. 12-14) are composed of extruded aluminum and are mounted on edge portion 108 by a tongue and groove connection. The tongue thereof is formed by the edge member 108 of cover 100 and is received within groove 112 of side rails 110. Each side rail 110 further includes a longitudinal recess 114 formed in its outer side which serves as a finger hold for lifting and carrying the cover 100 as well as a means of installing it on mold bodies. A flexible sealing member 116 is attached to the bottom side of each side rail 110 and provides a seal when brought into contact with the side rails 42 of the mold body. Typically, sealing member 116 is formed of common weather stripping. Ribs 106 provide strength to cover 100 and decrease the flexibility of

cover 100 thereby making the cover easier to install, lift and remove from the mold body.

A cover lifter 102, as best seen in FIG. 13, preferably includes a conventional linear actuator employing an internal screw jack mechanism. Lifter 102 includes a battery 120 or other electrical power supply, a timer 122, an electric motor 126 connected to a gear drive 124, an upper actuator tube 128 and a lower actuator tube 130. The upper tube 128 is connected to one side of cover 100, preferably centered along its length at one of the side rails 110 as in FIGS. 12 and 13. At a predetermined time, as set on timer 122, the actuator is activated by closing the power circuit to motor 126. Upper tube 128 is hollow and extends from gear drive 124, and lower tube 130 extends downwardly from within upper tube 128. Tubes 128 and 130 are longitudinally extensible and retractable upon rotation of a screw (not shown) within the hollow interior thereof coupled to the gear drive 124. Thus, in operation, tubes 128 and 130 are telescopic and upon extension of lower tube 130 from upper tube 128, cover 100 is lifted from the mold body.

A first clamping member 134 connects the cover 100 to lifter 102, as best seen in FIG. 14. First clamping member 134 is secured to the side rail 110 of cover 100 by cam member 136 which is mounted on an L-shaped plate 138 by threaded bolt 140 and nuts 142. A surface of cam member 136 engages the top surface of side rail 110, and L-shaped plate 138 engages the top surface of the recess 114 formed in side rail 110 thereby clamping side rail 110 between cam member 136 and L-shaped plate 138. The first clamping member 134 is secured to upper tube 128 of lifter 102 by a pair of ears 144 projecting from the L-shaped plate 138, the outer ends of which are pivotally coupled to a pair of C-shaped brackets 146 by a cross-bolt 148. The C-shaped brackets 146 clamp upper tube 128 therebetween and are secured to upper tube 128 by two smaller bolts 150.

A second clamping member 156 connects lower tube 130 of lifter 102 to the side rail 42 of the mold body directly below or in alignment with first clamping member 134, as seen in FIGS. 12 and 13. As best seen in FIG. 15, second clamping member 156 is similar to first clamping member 134 in that it is secured to side rail 42 by cam member 158 which is mounted on an L-shaped plate 160 by a threaded bolt 162. A surface of cam member 158 engages the bottom surface of side rail 42, and the L-shaped plate 160 engages the bottom surface of recess 54 to clamp side rail 42 of mold body therebetween. Second clamping member 156 is connected to lower tube 130 of lifting member 102 by parallel lugs 164 (only one shown) which extend outwardly from the side of plate 160 and are secured to lower tube 130 by a pivot bolt 166.

A third clamping member 170 provides a stop plate 172 which prevents the displacement of cover 100 upon the activation of lifter 102 to raise cover 100 from the mold body and presents an axis about which cover 100 swings between its closed position and its open position. Third clamping member 170, as best seen in FIG. 16, is most commonly connected to the mold body directly opposite the first and second clamping members 134 and 156 when only one stop plate 172 is needed. However, to accommodate a long mold body, two or more spaced stop plates 172 may be utilized.

The third clamping member 170 includes a cam member 174, similar to cam member 158, which attaches stop plate 172 to the side rail 42 of the mold body. Stop plate 172 is joined to an L-shaped clamping plate 176, preferably by welding, and extends upwardly therefrom into engagement with the outer side of side rail 110 of cover 100.

Cam members 136, 158 and 174 are all substantially identical and may be formed from 1¼ inch round steel bars. For an example, see FIGS. 17-19, showing the first clamping member 134 in detail. An eccentric threaded bore 180 extends partially through cam member 136 and receives threaded bolt 140 therein.

Each cam member 136, 158 and 174 can be used with different sizes of the corresponding side rail 42 or 110. When used with smaller side rails 42 or 110, a surface of the cam that projects a greater radial distance will engage the corresponding side rail 42 or 110. During assembly, only a quarter turn or less of each cam member 136, 158 and 174 is needed to create a sufficiently tight connection between the side rail 42 or 110 and the corresponding clamping member 134, 156 and 170. The bolts and nuts provided for this purpose, e.g. 140-142, assure that the cams are fixed in their rail-engaging positions.

Referring to FIGS. 20-22, a portion of a waffle panel structure is shown to illustrate a solution provided by the present invention to the problem of exposed connectors used to join a roof or ceiling waffle panel 200 to an exterior (or interior) wall panel 202. A bolt cover 190, as seen in FIGS. 20-22, is used to cover connectors, such as bolt 191 as seen in FIG. 20, left exposed during construction of waffle a panel building. Bolt cover 190 is substantially C-shaped and includes an inwardly facing side 192 and a pair of legs 194 as best seen in FIG. 22. Side and legs 192 and 194 each progressively thicken as they extend from the upper open end 196 to the lower open end 198 of bolt cover 190. Each of the legs 194 is also progressively wider presenting an angled distal surface 199 which extends between open ends 196 and 198 and complements the interior side surface 200a of the peripheral rib of panel 200. Bolt cover 190 is cast from concrete and is approximately 6 inches tall and 4 inches wide in typical applications.

In assembly, bolt cover 190 extends between the horizontally extending waffle panel 200, typically forming a ceiling, and the vertically extending waffle panel 202, typically forming a sidewall. Bolt cover 190 is shown partially installed (FIG. 21) spaced from interior side surface 200a, and is shown fully inserted around bolt 191 (FIG. 20) with angled surfaces 199 flush against the interior surface 200a, upper end 196 abutting against the bottom surface of the ceiling panel 200, and lower end 198 abutting against the top surface of the side panel 202. A suitable adhesive such as a mastic is applied to the abutting surfaces. Thus, bolt cover 190 extends between panels 200 and 202 to thereby conceal bolt 191. It may be appreciated, therefore, that bolt covers 190 give the appearance of ribs in structures where the interior is not finished. This materially improves appearance and also provides structural security by hiding the interconnecting bolts from thieves and vandals who might otherwise attempt to remove them.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is as follows:

1. A mold for forming precast panels, said mold comprising:

a mold body configured to impart a predetermined shape to a molded product formed therein, said body having a panel-forming component provided with a plurality of integral, flexible, elongated, partial side elements presenting the periphery of the body, each of said elements terminating at a longitudinal edge,

a plurality of elongated, rigid side rails on respective elements longitudinally coextensive therewith, each of

said side rails projecting from said longitudinal edge of the corresponding element and cooperating therewith to provide a sidewall of the mold body complementing said panel-forming component and presenting a continuous inwardly facing molding surface for forming the molded product, at least certain of said side rails having openings therethrough communicating with the interior of the mold body,

a plurality of tapered holeformers received in corresponding openings of said side rails and extending into said mold body interior,

a plurality of tapered recess formers mounted on respective interior ends of said holeformers and each having a substantially greater diameter than the associated holeformer,

said sidewalls having end edges and the flexible elements thereof providing hinge means for swinging movement of the sidewalls on said component outwardly from normal, molding positions and away from a molded product within the mold body to permit said product to be withdrawn therefrom,

the end edges of adjacent sidewalls defining closed corners of the body when said sidewalls are in their normal positions and, upon said outward swinging movement of the sidewalls, said end edges separating to cause said corners to open, and

releasable means associated with said end edges for holding the corners closed to maintain the sidewalls in their normal positions during the molding process.

2. The mold as claimed in claim 1, wherein each of said recess formers has an aperture in one side thereof for receiving said interior end of the corresponding holeformer.

3. A mold structure for forming precast concrete panels, said mold structure comprising:

a mold body configured to impart a predetermined shape to a molded concrete product formed therein, said body having a panel-forming component provided with a plurality of integral, flexible, elongated side elements presenting the periphery of the body,

a plurality of elongated, rigid side rails on respective elements extending longitudinally thereof, whereby each element and its associated side rail present a sidewall of the mold body,

said flexible elements providing hinge means for swinging movement of the sidewalls on said component outwardly from normal, molding positions and away from a molded product within the mold body to permit said product to be withdrawn therefrom,

releasable means for maintaining the sidewalls in their normal positions during the molding process,

a removable, insulated curing cover on the mold body, said cover being composed of a plastic sheet material configured to impart sufficient thickness to the cover to provide an insulation-containing member substantially coextensive with the underlying mold body, and said cover presenting a peripheral edge and being provided with elongated, rigid side rails along said peripheral edge,

selectively operable lifter means on one of said side rails of the mold body and coupled to a corresponding side rail of the cover for raising the cover from a closed position on the mold body to an open position exposing a molded product therein, and

a timer for operating said lifter means after a predetermined curing period, whereby to automatically raise the cover to permit the molded product to cool.

4. The mold structure as claimed in claim 3, wherein said one of said side rails of the mold body has a longitudinal recess in an outer side thereof, and wherein said mold structure further comprises means engaging said one of said side rails within said recess for clamping said lifter means on said one of said side rails.

5. The mold structure as claimed in claim 4, wherein said corresponding side rail of the cover has a longitudinal recess in an outer side thereof, and wherein said mold structure further comprises means engaging said corresponding side rail of the cover within said recess for clamping said lifter means thereon.

6. The mold structure as claimed in claim 3, wherein a portion of said peripheral edge presents an axis about which said cover swings between its open and closed positions.

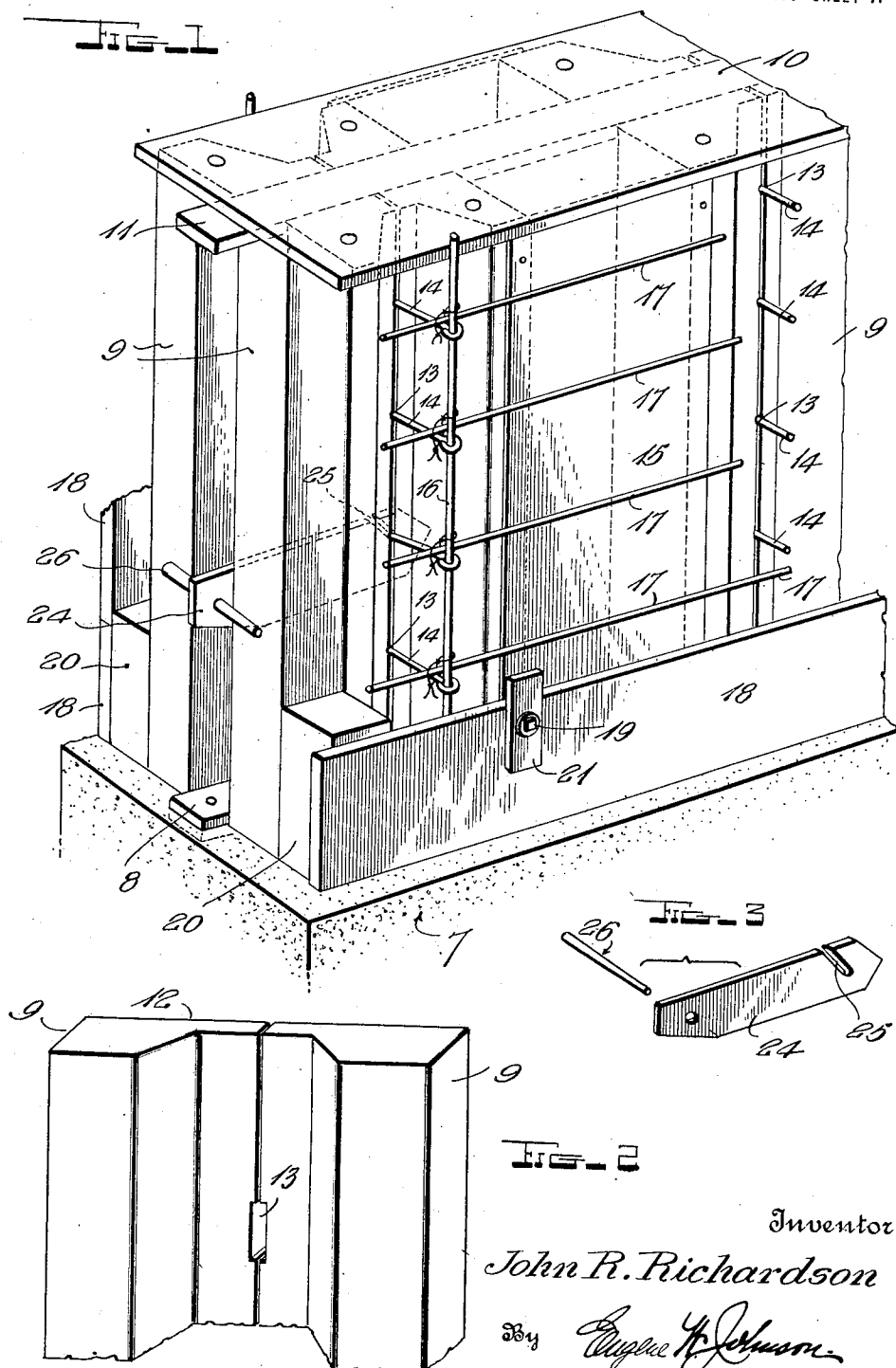
7. The mold structure as claimed in claim 6, further comprising a stop means connected to another of said side rails of said mold body for engaging a corresponding side rail of said peripheral edge portion to prevent displacement of said cover other than about said axis.

* * * * *

J. R. RICHARDSON.
MOLD FOR CONSTRUCTING HOLLOW WALLS OF CONCRETE.
APPLICATION FILED MAY 5, 1919.

1,329,095.

Patented Jan. 27, 1920.
2 SHEETS—SHEET 1.



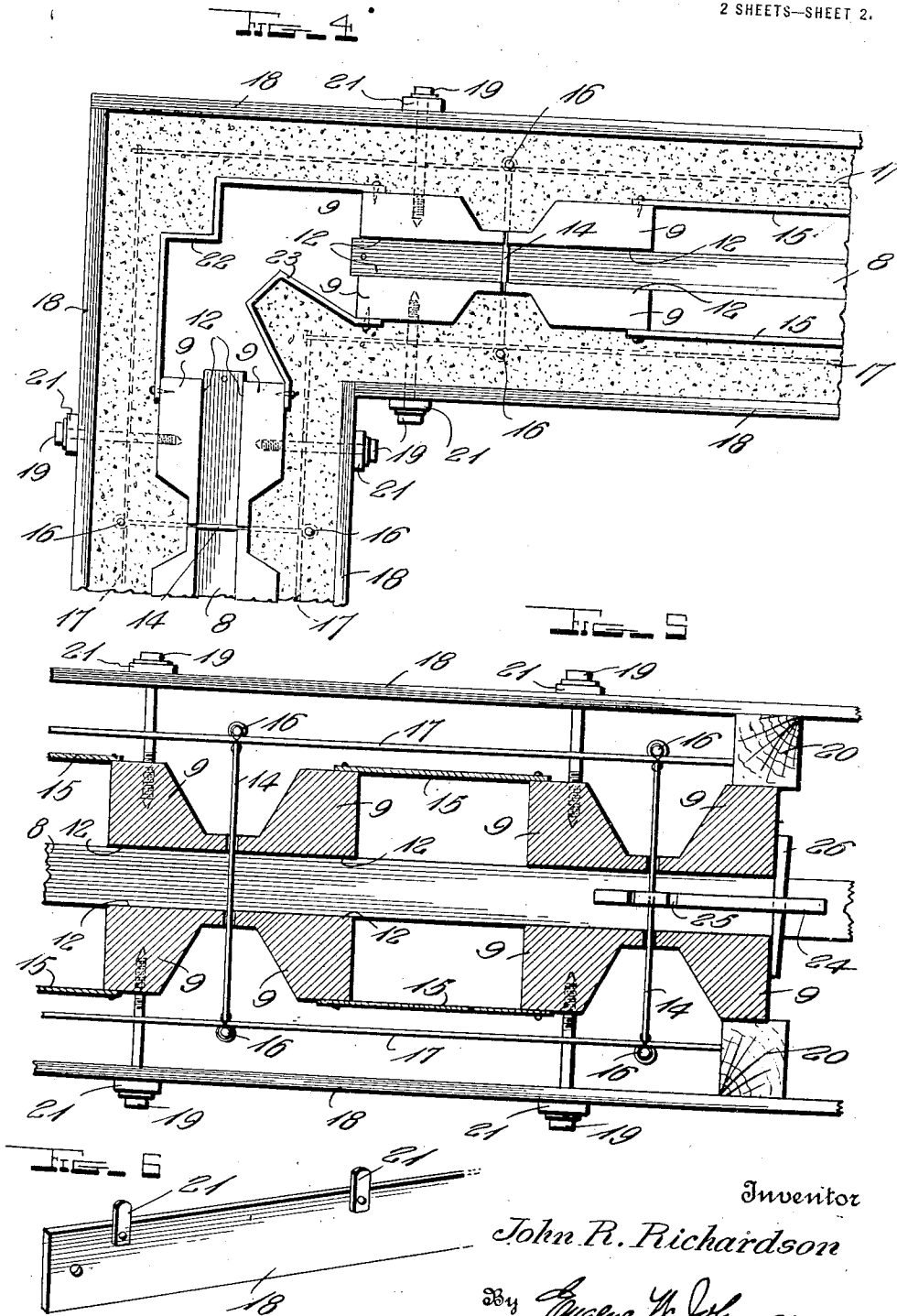
Inventor
John R. Richardson
By *Engle H. Johnson*
Attorney

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2 SHEETS—SHEET 2.



Inventor

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UNITED STATES PATENT OFFICE.

JOHN R. RICHARDSON, OF MADERA, CALIFORNIA.

MOLD FOR CONSTRUCTING HOLLOW WALLS OF CONCRETE.

1,329,095.

Specification of Letters Patent.

Patented Jan. 27, 1920.

Application filed May 5, 1919. Serial No. 294,795.

To all whom it may concern:

Be it known that I, JOHN R. RICHARDSON, a citizen of the United States, residing at Madera, in the county of Madera and State of California, have invented certain new and useful Improvements in Molds for Constructing Hollow Walls of Concrete, of which the following is a specification.

This invention relates to certain improvements in molds which are used in the construction of hollow and reinforced walls from concrete or other similar material and is designed as an improvement upon the construction of molds as shown in Letters Patent of the United States dated September 18, 1917, which are numbered 1,240,435 and 1,240,436.

In carrying my invention into practice, I provide a plurality of complementary abutment forming members which when associated are maintained opposite one another, they being of a length sufficient to mold one story of a building and are of such configuration as to provide on the inner sides of the walls inward projecting abutments with converging sides and truncated ends, said opposite abutments being connected by tie-bars, which tie-bars and the inner and outer mold plates are associated or maintained in position by the abutment forming members.

One of the objects of the invention is to provide abutment forming members of similar configuration which have recesses in their abutting edges to receive tie-bars, the tie-bars being maintained in position by clamps, the aforesaid members being made of wood are engaged by the pointed ends of lag screws which are used to connect the outer mold boards or plates to the abutment forming members.

In the accompanying drawings which illustrate a preferred embodiment of my invention, Figure 1, is a perspective view of the mold partly assembled. Fig. 2, is a perspective view of a pair of the abutment forming members of the mold. Fig. 3, is a perspective view of one form of clamp for holding the ties in engagement with the abutment forming members while assembling the parts of the mold. Fig. 4, is a plan view of the mold set up and partly filled with concrete. Fig. 5, is a horizontal section of a portion of the mold, and Fig. 6, is a perspective view of one of the outer mold plates.

Preparatory to setting up the mold or

forms I lay a concrete foundation 7, in which is partly embedded a board 8, the width of which board determines the width of the air space between the inner and outer walls. Abutment forming members 9, which are of a length about the height of one story of the building, are set up so the inner faces of their lower ends will bear against the edges of the board 8, with their lower ends resting upon the foundation 7, and they may be maintained in a vertical position by a top plate 10, to the underside of which is secured a spacing strip 11, of the same width as the board 8. The abutment forming members are each of like shape, the inner and longer sides 12, having reduced abutting edges, which have at suitable intervals recesses 13, which may be either round or flat to accord with the shape, in cross section, of the tie-bars 14. The thickness of the members 9, which are shaped to provide abutment forming recesses which determine the size and shape of the abutments, the thickness of the walls between the abutments being fixed by the distance between the inner face of the reduced portions of the members 9.

When a pair of opposite or inner and outer members have been placed in position and the top plate placed thereon, the other end being maintained against the edge of the dividing strip 8, the tie-bars are individually placed and maintained in position by suitable clamps, as shown in Fig. 3, and when successive tie-bars are positioned another pair of the abutment forming members are erected, and the clamps are removed.

A top plate 10 is temporarily attached to the members 9, and when the four pieces or two pairs of the abutment forming members are in place; four others are erected in a similar manner they being spaced as desired, to provide any suitable distance between the abutments of the completed walls. The space between adjacent mold forming sections is spanned by inner mold plates 15, which are provided adjacent to their upper edges with apertures for tacks, or the like, to hold the plates in place, which tacks are removed before the concrete in filling the forms reaches them.

Vertical reinforcing bars 16, are engaged by the bent or looped ends of the tie-bars 14, the upper ends of the bars 16, engaging with the edge of the top plate 10, said bars being in line with the center of the truncated portion of the abutments and near the center of

the walls. The end portions of the tie-bars 14, are connected to the vertical bars 16 and to horizontal bars 17, which rest upon and are secured to the tie-bars 14 and to the vertical bars 16.

The outer mold plates 18, may be either of planks of wood or strips of sheet metal and they are provided with openings for the passage of lag-screws 19, which openings are spaced so the screws may enter the outer faces of the abutment forming members to hold the outer mold boards in place, the inner faces of the boards or plates 18 engage with the blocks or strips 20, which serve as closures for the ends of the mold and at the same time determine the thickness of the walls, except at the abutments. When the outer mold plates are of wood the lag-screws will hold in place cleats 21, which are of a length to engage the face of the adjacent mold board, and when the outer mold plates are of sheet metal, as shown by Fig. 6, metallic cleats will be riveted to the upper edges thereof.

In molding the corners I use sheet metal or other suitable material in the construction of the elements or parts 22 and 23, as shown by Fig. 4, such parts being shaped to provide inward extending abutment forming portions, and when such parts 22 and 23 are of sheet metal they will be provided near their upper edges with perforations to receive tacks or nails, that temporarily attach the same to the sections 9.

With the means herein set forth, or shown by the drawings I can cast or pour walls of concrete or other cement mixture, which walls will have an air space of a predetermined size, and except as to the abutments the walls may be of any desired thickness, within the limits of the length of the lag-screws.

It will be noted that the invention herein set forth provides vertically divided abutment forming members which support the tie-bars and which also maintain all reinforcements of the wall and the inner and the outer mold plates, and that each section of the abutment forming members are of like construction and of a length and size sufficient when assembled to carry all the parts required to mold an entire story of a building.

The clamp shown by Fig. 3, consists of a flat bar 24, of suitable material that has near one end a recess 25 and at a suitable distance therefrom a perforation to receive a pin 26. In use the pin 26 being removed the recessed end of the bar is inserted in the space between opposite pairs of vertical members or supports to engage with a tie-bar to place the same in a recess 25 in the bar 24, the bar being moved to draw the tie-bar in one of the recesses 13, the pin 26 is then inserted

and by depressing the end of the bar that carries the pin such pin will be forced into engagement with the edges of the members 9, as shown by Fig. 1, thus holding a tie bar in place until an opposite member or support has been erected, separate clamps being used for each of the tie-bars, it being noted that the recesses 13 space the tie-bars 14 which are held in place by the clamp and that the removable pin 26 thereof engages the sides of two of the members 9 and holds the tie-bar in the recess 13, until abutting members are placed in position when the recesses in the abutment forming members will maintain the tie-bars which tie bars may be either flat or round.

It will be noted that the tie-bars 14, are of such length that the ends thereof will be located at a considerable distance beyond the abutments and that the vertical bars 16 engage the looped ends of the tie-bars 14 that support the horizontal bars, and in practice the bars are tied to each other as shown.

With a mold of the character hereinbefore described, no scaffolding is required and the ties and all reinforcing bars are maintained in place when the mold is set up, which I consider an advantage over placing the ties and reinforcements during the filling of the molds with concrete.

It will be noted that the top 10, is of less width than the distance between the outer faces of the walls, to allow a space for completing the filling of the wall forming chambers, and that the construction and arrangement of parts are such as to dispense with collapsible inner forms.

Though I have shown a preferred construction for molding a hollow wall, a part of which consists of oppositely located interior abutments, vertically located and connected by comparatively thin portions, such walls having continuous air spaces, I do not limit myself to the precise construction of the parts shown, as the size may be varied and the construction modified without departing from my invention, as set forth or pointed out by the claims.

The abutment forming members and supports though preferably of wood may be of wood faced with metal particularly when outer forms or planks are not used and the cement is applied with a concrete gun. The abutment forming members can be spaced to provide the door and window openings and will carry the frames thereof.

I claim:—

1. In a mold for molding *in situ* hollow walls having oppositely located and inward extending abutments with converging sides and truncated ends, a pair of similarly shaped supports which when associated provide means for forming the abutments and tie-bars for connecting the abutments

which are maintained between the supports that constitute the abutment forming members.

2. In a mold for constructing hollow walls having abutments, a pair of abutment forming members provided with reduced longitudinal edges in which are formed recesses that constitute means for supporting tie-bars.

3. In a mold for use in constructing hollow walls with abutments, vertically maintained supports for inner and outer mold plates which constitute abutment forming members the engaging edges thereof being provided with tie-bar receiving recesses.

4. In a mold for use in the construction of concrete walls, separable supporting members each of which have parallel inner and outer faces, an end at right angles thereto, an angular face and a reduced portion, means for maintaining a plurality of such members to provide abutment forming parts of the mold, and means for associating inner and outer mold plates with the outer faces of the supporting members.

5. In a mold for hollow walls which have inward extending abutments which are connected by tie-bars, vertically divided supports which constitute mold sections, reduced abutting portions in which are formed recesses for tie-bars, and means for associating with said vertically divided mold sections and supports inner and outer mold plates.

6. In a mold for hollow walls, a plurality of abutment forming members, for inner and outer mold plates, means for removably attaching the inner and the outer plates to said abutment forming members, and longitudinally disposed spacing means that are engaged by the abutment forming members.

7. In a mold for forming walls with abutments, a vertical support and a complementary support each in cross section being of the same shape and adapted when reversed

to be used as abutment forming members of a mold and as carriers for inner and outer mold plates; when the plates are associated therewith to form the walls with which the abutments are integral.

8. In a mold for use in forming hollow walls having oppositely located abutments with converging sides and truncated ends, of a pair of abutment forming members and supports for other members of a mold, the abutment forming members having reduced portions the edges of which are adapted to abut and recesses in such reduced portions.

9. In a mold for forming walls having integral abutments, an abutment forming means comprising two members which in cross section are hexagonal the same being formed by the removal of a trapezoidal portion from one corner which is of less width than the width of the members, to provide with other parts of the mold a wall having abutments with flat ends and inclined sides.

10. In a mold for use in the construction of walls having abutments, the combination of a plurality of vertical members which are associated in pairs each pair being of such transverse configuration as to provide an abutment forming recess, mold plates which are associated with said members beyond the abutment forming recess and other mold plates maintained in parallel relation thereto.

11. In a mold for use in constructing walls which are provided at intervals with abutments, a pair of vertical members which when associated provide means for molding the abutments, mold plates which are adapted to be removably attached to the vertical members to span the spaces beyond the ends thereof, mold plates which are spaced beyond the abutment forming members and means for maintaining such mold plates which engage with the abutment forming members.

JOHN R. RICHARDSON.



US006050043A

United States Patent [19]
Rosenblat et al.

[11] **Patent Number:** **6,050,043**
[45] **Date of Patent:** **Apr. 18, 2000**

[54] **APPARATUS AND METHOD FOR SUPPORTING CONCRETE BEAMS, WALLS AND THE LIKE**

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Primary Examiner—Michael Safavi
Attorney, Agent, or Firm—Piper, Marbury, Rudnick & Wolfe

[21] Appl. No.: **09/070,301**

[57] **ABSTRACT**

[22] Filed: **Apr. 30, 1998**

Related U.S. Application Data

[60] Provisional application No. 60/072,000, Jan. 20, 1998.

[51] **Int. Cl.**⁷ **E04G 15/06**

[52] **U.S. Cl.** **52/577**; 249/61; 249/175;
249/DIG. 2; 29/469

[58] **Field of Search** 52/720.1, 576,
52/577, 320; 249/DIG. 2, 61, 175, 176;
29/469; 493/391

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A completely closed and reinforced box-like structure for forming a void area in a concrete formation is constructed of a flat sheet that is scored with a plurality of parallel crease lines and features a side edge reinforcing panel. The reinforcing panel has a plurality of slots thereon. A plurality of interior and end pieces are slit scored so that they may be folded to provide interior and end support units. The support units define a plurality of spaced apart partitions having a plurality of slots and flat support surfaces thereon. The structure is assembled by initially folding the side edge reinforcing panel into a position generally normal to the flat sheet to define a longitudinal rib. The support units are then attached to the longitudinal rib by registering the slots in the partitions in interlocking relationship with corresponding slots on the rib. The support units are then rolled over to fold remaining panels of the sheet along the crease lines in wrapping relation around the support units and thus, the flat support surfaces. As a result, an enclosure with an interior chamber is defined wherein each of the support partitions substantially fills the cross-sectional area of the interior chamber and the flat support surfaces abut the enclosure. A pair of end panels cover the enclosure end openings so that the box-like structure is completely closed.

27 Claims, 7 Drawing Sheets

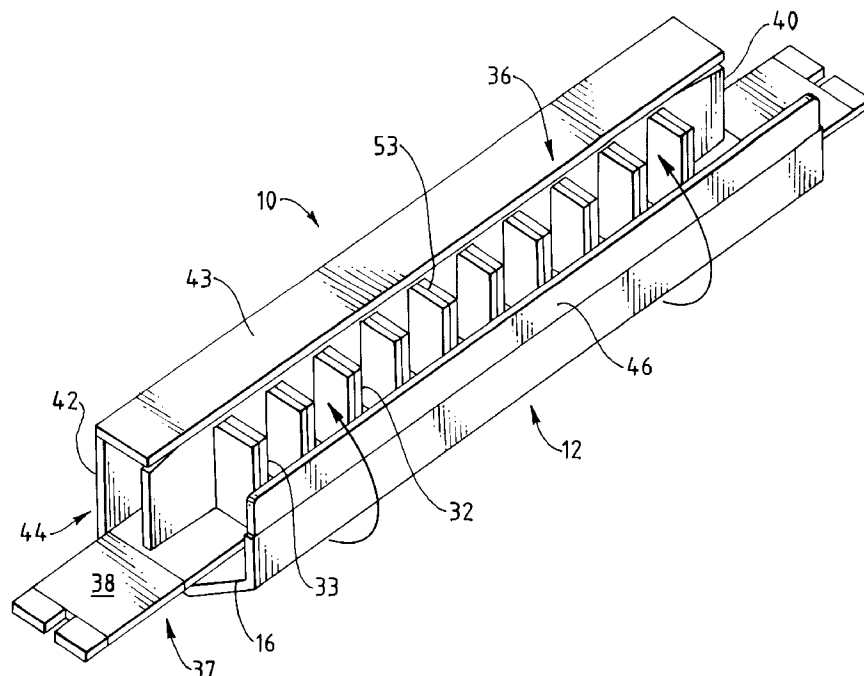


FIG. 1

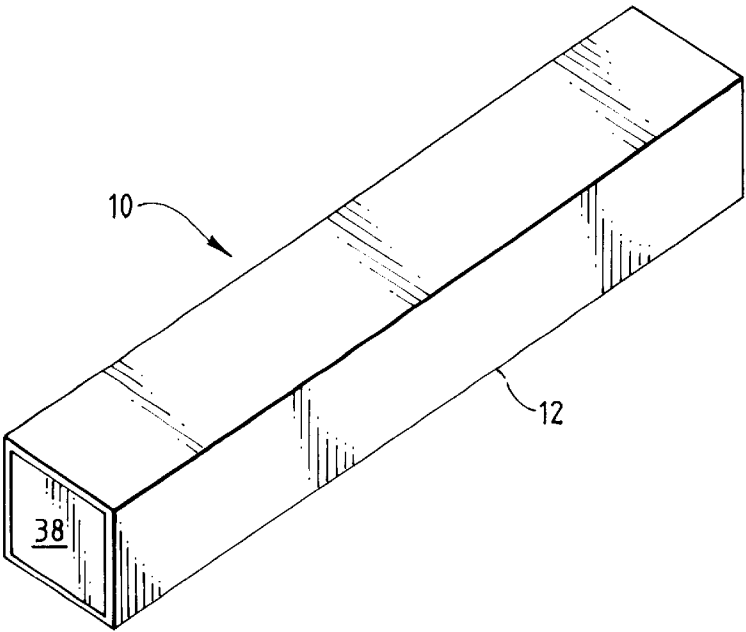


FIG. 2

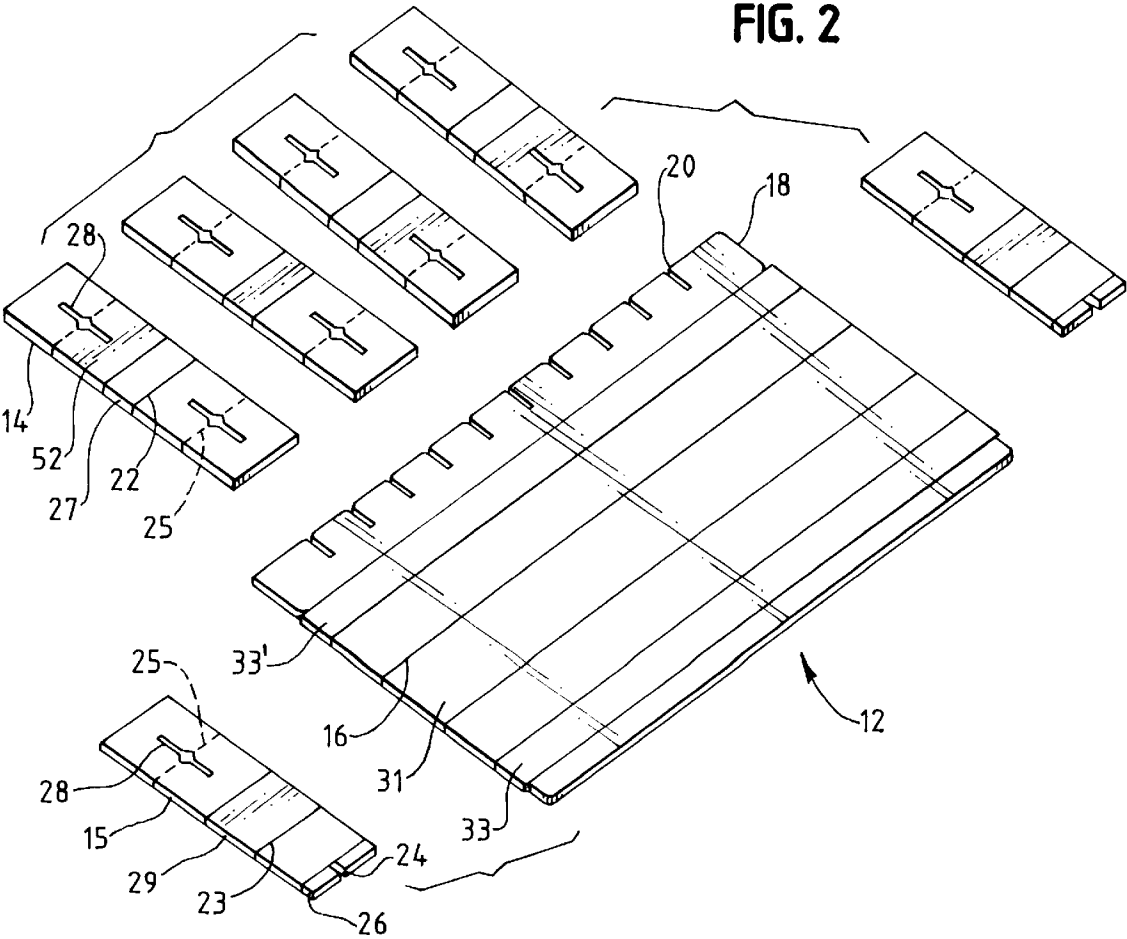


FIG. 3

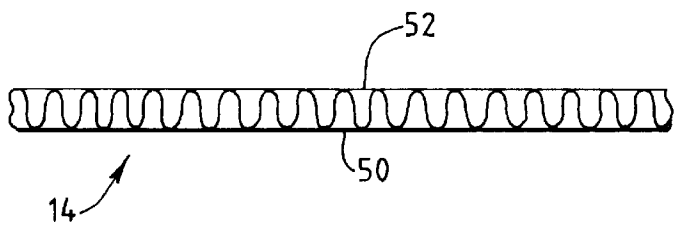


FIG. 4

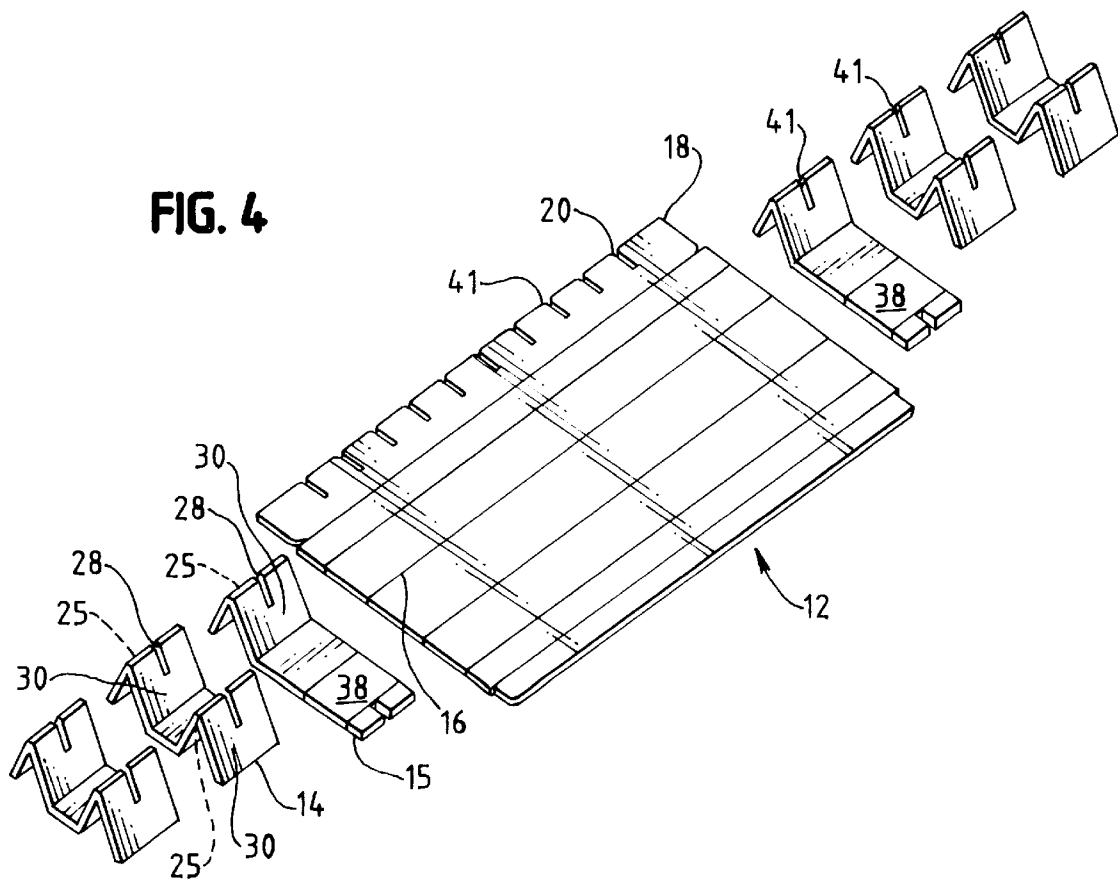


FIG. 5

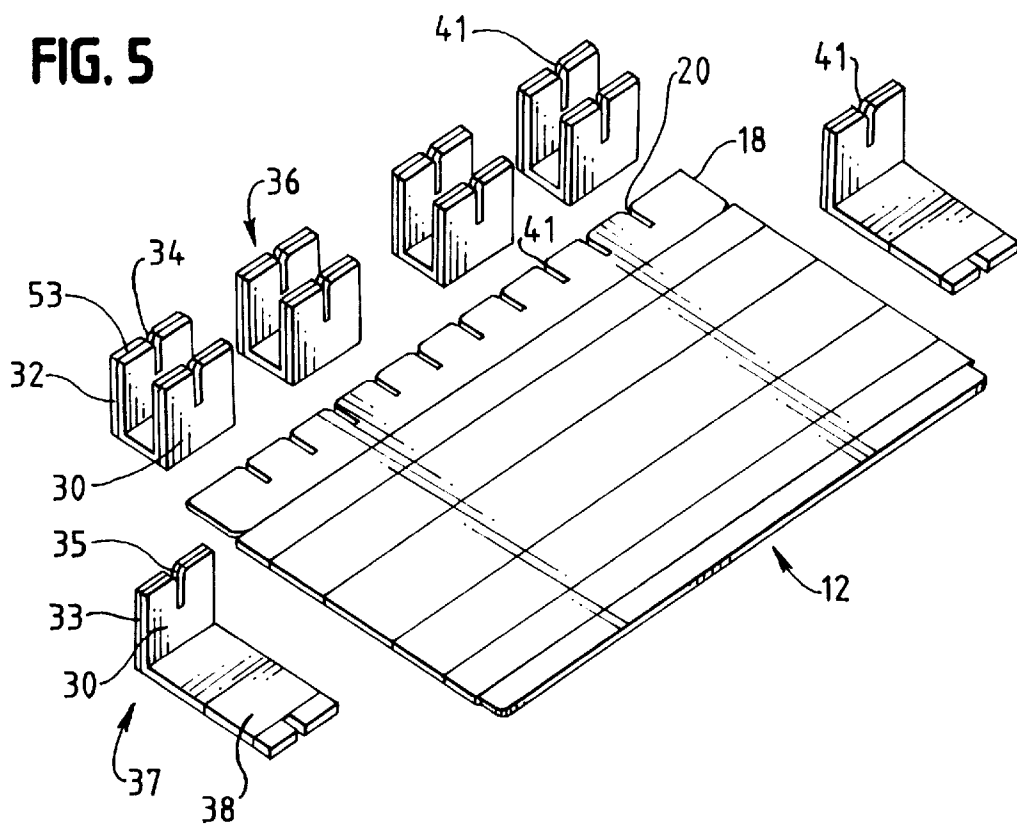
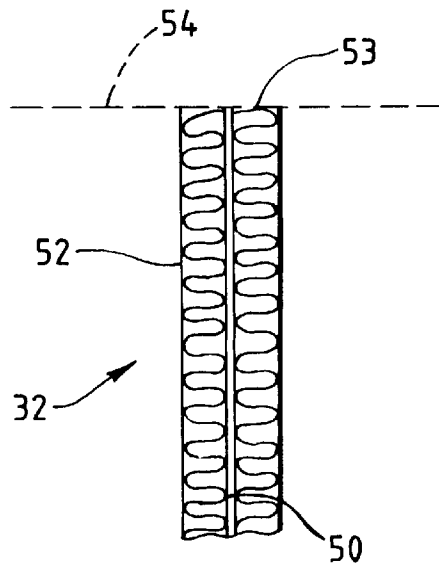


FIG. 6



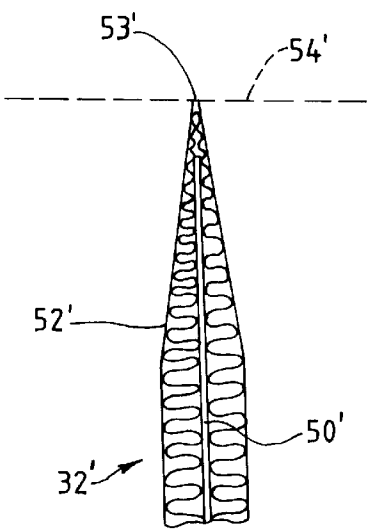
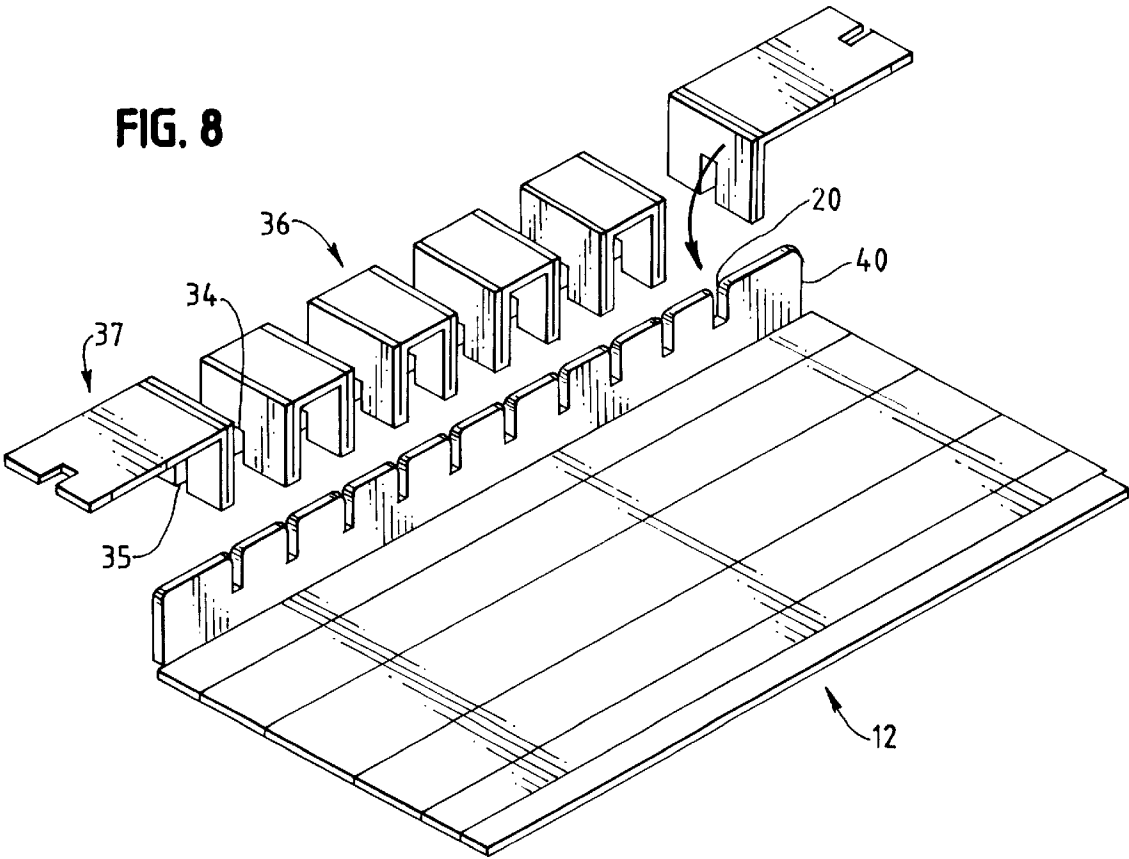
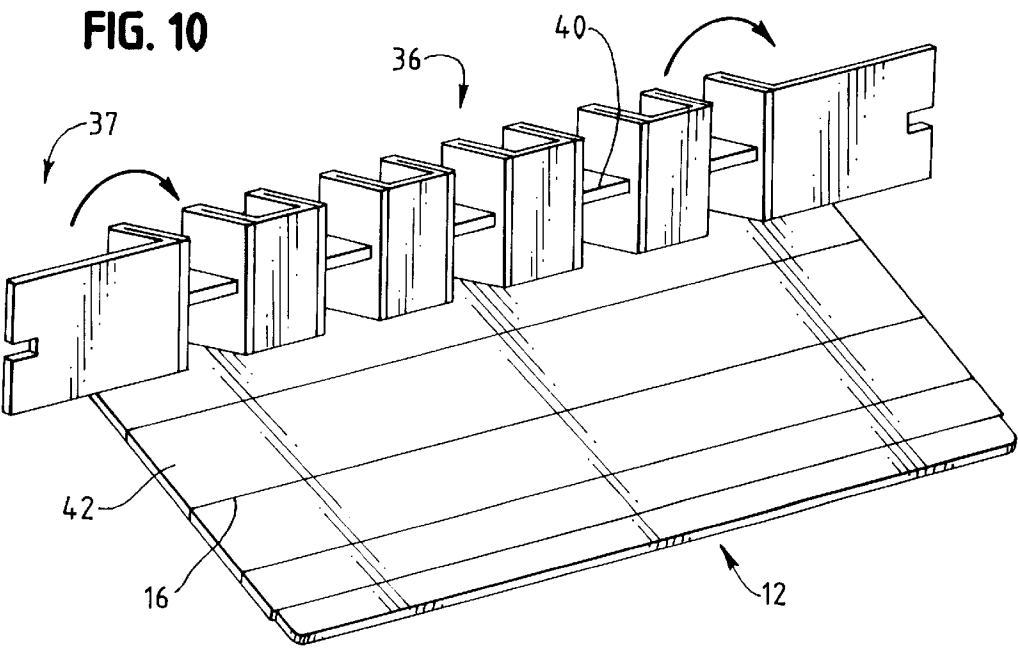
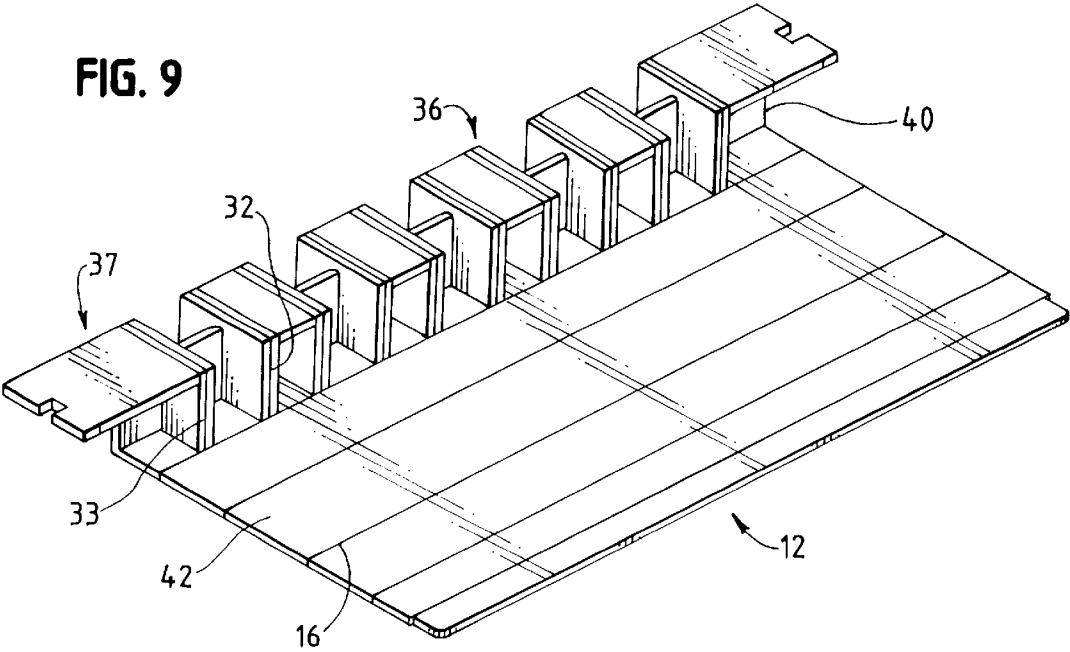
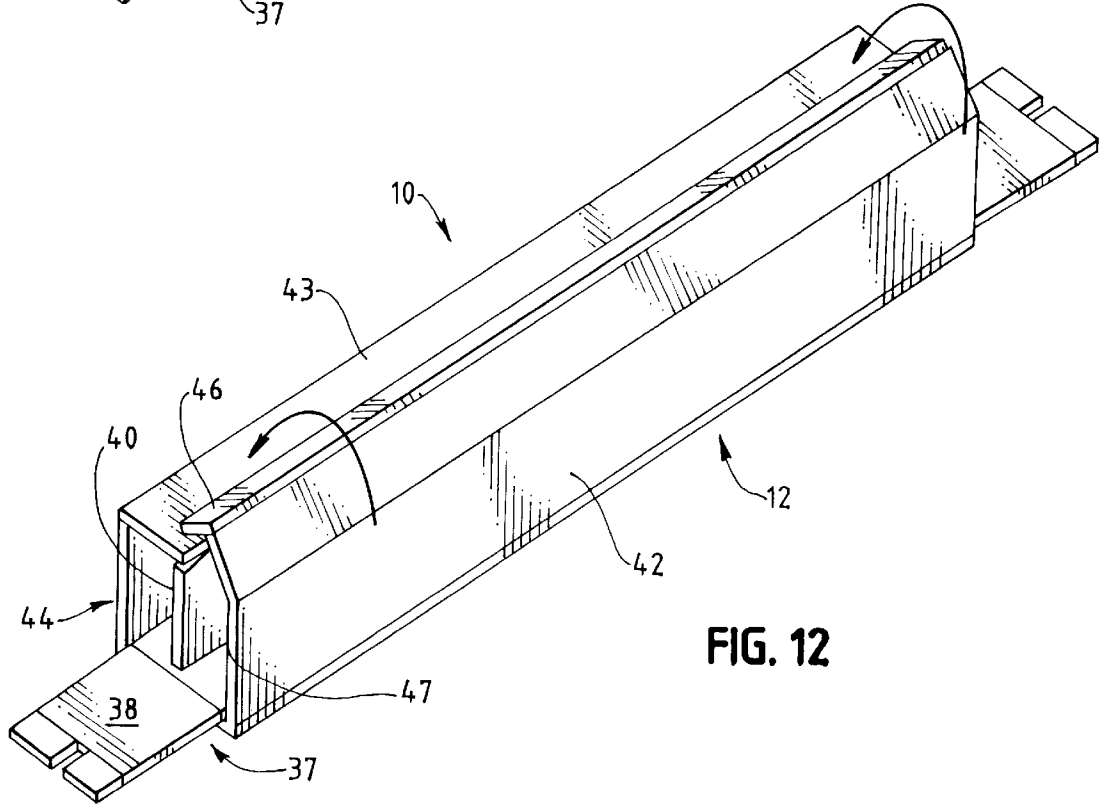
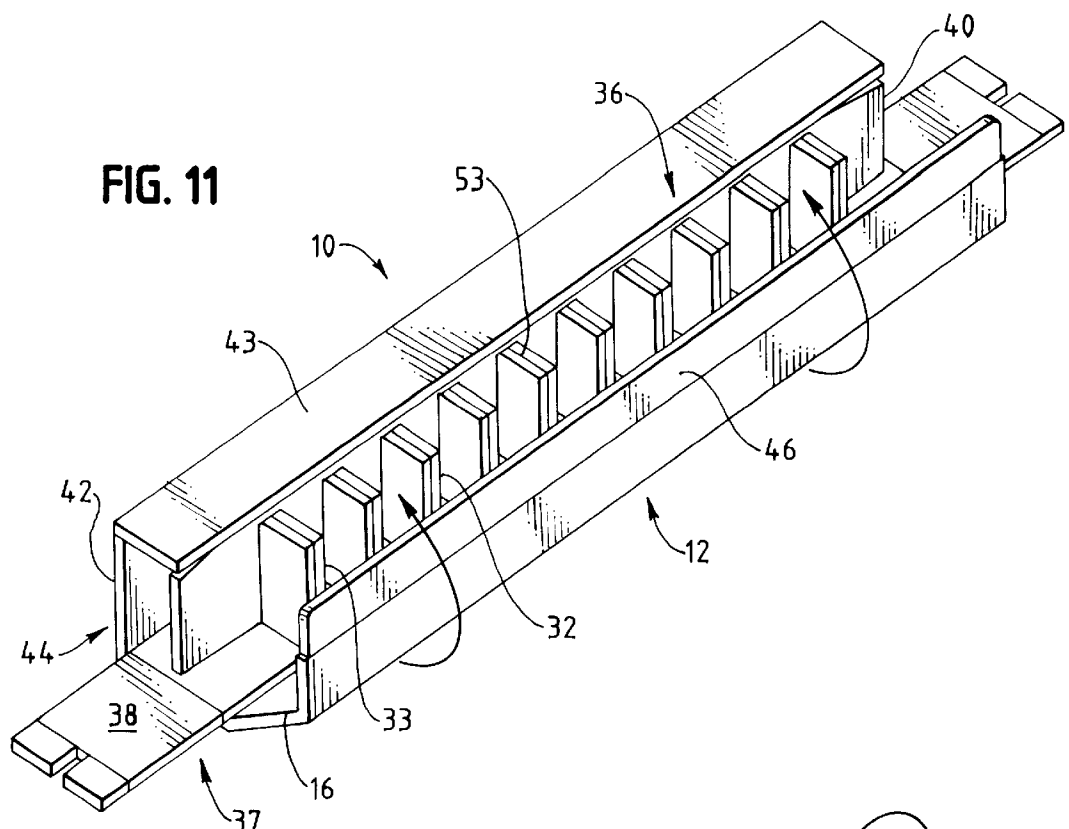
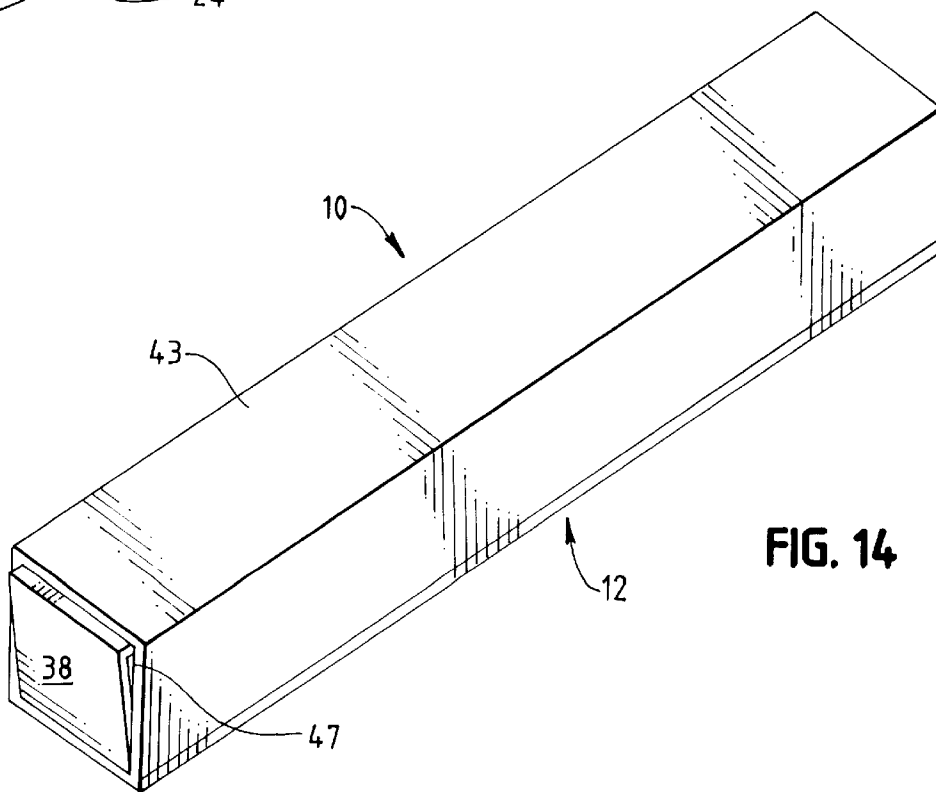
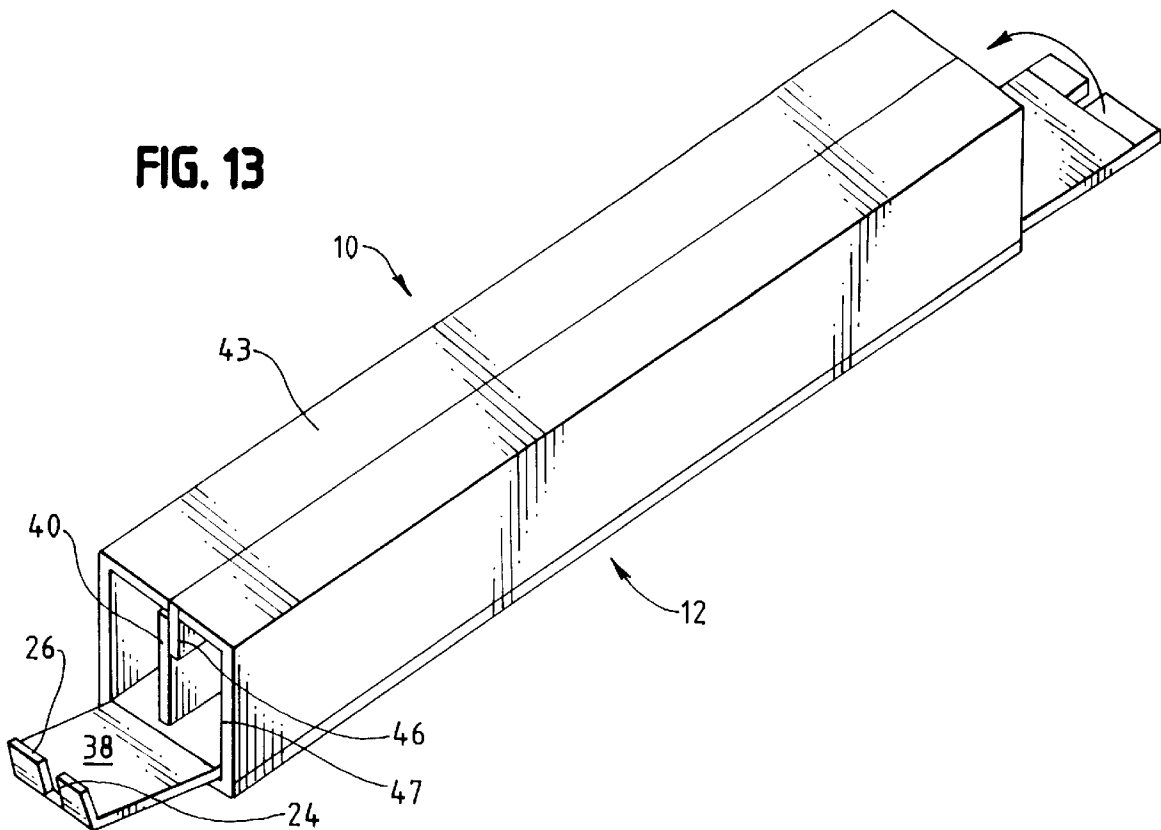


FIG. 7
PRIOR ART









APPARATUS AND METHOD FOR SUPPORTING CONCRETE BEAMS, WALLS AND THE LIKE

This application claims the benefit of U.S. Provisional Application No. 60/072,000 filed Jan. 20, 1998.

FIELD OF THE INVENTION

The present invention relates generally to reinforced cardboard structures for creating voids in concrete formations, and more particularly, to a box-like structure capable of being assembled at a construction site and supporting a structural column or grade beam until the concrete dries and the box-like structure deteriorates, thereby creating a void in the concrete formation.

BACKGROUND OF THE INVENTION

It is commonly known in the construction industry to create spaces or voids in or under various types of concrete formations. For example, concrete formations below grade such as the structural foundation of a building often require a space or void between the foundation and the ground to accommodate expansion of the soil, thereby preventing damage to the foundation. Thus, it is often desirable to create a void between the structural floor and/or grade beams of a foundation and the underlying soil to accommodate upheaval of the soil. It may also be desirable to create a void between the walls of a foundation and the surrounding soil to accommodate a similar expansion of the soil below grade. In addition, voids can also be utilized above grade between cement floor slabs to reduce the amount of cement required and to make the resulting slab lighter.

Another type of concrete formation that sometimes requires a void is a concrete pillar or column. It is often desirable to create a void in a pillar or column to allow room for internal plumbing, electrical conduits or the like within the column. By forming a void in the column, the items within the column are protected and the cost of making the column can be reduced because less concrete is required.

Typically, these voids are created by placing a biodegradable support structure made of corrugated cardboard in the desired location. These support structures are configured to support the building structural components until the poured concrete is capable of holding its own weight. As the concrete dries, and as the cardboard eventually deteriorates, a void is left in the concrete formation. However, such support structures are typically difficult to assemble and often can only be assembled at a factory and transported to a construction site.

Support structures featuring a main wrapping sheet with separate individual insert sections have been known. While these support structures could be assembled at the construction site, they provided an unsatisfactory compressive strength. Of the many features which in combination provided the overall compressive strength, FIG. 7 shows the prior art triangular shaped peaks that served as interior supports for the support structure side walls (see dashed line 54' in FIG. 7). Such triangular peaks offered low compressive strength and thus adversely effected the quantity of concrete that could be supported by the support structure.

Another feature of the prior art structure included interior walls assembled from single sections of paperboard. The paperboard sections were folded to provide double thickness walls and single thickness walls.

Heretofore known support structures that could be assembled on site also featured ends that were open. This

proved undesirable as it provided the very ends of the support structure surfaces with little or no support. In addition, such an arrangement provided an additional possible entry point for wet concrete. This was very undesirable as when the interior cardboard became wet, it lost virtually all of its strength.

Accordingly, it is an object of the present invention to provide a box-like structure that may be either delivered factory assembled to the construction site, or delivered in a "knocked-down" configuration for easy assembly and installation on site.

It is another object of the present invention to provide a box-like structure with a high compressive strength.

It is another object of the present invention to provide a box-like structure that prevents the leakage of liquid concrete into its interior.

It is still another object of the present invention to provide a box-like structure that is capable of being assembled in an efficient manner.

SUMMARY OF THE INVENTION

In view of the above, and in accordance with the present invention, there is provided a method of making a reinforced box-like structure for forming a void area in a concrete formation. A flat sheet of corrugated cardboard or similar material is scored with a plurality of parallel crease lines. A side edge reinforcing panel is also provided. The reinforcing panel has a plurality of slots thereon extending generally perpendicularly relative to the crease lines. A plurality of interior and end support units made of corrugated paper are provided separate from the flat sheet and feature a plurality of crease lines and slit scores. The support units define a plurality of spaced apart partitions having a plurality of slots and flat support surfaces thereon.

Each support unit is formed by folding a flat piece of material along parallel crease and slit score lines to define a plurality of spaced apart partitions with each featuring a flat support surface. The support units are formed so that the partitions have double-thickness walls that are separated by slit scoring. Also, the slots on the double-walled partitions are initially defined as slits extending transversely across the slit scoring on the flat pieces of material. Thus, the flat pieces of material are folded such that panel sections on each side of the slit scoring move into side by side relationship to define the double-walled partitions with flat support surfaces. The slits transverse to the slit scores are thereby also folded in half to form unitary insertion slots extending approximately one half the height of the double-walled partitions.

The structure is assembled by initially folding the side edge reinforcing panel into a position generally normal to the flat sheet to define a longitudinal rib. The support units are then attached to the longitudinal rib by registering the slots in the partitions in interlocking relationship with corresponding slots on the rib, wherein the partitions extend transversely relative to said rib. The support units are then rolled over to fold remaining panels of the sheet along the crease lines in wrapping relation around the support units and thus, the flat support surfaces. Thus, an enclosure with an interior chamber is defined wherein each of the support partitions substantially fill the cross-sectional area of the interior chamber. In addition, the flat support surfaces about the enclosure. This provides the support structure with increased strength so that an appropriate quantity of concrete may be supported thereby.

After the remaining panels of the flat sheet have been wrapped around the support units, a locking side flap of the

sheet opposite the reinforcing side flap is tucked adjacent the rib. In addition, the pair of end support units feature end panels that are folded inward to cover the ends of the box-like structure. Locking end flaps, positioned on each of the end panels, are tucked so that their end slots engage the ends of the longitudinal rib and the locking side flap. As a result, the box-like structure is completely closed so as to prevent the entry of wet cement. This allows the cardboard within the structure to remain dry and strong.

The present invention provides significant advantages over other void forming box-like structures. The support units with flat support surfaces may be easily assembled and releasably attached to the longitudinal rib of the cardboard sheet to provide internal strength for the structure. The connection of the support units to the rib also allows the overall box-like structure to be easily formed by rolling or "wrapping" the panels of the sheet around the support units. Thus, the completely closed box-like structures can be delivered factory assembled to the construction site, or they can be delivered in a "knocked-down" configuration for easy assembly and installation on site. Mechanical fasteners are not required to assemble the completely closed box-like structures, which are typically in the form of a beam or floor structure.

The present invention, together with further objects and advantages, will be best understood by reference to the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a top perspective view of a box-like structure completely assembled in accordance with the present invention;

FIG. 2 is a top perspective view showing a plurality of flat generally planar pieces of material such as cardboard that are cut and creased in relation to each other prior to assembly;

FIG. 3 is a partial end elevation view of an interior piece of FIG. 2;

FIG. 4 is a top perspective view similar to FIG. 2 but showing flat auxiliary pieces of material being folded along slit scores to create a plurality of support units defining spaced apart partitions;

FIG. 5 is a perspective view similar to FIG. 4 but showing the support units in folded relation such that the partitions in each support unit have double-thickness walls;

FIG. 6 is a partial end elevation view of a partition of FIG. 4;

FIG. 7 is a partial end elevation view of a partition of a prior art device;

FIG. 8 is a perspective view of the box-like structure of the present invention with the support units oriented to operably interconnect to a longitudinal rib of the sheet;

FIG. 9 is a perspective view showing assembly of the support units to the rib by registering insertion slots in the partitions with corresponding slots in the rib;

FIGS. 10 and 11 are perspective views showing the assembled support units being rolled over so that the remaining panels of the sheet wrap around the support units;

FIG. 12 is a perspective view showing a locking side panel opposite the reinforcing side panel being inserted adjacent the rib; and

FIGS. 13 and 14 are perspective views showing the end panels being folded and the locking end flaps being inserted to close the box-like structure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

While the present invention is susceptible of embodiment in various forms, there is shown in the drawings and will hereinafter be described a preferred embodiment of the invention with the understanding that the present disclosure is to be considered as setting forth an exemplification of the invention which is not intended to limit the invention to the specific embodiment illustrated.

Referring now to the drawings, wherein like reference numerals refer to like parts throughout the several views, there is shown in FIG. 1 a reinforced box-like structure 10 for forming a void area in a concrete formation (not shown). Although only a single box-like structure 10 is shown in FIG. 1, it will be understood by those having ordinary skill in the art that in a typical construction site, a plurality of box-like structures substantially identical to the structure 10 would be placed underneath grade beams of a building foundation to support substantially the entire weight of the grade beams when the concrete is initially poured.

Referring now to FIG. 2, the structure is initially formed from a rectangular, flat outer sheet 12, a plurality of rectangular, flat interior pieces 14 and a plurality of rectangular, flat end pieces 15 of a semi-rigid material. Preferably, the outer sheet 12, interior pieces 14 and end pieces 15 are made of corrugated paperboard. To facilitate folding, the outer sheet 12 is scored with a plurality of parallel crease lines 16 that define three adjacent side panels 31 as well as a first half-side panel 33 and a second half-side panel 33'. The outer sheet 12 also has a side edge reinforcing panel 18 with a plurality of evenly spaced slots 20 thereon which extend generally perpendicularly relative to the crease lines 16. Similarly, the flat interior and end pieces 14 and 15 are also scored with a plurality of parallel crease lines 22 and 23 thereon that define interior bridge panels 27 and end bridge panels 29 and facilitate folding. A transverse end slot 24 is also formed in a locking end flap 26 on each end piece 15. Transverse slits 28 are formed in each interior piece 14 as well as in the two end pieces 15. As will be discussed in more detail below, the slits 28 in the interior and end pieces 14 and 15 are ultimately manipulated to register with the slots 20 in the outer sheet reinforcing panel 18.

Interior and end pieces 14 and 15 are also provided with slit scores, indicated by dashed lines 25. Referring to FIG. 3, interior pieces 14 feature inner layers 50 and outer layers 52. The slit scoring is accomplished by slitting the outer layers 52 along the paths indicated by dashed lines 25 in FIG. 2. The inner layers 50 are not slit. Slit scoring 25 is performed upon end piece 15 in the same manner.

As illustrated in FIGS. 4 and 5, the interior and end pieces 14 and 15 are folded so that panel sections 30 on each side of the slit scores 25 move into side by side relationship to define a plurality of double-thickness walls or partitions 32 and end partitions 33. The slits 28 on each slit score 25 are thereby also folded in half to form unitary insertion slots 34 and 35 extending approximately one half the height of the partitions 32 and 33. As a result, interior support units 36 and end support units 37 are defined. Each end support unit 37 is also configured with a single end panel 38 which, as will become apparent, defines a pair of single-thickness end walls.

As shown in FIG. 6, the slit scoring 25 allows partitions 32 (and likewise 33) to provide a flat support surface 53. As a result, partitions 32 and 33, and thus support units 36 and 37, are very effective at supporting heavy surfaces oriented in the manner indicated by dashed line 54. In contrast to the

apparatus and method of the present invention, if slit scoring were not used, partitions **32** and **33** would have a profile as indicated in FIG. 7 at **32'**. More specifically, the top portion of the partition would have the profile of a triangle with the apex forming the support surface **53'**. Such an arrangement only allows a minimal load to be accommodated by surface **54'** without the occurrence of buckling.

To begin assembly of the interior and end support units **36** and **37** to the outer sheet **12**, the side edge reinforcing panel **18** (FIGS. 2, 4 and 5) is folded into a position generally normal to the flat outer sheet **12** to define a longitudinal rib **40** (FIG. 8). The interior and end support units **36** and **37** are then attached to the longitudinal rib **40** by registering the slots **34** and **35** into interlocking relationship with the corresponding slots **20** in the rib **40** (FIG. 9). Thus, the interior and end support units **36** and **37** are secured to the rib **40** and the partitions **32** and **33** extend transversely relative to the rib **40**.

As will be appreciated, the slots **20** in the rib **40** have a thickness substantially the same as the overall thickness of the partitions **32** and **33**, and the slots **34** in the partitions **32** have a thickness substantially the same as the thickness of the rib **40**. To facilitate registration of the partitions **32** and **33** with rib **40**, the slots **20**, **34** and **35** each have a chamfer region **41** on the top of each slot **20**, **34** and **35**. (FIGS. 4 and 5).

After they are assembled to the rib **40**, the support units **36** and **37** are rolled over to fold remaining panels **42** of the sheet **12** along the crease lines **16** in a wrapping relation (FIGS. 10-12). As will be appreciated, the width of each panel **42** corresponds to an associated edge of the partitions **32** and **33**. Thus, as shown in FIGS. 11 and 12, the foregoing folding or rolling about the crease lines **16** results in an inherently strong enclosure **43** with an interior chamber **44**, wherein each of the support partitions **32** and **33** substantially fills the cross-sectional area of the interior chamber **44** and the support surfaces **53** of the support units abut the outer sheet **12** to enhance the strength of the structure **10**. The outer sheet **12** is also provided with a locking side flap **46** opposite the reinforcing rib **40**, which is tucked into abutting relationship with the rib **40** as shown in FIG. 13.

Finally, as shown in FIGS. 13 and 14, end panels **38** are folded inward so that locking end flaps **26** may be inserted into the opposing end openings **47** of the enclosure **43** with end slots **24** receiving the ends of rib **40** and locking side flap **46**. This allows box-like structure **10** to be completely closed so as to eliminate the leakage of liquid concrete into its interior.

Thus, an inherently strong, cellular box-like structure **10** is provided that can support a great deal of weight when concrete is poured thereon to create a void.

Preferably, the box-like structure **10** is manufactured to ISO 9001 Standards and is available in a wide variety of sizes, shapes and strengths to accommodate the desired void-forming application. For example, the box-like structure is preferably available in a "standard" strength having approximately 1200 PSF ultimate capacity, which is approved for a maximum beam/wall height of 8 feet, and an "extra" strength having approximately 2000 PSF ultimate capacity, which is approved for a maximum beam/wall height of 14 feet. It should be noted that an engineer's discretion may be substituted for the maximum beam/wall heights stated for each strength. The dimensions of the box-like structure itself can also vary depending on the particular application. For example, the standard and extra versions of the box-like structure **10** can have a width of 8, 9, 10 and 12 inches, and a height of 4, 6, 8, 10 and 12 inches.

In a preferred form of the invention, the box-like structure **10** is covered with a protective coating on each exterior surface to provide temporary protection prior to installation of the box-like structure **10** at the construction site. In case of extremely wet ground conditions, it may be desirable to cover the box-like structure **10** with a water resistant membrane. For example, the box-like structure **10** can be covered with a polyurethane coating, preferably about 4 millimeters thick, with overlapping joints where required. Where fitting is required, a desired area can be wrapped to prevent penetration of water from wet concrete.

Thus, a box-like structure is provided which is inherently strong and easy to assemble without glues or mechanical fasteners at a construction site or prior to delivery to the construction site. The strength of the corrugated paper and the orientation of the crease and slit score lines facilitates the unique folding action to allow quick and easy assembly of the partitions. The double-thickness walls of the partitions, combined with the flat support surfaces provided by the slit scoring, increase the vertical strength of the box-like structure to provide adequate support for a concrete formation.

From the foregoing, it will be observed that numerous modifications and variations can be effected without departing from the true spirit and scope of the novel concept of the present invention. It will be appreciated that the present disclosure is intended as an exemplification of the invention, and is not intended to limit the invention to the specific embodiment illustrated. The disclosure is intended to cover by the appended claims all such modifications as fall within the scope of the claims.

What is claimed is:

1. A reinforced box-like structure for forming a void area in a concrete formation, comprising:

an enclosure defining an interior chamber;

a longitudinal rib extending in a normal direction from a wall of said enclosure into said interior chamber;

a plurality of interior support units attached to said longitudinal rib, each including a plurality of spaced apart support partitions extending transversely to said longitudinal rib and substantially filling a cross-sectional area of said interior chamber; and

each of said support partitions including a double-thickness wall folded about slit scoring so as to define a flat support surface upon which said enclosure is supported so as to increase interior structural support thereof.

2. The structure of claim 1 wherein said enclosure defines a pair of opposing end openings and further comprising a pair of end panels, each of which engage said enclosure to cover said opposing end openings.

3. The structure of claim 2 further comprising a pair of end support units, one of each of which are attached to one of each of said end panels and each including an end support partition transversely attached to said longitudinal rib and sized so as to substantially fill the cross-sectional area of said interior chamber.

4. The structure of claim 2 further comprising a pair of locking end flaps, one of each attached to one of each of said end panels and each including an end slot therein, said end flaps inserted through one of each of said end openings of said enclosure with said end slots engaged by said longitudinal rib.

5. The structure of claim 1 wherein said support units are provided separate from the enclosure prior to assembly and are removably attachable to said longitudinal rib.

6. The structure of claim 1 wherein said longitudinal rib has a plurality of slots formed therein for interconnection with the partitions of the support units.

7. The structure of claim 6 wherein each of said partitions has a slot formed therein for registering in interlocking relationship with corresponding slots in the longitudinal rib.

8. The structure of claim 1 wherein the enclosure is configured as a flat sheet prior to assembly, said flat sheet having parallel crease lines thereon to facilitate folding of the flat sheet into said enclosure.

9. The structure of claim 8 wherein the support units are attached to the rib, and subsequently rolled over to fold remaining panels of the enclosure along said crease lines in wrapping relation around said support units and a remaining locking side flap is inserted adjacent the rib.

10. A reinforced box-like structure for forming a void area in a concrete formation, comprising:

an enclosure having an interior chamber;

a longitudinal rib extending in a normal direction from a wall of said enclosure into said interior chamber;

an interior support unit formed of an interior piece that is separate from said enclosure having an inner layer and an outer layer, said outer layer of said interior piece having a plurality of parallel slits therethrough so as to define a plurality of parallel slit scores, said interior piece folded about said slit scores so as to define a plurality of support partitions each of which includes a double-thickness wall and defines a flat support surface;

each of said support partitions engaging said longitudinal rib transversely and sized so as to extend across said interior chamber both vertically and horizontally with said flat support surfaces abutting said enclosure; whereby interior structural support of said enclosure is increased.

11. The structure of claim 10 wherein said enclosure defines a pair of opposing end openings and further comprising a pair of end panels, each of which engage said enclosure to cover said opposing end openings.

12. The structure of claim 11 further comprising a pair of end support units, one of each of which are attached to one of each of said end panels and each including an end support partition transversely attached to said longitudinal rib and sized so as to substantially fill the cross-sectional area of said interior chamber.

13. The structure of claim 11 further comprising a pair of locking end flaps, one of each attached to one of each of said end panels and each including an end slot therein, said end flaps inserted through one of each of said end openings of said enclosure with said end slots engaged by said longitudinal rib.

14. The structure of claim 10 wherein said support units are provided separate from the enclosure prior to assembly and are removably attachable to said longitudinal rib.

15. The structure of claim 10 wherein said longitudinal rib has a plurality of slots formed therein for interconnection with the partitions of the support units.

16. The structure of claim 15 wherein each of said partitions has a slot formed therein for registering in interlocking relationship with corresponding slots in the longitudinal rib.

17. The structure of claim 10 wherein the enclosure is configured as a flat sheet prior to assembly, said flat sheet having parallel crease lines thereon to facilitate folding of the flat sheet into said enclosure.

18. The structure of claim 17 wherein the support units are attached to the rib, and subsequently rolled over to fold remaining panels of the enclosure along said crease lines in wrapping relation around said support units and a remaining locking side flap is inserted adjacent the rib.

19. An assembly for forming a reinforced box-like structure that may be used to form a void area in a concrete formation, comprising:

a flat outer sheet having a plurality of parallel crease lines thereon and a side edge reinforcing panel adjacent one of said parallel crease lines so that it may be folded into a position generally normal to the flat sheet to define a longitudinal rib;

said longitudinal rib having a plurality of slots thereon extending generally perpendicular to said crease lines; a plurality of flat interior pieces that are separate from said flat outer sheet, each having a plurality of parallel slit scores thereon, a plurality of transverse slits extending transversely across said slit scores and panel sections on each side of said slit scores so that when each of said flat interior pieces are folded about said slit scores, said panel sections move into a side by side relationship to define a plurality of support partitions which include double-thickness walls and define flat support surfaces and said transverse slits fold in half to form unitary insertion slots in said partitions;

whereby the insertion slots in the partitions may be interlocked with corresponding slots on the rib so that said partitions extend transversely relative to said rib so that said outer sheet may be wrapped about said partitions so that said flat support surfaces abut said outer sheet.

20. The assembly of claim 19 wherein the parallel crease lines of said flat outer sheet define three adjacent side panels, two of which are bordered by first and second half-side panels with said first said half-side panels bordered by a locking side flap and said second half-side panel bordered by said side edge reinforcing panel so that said locking side flap and said longitudinal rib engage when said outer sheet is wrapped about said partitions.

21. The assembly of claim 19 wherein the flat interior pieces each include at least one pair of parallel crease lines that define at least one interior bridge panel that extends between said support partitions when each of said flat interior pieces is folded.

22. The assembly of claim 19 further comprising a flat end piece having a slit score thereon, a transverse slit extending transversely across said slit score and panel sections on each side of said slit score so that when said flat end piece is folded about said slit score, said panel sections move into a side by side relationship to define an end support partition which defines a flat support surface and said transverse slit folds in half to form a unitary insertion slot in said end support partition and one of said panel sections being connected to an end bridge panel via a crease line with said end bridge panel being connected to an end panel via a crease line;

whereby the unitary insertion slot of said end support partition may be inserted into a slot of said longitudinal rib so that said end panel may be folded to cover an end opening after said outer sheet is wrapped about said support partitions.

23. A method of making a reinforced box-like structure for forming a void area in a concrete formation, comprising:

providing a flat outer sheet having a plurality of parallel crease lines thereon and a side edge reinforcing panel, said reinforcing panel having a plurality of slots thereon extending generally perpendicularly relative to said crease lines;

providing a plurality of flat interior pieces that are separate from the flat outer sheet, each having a plurality of parallel slit scores thereon and a plurality of transverse slits extending transversely across said slit scores;

folding each flat interior piece such that panel sections on each side of said slit scores move into side by side relationship to define a plurality of support partitions, each featuring a double-thickness wall and a flat support surface, whereby the transverse slits on said slit scores are folded in half to form unitary insertion slots in said partitions and whereby each folded interior piece defines an interior support member;

folding the side edge reinforcing panel into a position generally normal to the flat sheet to define a longitudinal rib;

attaching said support units to the longitudinal rib by registering the insertion slots in the partitions in interlocking relationship with corresponding slots on the rib, wherein said partitions extend transversely relative to said rib; and

folding remaining panels of the outer sheet along said crease lines in wrapping relation around said support units, thereby defining an enclosure with an interior chamber, each of said support partitions extending across said interior chamber both horizontally and vertically with said flat support surfaces abutting said enclosure to increase the strength of the structure.

24. The method of claim 23 further comprising the steps of:

providing a pair of end panels; and

engaging said enclosure with said end panels to cover opposing end openings defined by said enclosure.

25. A reinforced box-like structure for forming a void area in a concrete formation, comprising:

an enclosure having an interior chamber and defining a pair of opposing end openings;

a longitudinal rib extending in a normal direction from a wall of said enclosure into said interior chamber;

a pair of end panels, each of which engage said enclosure to cover said opposing end openings;

a pair of locking end flaps, one of each attached to one of each of said end panels and each including an end slot therein, said end flaps inserted through one of each of said end openings of said enclosure with said end slots engaged by said longitudinal rib;

an interior support unit formed of an interior piece having an inner layer and an outer layer, said outer layer of said interior piece having a plurality of parallel slits there-through so as to define a plurality of parallel slit scores, said interior piece folded about said slit scores so as to define a plurality of support partitions each of which defines a flat support surface;

each of said support partitions engaging said longitudinal rib transversely and sized so as to substantially fill a cross-sectional area of said interior chamber with said flat support surfaces abutting said enclosure;

whereby interior structural support of said enclosure is increased.

26. An assembly for forming a reinforced box-like structure that may be used to form a void area in a concrete formation, comprising:

a flat outer sheet having a plurality of parallel crease lines thereon and a side edge reinforcing panel adjacent one of said parallel crease lines so that it may be folded into a position generally normal to the flat sheet to define a longitudinal rib;

said longitudinal rib having a plurality of slots thereon extending generally perpendicular to said crease lines;

a plurality of flat interior pieces each having a plurality of parallel slit scores thereon, a plurality of transverse slits

extending transversely across said slit scores and panel sections on each side of said slit scores so that when said flat interior pieces are folded about said slit scores, said panel sections move into a side by side relationship to define a plurality of support partitions which define flat support surfaces and said transverse slits fold in half to form unitary insertion slots in said partitions so that the insertion slots in the partitions may be interlocked with corresponding slots on the rib so that said partitions extend transversely relative to said rib so that said outer sheet may be wrapped about said partitions so that said flat support surfaces abut said outer sheet;

a flat end piece having a slit score thereon, a transverse slit extending transversely across said slit score and panel sections on each side of said slit score so that when said flat end piece is folded about said slit score, said panel sections move into a side by side relationship to define an end support partition which defines a flat support surface and said transverse slit folds in half to form a unitary insertion slot in said end support partition and one of said panel sections being connected to an end bridge panel via a crease line with said end bridge panel being connected to an end panel via a crease line so that the unitary insertion slot of said end support partition may be inserted into a slot of said longitudinal rib so that said end panel may be folded to cover an end opening after said outer sheet is wrapped about said support partitions.

27. A method of making a reinforced box-like structure for forming a void area in a concrete formation, comprising:

providing a flat outer sheet having a plurality of parallel crease lines thereon and a side edge reinforcing panel, said reinforcing panel having a plurality of slots thereon extending generally perpendicularly relative to said crease lines;

providing a plurality of flat interior pieces each having a plurality of parallel slit scores thereon and a plurality of transverse slits extending transversely across said slit scores;

folding each flat interior piece such that panel sections on each side of said slit scores move into side by side relationship to define a plurality of support partitions, each featuring a flat support surface, whereby the transverse slits on said slit scores are folded in half to form unitary insertion slots in said partitions and whereby each folded interior piece defines an interior support member;

folding the side edge reinforcing panel into a position generally normal to the flat sheet to define a longitudinal rib;

attaching said support units to the longitudinal rib by registering the insertion slots in the partitions in interlocking relationship with corresponding slots on the rib, wherein said partitions extend transversely relative to said rib;

folding remaining panels of the outer sheet along said crease lines in wrapping relation around said support units, thereby defining an enclosure with an interior chamber, each of said support partitions substantially filling a transverse cross-sectional area of said interior chamber with said flat support surfaces abutting said enclosure to increase the strength of the structure;

providing a pair of end panels; and

engaging said enclosure with said end panels to cover opposing end openings defined by said enclosure.