

en los ocho vértices, de tal manera que un bloque se pueda unir al siguiente -sin necesidad de mortero- bien sea en sentido vertical o en sentido horizontal; este bloque tiene, además un receso en tres o cuatro de sus costados superior, laterales o inferior. El segundo módulo es un bloque generalmente cúbico con una protuberancia en uno o más de sus costados. El segundo bloque tiene un interior hueco.

El problema planteado en esta solicitud es satisfacer la necesidad de lograr un sistema de construcción que sea sismorresistente, liviano, fácil de erigir y no requiera mano de obra especializada.

Para solucionar este problema técnico la solicitud en estudio proporciona dos tipos de módulos de material liviano: el primero, es un bloque de construcción de forma generalmente paralelepípeda con medios machiembrados en los ocho vértices, de tal manera que un bloque se pueda unir al siguiente -sin necesidad de mortero- bien sea en sentido vertical o en sentido horizontal; este bloque tiene, además un receso en tres o cuatro de sus costados superior, laterales o inferior. El segundo módulo es un bloque generalmente cúbico con una protuberancia en uno o más de sus costados. El segundo módulo tiene un interior hueco. El sistema de construcción se basa en que, al poner varios módulos del primer tipo unidos entre sí, se forma una pared que tiene unos conductos verticales y horizontales formados al unir los recesos de dos bloques vecinos entre sí. Estos conductos se pueden llenar con concreto reforzado mediante varillas, para formar una red interna. Además, al colocar unas columnas, hechas con los módulos del segundo tipo, superpuestos, espaciadamente a lo largo de los muros, se logra darle una sustentación firme a éstos, gracias a que se rellena el interior hueco con concreto reforzado con varillas para formar columnas sólidas. Estas columnas pueden servir para colocar muros en ángulo recto, dependiendo del número de protuberancias que tenga el módulo del segundo tipo empleado.

Clasificación Internacional de Patentes (IPC): E04C 1/39, E04B 2/28, 2/32

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3. De la solicitud de Patente

Antes de entrar en detalles específicos, se le dan al solicitante ciertas indicaciones generales, algunas de las cuales son aplicables a este caso y todas deberán ser tenidas en cuenta en las eventuales modificaciones:

El título o nombre de la invención debe concordar con lo que se reclama en el capítulo reivindicatorio. Esto es, si en las reivindicaciones se reclama un producto, tal producto debe ser mencionado en el título, y si en las reivindicaciones se reclama un procedimiento o un sistema o un método, también debe ser mencionado allí. Normalmente, el título debe contener máximo diez palabras aunque eventualmente pueden ser más. El título no debe contener palabras cuyo significado no esté reconocido dentro del sector de la técnica de que se trate. Preferiblemente, deben ser palabras cuyo significado se encuentre en el Diccionario de la Real Academia Española (DRAE).

En Colombia, la máxima autoridad en cuestiones del lenguaje es la Academia Colombiana de la Lengua. En caso de duda sobre el significado de las palabras, se debe acoger la definición que trae el Diccionario de la Real Academia Española (DRAE).

En Colombia, es de uso obligatorio el Sistema Internacional de unidades. Esto implica, también, que la coma decimal es de uso obligatorio. Cuando aparezca algún valor con unidades diferentes a las exigidas, deberá incluirse su correspondiente conversión al Sistema Internacional.

La parte técnica de la solicitud se divide en tres secciones, debidamente separadas, preferiblemente en este orden: El capítulo descriptivo, el capítulo reivindicatorio y el juego de dibujos o figuras. Se prefiere que el texto se presente escrito de manera mecánica, en una sola columna. Ninguna de estas secciones podrá llevar membretes (encabezamientos o pies de página) ajenos al contenido técnico de la solicitud.

Por lo menos el capítulo descriptivo debe estar debidamente paginado y estar escrito a doble espacio, con el fin de facilitar la referencia a los apartados del texto. Se debe evitar, en lo posible, el uso de mayúsculas corridas, hay que recordar que ese empleo equivale a gritar en el lenguaje oral. Se pueden emplear las mayúsculas para resaltar ciertos apartados del texto, pero si todo el texto está escrito en mayúsculas, nada queda resaltado.

La terminología empleada en la descripción y en las reivindicaciones debe ser igual para designar las diferentes partes, piezas, elementos, detalles o aspectos de lo que se mencione en ellas; los cuales, a su vez, deben estar designados con números o signos de referencia.

Dentro del texto de la descripción y las reivindicaciones se aconseja encerrar entre paréntesis el número o signo de referencia cada vez que se mencione el detalle correspondiente, con el fin de distinguirlo de otros tipos de números o signos que eventualmente aparezcan allí. Estos números o signos de referencia deben aparecer dentro del juego de dibujos (preferiblemente, sin paréntesis, aunque pueden estar encerrados dentro de un círculo) siempre acompañados de líneas o flechas que señalen o indiquen a qué parte, pieza, elemento o aspecto se encuentran asociados.

Las reivindicaciones deben estar numeradas individual y consecutivamente (1, 2, ... 5, 6, etc.) El capítulo reivindicatorio no debe tener subtítulos.

Normalmente se pueden encontrar dos categorías de reivindicaciones: una, la de producto; y, la otra, de procedimiento.

En las reivindicaciones se deben definir los alcances de la protección que desea el solicitante. En consecuencia, las reivindicaciones forman un cuerpo aparte de la descripción y como tal debe ser redactado: la primera vez que se mencione un nombre dentro de las reivindicaciones debería estar acompañado de un artículo indeterminado; y, la inclusión -entre paréntesis- de un número de referencia no sustituye la definición del elemento o aspecto al que se refiere, simplemente sirve de información complementaria. Se debe entender que la descripción sirve para interpretar las reivindicaciones y, en consecuencia, si en una reivindicación se reclama un aparato, por ejemplo, no se deberían mencionar aspectos del funcionamiento del aparato dentro de la reivindicación, limitándose a definir únicamente los elementos que constituyen el aparato.

Para detectar si una definición de producto está bien hecha, se debe poder responder a la cuestión: ¿cómo es el producto reclamado? Si no se puede dar una respuesta razonable, es porque el producto está mal definido o no ha sido definido en absoluto. Otra prueba común es la de invertir el razonamiento: ¿son las características definidas -en determinada reivindicación- propias de un producto? Si la definición de una característica de un producto empieza por un verbo, muy seguramente no es una característica propia del producto.

Normalmente no se puede definir un producto por el procedimiento de su

obtención, porque el producto, en la mayoría de los casos, es producido en cantidades industriales por una variedad de procedimientos, muchos de los cuales no dejan trazas o huellas que se puedan detectar satisfactoriamente en el producto terminado y puesto a disposición del público.

Por lo demás, los productos industriales son bienes tangibles, son algo concreto, tienen existencia física, y por tanto son susceptibles de definición mediante sus características físicas -en la mayoría de los casos- o físico-químicas en los restantes, aunque existen unas pocas excepciones -que pertenecen a ciertas tecnologías emergentes- en donde resulta más fácil su identificación por el procedimiento de obtención, pero éste no es el caso en la presente oportunidad.

Cada una de las figuras debe estar debidamente identificada, preferiblemente con un número consecutivo: Figura 1, figura 2, ...

Las figuras deben ser realizadas siguiendo las reglas del dibujo técnico.

Se prefiere que dentro de las figuras no se incluya ningún texto. Cada uno de los detalles ilustrados en las figuras deberá estar señalado con un número o signo de referencia, el cual será el mismo en todas las figuras en donde se encuentre el detalle en cuestión. Si en alguna figura no se encuentran números de referencia, se entiende que no se va a decir nada sobre ella dentro del texto de la descripción y, entonces, es preferible que se omita tal figura. Análogamente, si en una figura no se encuentra señalado algún detalle con el respectivo número de referencia, es preferible que se omita tal detalle.

La patente de modelo de utilidad no puede incluir los procedimientos, por definición. Si alguna de las reivindicaciones de una solicitud de patente de modelo de utilidad reclama un procedimiento, debe ser suprimida.

Descripción (artículo 28 D. 486)

Durante el análisis del texto de la descripción y de las ilustraciones anexadas, se observaron los siguientes defectos:

- 1) En la página 2, folio 6, aparece la expresión *patente internacional* que no tiene un significado específico dentro de la propiedad industrial.
- 2) En la página 5, folio 9, aparece por primera vez la expresión *Fig. 5* que no corresponde a ninguna ilustración anexada. Dentro del juego de dibujos se encuentran, en cambio, la figura 5A y la figura 5B, ver folio 32, que no merecieron una mención dentro del texto de la descripción.
- 3) En la página 6, folio 10, con relación a la figura 1 [folio 28], se mencionan los siguientes números de referencia: (101), (105), (107) y (109) que no se encuentran señalados allí. Los números de referencia (101), (107) y (109) tampoco se encuentran en alguna otra figura, a pesar de que se citen esporádicamente dentro del texto; ver, por ejemplo, la página 8, folio 12, o, la página 11, folio 15.
- 4) En la misma página 6 se menciona *la cara superior (103)* pero, en la figura 1, folio 28, si bien aparece el número de referencia (103), no aparece asociado a una flecha o una línea de señalización.
- 5) En la misma página 6, aparece por primera vez la expresión *y/o*. Al respecto, el *Diccionario panhispánico de dudas* de la Real Academia Española y de la Asociación de Academias de la Lengua Española, primera edición, octubre de 2005, página 681, dice:

y/o: Hoy es frecuente el empleo conjunto de las conjunciones copulativa y disyuntiva separadas por una barra oblicua, calco del inglés «and/or», con

la intención de hacer explícita la posibilidad de elegir entre la suma o la alternativa de dos opciones: «Se necesitan traductores de inglés y/o francés». Se olvida que la conjunción 'o' puede expresar en español ambos valores conjuntamente.

El examinador ha subrayado la última frase porque es particularmente aplicable a este caso.

- 6) En la página 7, folio 11, aparece por primera vez la expresión *módulos de columna (2)* pero, en ninguna de las figuras anexadas se encuentra señalado el número de referencia (2).
- 7) En la página 11, folio 15, aparece la expresión *varillas de refuerzo ubicadas en cada una de las esquinas del cuadrado, rectángulo, círculo u óvalo del espacio interior de la columna* en la cual se ignora que significa *esquinas del... círculo u óvalo*.
- 8) En la página 12, folio 16, aparece la expresión *el sistema de construcción de la presente invención comprende un sistema de losa como techo* que se objeta, en primer lugar, porque lo que se define no debe entrar dentro de la definición, en este caso *el sistema...comprende un sistema...*; en segundo lugar, porque dentro del juego de dibujos no se ilustra cómo son esas losas; y, en tercer lugar, porque *sistema* significa, según el Diccionario de la Real Academia Española (DRAE): *Conjunto de cosas que relacionadas entre sí ordenadamente contribuyen a determinado objeto*; y, en este caso concreto, si solo se habla de las losas...
- 9) En la página 13, folio 17, aparece la expresión *se fijan con epóxico* que no es clara, ¿se trata de un *adhesivo* epóxico?
- 10) En la misma página 13 aparece la expresión *hasta 3 o 4 cm por debajo...* que se objeta, en primer lugar, porque *hasta* es una preposición que se usa para expresar un término límite, en este caso, en relación con el espacio y si se dice hasta 3 o 4 no se sabe cuál es el límite, lo correcto sería *hasta 4 cm*; y, en segundo lugar, cuando se expresa un intervalo o rango, cada una de las cifras debe estar acompañada por sus unidades lo correcto sería: *entre 3 cm o 4 cm por debajo...* El solicitante deberá escoger cual es el sentido que desea expresar y hacer la modificación pertinente.
- 11) En la página 14, folio 18, aparecen las expresiones *2.8 m* , *½"* que se objetan, la primera, porque no emplea la coma decimal, de uso obligatorio en Colombia, con relación a expresiones numéricas; y, la segunda porque no se deben emplear fracciones sino cifras decimales y porque se deben expresar las unidades de acuerdo al Sistema Internacional.

La descripción no cumple con los requisitos de claridad y divulgación completa, lo que dificulta o impide su comprensión y ejecución de acuerdo al Art. 28 de la Decisión 486

Reivindicaciones (artículo 30 D 486)

Durante el análisis del texto de las reivindicaciones se observaron los siguientes defectos:

- 1) En la reivindicación 1, folio 21, aparece el número de referencia (107) que no se encuentra señalado en ninguna de las figuras anexadas, por lo que se ignora su significado dentro del contexto.
- 2) En la reivindicación 2, folio 21, aparece la expresión *caracterizado porque comprende opcionalmente un cuarto espacio...* que no contribuye a definir los alcances de la protección que desea el solicitante. Se debe suprimir el término *opcionalmente* para que la reivindicación adquiera sentido pleno, asertivo.
- 3) En la reivindicación 4, folio 21, aparece la expresión *puede tener... o comprender...* que es ambigua, porque así como puede tener puede no tener y así

como puede comprender puede no comprender. El solicitante deberá modificar la expresión objetada sustituyéndola por una expresión asertiva: *tiene...* o *comprende...* u otra expresión que se ajuste mejor a lo que el solicitante quiere decir.

4) En la misma reivindicación 4 aparece por primera vez dentro del capítulo reivindicatorio la expresión *y/o* que fue objetada arriba, con relación a la descripción.

5) En la reivindicación 6, folio 21, aparece la expresión *tienen una profundidad... su ancho va desde... y su largo vertical oscila...* en la cual, en primer lugar se objeta la expresión *largo vertical* ¿se trata de la altura?; y, en segundo lugar, se considera que no es apropiado aquí usar el verbo *oscilar*.

6) En la reivindicación 7, folio 21, se reclama *el módulo... según la reivindicación 1, caracterizado porque la forma de los conectores macho-hembra se selecciona del grupo que comprende forma triangular... forma trapezoidal, entre otras* pero, se objeta el hecho de que en la reivindicación 1, folio 21, no se han mencionado *conectores macho-hembra* -sí se mencionan conectores macho y conectores hembra, pero, por separado-; y, también se objeta que el *grupo de formas* que se menciona no es un grupo cerrado, definido, ya que incluye *entre otras* [formas]. La reivindicación 7 carece de claridad y de definición por estas causas.

7) En la reivindicación 10, folio 22, aparece la expresión *pueden presentar diferentes formas... entre otras* que no contribuye a definir los alcances de la protección que desea el solicitante, en primer lugar, porque así como pueden presentar pueden no presentar; y, en segundo lugar, porque al decir *entre otras* no se están limitando las posibilidades.

8) En la reivindicación 11, folio 22, aparece la expresión *oscilan desde 4 cm en adelante* en la cual se objeta, en primer lugar, el empleo del verbo *oscilar*; y en segundo lugar la expresión *en adelante*, que no contribuye a definir los alcances de la protección que desea el solicitante. Se sugeriría sustituirla por la expresión *4 cm como mínimo* pero, como está hablando de *espacios vacíos* ¿serían 4 cm^3 como mínimo? La modificación que se haga aquí debe tener sustento en la descripción, en todo caso.

9) En la reivindicación 12, folio 22, se reclama *un sistema de construcción de viviendas caracterizado porque comprende uno o más módulos... de una cualquiera de las reivindicaciones anteriores* pero, aquí es pertinente analizar lo que se está reclamando: ¿*un sistema... que comprende... uno... de los módulos*? No tiene sentido. Tampoco tiene sentido si son varios módulos, porque lo que se ha divulgado es un sistema que comprende tanto los dos tipos de módulos (uno para formar los muros y el otro para formar las columnas) como el concreto y las varillas de refuerzo. La reivindicación 12 carece de claridad, de definición y de sustento por la descripción.

10) En la reivindicación 13, folio 22, se reclama *El sistema... caracterizado adicionalmente porque comprende... y opcionalmente un sistema de losas* expresión en la que se objeta, en primer lugar, el término *opcionalmente* que es ambiguo; y, en segundo lugar se objeta que lo que se define [*sistema*] entre en la definición. También se objeta el hecho de que el *sistema de losas* no haya sido suficientemente definido dentro de la descripción.

11) En la misma reivindicación 13 aparece, por primera vez dentro del capítulo reivindicatorio, la expresión *módulo de columna (2)* en la cual el número de referencia (2) fue objetado arriba, con relación a la descripción.

12) En la reivindicación 15, folio 22, se objeta el término *opcionalmente* por la razón expuesta arriba, en su oportunidad.

13) En la reivindicación 17, folio 23, se objeta la expresión *entre otras* por la razón expuesta arriba, en su oportunidad.

- 14) En la reivindicación 19, folio 22, se objeta la expresión *puede tener... o comprender...* por la razón expuesta arriba, en su oportunidad. Un defecto similar se encuentra en la reivindicación 39, folio 25.
- 15) En la reivindicación 21, folio 23, se objetan las expresiones *pueden presentar, entre otras* por las razones expuestas arriba, en su oportunidad.
- 16) En la reivindicación 22, folio 23, se objeta la expresión *espacios vacíos... parten desde 4 cm en adelante* por razones análogas a las que se encuentran arriba con relación a una expresión similar.
- 17) En las reivindicaciones 23 y 24, folios 23 y 24, se objeta el término *coinciden* porque está asociado a formas complementarias no idénticas o similares.
- 18) En la reivindicación 29, folio 24, se objeta la expresión *ancho y diámetro en adelante* que carece de sentido.
- 19) En la reivindicación 32, folio 25, se objeta el término *acolados* cuyo significado, según el Diccionario de la Real Academia Española (DRAE), no concuerda con el contexto.
- 20) En la reivindicación 37, folio 25, se objeta la expresión *sistema... caracterizado porque el sistema para losas... un sistema de acople... y un sistema de agarre* en la cual lo que se define entra dentro de la definición.
- 21) En la reivindicación 41, folio 26, se reclama *el sistema... de una cualquiera de las reivindicaciones anteriores...* pero, en las reivindicaciones 1 a 11 no se reclama un *sistema*.
- 22) En la misma reivindicación 41 se objeta la expresión *pueden ser* porque es ambigua.
- 23) En la reivindicación 43, folio 26, se objeta la expresión *losa de fundición*, porque no se encuentra dentro del texto de la descripción, y en consecuencia, esta reivindicación carece de sustento.
- 24) En la misma reivindicación 43, aparece la expresión *caracterizado porque adicionalmente comprende... cualquier otro elemento convencionalmente utilizado en construcción* que no contribuye a definir los alcances de la protección que desea el solicitante.
- 25) En la reivindicación 44, folio 26, se reclama *el sistema... de la reivindicación 43, caracterizado porque la ubicación... es marcada...* expresión que no es coherente, porque el *sistema* reclamado es un conjunto de cosas, no un conjunto de etapas de un procedimiento. Un defecto análogo se encuentra en las reivindicaciones 45 y 46, folio 26.
- 26) En la reivindicación 46, folios 26 y 27, aparece la expresión *entre otros* que fue objetada arriba, en su oportunidad.

Debe entenderse que las reivindicaciones dependientes de las reivindicaciones objetadas son, asimismo, objetadas, por razones análogas.

Las reivindicaciones no cumplen con los requisitos de definición, claridad, concisión o sustento por la descripción de acuerdo al Art. 30 de la Decisión 486.

Se deben presentar, entonces, nuevos capítulos descriptivo y reivindicatorio, ambos completos, junto con un nuevo juego de dibujos, donde se hayan corregido todas las objeciones que se han hecho arriba. Esto con el fin de evitar -cuando solo se presentan algunas páginas sueltas corregidas- que el lector tenga que desplazarse desde un sitio a otro de la solicitud y luego regresar a donde estaba antes sin perder la ilación de la lectura, porque esto produce confusión y afecta negativamente la claridad de dichos capítulos.

Se le advierte al interesado que las modificaciones sugeridas arriba podrían resultar inconducentes si se mantienen las objeciones a la patentabilidad que se insinúan adelante.

4. Determinación del Estado de la Técnica

La fecha que se ha tenido en cuenta para determinar el Estado de la Técnica es la

Fecha de presentación de la solicitud nacional 2007-09-27

Se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud teniendo en cuenta la fecha indicada; y durante la búsqueda de anterioridades se encontraron los siguientes documentos, que forman parte del estado de la técnica más cercano al objeto de la solicitud:

n.º	Documento	Título	Fecha de publicación
*D1	Patente US 4 223 501, cuyo inventor es Howard K. DeLozier, quien le cedió sus derechos a la Rocky Muntain Foam Form, Inc.	«Concrete form»(Una formaleta para concreto)	1980-09-23
D2	Patente US 4 823 534, cuyo inventor es Carl L. Hebinck	«Method for constructing insulated foam homes»(Un método para construir casas con asilamiento espumoso)	1989-04-25
*D3	Patente US 4 860 515, cuyo inventor es Bruce E. Browning, Jr.	«Self-supporting concrete form»(Una formaleta autosustentada para concreto)	1989-08-29
D4	Patente US 5 024 035, cuyos inventores son Gary N. Hanson y Keith W. Inness, quienes le cedieron sus derechos a la Insulock Corporation	«Building block and structures formed therefrom»(Un bloque de construcción y las estructuras hechas con él)	1991-06-18
D5	Patente US 5 404 685, cuyo inventor es Dennis W. Collins	«Polystyrene foamed plastic wall apparatus and method of construction»(Una pared de plástico espumoso de poliestireno y el método para su construcción)	1995-04-11
D6	Patente US 5 457 926, cuyo inventor es Daniel M. Jensen, quien le cedió sus derechos a la Templeton Trust	«Interlocking block»(Un bloque para entrecruzamiento)	1995-10-17
*D7	Patente US 5 839 249, cuyo inventor es Scott J. Roberts	«Foam block wall and fabrication method»(Una pared de bloques de espuma y su fabricación)	1998-11-24
*D8	Publicación US 2004/0216415 A1, cuyos inventores son Henry E. Pfeiffer, Kelvin Leslie Doerr, Karen Ann Bexten y Maher Khalil Tadros	«Welded reinforcement for modular concrete forms»(Refuerzo soldado para formaletas modulares para concreto)	2004-11-04
D9	Solicitud CO 2006 - 85850 del 2006-08-30, cuyo inventor es Germán Alfonso Echeverri López, publicada en la Gaceta 569, página 127	«Estructura de panel modular»	2006-10-31
D10	Patente CO concedida el 2009-12-15, correspondiente a la solicitud 2006 - 109 624 , cuyo inventor es José Alejandro Castilla Hernández, publicada en la Gaceta 575, página 41	«Bloques para construcción de manpostería»	2007-04-30

* Documentos citados por el solicitante, ver página 2, folio 6.
Se anexa la copia de algunas páginas pertinentes de estos documentos

NOTAS: No se realizaron las evaluaciones de los demás requisitos de patentabilidad, porque se hicieron algunas objeciones respecto a la definición, la claridad, la concisión y el sustento por la descripción de las reivindicaciones; esto es, no se pudo practicar un análisis comparativo, por ausencia de materia.

A pesar de lo anterior, con base en las enseñanzas de los documentos encontrados hasta ahora, se prevén objeciones respecto a la novedad o respecto al nivel inventivo del objeto de la solicitud, porque aparentemente los problemas técnicos propuestos ya habían sido resueltos de una manera similar.

Se le advierte al solicitante que unos de los criterios aplicables al presente caso están formulados en los siguientes textos:

Sobre la novedad:

(...) la identidad entre la pretendida invención y la anterioridad destructiva de su novedad no requiere ser literalmente total; basta con que una persona técnicamente capacitada derive, de la anterioridad relevante, un contenido tecnológico idéntico al de la pretendida invención. En el contexto de la Convención de la Patente Europea, señalan Singer y Lunzer: "El requisito de que exista identidad sustancial entre lo que se reivindica y lo que haya sido previamente publicado en un documento anterior, a fin de establecer la publicación previa, no requiere algo de la naturaleza de una identidad fotográfica, ni que exista identidad de palabras para que el documento previo sea tenido por destructivo de novedad. (El Tribunal técnico de la Oficina Europea de Patentes) decidió que la mera novedad de forma con respecto al estado de la técnica, esto es, una mera diferencia de palabras entre la supuesta invención y el estado anterior de la técnica, no es suficiente para establecer la existencia de novedad. Por el contrario, al examinar la novedad, la cuestión a determinarse es si la técnica preexistente revela la sustancia de la pretendida invención, o bien si existe alguna enseñanza técnica novedosa que pueda ser encontrada en la pretendida invención y que no esté presente en la técnica preexistente."

Derecho de las patentes de invención por Guillermo Cabanellas de las Cuevas, 2a Ed., HELIASTA, Buenos Aires, 2004, págs. 679 y 680. Citado en la oposición a CO 05 - 109 679 Máquina de juego de ruleta por Ernesto Rengifo García, Calle 70 4-30 Tel 2118014 ernesto@garridorengifo.com

Y, sobre el nivel inventivo:

Tomado de *Los requisitos positivos de patentabilidad en el derecho alemán* por Alberto Bercovitz. Madrid, 1969, pág 325:

...Pues bien, a los efectos del Derecho de patentes se consideran equivalentes (patentrechtliche Aequivalente) aquellos medios que, de acuerdo con los conocimientos normales de un perito en la materia, son capaces de realizar la misma función para la consecución de un mismo resultado o para la producción de un mismo efecto, sin que su recíproca sustitución suponga ninguna modificación esencial a la solución dada. Conviene advertir que en Derecho de patentes la equivalencia se juzga siempre referida a un caso concreto, porque los medios equivalentes deben producir los mismos efectos dentro de la concreta idea inventiva de que se trate.

pág 327:

C) Equivalencia técnica

Junto a la equivalencia en el sentido del Derecho de patentes, se refieren los autores a la llamada 'equivalencia técnica'. Son equivalentes técnicos, se dice, aquellos medios conocidos según las reglas normales de la técnica como susceptibles de realizar, en general y sin consideración especial a un caso concreto, las mismas funciones.

Pues bien, la llamada 'equivalencia técnica' no tiene ninguna relevancia desde el punto de vista del Derecho de patentes, a no ser como indicio o presunción de que la 'equivalencia', en el sentido propio de esta rama jurídica, existe en un supuesto dado, puesto que en la mayoría de los casos la equivalencia del Derecho de patentes coincide con esta 'equivalencia técnica' a que nos estamos refiriendo.

3) PRINCIPALES SUPUESTOS DE EQUIVALENCIA

Es interesante hacer mención de los principales supuestos en que la equivalencia, tal como acaba de ser definida, puede manifestarse claramente, aunque quizá conviene advertir que a los efectos de esta enumeración entendemos la 'equivalencia' en un sentido tan amplio, que podría decirse que nos referimos más bien a los principales supuestos de falta de altura inventiva.

A) Cambio de medidas o de cantidad.

Cuando existe una regla técnica conforme a la cual se consigue un resultado determinado, empleando unos medios concretos, no es patentable la modificación de esos medios en cuanto a las medidas o cantidades empleadas, si esa modificación está al alcance de cualquier técnico y su único efecto es la obtención del mismo resultado con variaciones simplemente de cantidad. En estos casos, la segunda regla técnica, establecida con cambios de medidas o de cantidades ha de considerarse equivalente a la primera. Distinto sería, naturalmente, el caso en que la modificación introducida no estuviera dentro de las posibilidades de cualquier técnico o en que el resultado conseguido fuera diferente al anterior.

B) Modificación insignificante de algún elemento de una regla técnica.

Tampoco es patentable la modificación de alguno de los elementos señalados en una regla técnica para la obtención de un resultado, cuando dicha modificación es tan insignificante que está al alcance de cualquier técnico y no varía realmente el resultado. Este es el caso, en particular, de los simples cambios de forma en las piezas o aparatos.

C) Sustitución, en una regla técnica, de un medio por otro totalmente distinto, pero que realiza la misma función.

Cuando en una regla técnica se sustituye un medio por otro totalmente distinto, pero que en el caso concreto realiza la misma función que el anterior para la obtención del mismo resultado, estamos también ante un caso típico, el más típico, de equivalencia, siempre que la posibilidad de la sustitución estuviera al alcance de cualquier técnico en la materia. Este es precisamente el supuesto al que la doctrina de los equivalentes apunta de una manera más directa.

Es un caso especialmente frecuente, dentro de este supuesto de equivalencia, el del cambio en la materia o sustancia utilizada. Esta sustitución no es patentable cuando estaba al alcance de cualquier técnico y el resultado conseguido a través de ella es el mismo conseguido anteriormente.

D) Adición o supresión de un elemento intrascendente en una regla técnica.

La adición o supresión de un elemento de los previstos en una regla técnica para conseguir un resultado concreto no es patentable, cuando tal adición o supresión no ofrece especiales dificultades o cualquier técnico podía prever que con ella se conseguiría el mismo resultado.

E) Inversión cinemática

La inversión cinemática tampoco es patentable. Este supuesto se refiere al caso en que, dado un proceso químico o físico, se invierta o se modifique el orden de las diversas partes, cuando, según reglas técnicas conocidas, el cambio introducido debe conducir a un efecto previsible por cualquier técnico, y cuando, además, era posible para cualquier perito en la materia la realización de aquel cambio.

Pueden ser ejemplos de inversión cinemática: 1) la inversión del orden, dentro de una maquinaria, entre las partes en movimiento y las partes en reposo; 2) el caso en que, conocido el camino para producir un producto partiendo de una sustancia determinada, se aplica ese conocimiento en sentido inverso, de manera que partiendo del producto final se obtenga la sustancia que antes servía de punto de partida. No se olvide, sin embargo, que en ningún momento puede hablarse de verdadera equivalencia en sentido jurídico, cuando la variación en que la equivalencia consiste no estaba al alcance de un técnico normal.

(...)

Teniendo en cuenta lo anterior, se le sugiere al solicitante que, si considera que el objeto de la solicitud reúne los requisitos para ello -en especial los determinados por el artículo 81 de la Decisión 486-, cambie la modalidad de su solicitud a patente de modelo de utilidad. De aceptar esta sugerencia, deberá expresarlo así y deberá realizar los ajustes que considere necesarios en el capítulo reivindicatorio para que no se encuentre ninguna objeción previsible -en el momento en que la Oficina examine su solicitud para verificar el cumplimiento de los requisitos, bajo esta nueva modalidad-.

Esta sugerencia se hace en concordancia con lo dispuesto en el artículo 35 de la mencionada Decisión.

5. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados negativamente por la falta de claridad de la descripción y las reivindicaciones y por la falta de definición, de sustento y de concisión de estas últimas.

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

United States Patent [19]

DeLozier

[11] 4,223,501

[45] Sep. 23, 1980

[54] CONCRETE FORM

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[73] Assignee: Rocky Mountain Foam Form, Inc., Fort Collins, Colo.

[21] Appl. No.: 974,544

[22] Filed: Dec. 29, 1978

[51] Int. Cl.³ E04B 2/20; E04C 2/20

[52] U.S. Cl. 52/309.11; 52/309.12; 52/426; 52/364; 52/565; 52/712

[58] Field of Search 52/309.2, 309.4, 309.8, 52/309.12, 426, 565, 673, 712, 364

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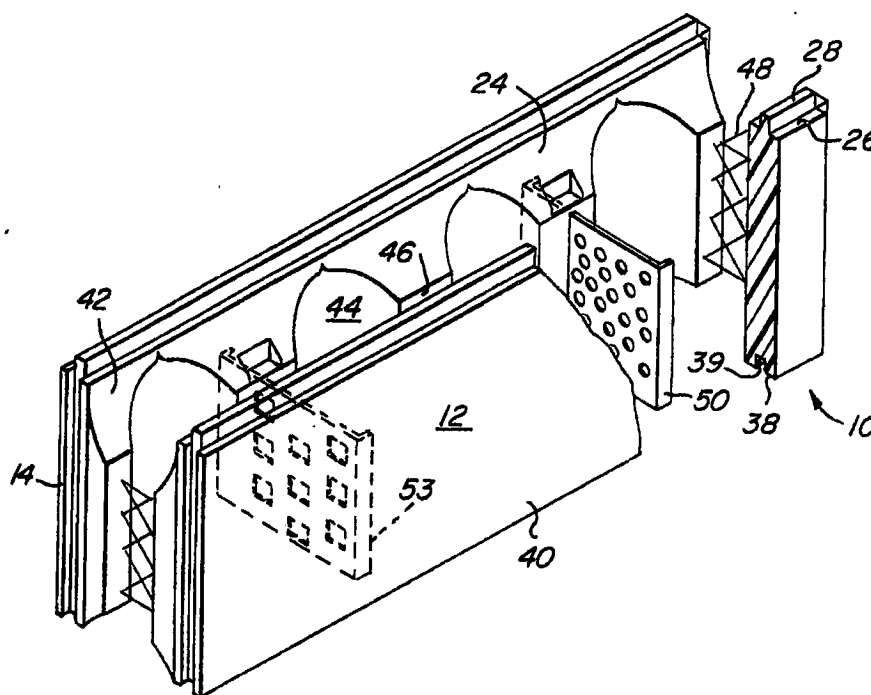
Primary Examiner—Alfred C. Perham

Attorney, Agent, or Firm—Bruce G. Klaas

[57] ABSTRACT

In a self-supporting concrete form of foamed polymeric material, a one piece transverse connecting member is provided which mechanically holds fastening members inserted into the form providing mechanical support for finish material such as furring strips, paneling, etc. The connecting member is formed from one piece of sheet material, preferably cold rolled steel, and comprises a central connecting web portion extending between and embedded in sidewall members of the form and first and second imperforate flat attachment flange portions extending perpendicularly from the web portion and embedded near the outer surfaces of the sidewall members for supportably receiving fastening members penetrating the sidewall members. The web portion of the connecting member comprises an array of relatively large openings to permit the flow of concrete through the form units and to provide a high strength web of metal. The connecting members may be arranged in each form unit with one connecting member midway between the longitudinal center and each end of the form unit so that, when the form units are laid up in courses in a staggered array, the connecting members of form units in succeeding courses are aligned.

11 Claims, 5 Drawing Figures



CONCRETE FORM

BACKGROUND OF THE INVENTION

The present invention relates to construction materials and more particularly to a self supporting concrete form unit of foamed polymeric material of the type described in U.S. Pat. No. 3,778,020, the description of which is incorporated herein by reference thereto.

Briefly, such a concrete form unit is of rectangular block shape and comprises a pair of rectangular sidewall members of the same size and shape which are held in spaced parallel relationship by rigid vertically positioned connecting members (sometimes also referred to in the art as tension members or spreaders) extending laterally therebetween with opposite end portions embedded in the sidewalls.

The inner faces of the sidewall members are provided with spaced laterally inwardly projecting vertically extending rib portions in which the opposite end portions of the spreaders are embedded with the portions of the inner faces of the side wall members between the rib portions and the connecting members defining vertically disposed cavities for concrete. The spreaders are conventionally made of flat, rectangular-shaped, expanded sheet metal providing a plurality of openings to enable receipt of foam material in the embedded end portions of the connecting members during manufacture of the form units and also to enable concrete to flow between the cavities during construction of a form unit wall.

In use, a number of these form units are mounted end to end in a course and one above the other in additional courses in interlocking and interconnected relationship to provide a complete permanent wall form into which reinforcing steel bars are placed and concrete or the like is then poured to form a continuous concrete reinforced wall therewithin with the form units remaining in place thereafter to form part of a building or other structure. During subsequent construction, it is usually necessary to make attachments to the wall structure formed by the concrete and the permanently attached form units. For example, as a building is being finished, it is often desirable to apply a finish covering of lath, sheetrock, paneling, or the like, which must be supportably attached to the form units. In the prior art type of form units, it has been necessary to glue finish materials to the outer surfaces of the form units or to anchor the material in the concrete inside the form units.

The present invention provides an improved concrete form unit having attachment flange means integrally mounted in the side wall members adjacent to the outer surfaces thereof for mechanically receiving and supporting mechanical fastening devices such as self tapping screws, by which finish materials or the like may be more economically and easily and securely fastened to the wall structure.

In the presently preferred embodiment of the invention, the attachment flange means are an integral part of one or more connecting members of new and improved design and which replace expanded metal spreaders in each form unit. The connecting members are made of one piece of flat sheet metal formed into a channel shaped configuration defined by a flat central connecting web portion and transversely extending flat attachment flange means portions. The flat connecting web portion which is mounted in a vertical position between the sidewall members of the form unit and has end

portions embedded in the rib portions of the sidewall members, has multiple relatively large openings therein to more readily permit the flow of both plastic foam material and concrete therethrough. The openings may be arcuate or polygonal. If arcuate, they are preferably arranged in rows of staggered openings so that the percentage of the area of the openings relative to the percentage of solid interconnected metal is 75% or more. The flange portions are imperforate solid sheet metal material and extend laterally at substantially right angles to the connecting web portion in substantially parallel relationship to the outer surfaces of the side wall members and are located in relatively closely spaced relationship thereto. The connecting members of each form unit are positioned and arranged in a predetermined pattern so that the fastener attachment flange portions of each form unit will be vertically aligned between succeeding courses.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side view of a structural wall built with a plurality of form units of the present invention;

FIG. 2 is a perspective view of a form unit of the present invention with portions removed for clarity;

FIG. 3 is a plan view of the form units of FIG. 2;

FIG. 4 is a plan view of a connecting member of the present invention; and

FIG. 5 is an end sectional view of the connecting member of FIG. 4 taken along line 4—4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, an assembly of form units 10 of the present invention are shown laid up in staggered array wherein planar first sidewall members 12 of the form units are arranged in coplanar relationship, and the ends 14, the tops 16, and the bottoms 18 of the form units are in abutting relationship with the end of a form unit 10 in one row being adjacent to a center line 20 extending through the longitudinal midpoint of a form unit in the next adjacent row. When the form units are arranged in this staggered array, greater lateral support is provided, while various mold cavity portions 22 in the form units 10 are in top to bottom alignment. The mold cavity portions, as shown in FIGS. 2 and 3, are defined in each block between the first sidewall member 12 and a second sidewall member 24 parallel to and oppositely symmetrical with the first sidewall member. Each sidewall member is in the form of an elongated rectangle having a linear top edge 26 with a tongue portion 28, a linear forward edge 30 with a groove portion 32, a linear rearward edge 34 with a tongue portion 36 and a linear bottom edge 38, with a groove portion 39. The groove portions 32, 39 receive the tongue portions 28, 36 of adjacent form units as the sidewall members 12, 24 each comprise a smooth rectangular outer surface 40 and a scalloped inner surface 42. The inner surface 42 comprises four regularly spaced concave portions 44 oriented between the top and bottom of the block and separated one from the other by five form unit rib portions 46 extending from the bottom of the block to a portion of outward curvature about three fourths of the distance between the top and the bottom of the form unit. The sidewall members thus form four equally spaced mold cavities 22 through concave portions 44 extending between inwardly extending rib portions 46.

The two sidewall members 12, 24 are held together by a number of cross members 48 extending between the center, forwardmost, and rearwardmost ribs and which serve longitudinally to define the mold cavities 22. Each cross member 48 comprises a length of expanded metal embedded in laterally opposing rib portions 46 during the manufacture of the form unit to provide a relatively narrow space between the ribs of opposing sidewall members and to hold the sidewall members together in parallel relationship. The form unit is preferably manufactured, as is known in the art, of foamed polystyrene. The open mesh of the expanded metal permits the flowable construction material which is poured into the block assembly to flow among the adjacent form units and mold cavities. Two one piece transverse connecting members 50, 52 are also embedded in the sidewall members 12, 24 during the manufacture of the form unit to extend perpendicularly between the sidewall members from opposing rib portions thereof. The connecting members 50, 52 serve to longitudinally define mold cavities 22 and to supportably position the sidewall members 10, 12. The first connecting member 50 is embedded in the sidewall members 12, 24 to extend from the rib portions 46 midway between the center line 20 of the form unit and the rearward edge 24 of the form unit. The second connecting member 52 is embedded in the sidewall members 12, 24 to extend from the rib portions 46 midway between the center line 20 of the form unit and the forward edge 30 of the form unit. The connecting members 50, 52 are embedded in the sidewall members with their laterally outwardmost portions about one half inch below the outer surfaces 40 of the sidewall members.

Each connecting member 50, 52 used in the present invention is essentially identical. Accordingly, only one connecting member 50 will be described in detail with reference to FIGS. 4 and 5. The laterally outwardmost portions of the connecting member 50 comprise a first flat fastener attachment flange portion 54 and a second flat fastener attachment flange portion 56 which extend at an angle from a flat central connecting web portion 58 of the member. The central web portion 58 is generally rectangular, having its width extending between the flange portions 54, 56, and sized so that the laterally outwardmost portions of the connecting member embedded in the sidewall members include the flange portions and a substantial portion of the planar central web portion. The rib portions 46 extend inwardly more than one third of the width of the web portion, terminating along relatively closely spaced parallel lines 60, 62. The central web portion 58 comprises a plurality of openings 64 which are circular and of relatively large, e.g. one inch, diameter. The openings 64 are arranged in rows and columns of between three and seven openings. Seven columns 66 extend along the length of the central web portion, and seven rows 68 extend across the width of the web portion. The openings 66 are regularly equally spaced from each other. Being arcuate, they are offset from each other in adjacent rows and columns so that they define between them a uniform web 70 of sheet material having an area less than 25% of that of the openings. The opening pattern provides a high strength web which provides uniform support in all directions.

As shown in connection with connecting member 53, the openings may also be polygonal, or square, and arranged in parallel rows and columns.

The first and second flange portions 54, 56 are each joined to the web portion 58 through a curved shoulder portion 72. The array of openings 64 extends substantially the entire length and width of the web portion, but the laterally outwardmost columns 66 of openings do not extend into the shoulder portions 72. The first and second flange portions 54, 56 each extend normally from the center portion in the same direction so that they are arranged in opposing parallel to face relationship. Each is coextensive with the length of the center portion, imperforate, and of the same approximate width, e.g. 1.5 in. (3.9 cm), and forms a continuous planar surface to mechanically receive self-tapping fastening members.

The web and flange portions of the connecting member are stamped and bent from a single flat sheet of metal, preferably cold rolled steel, of a gauge, e.g. 24-28 gauge, selected so that the flange portions are constructed to receive therethrough self-tapping screws.

Thus, in the use of the present concrete form units, the form units are laid up to provide a self-supporting form and filled with flowable construction material in a conventional way. Then, when the structure is to be finished, paneling, plasterboard, sheeting, furring strips, studs, wire mesh, etc. can be affixed to the structure through fastening members anchored in the flange portions of the connecting members. The connecting members, being rigidly fixed in the construction material, provide sturdy mechanical support to the finishing material applied to the block structure. The preferred fastening members are standard self-tapping screws used in conjunction with electric screw guns. The flange portions of the connecting members are regularly spaced just inside the outer surfaces of the form units and can be rapidly located with templates or markings on the form units. Templates may be held against the structure for location of the flanges or the form units may comprise colored markings on their outer surfaces above the flange portions. Alternatively, the outer surfaces above the flange portions may be broken away to reveal the flange portions. The connecting members are arranged in repeating patterns so that the connecting members in succeeding courses of form units are aligned when the units are laid up in staggered relationship. This permits the solid anchoring of finishing materials furring strips, or the like.

While the inventive concepts have been disclosed with reference to an illustrative and presently preferred embodiment thereof, it is intended that the appended claims be construed as including alternative embodiments, except insofar as limited by the prior art.

What is claimed is:

1. In a self-supporting form of polymeric material comprising first and second sidewall members extending in length on either side of a cavity disposed to receive flowable construction material, the combination comprising:

a one piece transverse connecting member of sheet material extending between and embedded in said first and second sidewall members and comprising: a central, connecting web portion extending between said first and second sidewall members and serving to define said cavity therebetween, and having therein a plurality of openings for permitting flow therethrough of said flowable construction material; and

attachment flange means integral with said central, connecting web portion, extending transversely

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[54] METHOD FOR CONSTRUCTING
INSULATED FOAM HOMES

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- [21] Appl. No.: 156,903
- [22] Filed: Feb. 17, 1988
- [51] Int. Cl.⁴ E04B 1/16
- [52] U.S. Cl. 52/743; 52/309.12;
52/251
- [58] Field of Search 52/309.4-309.9,
52/309.12, 309.16, 309.17, 251, 259, 743, 740

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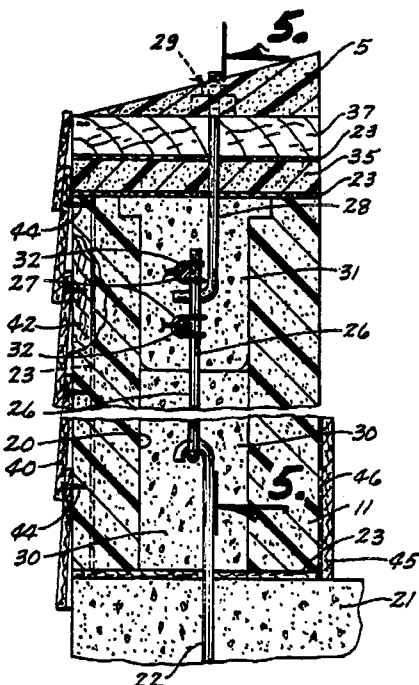
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Primary Examiner—David A. Scherbel
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[57] ABSTRACT

A method for forming building walls by starting with blocks of expanded polystyrene, for example in typical 4'×16' lengths. Spaced apart vertical voids are formed in the polystyrene and a depression along the top of the block of polystyrene is provided for interconnection with the vertical voids to form concrete can be poured into the vertical voids to form vertical posts and concrete can be poured into the horizontal depression to form horizontal beams, thereby forming wall sections which are well-insulated because of the high R value of the expanded polystyrene and which have great rigidity because of the concrete posts and beams. An insulated roof structure is formed having air passageways formed over the insulation and leading to a roof top ventilator.

5 Claims, 4 Drawing Sheets



METHOD FOR CONSTRUCTING INSULATED FOAM HOMES

TECHNICAL FIELD

The present invention relates generally to a method of constructing homes or the like, and more particularly to a method for forming walls and roofs of expanded polystyrene having concrete posts and beams therein and uniquely joined to produce a super energy edifice.

BACKGROUND ART

The problem of constructing buildings such as homes which are well insulated is a long-standing one, although the demand for such construction has increased dramatically since the costs of energy for heating buildings and homes has increased significantly over the last decade or two. A major problem seems to be that structural materials having a high degree of rigidity and strength by their very nature are also quite dense and tend to be, for that reason, quite good conductors of heat. Consequently, when homes or other buildings are constructed of normal building materials, chosen because of their rigidity and strength, the heat from the home is readily radiated through such structural members and to the outside air. For that reason, materials having a higher R value tend to have less strength and more air spaces between the parts thereof.

One excellent insulating material is expanded polystyrene which can be formed in rigid blocks, but its application and wall structure is somewhat limited because it does not have the strength of wood or concrete or the like. Consequently, there is a need for methods of constructing walls and roofs of materials having a high insulating R value, while at the same time having the necessary strength and rigidity.

DISCLOSURE OF THE INVENTION

The present invention relates generally to a method for forming building walls and roofs by starting with blocks of expanded polystyrene, for example in typical 4'x16' lengths. Spaced apart vertical voids are formed in the polystyrene and a depression along the top of the block of polystyrene is provided for interconnection with the vertical voids so that concrete can be poured into the vertical voids to form vertical posts and concrete can be poured into the horizontal depression to form horizontal beams, thereby forming wall sections which are well-insulated because of the high R value of the expanded polystyrene and which have great rigidity because of the concrete posts and beams.

An object of the present invention is to provide an improved wall and roof construction for buildings.

Another object of the present invention is to provide a method of forming walls and roofs which are super insulated and super strong.

Another object of the present invention is to provide a wall which is soundproof, economical, termite resistant, rot proof and simple to construct.

Another object of the invention is to provide a method of forming a wall of the aforementioned type which requires very little maintenance in addition to the other advantages listed above.

Other objects, advantages, and novel features of the present invention will become apparent from the detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a building constructed in accordance with the present invention;

FIG. 2 is an exploded perspective view of a wall in the process of being constructed in accordance with the present invention;

FIG. 3 is one of several electrically operated hot wire cutout jig mechanisms which could be used for cutting the depression in the top of the expanded polystyrene rigid block shown in FIG. 2;

FIG. 4 is a cross sectional view through the wall after it is formed, which is shown in the process of being formed in FIG. 2;

FIG. 5 is a cross sectional view taken along line 5—5 of FIG. 4;

FIG. 6 is a cross sectional view taken along line 6—6 of FIG. 2;

FIG. 7 is a partial perspective view similar to FIG. 2 but showing a foam gasket and a wooden board which fits on top of the foam wall;

FIG. 8 is a cross sectional view through a top portion of the roof of FIG. 1;

FIG. 9 is a cross sectional view through one side of the rafters of the FIG. 1 structure;

FIG. 10 is a cross sectional view through one edge of the roof and a top portion of the walls of the building of FIG. 1;

FIG. 11 is a cross sectional view taken along line 11—11 of FIG. 10; and

FIG. 12 is a partial perspective cross sectional view of a section of the roof.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the drawings wherein like reference numerals designate identical or corresponding parts throughout the several views, FIG. 1 shows a building (10) constructed by utilizing the method and apparatus of the present invention.

FIG. 2 shows a standard 4'x16'x11 1/2" block (11) of expanded polystyrene in a rigid form. The top polystyrene block (11) has a cutout depression (12) in the top thereof which can be preformed or formed on the site by the hot wire jig (13) shown in FIG. 3. The hot wire jig (13) includes an electrical cord (14), a switch (15), handles (16) and housing (17). Rigid wire section (18) is heated by resistance heating methods by sending electricity through the hot wire (18). Because the hot wire (18) is of the shape of the depression (12), the tool (13) can be utilized to cut the depression completely across the top of the polystyrene block (11), either on the building site or such depression can be preformed and shipped to the building site. Other shapes of wire (13) can be used if desired.

Similarly, vertical depressions (20) extend from the bottom of the depression (12) to the complete bottom of the polystyrene block (11).

If it is desired to cut a window like (19) in FIG. 1, then a hot wire jig of another type would be utilized to melt the polystyrene block (11) and remove the desired shape. It will be appreciated that windows of many different shapes can readily be placed into a wall utilizing this construction.

Referring to FIG. 4, it is noted that a slab (21) of concrete is first poured with a short hooked reinforcing rod (22) placed therein. Slab (21) can be on top of a basement wall (47) poured between forms (48), resting

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on a concrete footing (49). Vapor barrier (4) is also provided. Once the concrete (21) has dried, an adhesive (23) is applied to a top portion of the concrete (21). The bottom polystyrene block (11) is then placed on the adhesive (23), before it is cured, to secure the bottom polystyrene block (11) in place on the slab. Then the top block (11), with the lentil cutout (12) is placed on the bottom block (11), aligning the holes (20) and inserting the long hooked rods (26) down into the hole hooking the slab hook (22) and tied above.

The rod (26) of FIG. 4 is connected to a pair of rods (32) by clips (27) extending around rods (32) and rod (26).

Rod (28) (FIG. 4) extends through holes in EPS foam gasket (35) and 2x10 inch wooden plate (37). Nut and washer assembly (29) connects to member (28) to hold gasket (35) and wooden plate (37) in place.

Pumped concrete (24), passing out of a hose (25) as shown in FIG. 2 is directed into the voids (20), until they are filled. The concrete is preferably 5,000 PSI concrete reinforced with $\frac{3}{8}$ " steel rods (22). The concrete (24) shown in FIG. 2 can be poured into the vertical voids (20) and also at the same time into the horizontal depression (12) so that the posts (30) and the horizontal beam (31) are integrally formed in one piece (monolithic) when the concrete dries. If it is desired to have more than one floor (story), then another or second set of tie-down reinforcing rods (22) can be placed in the position shown in FIG. 4 and the process repeated before the concrete of the horizontal posts (31) cures.

EPS foam (5) fills a wedge shaped area between the rafters and the top wooden plate (37).

Each of the three wall sections, one on top of the other as shown in FIG. 1 are essentially identical except that the center one has a window (19) placed in it. Furthermore, each of the sections are identically formed, one at a time, as one is formed on top of the one just previously formed.

If it is desired to place siding boards (40) on the exterior of the wall, as shown in FIGS. 1, 2 and 4, then vertical cutouts (41) are made in the exterior of the polystyrene block (11) at spaced intervals as shown in FIG. 2. These can be formed by a tool like the tool shown in FIG. 3, but with a wire (13) of a shape like cutout (41). Strips of wood (42) are then glued into the space cutouts (41) by use of adhesive (23). The siding (40) is then attached to the wood strips (42) by nails (44).

If desired, drywall (45) can be glued to the interior of the walls of polystyrene block (11), for example as shown in FIG. 2, care being taken to use adhesives compatible with the EPS foam.

The windows are aligned with wooden 2x12's and secured to adjacent posts and beams with threaded nuts and bolts. All cracks are sealed with foam sealant and are sanded. The blocks butt-joint together like cinder blocks and are secured in place with foam sealant or other adhesive.

A prefabricated roof is also provided of truss joints and wooden I-beam surface rafters. A radiant foil barrier is glued to the upper surface of the foam beams which are tightly inserted into the cavities of the rafters and placed on 24" centers. The foil deflects roof heat and carries it upward through a $1\frac{1}{2}$ " space and out a continuous ridge vent, thereby removing latent heat and prolonging the life of the shingles. Electrical wiring is placed in the $1\frac{1}{2}$ " gap between gypsum board on the underside of the rafters and the foam insulation. Gyp-

sum board provides a fire barrier even though the polystyrene foam is fire retardant and non-toxic.

Referring to FIG. 8, it is noted that a ventilator (50) is shown attached at the top of the roof (51). Fiberglass shingles or other shingles or waterproofing over felt and plywood are shown at (52), although it will be understood that other types of waterproofing can be used.

A central wooden beam extends along the top peak of building roof (51) along the entire length thereof and has truss joist rafters (56) attached thereto at spaced intervals along the length thereof. These can be 2x12 wooden members, for example. Laminated wooden I-beam members (60) are connected to the plywood roof (51) on the top thereof, to wooden I-beam truss joist (56) on the bottom thereof and to members (60) on the bottom of members (56) which are connected to drywall (45) which is readily shown also in FIG. 10 extending up the vertical wall and then along under the roof as well. Rigid EPS foam (61), for example of $8\frac{1}{2}$ " thickness and having a radiant foil (62) on the top thereof is held in place by being sandwiched between the members (60) as shown in FIG. 11 and providing an air space between the plywood roof (51) and the radiant foil (62) and between the bottom of the foam (61) and the drywall (45).

A 2x8 wooden member (58) is shown in FIG. 10 and connects with the plywood (51) on the top thereof and with a plate (59) under the eaves of the house which also extends over to the siding (40). The EPS foam (61) can be of a R-50 roof system with a radiant foil thereon.

Referring to FIG. 12, it is noted that heated air rises in the $1\frac{1}{2}$ " air space between the roof sheathing and the radiant foam on the EPS beams. This hot air will then exit out of rooftop continuous ridge vent (50) as is clearly shown in FIG. 12.

Accordingly, it will be appreciated that the method and apparatus shown in the drawings and just described above do indeed accomplish the aforementioned objects. Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. A method of constructing walls for buildings consisting of:

providing a form in the ground;
pouring concrete into said form;
placing substantially vertically disposed rigid reinforcing rods in said concrete at spaced intervals, before said concrete hardens, said reinforcing rods having a bottom portion in said concrete and a portion above said concrete;

applying liquid adhesive to a top portion of said concrete once it has cured;

securing a rigid expanded polystyrene block to the top of said concrete by placing the bottom thereof on said liquid adhesive and on the top portion of said concrete, said expanded polystyrene block having a plurality of vertically disposed openings spaced apart at substantially the same intervals as the spacing of said reinforcing rods whereby said openings, and said block also includes a horizontal depression formed in said block and extending substantially completely along the top thereof in liquid communication with said vertically disposed openings;

Browning, Jr.

[11] Patent Number: 4,860,515

[45] **Date of Patent:** Aug. 29, 1989

[54] SELF-SUPPORTING CONCRETE FORM

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[21] Appl. No.: 54,430

[22] Filed: May 26, 1987

[51] Int. Cl.⁴ E04B 2/40

[52] U.S. Cl. 52/426; 52/422;
52/432; 52/439

[58] Field of Search 52/426, 422, 425, 424,
52/437, 439, 604, 432; 249/27, 33

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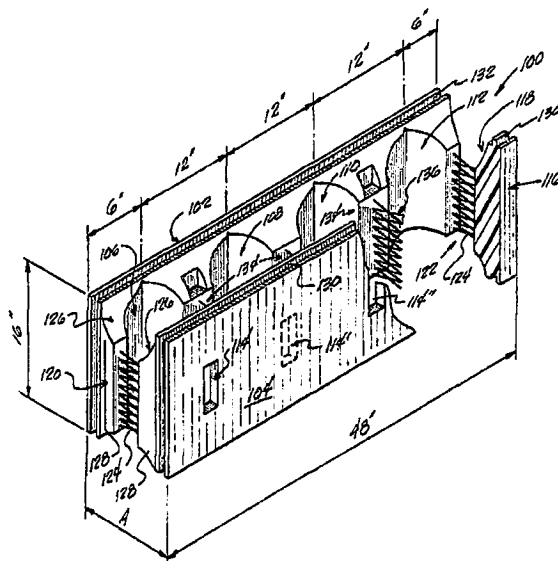
Primary Examiner—Michael Safavi

Attorney, Agent, or Firm—Dority & Manning

[57] **ABSTRACT**

An approved self-supporting form for use in constructing walls is adapted to be reinforced with cementitious materials poured therein, while securely supporting additional building materials on the outside thereof. The walls of the forms themselves are generally comprised of resilient, insulating materials, such as foamed plastics or the like. An anchored securement member is embedded in the concrete interiorly cured in the forms, and also extends to the exterior of the forms, where it is adapted for receipt of conventional attachment elements such as nails or screws. A plurality of the forms may be used to construct walls, much like conventional building blocks. Then, finishing cladding materials such as panelling, wallboard, or the like may be safely secured to the exterior of the forms with such attachment elements, even if the actual foamed sidewalls of such forms become damaged by heat or the like.

6 Claims, 4 Drawing Sheets



United States Patent [19]

Hanson et al.

[11] Patent Number: 5,024,035

[45] Date of Patent: Jun. 18, 1991

[54] BUILDING BLOCK AND STRUCTURES
FORMED THEREFROM

[75] Inventors: Gary N. Hanson; Keith W. Inness,
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[73] Assignee: Insulock Corporation, Seattle, Wash.

[21] Appl. No.: 258,052

[22] Filed: Apr. 28, 1981

Related U.S. Application Data

[63] Continuation of Ser. No. 85,871, Oct. 18, 1979, abandoned, which is a continuation of Ser. No. 966,082, Dec. 4, 1978, abandoned.

[51] Int. Cl.⁵ E04C 1/10

[52] U.S. Cl. 52/591; 52/594;
52/309.12

[58] Field of Search 52/589, 591, 594, 309.12

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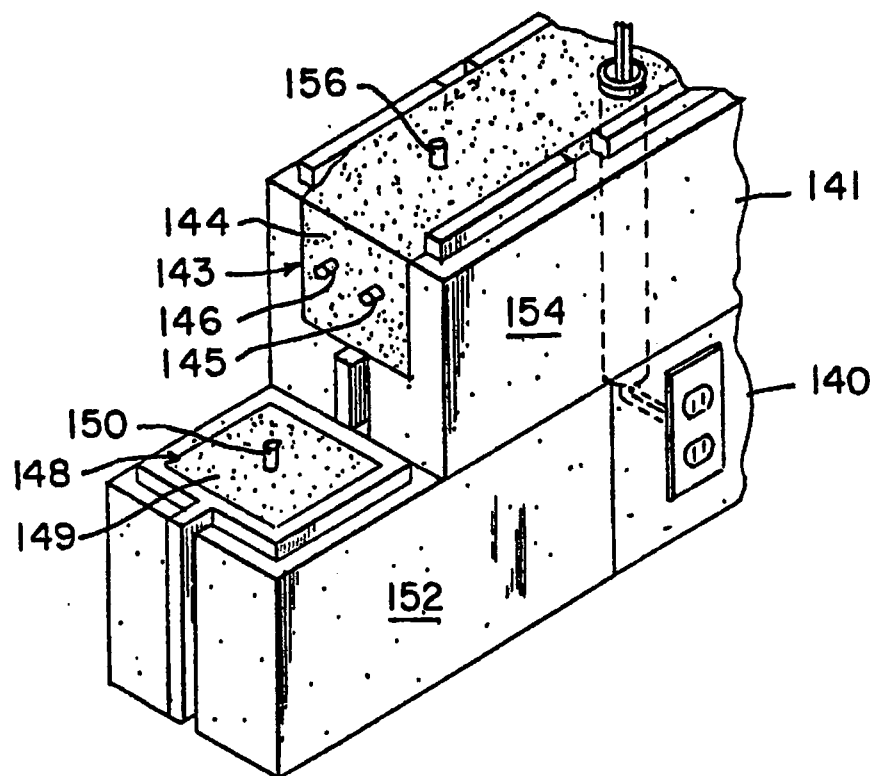
Attorney, Agent, or Firm—George M. Cole

[57]

ABSTRACT

A mortarless, lightweight building block and walls formed therefrom. The block is generally rectangular and comprises side walls, end walls, and an interior wall which divides the interior of the block into two vertical passages through the block. In certain blocks, parts of the end and interior walls are removed to form horizontal channels through the blocks. The blocks are provided with projections and recesses having rectangular cross sections by which means they may be interlocked together to form walls. In such a wall, the vertical passages and horizontal channels may receive reinforcing structures to impart added strength and load bearing properties to the wall.

3 Claims, 4 Drawing Sheets



BUILDING BLOCK AND STRUCTURES FORMED THEREFROM

This application is a continuation of application Ser. No. 085,871 filed Oct. 18, 1979, which is a continuation of Ser. No. 966,082, filed Dec. 4, 1978, now both abandoned.

FIELD OF THE INVENTION

This invention relates to interlocking building blocks and walls formed therefrom.

DESCRIPTION OF THE PRIOR ART

A number attempts have been made to provide building blocks capable of being joined together without the use of mortar into walls or other loading structures. Ideally, such mortarless building blocks should be lightweight so that they are easy to handle and transport, easy to use so that the walls can be quickly constructed by unskilled workmen, and adapted to accept varying degrees of reinforcement so that the walls may readily be constructed to meet any degree of load bearing requirements.

Prior mortarless building blocks have fallen considerably short of these ideals. No prior blocks have provided practical, mortarless building elements which are adapted, when assembled into a wall, of receiving a variable amount of reinforcement to provide different degrees of strength and stability. A number of prior blocks are designed to be filled with cement or other heavy material at the time they are assembled or constructed. Although such blocks are comparatively massive and thereby impart some stability to the finished wall, they provide no advantage whatsoever in terms of ease of handling or transportation over conventional cinder blocks. Other prior blocks have sought to achieve stability by providing flared interlocking structures between adjacent blocks. In addition to increasing the complexity of the blocks' designs, such flared structures also add considerably to the difficulty of assembling the blocks into walls, since such blocks may only be brought together from certain directions or angles.

SUMMARY OF THE INVENTION

This invention provides novel, lightweight, highly insulating building blocks in a number of embodiments, which blocks are capable of being joined together without mortar to form a wall or other load bearing structure. The blocks are extremely lightweight and easily used by unskilled laborers. The blocks are designed such that when joined together into a wall, the interior of the wall contains forms for a variable number of reinforcing structures. Such structures may be provided to yield walls of differing strengths and load bearing abilities.

The building blocks of the present invention have a generally rectangular exterior configuration, and are composed of urethane foam or other lightweight, highly insulating non-cementitious material. In one embodiment, the block comprises a pair of opposed side walls; a pair of opposed end walls having heights equal to that of the side walls; an interior wall having a height equal to that of the side walls and extending between the side walls approximately parallel to the end walls, the interior wall forming two vertical passages through the blocks of approximately equal, rectangular cross sections; projections on the upper surfaces of the end,

side and interior walls the projections being formed into two identical patterns respectively associated with said two passages; and the lower surfaces of the side, end and interior walls being shaped so as to form recesses identical to the projections in size and shape, and directly below the projections in position. In a second embodiment, referred to as a horizontal support block, the upper portions of the end and interior walls are removed to form a horizontal channel extending through the block. Blocks according to the present invention may be used to construct walls comprising a series of horizontal rows, with adjacent rows offset horizontally by half the length of a block, and with projections of the blocks in each row being received within the recesses of the blocks of the row above. Certain rows may consist entirely of horizontal support blocks, and horizontal reinforcing structures may be placed through the channels of the blocks in such rows. Vertical reinforcing structures may be placed through the vertical openings formed by the passages of several blocks. By such means, a wall or other structure having almost any desired amount of reinforcing may be constructed.

These and other features and advantages of the invention will be apparent from the detailed description and claims to follow taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 presents a partly broken away perspective view of a part of a building structure assembled from building blocks according to the present invention;

FIG. 2 presents a perspective view of a building block according to the present invention;

FIG. 3 presents a perspective view of the block of FIG. 2 as seen from below;

FIG. 4 presents a perspective view of a left hand corner block according to the present invention;

FIG. 5 presents a perspective view of a right hand corner block according to the present invention;

FIG. 6 presents a perspective view of a half unit block according to the present invention;

FIG. 7 presents a perspective view of a double unit reinforcing block according to the present invention;

FIG. 8 presents a perspective view of a building block according to the present invention adapted to receive a horizontal reinforcing structure;

FIG. 9 presents a perspective view of a reinforced section of a wall comprising the blocks of FIGS. 2 and 8;

FIG. 10 presents a side elevational view, partly broken away, of a reinforced wall according to the present invention

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts a structure 10 comprised of mortarless building blocks according to the present invention. Structure 10, is shown, consists of foundation 11, walls 12, 14 and support structure 16 extending inwardly from wall 12. Each wall consists of a series of horizontal rows, such as rows 18a-f comprising wall 12, positioned one on top of another. Each such row is composed principally of rectangular blocks 20 placed end to end. With two exceptions to be described below, all the blocks of the present invention preferably have identical outer dimensions, which dimensions may be the same as that of a standard 8"×8"×16" cinder block.

D4

115

United States Patent [19]
Collins

US005404685A
[11] Patent Number: 5,404,685
[45] Date of Patent: Apr. 11, 1995

- [54] POLYSTYRENE FOAMED PLASTIC WALL
APPARATUS AND METHOD OF
CONSTRUCTION
- [76] Inventor: Dennis W. Collins, 3303 N. Morino
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- [21] Appl. No.: 937,297
- [22] Filed: Aug. 31, 1992
- [51] Int. Cl.⁶ F04H 17/16
- [52] U.S. Cl. 52/309.7; 52/295;
52/309.9; 52/309.12; 52/309.17; 52/780;
52/743; 52/745.05; 256/19; 256/24
- [58] Field of Search 256/19, 24; 52/780,
52/777, 309.7, 309.8, 309.9, 309.12, 309.16,
309.17, 295, 296, 297, 283, 434, 440, 743,
745.05, 309.4; 446/105, 108, 111

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Primary Examiner—Carl D. Friedman

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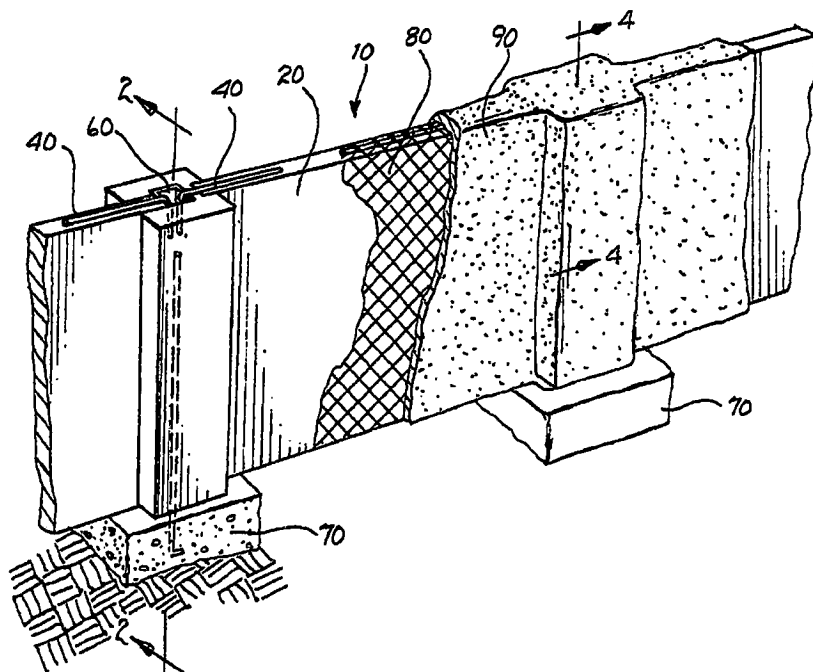
Attorney, Agent, or Firm—Donald J. Lisa; Steven Lin

[57]

ABSTRACT

An outside STYROFOAM[®] polystyrene plastic wall or fence is constructed by anchoring each of at least two styrofoam H-columns to a concrete base in the ground supporting a steel reinforcing bar which extends up into a hollow of the column by filling the hollows with concrete. A STYROFOAM[™] polystyrene plastic panel is supported within the grooves of juxtaposed columns. The fence may have any desired length. The panel is secured to the two columns by L-shaped rebars or a continuous length of rebar laid in a recessed groove atop each panel and column and anchored in the concrete in the column hollows. An exterior mesh-stucco or paint finish covers the wall. Columns—in—line, L, T—and panels—square or T—enable making walls of any shape or configuration.

36 Claims, 4 Drawing Sheets



POLYSTYRENE FOAMED PLASTIC WALL APPARATUS AND METHOD OF CONSTRUCTION

BACKGROUND OF THE INVENTION

1. The Field Of The Invention

The present invention relates generally to a Polystyrene Foamed Plastic Wall Apparatus and its method of construction, and more particularly, to an outside STYROFOAM™ polystyrene plastic fence comprised of at least one panel supported between at least two H-columns and associated reinforcing and attaching features and exterior finish.

¹A trademark for a light, resilient polystyrene plastic.

2. DISCUSSION OF BACKGROUND AND PRIOR ART

Walls and fences are manufactured from different types of materials. Some of the more common types of materials that walls and fences are made of are wood, brick, masonry block, or wire. Wood walls or fences have the disadvantage in that they can be more easily damaged or chipped.

The surface of a wood wall or fence begins to weather down after a period of time, and pieces of the wall or fence have to be replaced on a periodic basis. A wood wall or fence is not as sturdy as the other types of walls or fences, and it may not stand up against the wind as well as the others.

A wire wall or fence is also not as sturdy or solid as the other types of fences. Typically, a wire wall or fence encompasses a certain area, but the surface of the wall or fence is usually not covered. A wire wall or fence also has the disadvantages of a person being able to cut through it, or a person bending the surfaces or sides of the wire wall or fence.

Brick or masonry block type walls and fences have the advantage of being strong and sturdy. They hold up very well against the wind, and they are not easily broken. They have the further advantage in that stucco can be applied to the surface of the wall or fence to create a more appealing aesthetics especially for a wall or fence that can be matched to the exterior of a house. These types of walls or fences have been required by certain municipal housing or zoning laws.

Brick or block masonry type walls or fences, however, have several disadvantages. They are more expensive because they require significant time, labor, and material to construct. Another problem with these types of walls or fences is that the top row of bricks or blocks can be easily knocked off. These brick and masonry block type walls or fences have the further problem of weight settling which in effect causes ladder cracks in the surfaces and sides of the wall or fence.

Thus, there is not available on the market today a wall or fence that is mainly constructed of polystyrene foamed plastic that is fairly sturdy, that provides an appealing aesthetic look, that is easy and inexpensive to construct, and that would not have chipping or cracking problems.

SUMMARY OF THE INVENTION

Set forth below is a brief summary of the invention in order to overcome the foregoing problems and achieve the foregoing and other objects and advantages in accordance with the purposes of the present invention as embodied and broadly described herein.

One aspect of the invention is a wall or fence apparatus that is mainly constructed of polystyrene plastic

material, and more particularly, STYROFOAM™ polystyrene plastic and its method of construction.

A second aspect of the invention is that the wall or fence comprises at least one styrofoam panel supported within at least two reinforced H-columns anchored in the ground, and an exterior finish for the entire wall or fence.

A third aspect of the invention is the method of manufacturing a wall or fence that is mainly constructed of polystyrene plastic material and, more particularly, STYROFOAM™ polystyrene plastic.

Further features of the invention include various shaped columns to form T's and corners that fit the panels in various ways and various reinforcing structures and attaching features that provide various ways of holding the columns and panels together and to the ground.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of the specification, illustrate several embodiments of the present invention and together with the description, serve to explain the principles of the invention. In the drawings:

FIG. 1—Perspective view of the Polystyrene Foamed Plastic Wall Apparatus with open portion showing the inner parts of the wall with the L-shaped attachment bars.

FIG. 2—2—2 cross-sectional side elevation view of the Polystyrene Foamed Plastic Wall Apparatus of FIG. 1 with cross-sectional portions showing the inner parts of the wall.

FIG. 3—3—3 top plan view of the Polystyrene Foamed Plastic Wall Apparatus of FIG. 2.

FIG. 4—4—4 cross-sectional elevation view of the Polystyrene Foamed Plastic Wall Apparatus of FIG. 1.

FIG. 5—Perspective view of the Polystyrene Foamed Plastic Wall Apparatus with U-joints and straight bar attachments.

FIG. 6—6—6 cross-sectional elevation view of the Polystyrene Foamed Plastic Wall Apparatus of FIG. 5.

FIG. 7—Perspective view of two straight reinforcement bars that are tied together and placed on top of the Polystyrene Foamed Plastic Wall Apparatus.

FIG. 8—Perspective view of a first embodiment in-line column which is an H-column and a panel that is attached to the H-column.

FIG. 9—Perspective view of a second embodiment corner column where two panels are attached perpendicularly to the column.

FIG. 10—Perspective view of a third embodiment T-column where three panels are attached in a T-shape configuration to the column.

FIG. 11—Perspective view of an in-line H-column showing a second embodiment of the panel that can be inserted in the groove of the H-column.

FIG. 12—Perspective view of a fifth embodiment column where the column has no attached panels.

FIG. 13—Perspective view of a sixth embodiment column where the column is attached to a different type of panel.

DETAILED DESCRIPTION OF THE INVENTION

As seen in FIG. 1, the wall apparatus 10 comprises panel(s) 20 that are inserted in the grooves of the columns 30 so that the panels and columns fit snugly to-

gether. These columns and panels are made of STYRO-FOAM™ polystyrene plastic, which is best described as a well known polystyrene foamed plastic. The columns 30 are secured in the ground so that they firmly stand up to support the panel(s) 20. The panel(s) 20 are then fastened to the columns 30. An exterior finish 90 is then applied to the entire wall structure.

The Columns

The columns 30 may have various shapes depending on the function of the column and the number and ways the panels 20 are to be attached, as seen in FIGS. 8-13 which are merely exemplary of some embodiments.

FIG. 8 shows a column 30 as an in-line, H-column in which the panel 20 is inserted in the groove of the column 30. The H-columns provide two in-line grooves opposite sides of the hollow 60. A series of panels 20 and columns 30 can be connected together in a line in order to create a length of wall that is any desired length.

FIG. 9 shows a corner-column 30 which is shaped to have two panels 20 attached perpendicularly to each other. These columns and panels are often used to create the corner of a wall or a fence.

FIG. 10 shows a T-column 30 which is shaped to have three panels 20 attached to each other in a T-shape configuration. This configuration is useful when using a wall portion to separate two areas.

FIG. 11 shows an in-line H-column 30 with panel 20 configured with a tongue 21 and integral wider portions 22, 23 which would typically be used when creating a flush-looking wall or fence.

FIG. 12 shows a completely enclosed column 30 with double hollows 60. Panels cannot be secured to this type of column 30 which is used to make a post that can have a variety of uses.

FIG. 13 shows an A-column 30 which is used as an end column to which an L-shaped stud 70 may be anchored to which a gate 72 may be hung, for example. This embodiment differs from FIG. 11 in that the shape of the panel 20 that is secured in the groove of column 30 of FIG. 13 would have a trapezoidal shaped tongue rather than a square shaped tongue.

The Panels

The panels 20 also have different embodiments that are made of various shapes and sizes. The main important feature of the panels 20 is the shape of the tongue that will have to fit into the groove of the columns 30. Therefore, the type of panel 20 that is used to construct a wall will depend on the type of columns 30 that are used since the columns and panels have to fit snugly together.

FIG. 8 shows a perspective view of a first embodiment of the panels 20 in which the panel is a rectangular box shape with a width that would fit into the groove of the column 30. This is one of the more typical embodiments that would be used. However, the configuration that is created with these types of panels and columns are such that it cannot create a flush wall surface because the surface at the columns will be protruding outwards from the surface of the panels.

As seen in FIG. 11, however, this problem is eliminated. The panel 20 is shaped to have the same width as the column 30 and has a tongue at the end of the panel that is of a width and depth perfectly sized to fit the groove of the column 30.

As seen in FIG. 13, the tongue of the panel 20 would be trapezoidal shaped as opposed to rectangular shaped as shown in the embodiment in FIG. 11.

Column Support Base and Column Reinforcing Structure

The columns 30 in any of the embodiments are secured in the ground in a number of ways, such as, by using reinforcement bars and a concrete footing.

As seen in FIG. 2, a reinforcing structural bar 50 is secured in a concrete footing 70 firmly sunk in the ground. The reinforcement bars 50 are sunk in the concrete while it is still wet and extend upwardly above the ground.

The bar 50 is essential in providing the structural reinforcement to the columns 30. All of the embodiments of the column 30 are formed with a central hollow 60 from the top to the bottom of the column. The column 30 is placed over the reinforcement bar 50 which extends into the central hollow 60.

A reinforcing filler, such as, concrete is then poured into the central hollow 60 of the column 30 which, when hardened, is shown as concrete portion 61. The concrete portion 61 in FIG. 4 functions to secure the column 30 to the reinforcement bar 50 upon the concrete footing 70 thereby providing structural stability to the column 30.

Column/Panel Structural Fasteners

After the columns 30 are structurally reinforced to bar 50 as aforesaid the ends of each panel 20 are inserted into the grooves of juxtaposed columns 30 to form a wall portion. By repeating the process with other juxtaposed columns of various shapes, as aforesaid, the wall may have any length or shape as desired.

The panels 20 and columns 30 then have to be fastened together. FIG. 1 shows one method of attaching the columns and panels together by the use of L-shaped attachment bars 40.

The attachment bars 40 are placed in grooves that are recessed in the top of the columns 30. FIG. 3 shows the top plan view of the wall apparatus of FIG. 2 where the L-shaped attachment bars are placed. The reinforcing structural bar 50 is centered in the hollow 60 of column 30. The short end of the L-shaped attachment bar 40 is placed in the wet concrete which is allowed to harden. In FIG. 4, the 4-4 cross-sectional side elevation view of FIG. 1 shows the location of the attachment bar 40 placed in the concrete. After the concrete hardens, the panels 20 are then securely attached to the columns 30.

A second method of fastening the panels 20 to the columns 30 is shown in FIG. 5. Instead of using the L-shaped attachment bars 40, a continuous reinforcing structural bar 42 is placed along the grooves on top of the panels 20 and columns 30. If a longer reinforcing bar 42 is needed, FIG. 7 shows that two reinforcing bars may be attached together by tie wire 43. A U-shaped joint 41 is then placed into the wet concrete that was poured in the hollow 60 of column 30. The U-shaped joint 41 is placed upside down into the concrete so that the bottom of the U contacts the reinforcing bar 42. After the concrete hardens the panels 20 are secured to the columns 30. In FIG. 6, a cross-sectional of FIG. 5 shows the placement of both the reinforcing bar 42 and U-shaped joint 41.

Exterior Finish for Entire Wall Apparatus

After the columns have been secured in the ground and the columns and panels are attached to each other, an exterior finish is then applied to the entire wall apparatus.

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US005457926A

United States Patent [19]
Jensen

[11] **Patent Number:** **5,457,926**
[45] **Date of Patent:** **Oct. 17, 1995**

[54] **INTERLOCKING BLOCK**

[75] **Inventor:** Daniel M. Jensen, Phoenix, Ariz.

[73] **Assignee:** Templeton Trust, Salt Lake City, Utah

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[21] **Appl. No.:** 147,137

[22] **Filed:** Nov. 3, 1993

[51] **Int. Cl.⁶** E04C 2/20; E04C 2/30

[52] **U.S. Cl.** 52/604; 52/309.4; 52/503;
52/570; 52/592.3; 52/605; 52/606

[58] **Field of Search** 52/309.1, 309.4,
52/561, 569-572, 604-606, 592.1-592.3,
592.6, 503

Primary Examiner—Carl D. Friedman
Assistant Examiner—Robert J. Canfield
Attorney, Agent, or Firm—Tod R. Nissle

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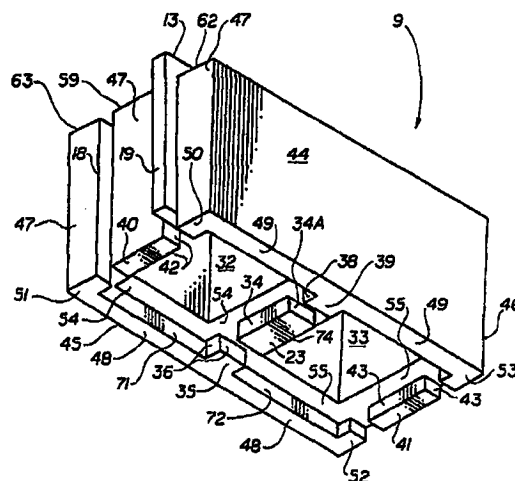
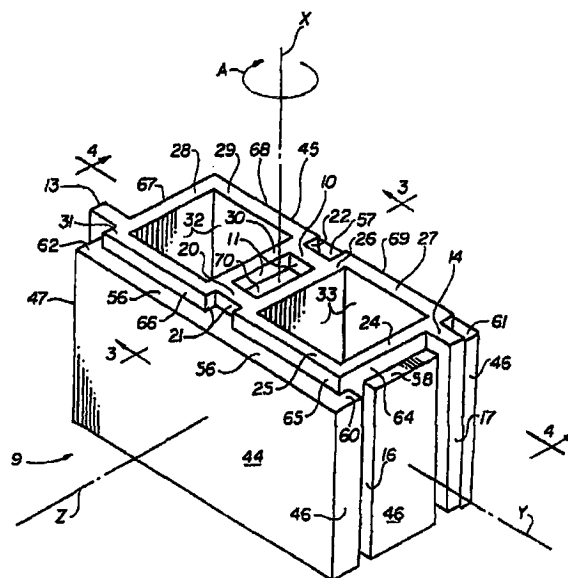
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[57] **ABSTRACT**

Lightweight foam building blocks simplify the interlocking of the blocks when the blocks are being stacked, increase the resistance of the blocks to rotational forces which twist one block with respect to another, and decrease the passage of air and light intermediate interlocking block pairs.

5 Claims, 4 Drawing Sheets



1 INTERLOCKING BLOCK

This invention relates to interlocking building blocks.

More particularly, the invention relates to lightweight, non-cementitious, resilient, plastic foam building blocks which simplify the interlocking of the blocks when the blocks are being stacked, which significantly increase the resistance of the blocks to rotational forces which twist one block with respect to another, and which decrease the passage of air and light through spaces in interlocking block pairs.

Many patents exist which describe and claims lightweight interlocking foam building blocks. See, for example, U.S. Pat. Nos. 5,024,035 to Hanson et al. and 4,475,326 to Hanson. Certain disadvantages are typically associated with such blocks. First, when walls are constructed of the blocks, light, and consequently air, passes intermediate the blocks reducing the efficiency of the wall in producing a tight, insulating wall. After such walls are assembled, the builder can stand back and visually ascertain light passing through small spaces in the wall. Second, even though the blocks interlock, they are susceptible to movement when one block is rotated with respect to another about a vertical axis. This reduces the structural integrity and stability of the block structure. Third, when an attempt is made to manufacture blocks to close tolerances to obtain a tight interlock between adjoining blocks, the friction generated by such a tight interlock makes interlocking of the blocks difficult.

Accordingly, it would be highly desirable to produce an improved lightweight interlocking foam building block which prevented the passage of light intermediate adjoining blocks, which prevented rotation slack or movement between stacked block pairs, and which facilitated the readily assembly and interlocking of block pairs.

Therefore, it is a principal object of the invention to provide an improved interlocking block.

Another object of the invention is to provide a lightweight, non-cementitious, resilient, plastic foam block which can be assembled with other like blocks to produce a light impervious wall.

A further object of the invention is to provide a lightweight foam blocks which facilitates the ready interlocking of the block with like blocks and which eliminates or substantially minimizes rotational movement of one block with respect to another.

These and other, further and more specific objects and advantages of the invention will be apparent to those skilled in the art from the following detailed description thereof, taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view illustrating an interlocking building block constructed in accordance with the principles of the invention;

FIG. 2 is a perspective view of the block of FIG. 1 further illustrating construction details thereof;

FIG. 3 is a partial section view of the block of FIG. 1 taken along section line 3—3 thereof and illustrating the adjoining of the block with another like block stacked squarely on top of the block of FIG. 1; and,

FIG. 4 is a partial section view of the block of FIG. 1 illustrating the adjoining of the block with other like blocks stacked on top of and longitudinally offset from the block by one-half the length of the block.

Briefly, in accordance with my invention, I provide an interlocking block comprising a pair of spaced sidewalls; first and second end walls joining the sidewalls and spaced from each other; an upper surface; and, a lower surface. The end walls each have respective first and second end faces.

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Each end face of the block carries vertically aligned spaced apart tongue and groove pair. The tongue and groove pair on the first end is positioned to be complementary to and engage a respective groove and tongue pair on an abutting end face of an identical block that is longitudinally aligned with the building block. The upper surface carries a pair of vertically extending projections and adjoining vertical recesses. The projections are adjoined by a pair of webs. The webs extend longitudinally across the upper surface. The vertically extending projections and the webs define a four sided enclosed recess centrally positioned on the upper surface. The lower surface has a pair of recesses shaped and positioned so that one of the pair of projections on the upper surface is complementary to and engages one of the pair of recesses on an abutting surface of an identical block that is longitudinally offset by one-half the length of the block. A four-side outward projection is centrally positioned on the lower surface and shaped such that the projection is complementary to and engages the enclosed recess on the upper surface of an identical block that is set squarely on the building block.

In another embodiment of the invention, I provide an interlocking building block comprising a pair of spaced sidewalls; first and second end walls joining said sidewalls and being spaced from each other; an upper surface; and a lower surface. The first end wall has a first end face. The second side wall has a second end face. Each end face carries a vertically aligned spaced apart tongue and groove pair. The tongue and groove pair on the first end is positioned and shaped to be complementary to and engage a respective groove and tongue pair on an abutting end face of an identical block that is longitudinally aligned with the building block. The upper surface joins the side walls and carries outwardly extending projections each including at least one vertically oriented planar surface having a proximate portion adjacent the upper surface and a distal portion spaced away from the upper surface. Each of the projections is spaced inwardly from and adjacent one of the sidewalls and the end walls and is canted away from said one of the sidewalls and end walls toward a vertical axis through the center of the building block and adjoining vertical recesses such that the distal portion is closer to the vertical axis than the proximate portion. The projections are adjoined by a pair of vertically extending webs. The webs extend longitudinally across the upper surface. The vertically extending projections and the webs defining and enclosing a recess centrally positioned on the upper surface. The lower surface has recesses each having at least one vertically oriented planar surface having a lower portion adjacent the lower surface and an upper portion spaced apart from the lower surface. The planar surfaces are each canted such that the upper portion is closer to the vertical axis than the lower portion. The planar surfaces of the recesses are each shaped and positioned so that each one of the outwardly extending projections on the upper surface is complementary to and engages one of the recesses on an abutting surface of an identical block that is longitudinally offset by one-half the length of the block.

Turning now to the drawings, which depict the presently preferred embodiment of the invention for the purpose of illustrating the practice thereof and not by way of limitation of the invention, and in which like reference characters refer to corresponding element throughout the several views, FIGS. 1 to 4 illustrate an interlocking building block generally indicated by reference character 9 and constructed in accordance with the principles of the invention. Block 9 includes spaced apart side walls 44 and 45. A first end wall and second end wall each extend between and join sidewalls

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US005839249A

United States Patent [19]

Roberts

[11] Patent Number: 5,839,249

[45] **Date of Patent:** Nov. 24, 1998

[54] **FOAM BLOCK WALL AND FABRICATION METHOD**

[76] Inventor: **Scott J. Roberts**, 1730 N. Kittredge Rd., Flagstaff, Ariz. 86001

[21] Appl. No.: 730,940

[22] Filed: Oct. 16, 1996

[51] **Int. Cl.⁶** **E04B 1/00**

[52] U.S. Cl. 52/745.08; 52/742.12;
52/439; 52/562

[58] **Field of Search** 52/223.7, 434,
52/442, 439, 566, 606, 503, 505, 562, 742.1,
742.12, 742.16, 745.05, 745.08

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Primary Examiner—Lanna Mai

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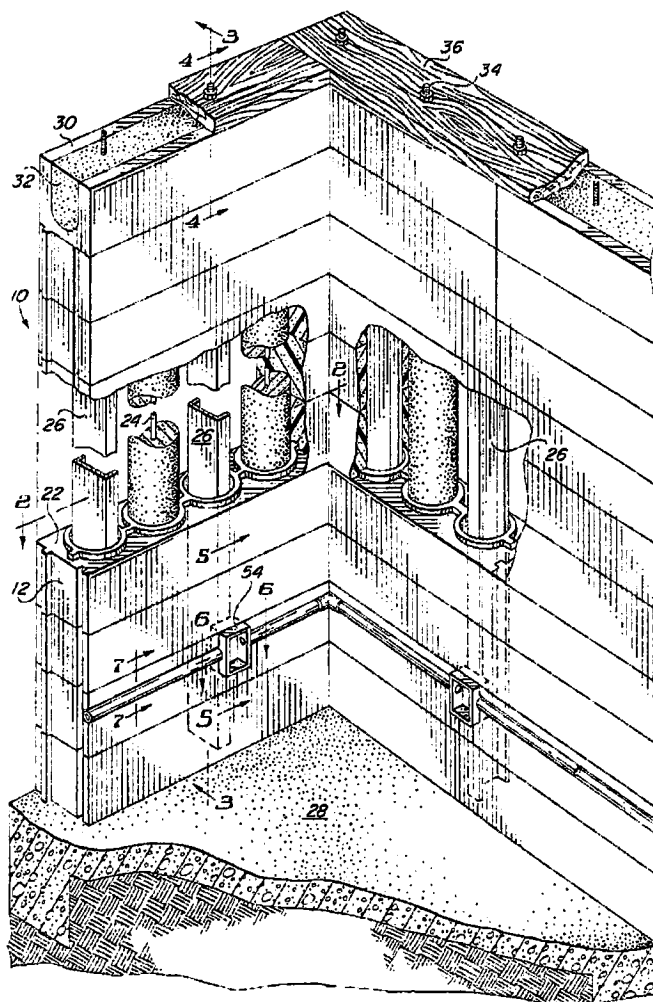
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[57] **ABSTRACT**

Foam blocks including vertical passageways are aligned by a block alignment element having first and second edge alignment surfaces for simultaneously engaging the internal block passageways at angularly spaced apart intervals to align one block relative to another block.

20 Claims, 4 Drawing Sheets



FOAM BLOCK WALL AND FABRICATION METHOD

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to foam block walls, and more particularly, to block walls including vertically extending block alignment elements.

2. Description of the Prior Art

The prior art discloses a variety of wall designs fabricated from a plurality of stackable insulating foam blocks. For example, U.S. Pat. No. 5,024,035 (Hanson) discloses an interlocking, structural foam block having vertical channels. Hanson fails to disclose any technique for accurately aligning the blocks prior to grouting the block cells with cement.

U.S. Pat. No. 5,457,926 (Jensen) discloses interlocking foam building blocks, but Jensen's design fails to overcome the problem of attaching wall-mounted devices to the wall system or a fail-safe technique for vertically and horizontally aligning the discrete block elements into a straight wall.

U.S. Pat. No. 3,788,020 (Gregori) discloses a self-supporting concrete form made from foamed polymeric material left in place after the concrete has been poured. A thin, heat conductive transverse member connects the inner and outer wall forms, but greatly reduces the insulating capability of the wall because that transverse member also functions as a thermal bridge. The Gregori wall design requires an inner frame structure to mount interior walls, electrical conduit and junction boxes, and cabinets. Gregori fails to disclose an effective technique for aligning adjacent wall elements.

U.S. Pat. No. 4,862,660 (Raymond) discloses a foam wall formed around a plastic load bearing member. While the Raymond wall design provides for placement of wall-mounted devices, the load bearing columns function as a thermal bridge significantly reducing the wall insulating efficiency.

U.S. Pat. No. 4,731,729 (Isshiki) discloses a foam block wall reinforced by a bar inserted through the bores of selected blocks. While that bar may reinforce the strength of the wall, Isshiki does not teach the use of a vertical reinforcement member to align a wall, nor the use of a vertical reinforcement member for mounting structures to the wall.

SUMMARY OF THE INVENTION

It is therefore a primary object of the present invention to provide a foam block or heating insulating wall including a vertically extending block alignment element capable of laterally aligning each of a plurality of vertically stacked blocks relative to one another.

Another object of the present invention is to provide a foam block wall which can be accurately aligned by a block alignment element prior to grouting adjacent cells with concrete.

Yet another object of the present invention is to provide a foam block wall with a coupling surface forming a part of each block alignment element for receiving and retaining elongated fastening devices penetrating through the block sidewall.

Yet another object of the present invention is to provide a foam block wall having a block alignment element including a coupling surface for allowing wall-mounted devices such as drywall, electrical boxes and siding to be directly coupled to and supported by the exterior surface of the block wall by mechanical means.

Briefly stated, and in accord with one embodiment of the invention, a foam block wall includes a first foam block having an upper surface, a lower surface, opposing parallel-oriented exterior side surfaces and a first passageway extending vertically between the upper and lower block surfaces and defining a reduced thickness sidewall between the exterior side surface and the internal passageway. A second foam block includes an upper surface, a lower surface, opposing parallel-oriented exterior side surfaces and a second passageway extending vertically between the upper surface and lower block surface defining a reduced thickness sidewall between the exterior surface and the internal passageway. The lower surface of the second block is supported by the upper surface of the first block with the second passageway aligned with the first passageway. A block alignment element includes a first end, a second end and first and second edge alignment surfaces disposed between the first and second ends for simultaneously engaging the internal passageways of the first and second blocks at angularly spaced apart intervals to align the first and second blocks.

As an additional element of the invention, the block alignment elements may also be provided with a coupling surface positionable in proximity to the reduced thickness sidewall of at least one block to receive and retain elongated fastening devices penetrating through the sidewall and engaging the coupling surfaces.

DESCRIPTION OF THE DRAWINGS

The invention is pointed out with particularity in the appended claims. However, other objects and advantages together with the operation of the invention may be better understood by reference to the following detailed description taken in connection with the following illustrations, wherein:

FIG. 1 represents a partially cutaway perspective view of one embodiment of the foam block wall of the present invention.

FIG. 2 represents a sectional view of the block wall illustrated in FIG. 1, taken along section lines 2—2.

FIG. 3 represents a partially cutaway elevational view of the block wall illustrated in FIG. 1, taken along section lines 3—3.

FIG. 4 represents a partially cutaway elevational view of the block wall illustrated in FIG. 1, taken along sections 4—4.

FIG. 5 represents a partially cutaway elevational view of the block wall illustrated in FIG. 1, taken along section lines 5—5.

FIG. 6 represents a partially cutaway elevational view of the block wall illustrated in FIG. 1, taken along section line 6.6.

FIG. 7 represents a partially cutaway elevational view of the block wall illustrated in FIG. 1, taken along section lines 7—7.

FIG. 8 represents a partially cutaway elevational view of a C-shaped block alignment element including fastening devices penetrating through both the interior and exterior sidewalls of the block for securing wall-mounted devices to the outside and inside of the block wall.

FIG. 9 represents a partially cutaway elevational view of a modified C-shaped block alignment element including fastening strips for securing wall-mounted devices to the exterior and interior sidewalls of the block where the previously open block passageway has been filled with cured concrete.



US 20040216415A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0216415 A1**
Pfeiffer et al. (43) **Pub. Date: Nov. 4, 2004**

(54) **WELDED WIRE REINFORCEMENT FOR
MODULAR CONCRETE FORMS**

(52) **U.S. Cl. 52/506.01; 52/782.1; 52/633**

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(57) **ABSTRACT**

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A welded wire reinforcement is used in combination with insulated concrete form blocks having opposed panels joined by form ties. A method of construction forms building structures with insulated concert form blocks. The reinforcement member has a base bar and a plurality of arms extending downwardly from the base bar and is utilized to provide increased internal strength to a modular concrete wall system. The welded wire reinforcement provides vertical and horizontal support without requiring any extra time or material to connect a vertical reinforcement to the concrete forms of the wall system. An alternate embodiment of the reinforcement member includes a horizontal base bar, arms extending downward and perpendicular from the base bar, and a plurality of end pieces attached to the arms to form a discontinuous bottom bar. The base bar and bottom bar are slidably received in rebar chairs defined by the form ties. Another embodiment of the reinforcement member is utilized for reinforcing a modular concrete wall form with a ledge.

(21) **Appl. No.: 10/770,811**

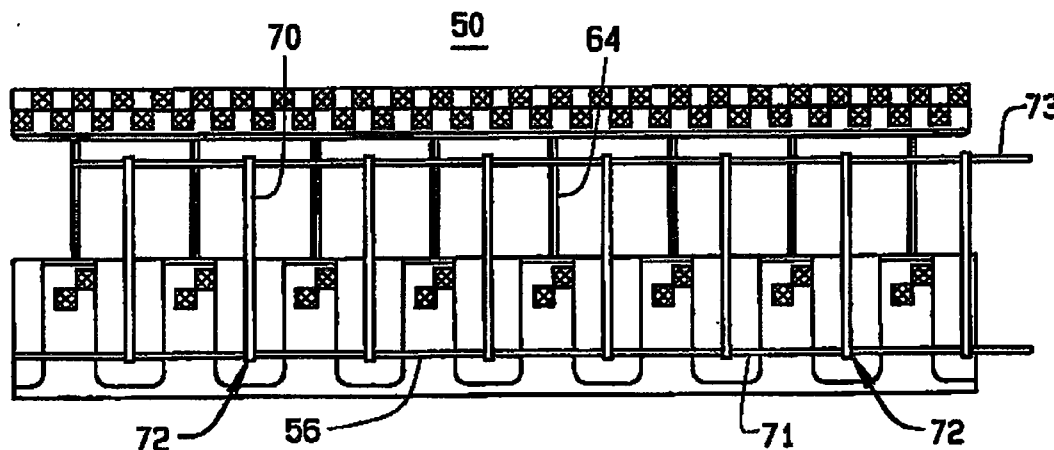
(22) **Filed: Feb. 3, 2004**

Related U.S. Application Data

(60) **Provisional application No. 60/444,741, filed on Feb. 4, 2003.**

Publication Classification

(51) **Int. Cl.⁷ E04C 2/54**



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Título BLOQUES PARA CONSTRUCCION DE MAMPOSTERIA

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Resumen

21.- Bloque para construcción caracterizado porque se diseñan de diferentes tipos de bloques de acuerdo a las dimensiones del área a construir, teniéndose básicamente estos tipos: el Bloque Tipo I, el Bloque Tipo II y los Bloques de Amarre Esquineros; donde el Bloque Tipo I esta conformado por: dos plaquetas rectangulares (1) paralelas las cuales se encuentran separadas por una serie de siete plaquetas transversales dispuestas perpendicularmente a las plaquetas (1); estando la plaqueta izquierda (2) desplazada unos centímetros hacia afuera de la plaqueta (1) formando la parte macho y la plaqueta derecha (3) ubicada hacia adentro de la plaqueta (1) en la misma distancia del desplazamiento de la plaqueta izquierda (2) para formar la parte hembra, y las demás plaquetas se encuentran distribuidas a lo largo de la plaqueta (1) así: las plaqueta (4) unida por la parte inferior por una base (5) a la plaqueta izquierda (2); las plaquetas (6), (7) y (8) unidas entre sí por la parte inferior por una base (9) y las plaquetas (10) y (3) unidas por la parte inferior por la base (11); además las plaquetas transversales están ubicadas unos centímetros más abajo de las plaquetas (1).

