

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/021892 A1

(51) International Patent Classification⁷: E04G 9/05,
11/10, 17/02, E04F 15/10

(21) International Application Number:
PCT/IB2004/002793

(22) International Filing Date: 30 August 2004 (30.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003/6715 28 August 2003 (28.08.2003) ZA

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

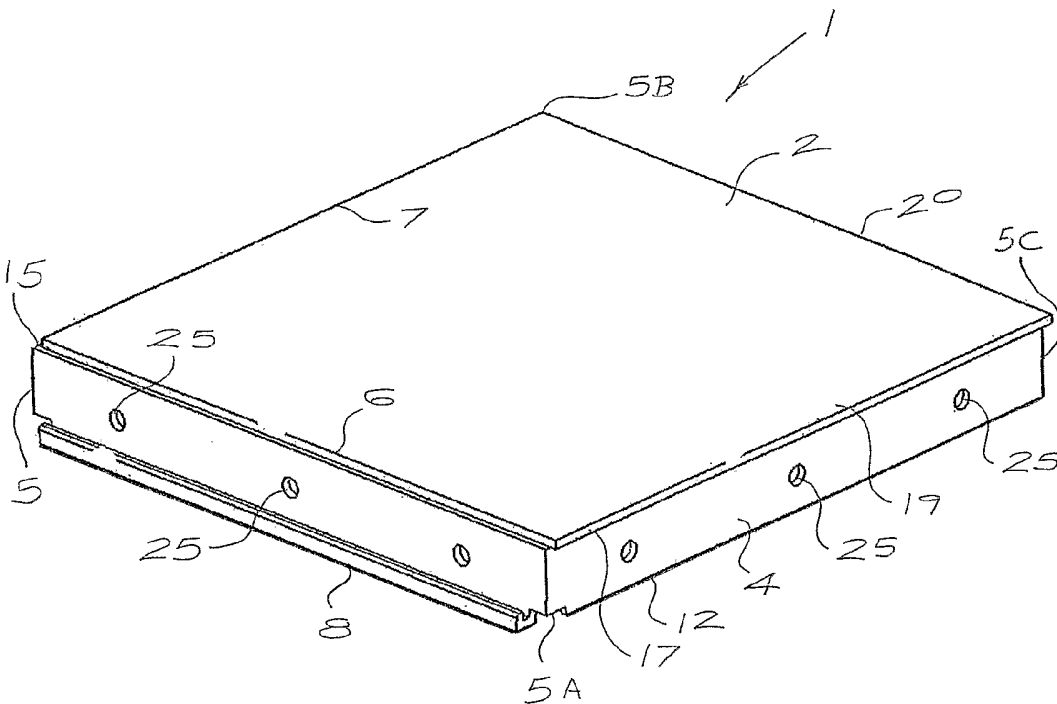
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

[Continued on next page]

(54) Title: A SHUTTERING ELEMENT



(57) Abstract: A shuttering element moulded from a plastics material is provided which includes a rectangular panel with a skirt extending therefrom at least partway around the periphery thereof. The skirt along each of an adjacent pair of sides of the panel has a channel section complementary to a lip on the skirt opposite thereto.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A SHUTTERING ELEMENT

5

FIELD OF THE INVENTION

This invention relates to a shuttering element, more particularly, but not
10 exclusively, to a shuttering element for use in the construction industry.

BACKGROUND TO THE INVENTION

15 Shuttering is widely used in the construction of buildings to shape wet concrete and typically is formed by a plurality of steel or plastics panels secured end to end. These panels are usually rectangular with a flange extending around the periphery which enables panels to be secured side-by-side.

20 Although effective, such panels, particularly steel panels, are fairly expensive to manufacture and are frequently damaged by rough handling. Such damage includes deformation of the peripheral flange which often results in the panels becoming unusable. Also, it is common for wet cement to leak from between adjacent flanges.

25

OBJECT OF THE INVENTION

It is an object of this invention to provide a shuttering element which will at least
30 partially alleviate some of the abovementioned problems.

SUMMARY OF THE INVENTION

In accordance with this invention there is provided a shuttering element comprising a rectangular panel with a skirt extending therefrom at least partway
5 around the periphery thereof, with the skirt along each of an adjacent pair of sides of the panel having a channel section complementary to a lip on the skirt opposite thereto.

Further features of the invention provide for the edge of the panel to be recessed
10 along each of a pair of adjacent sides, preferably the sides adjacent the channel sections; for a tongue to extend from the edges of the panel opposite each recess; for the skirt to extend the length of each side of the panel; for each channel section to extend at least partway along the length of its corresponding side; for each channel section to extend integrally from the skirt; for each lip to
15 extend integrally from the skirt; and for there to be a number of oppositely aligned apertures extending through the skirt.

Still further features of the invention provide for at least parts of the channel section to extend towards the panel and for the extended channel sections to be
20 engageable with the skirt of an oppositely disposed shuttering element.

Yet further features of the invention provide for the shuttering element to be moulded from a plastics material; and for strengthening elements to extend across the panel within the skirt.
25

The invention also provides a shuttering element moulded from a plastics material and characterised in that it has interlocking formations which are operatively securable to complementary formations on adjacent elements.
30

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described, by way of example only, with reference to the drawings in which:

5

Figure 1 is a top perspective view of a first embodiment of a shuttering element;

Figure 2 is a bottom perspective view of the shuttering element in Figure 1;

Figure 3 is a sectional side elevation of the shuttering element in Figure 1;

10 Figure 4 is a sectional side elevation of a part of a pair of shuttering element is secured side to side;

Figure 5 is a bottom perspective view of a second embodiment of a shuttering element; and

15 Figure 6 is a bottom perspective view of a third embodiment of a shuttering element;

Figure 7 is a top perspective view showing locking formations for the securing abutting skirts of contiguous panels together;

Figure 8 is a detail of the locked formations; and

Figure 9 is a bottom perspective of two panels secured together.

20

DETAILED DESCRIPTION OF THE DRAWINGS

25 A shuttering element (1) moulded from a plastics material is shown in Figures 1 to 3 and includes a rectangular, in this embodiment square, panel (2) with a skirt (4) extending normally therefrom about its periphery. The skirt (4) thus forms four corners (5).

30 The skirt along a pair of adjacent sides (6,7) has a channel section (8,9) extending integrally therefrom opposite the skirt (4). The channel sections (8,9) are outwardly directed and extend from the skirt (4) from near the corners (5).

A co-planar lip (12,13) extends integrally from the skirt opposite each channel section (8,9). The lips (12,13) extend along the skirt (4) from near the corners (5a, 5b) adjacent the channel sections (8,9) to the opposite corner (5c) where they are joined.

The edges of the panel (2) adjacent the sides (6,7) have recesses (15) therein while a complementarily shaped tongue (17) extends from the edges of the opposite sides (19, 20).

A series of oppositely aligned apertures (25) are formed in the skirt (4), evenly spaced between the corners (5).

Strengthening elements (30) extend across the panel (2) within the skirt (4). These have the form of intersecting flanges extending normally from the skirt (4) in a manner well-known to those skilled in the manufacture of plastics goods.

In use, a plurality of shuttering elements are arranged side-by-side with each lip nested within an adjacent channel section and a tongue (17) seated in a recess (15), as shown in Figure 4. In this condition the apertures (25) along each side of adjacent skirts are aligned and can receive a fastener (40), in this embodiment a bolt, therethrough. This permits easy assembly of a formwork while the configuration of the tongue and recess and lip and channel section substantially eliminate the possibility of leakage between adjacent skirts.

Furthermore, as the shuttering element is moulded from a durable plastics material, preferably polypropylene or high density polyethylene (HDPE), it is highly resistant to deformation and can be cheaply manufactured. It has been found that the shuttering elements are able to be used up to approximately 100 times without any maintenance, unlike the steel units which are maintained on a regular basis.

Also, as concrete does not stick to the panels they can be easily cleaned and leave a smooth finish to cast concrete structures.

5 It will be appreciated, however, that many other embodiments of a shuttering element exist which fall within the scope of the invention, particularly as regards the configuration thereof. For example, as shown in Figures 5 and 6 the shuttering element (60, 70) could have adjacent sides of unequal length. Also, the skirt, channel sections and lips to be interrupted in their length and a tongue
10 and recess need not be provided in the panel.

Also, it is not necessary to use bolts to secure the shuttering elements together and any suitable fastener can be used. The configuration of the shuttering elements makes it possible to reduce the number of fasteners needed or to
15 completely avoid the use of fasteners in certain circumstances. It has been found that the panels can be glued together using PVC solvent where the panels are made from HDPE. This is useful where the panels are used to construct a large number of identical buildings, such as in low cost housing developments. Whole sections of formwork can then simply be moved from site to site as
20 required, further simplifying the construction process.

Importantly, any suitable interlocking formation can be used on the shuttering elements enabling them to be secured end to end. These formations include dove tail, 'T' tail and key-hole formations.

25

Figures 7 to 9 show an alternative embodiment of the invention. In particular, the channel sections (8, 9) of the shutter element (80) extend towards the panel (2) in sections (81, 82). The extended sections (81, 82) are configured to capture the skirt (83) of an adjacent element (84). In addition, the skirt of the element
30 (80) is provided with two L-shaped slots (85, 86) in each of its four sides. The slots on a channelled side of an element align with slots on a lipped side of

another member allowing two adjacent elements to be secured to each other with a key (87). The key-slot assembly provides additional strengthening of the connections between two adjacent elements.

5 It is to be noted that the key-slots also pass through the extended sections 81, 82 of the channel sections. The keys (87) for locking contiguous panels together consist of brackets (100) on the ends of a rigid bar (101). The brackets carry rods (not shown) which engage the L-shaped slots and clamp abutting skirts together. The bar (101) also carries a manipulating handle (102) projecting on
10 the opposite to the brackets (100).

Also illustrated in Fig. 9 are hollow cylindrical components (103) which form part of the strengthening elements (30). The components (103) may accommodate expandable plugs (104) with handles (105). These plugs and handles facilitate
15 the manipulation of the panels.

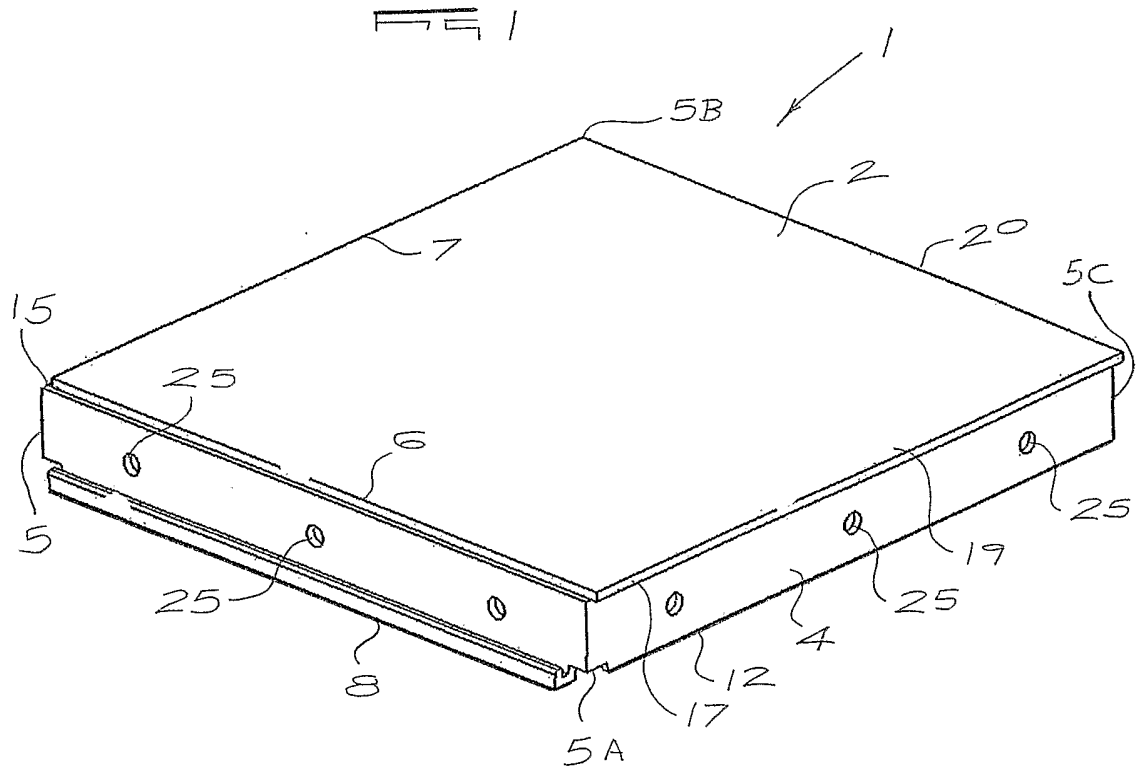
From the above it will be appreciated that the shuttering panels are versatile and simple to erect and dismantle which also reduces damage and general wear and tear during use.

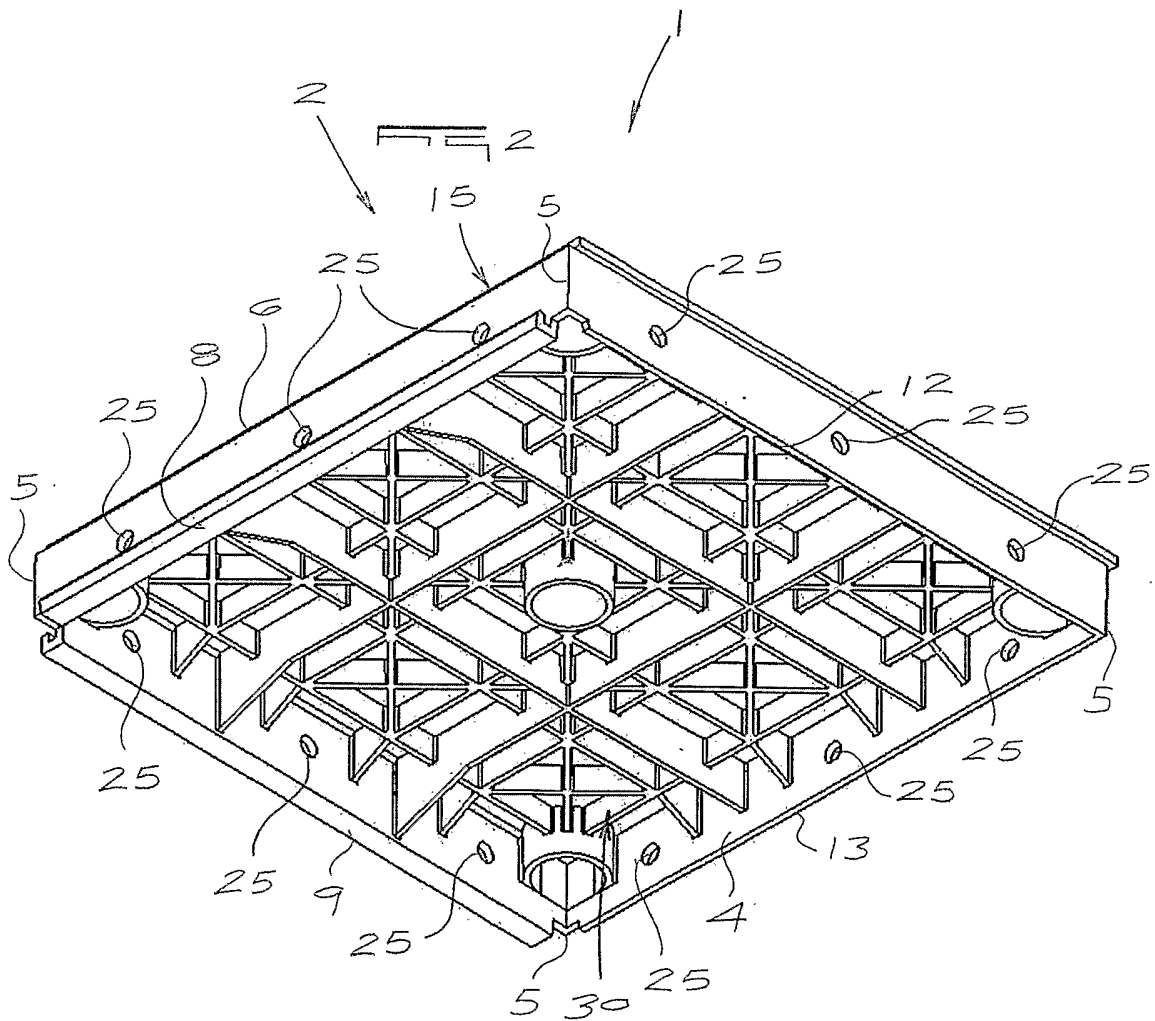
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CLAIMS

1. A shuttering element (1) comprising a rectangular panel (2) with a skirt (4) extending therefrom at least partway around the periphery thereof,
5 characterised in that the skirt (4) along each of an adjacent pair of sides (6, 7) of the panel (2) has a channel section (8, 9) complementary to a lip (12, 13) on the skirt (4) opposite thereto.
2. A shuttering element as claimed in claim 1 characterised in that the edge
10 of the panel (2) is recessed along each of a pair of adjacent sides.
3. A shuttering element as claimed in claim 2 characterised in that the sides having the recessed edges are adjacent the channel sections (8, 9).
- 15 4. A shuttering element as claimed in claim 2 or claim 3 characterised in that a tongue extends from the edges of the panel (2) opposite the recessed edges.
5. A shuttering element as claimed in any one of the preceding claims
20 characterised in that the skirt (4) extends along the length of each side of the panel (2).
6. A shuttering element as claimed in any one of the preceding claims
25 characterised in that each channel section (8, 9) extends partway along the length of its corresponding side.
7. A shuttering element as claimed in any one of the preceding claims
30 characterised in that each channel section (8, 9) extends integrally from the skirt (4).

8. A shuttering element as claimed in any one of the preceding claims characterised in that each lip (12, 13) extends integrally from the skirt (4).
- 5 9. A shuttering element as claimed in any one of the preceding claims characterised in that a number of oppositely aligned apertures (25) extend through the skirt (4).
- 10 10. A shuttering element as claimed in any one of the preceding claims characterised in that at least part of the channel section (8, 9) extends towards the panel (2).
- 15 11. A shuttering element as claimed in claim 10 characterised in that the extended section (81, 82) is engageable with the skirt (4) of an oppositely disposed shuttering element.
12. A shuttering element as claimed in any one of the preceding claims characterised it is moulded from a plastics material.
- 20 13. A shuttering element as claimed in claim 1 characterised in that strengthening elements extend across the panel (2) within the skirt (4).
- 25 14. A shuttering element moulded from a plastics material as claimed in claim 1 and characterised in that it has key operated interlocking formations (4) (81) which are operatively securable to complementary formations on adjacent elements.
- 30 15. A shuttering element substantially as described with reference to Figs 1 to 5 or Fig. 9 of the drawings.





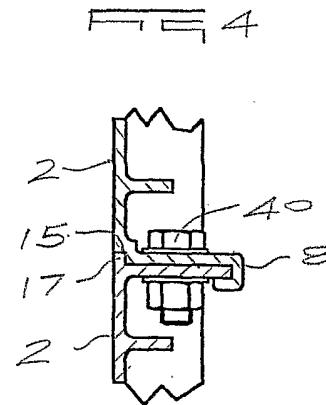
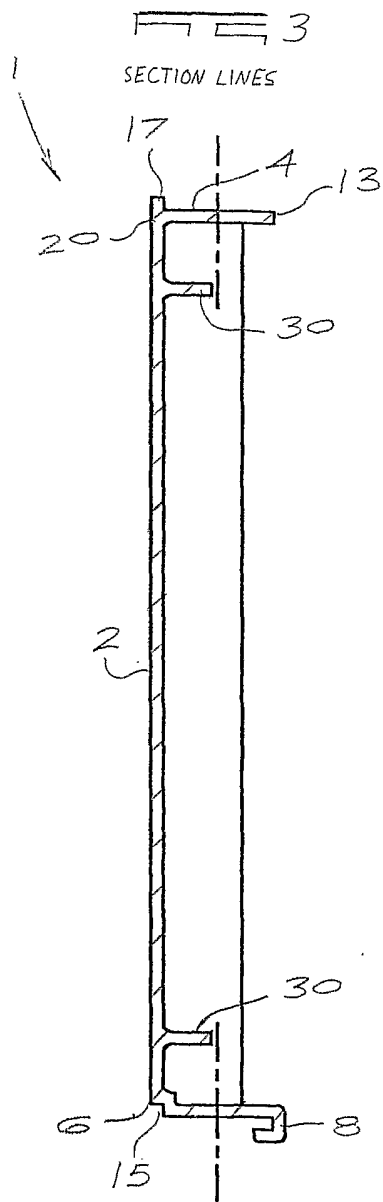
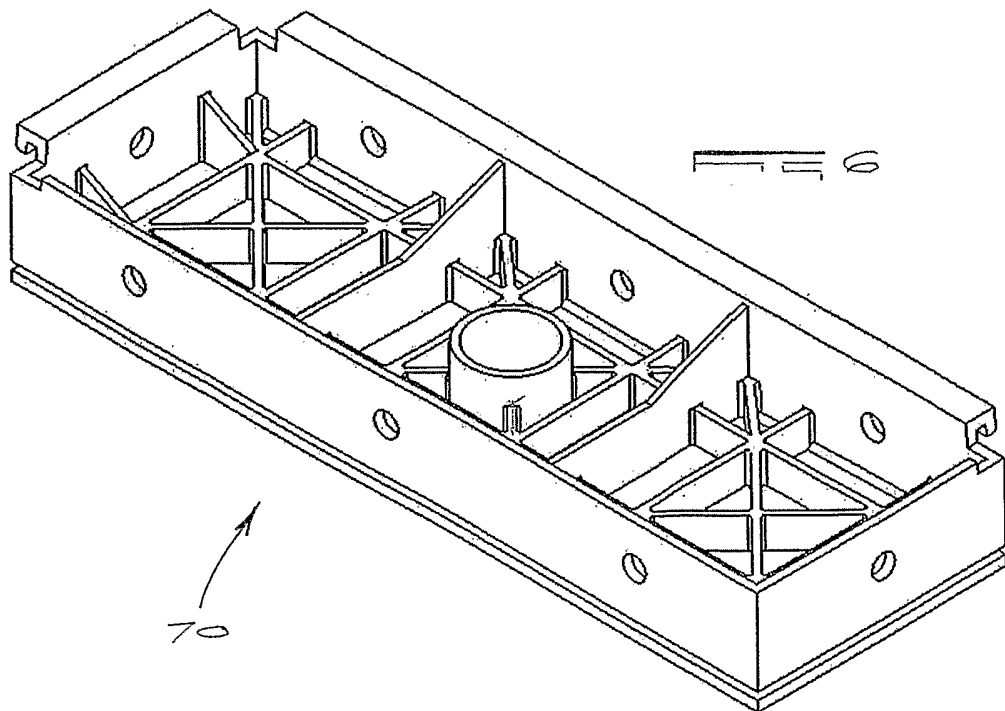
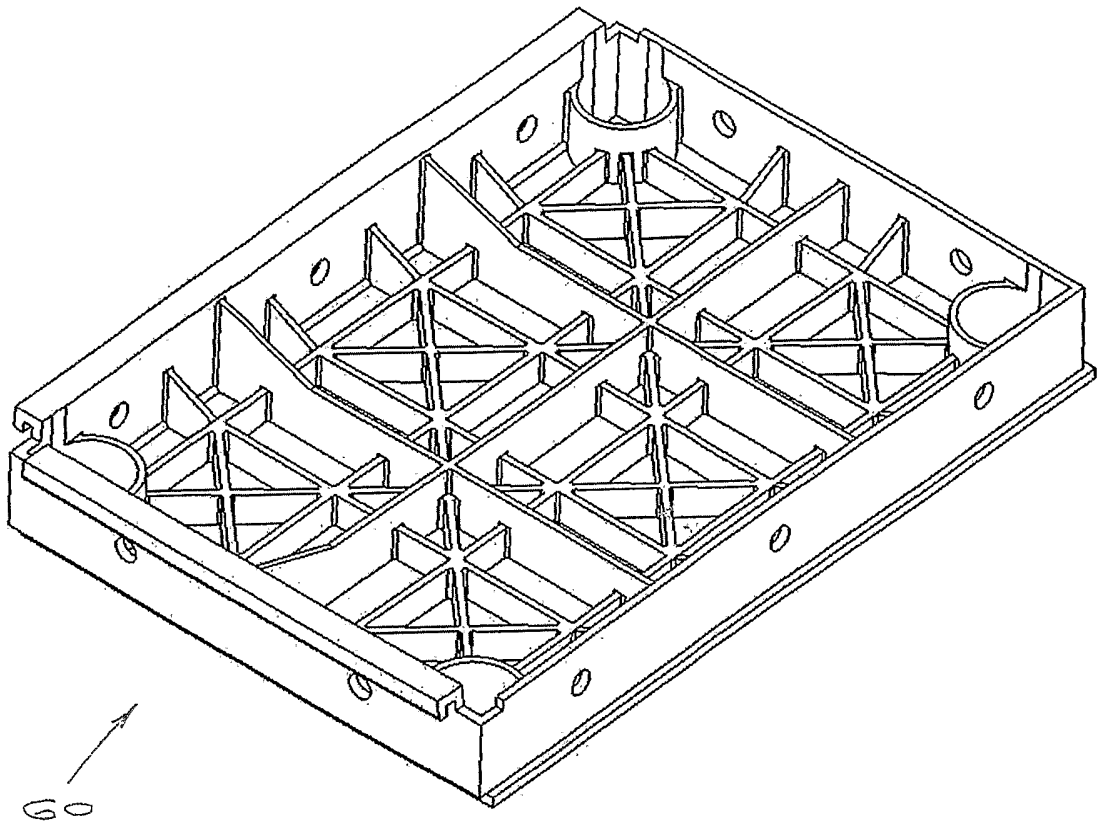
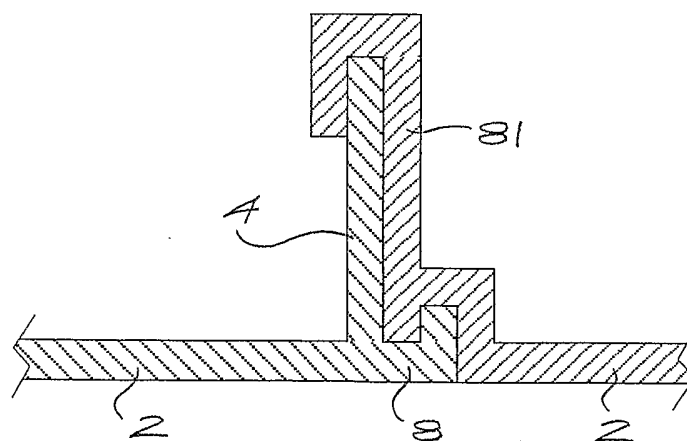
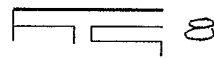
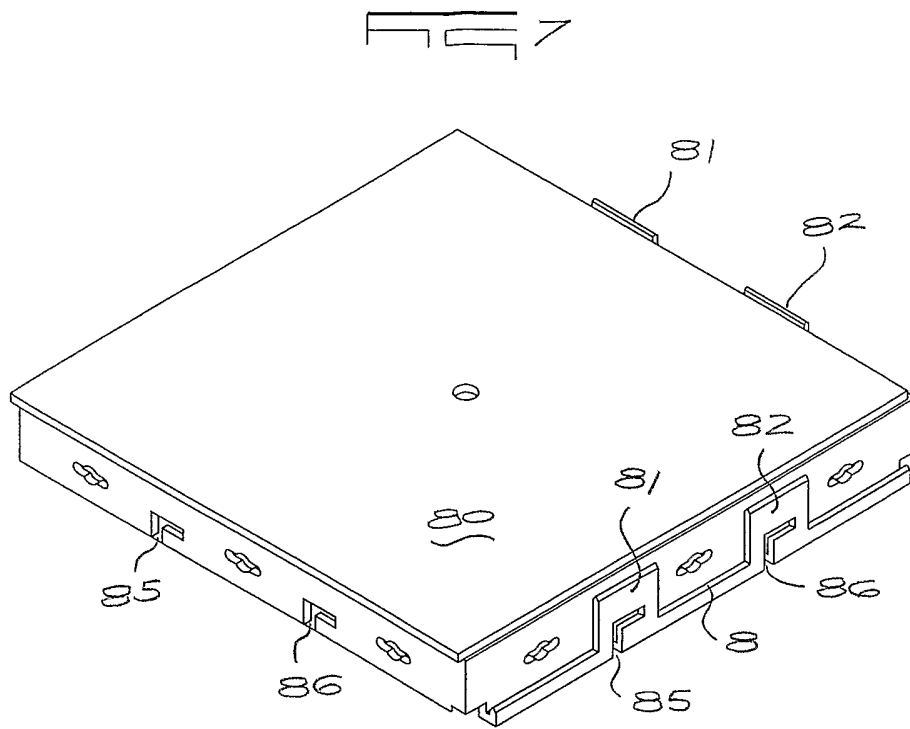
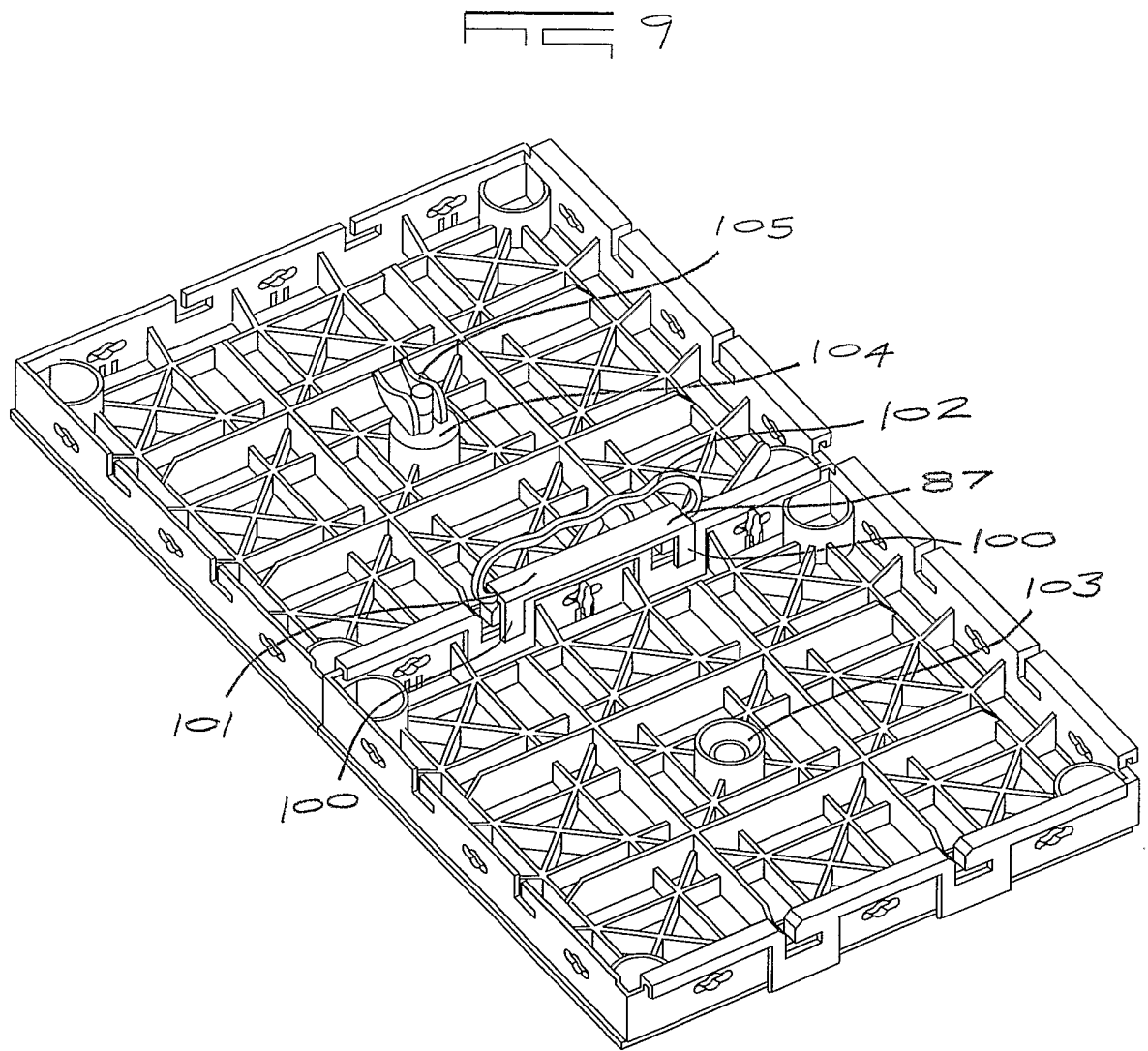


FIG 5







INTERNATIONAL SEARCH REPORT

International Application No
PCT/1B2004/002793

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04G9/05 E04G11/10 E04G17/02 E04F15/10

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04G E04F

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No |
|------------|--|----------------------|
| X | EP 0 399 114 A (BOTES, HENDRIK PETRUS) 28 November 1990 (1990-11-28) figures 1-6 | 1-8, 10-13 |
| Y | ----- | 9, 14 |
| Y | US 5 078 360 A (SPERA ET AL) 7 January 1992 (1992-01-07) figures | 9, 14 |
| A | ----- | 1-8 |
| X | US 4 077 598 A (MARSEILLAN ET AL) 7 March 1978 (1978-03-07) figures | 1, 5-8 |
| A | US 2 801 454 A (TROIEL ARTHUR E) 6 August 1957 (1957-08-06) figures | 1-5, 9, 13, 14 |

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents .

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

E earlier document but published on or after the international filing date

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

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

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

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

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

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

* & * document member of the same patent family

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| Date of the actual completion of the international search | Date of mailing of the international search report |
| 11 February 2005 | 18/02/2005 |

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| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016 | Authorized officer Andlauer, D |
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2004/002793

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

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

2. Claims Nos.: 15
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

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

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

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

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 15

Claim 15 does not fulfill the requirements of Rule 6.2(a) PCT and was therefore not searched.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/1B2004/002793

| Patent document cited in search report | A | Publication date | Patent family member(s) | Publication date |
|--|---|------------------|-------------------------|------------------|
| EP 0399114 | A | 28-11-1990 | CA 1329012 C | 03-05-1994 |
| | | | EP 0399114 A1 | 28-11-1990 |
| | | | AT 117758 T | 15-02-1995 |
| | | | AU 617808 B2 | 05-12-1991 |
| | | | AU 3515989 A | 06-12-1990 |
| | | | DE 68920863 D1 | 09-03-1995 |
| | | | US 5020769 A | 04-06-1991 |
| | | | | |
| US 5078360 | A | 07-01-1992 | CA 2006575 A1 | 22-06-1993 |
| | | | AT 112355 T | 15-10-1994 |
| | | | AU 8004191 A | 24-07-1991 |
| | | | WO 9110028 A1 | 11-07-1991 |
| | | | DE 69013012 D1 | 03-11-1994 |
| | | | EP 0507786 A1 | 14-10-1992 |
| | | | | |
| US 4077598 | A | 07-03-1978 | AR 212325 A1 | 30-06-1978 |
| | | | BR 7606692 A | 16-11-1977 |
| | | | ES 451926 A1 | 01-11-1977 |
| | | | FR 2327375 A1 | 06-05-1977 |
| | | | IT 1069884 B | 25-03-1985 |
| | | | JP 52046627 A | 13-04-1977 |
| | | | NL 7610978 A | 13-04-1977 |
| | | | | |
| US 2801454 | A | 06-08-1957 | NONE | |