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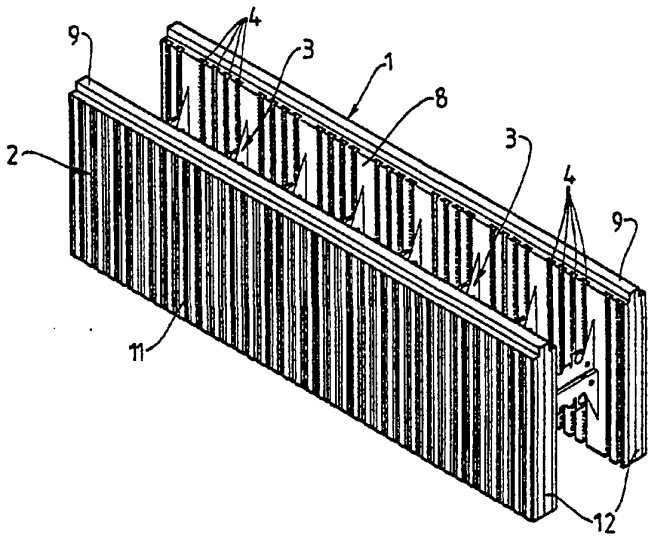
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(54) Title: A SHUTTER BLOCK USED IN A METHOD OF CONCRETE CONSTRUCTION



(57) Abstract

A shutter block, the shutter block including two regularly spaced shutter walls (1, 2), each shutter wall has a continuous ridge (9) on its top and a continuous recess (10) in its bottom, webs (3) are used to connect the shutter walls, and the webs are adapted to hold reinforcing rods relative to either the top and/or the bottom of the web. One or more dividers (13) can be used to close the, or any, open ends of the shutter blocks or can be used to create sections within the shutter block. The placement of one or more individual shutter blocks together will form larger shutter walls, joined by one or more webs adapted to hold reinforcing rods relative to the top and bottom of a web.

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A SHUTTER BLOCK USED IN A METHOD OF CONCRETE CONSTRUCTION

The invention relates to a shutter block, such as a polystyrene shutter block, used in a method of concrete construction.

The existing shutter blocks such as those described in European Patent Nos. 0137105 and 0092693 can be difficult to use. This is due to the complex means of joining one block to another and often the lack of a suitable means for supporting reinforcing rods within the shutter block.

These existing shutter blocks rely on a complex arrangement of spigots and recesses which require an exact fit. The spigots are easily damaged. The recesses are easily filled with foreign body material such as dust and concrete. Due to the size of the recesses it is difficult to detect and remove the foreign material. Such damage or contaminations make it difficult and at times impossible for the shutter blocks to fit exactly. An exact fit is required to prevent concrete slurry leakage. The joining means for existing shutter blocks means the shutter blocks cannot be slid along the top of one another hence

it is difficult to compensate for irregular joins in walls.

The reinforcing rods required for many concrete constructions are difficult to situate and keep in place using the existing shutter blocks. This is particularly so when an exact fit between separate shutter blocks is not possible.

An object of the present invention is to provide a simple and quick means of joining one shutter block to another while enabling reinforcing rods to be quickly and firmly fixed in place. This will enable a quick and efficient method of concrete construction.

Other objects and advantages of the invention will be apparent from the following description.

In one aspect, this invention provides for a shutter block, the shutter block including two regularly spaced shutter walls, each shutter wall has a continuous ridge on its top and a continuous recess in its bottom, webs are used to connect the shutter walls and the webs are adapted to hold reinforcing rods relative to either the top and/or the bottom of the web.

It is to be appreciated the reverse orientation of the continuous recess and continuous groove is intended to be covered by the invention.

Preferably one or more dividers can be used to close the, or any, open ends of the shutter blocks or can be used to create sections within the shutter block. The placement of one or more individual shutter blocks together will form larger shutter walls, joined by one or more webs adapted to hold reinforcing rods relative to the top and bottom of a web.

Preferably the internal faces of the shutter walls will include shaped grooves in which complementary parts of the divider can fit to close an open end of the shutter or be used to create a section within the shutter block.

Preferably the shaped grooves can be dove-tailed or approximately dove-tailed with curved edges.

One of the external faces of the shutter walls can include dovetailed or the like shaped grooves

which assist an external plaster coating to key to the wall.

Preferably the shutter walls are corrugated on their outer and end faces.

By combining different numbers and different shapes of shutter blocks a preferred shape of concrete construction can be obtained.

A further aspect of the invention provides for a means of manufacturing the shutter blocks in which a web or webs is or are placed between two moulds of a shutter wall which have been filled with polystyrene balls or a similar material. The polystyrene balls in the mould are heated and expand to form two shutter walls joined by the at least one web.

Preferably a mould filled with polystyrene balls can be heated to form a divider.

A further aspect of the invention provides for a means of manufacturing the shutter blocks in which a mould of the divider is filled with polystyrene balls or similar material. The

polystyrene balls in the mould are heated and expand to form a divider.

The shutter walls and dividers can be ejected from the moulds by a blast of compressed air.

Further aspects of the invention which should be considered in all its novel aspects will become apparent from the following descriptions which are given by way of example, only.

Examples of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a side elevational view of a shutter wall (being part of an example of the invention);

Figure 2 shows a plan view of a pair of shutter walls linked by webs to form an example of shutter block according to the invention;

Figure 3 shows an end elevational view of the shutter walls shown in Figure 2 with a web joining them together;

Figure 4 shows a perspective view of the shutter block according to the invention;

Figure 5 shows a plan view of an end wall block or divider for the shutter block shown in Figure 2;

Figure 6 shows an end view of the end wall or divider shown in Figure 5;

Figure 7 shows a side view of the end wall or divider shown in Figures 5 and 6;

Figure 8 shows an isometric view of the end wall or divider shown in Figures 7 and 8;

Figure 9 shows a side view, partly formed, of a web for the shutter block shown in Figure 2;

Figure 10 shows a sectional end view of the formed web shown in Figure 9;

Figure 11 shows an isometric view of the formed web shown in Figures 9 and 10;

Figure 12 shows a plan view of a right turn corner block according to the invention;

Figure 13 shows an elevational view in the direction of arrows X-X of the right turn corner block shown in Figure 12;

Figure 14 shows an elevational view in the direction of arrows Y-Y (Figure 12) of the corner block shown in Figures 12 and 13;

Figure 15 shows an isometric view of the corner block shown in Figures 12 and 13;

Figure 16 shows a plan view of a high floor unit for use with the shutter block and end wall blocks shown in Figures 2 and 5;

Figure 17 shown an elevational view of the high floor unit shown in Figure 16;

Figure 18 shows an end elevational view of the high floor unit shown in Figures 16 and 17; and

Figure 19 shows an isometric view of the high floor unit shown in Figures 16 to 18.

As shown in Figures 1 to 4 of the drawings the shutter block consists of two regularly spaced shutter walls 1, 2 of equal similar dimensions.

The internal face of each of the shutter walls 1, 2 includes a plurality of similarly dimensioned and dove-tail shaped anchoring grooves 4. The dove-tailed grooves 4 are grouped in sets of four 5 and the sets are spaced regularly along the shutter walls. The shutter walls 1, 2 are joined by webs 3 (shown in detail in Figures 9 to 11) positioned at intervals 6 along the shutter walls between the sets of grooves 5. The space between each set 5 of grooves 4 is at least twice space 8 between each individual dove-tailed groove 4 of a set 5.

Each shutter wall 1, 2 has on its top or bottom face a continuous ridge 9 or continuous recess 10 (Figure 3). Where the shutter wall 1, 2 has the continuous recess 10 on its top the bottom will have the continuous ridge 9. The continuous ridge 9 is of such a proportion that it fits in the continuous recess 10 of a similar shutter wall above or below.

The outer face 11 and end face 12 of each shutter wall 1, 2 are preferably corrugated.

The shutter walls 1, 2 can be connected by at least one of the webs 3. The webs 3 join the two shutter walls 1, 2 and have a width of smaller dimensions than the overall width of the pair of shutter wall 1,2 as shown in Figures 2, 3 and 4.

The webs 3 can be stamped from or moulded from a sheet of material which is preferably metal. The configuration of an example of the web is shown in Figures 9 to 11. In Figure 9 is shown a web 3 before it is folded into the shape shown in Figures 10 and 11.

The shape and dimension of a web is symmetrical about the horizontal axis A-A and the vertical axis B-B.

In use the web 3 is bent along the horizontal bend lines C-C and D-D and (alternatively not shown) can be bent along vertical bend lines.

The web 3 is also bent along lines E-E and F-F to form flanges 15 and 18 at either side of the web 3.

The web 3 includes four similar sites 16 for the fixing of reinforcing rods. The sites 16 include lugs 17 which can be twisted to an open position so that a reinforcing rod of smaller diameter than the recess formed between the sites 16 and lugs 17 can easily be placed in the recess. The lug 17 can then be twisted back to the closed position, as shown in Figures 9 and 11, so the reinforcing rod is fixed in place. It should be appreciated that there may be variations in the number and placement of the sites so long as there is at least one site on the top and bottom of the web 3.

The web 3 is further configured to include two larger recesses 19 and 20 for fixing one or more reinforcing rods (not shown) to enable a bond beam to be formed when the space between the shutter walls is filled with concrete. Any reinforcing held in larger recesses 19, 20 is held in position by wire ties (not shown).

The top or bottom face 21, 22 of a divider 13 or end wall (Figures 5 to 8) has a single anchoring ridge 14 or a single anchoring recess 15. Where a divider 13 has the single anchoring ridge 14 on its bottom face it has on its top face the single

anchoring recess 15. The single anchoring ridge 14 is of such a proportion that it fits in the single anchoring recess. The side faces 23 of the divider 13 are dove-tailed so that they are an insertable fit into the dove-tailed grooves 4 of a shutter wall. The divider 13 can be inserted so that the single anchoring ridge 14 on the top of the divider 13 corresponds to the continuous ridge 15 on the top of the shutter wall. Another option is for the single anchoring recess 15 on the top of a divider 13 to correspond to the continuous recess on the top of a shutter wall.

In use a shutter block is formed by positioning at least one web in a mould, before two shutter walls are formed by heating polystyrene balls placed in the mould. A divider is formed by heating a mould filled with polystyrene beads for an end wall.

In Figures 12 to 15 is shown an example of corner shutter block 24. This construction of block has similar webs 3 to the webs shown in Figures 9 to 11. The overall length of the walls 25, 26 are modular lengths of a standard block shown in Figure 4. This enables a standard block wall configuration to be built with the blocks.

The internal walls 27 of the block 24 have dovetailed grooves 4 in a similar format to that of the standard block. Similarly the upper edge 8 has a ridge 29 while the lower edge 30 has a complementary recess 31.

In Figures 16 to 19 is shown a high floor unit 32. The unit 32 is used on the periphery of a floor slab, for example where a door or window is to be situated. In this situation the edge 33 of the unit 32 is aligned with an outside wall of the floor slab. Concrete can then be screeded off level with the top surface 34 of the unit 32. The inner face 35 of the unit 32 is supported by spacers 36 which in this example are also constructed from the polystyrene material. The spacers 36 are I-shaped (Figures 18 and 19) to enable reinforcing to be fitted along the edge of the floor slab.

In use after a floor slab has been poured in situ a plurality of the shutter blocks are positioned in place leaving spaces for windows and doors. These spaces may be relatively easily formed to plan dimensions by cutting the polystyrene material as required. Dividers are

positioned where necessary to close off any open ends of the blocks.

After reinforcing is placed in position and tied down as required the space between the walls of the blocks is filled with an appropriate cementitious mix. The exterior and interior can then be finished off with an outer plaster or similar coating as required or by the placement of an interior lining like gib-board on the inside shutter wall.

In use the erected block walls can be stabilised by reusable bracing formed from galvanised iron metal sections which are mounted alongside an inner face of the erected walls with angled sections tied or braced down to the floor slab and fixed by dyna bolts or the like to the floor pad.

The exterior wall of the blocks being tied by wire ties to the inside bracing to form a rigid framework for a concrete pour in the blocks.

The shutter blocks form a structure which can with framework and bracing be used to create two

storey structure as well as a single storey structure.

It is possible to use the shutter block for a range of constructions or structures which include concrete walls, these include residential, commercial and industrial buildings.

It is possible that by combining all of the above elements to produce a shutter block which may be used with reinforcing rods in concrete construction.

It is to be understood that the scope of the invention is not limited to the described embodiments and therefore that numerous variations and modifications may be made to these embodiments without departing from the scope of the invention as set out in this specification and the appended claims.

CLAIMS:

1. A shutter block, the shutter block including two regularly spaced shutter walls, each shutter wall has a continuous ridge on its top and a continuous recess in its bottom, webs are used to connect the shutter walls and the webs are adapted to hold reinforcing rods relative to either the top and/or the bottom of the web.

2. A shutter block as claimed in claim 1 wherein the internal faces of the shutter walls include shaped grooves in which complementary parts of a divider can fit to close an open end of the shutter or to create a section within the shutter block.

3. A shutter block as claimed in claim 2 wherein the shaped grooves are dove-tailed or approximately dove-tailed with curved edges.

4. A shutter block as claimed in any one of the preceding claims wherein the shutter walls are corrugated on their outer and end faces.

5. A shutter block as claimed in any one of the preceding claims wherein the shutter walls are constructed from polystyrene.

6. A shutter block as claimed in any one of the preceding claims wherein the webs are constructed from a metal material such as galvanised steel.

7. A shutter block substantially as hereinbefore described with reference to the accompanying drawings.

8. A combination of different numbers and different shapes of shutter blocks as claimed in any one of the preceding claims which create a preferred shape of concrete construction.

9. A combination as claimed in claim 8 wherein one or more dividers can be used to close the, or any, open ends of the shutter blocks or can be used to create sections within the shutter block.

10. A means of manufacturing a shutter block in which the web is placed between two moulds for the shutter walls which have been filled with polystyrene balls or a similar material, the polystyrene balls in the mould being heated and expanded to form the two shutter walls joined by the at least one web.

11. A means as claimed in claim 10 wherein a mould filled with polystyrene balls is heated to form a divider.

12. A means as claimed in claim 10 or claim 11 wherein the shutter walls and dividers are ejected from the moulds by a blast of compressed air.

13. A means of manufacturing a shutter block as claimed in claim 10 and substantially as hereinbefore described with reference to the accompanying drawings.

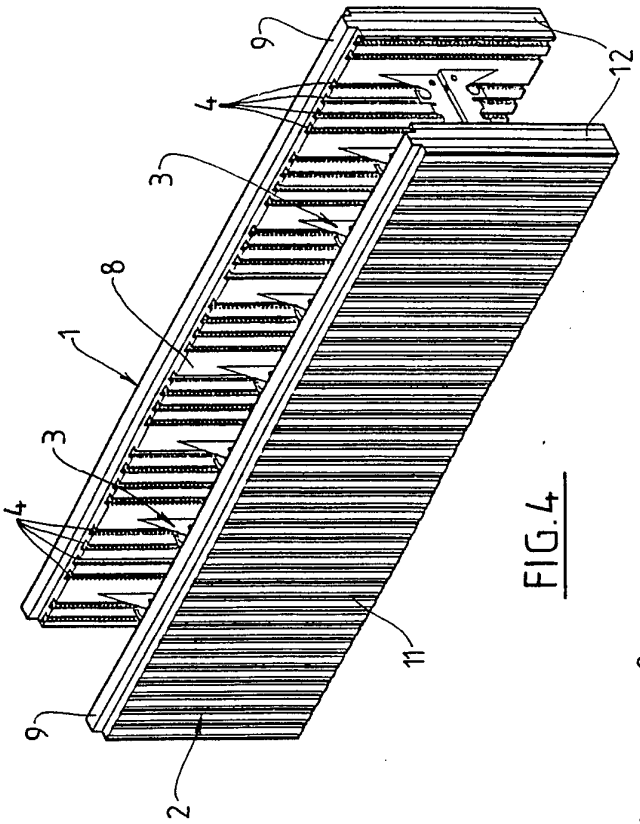


FIG.4

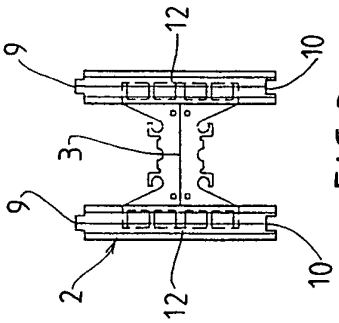


FIG.3

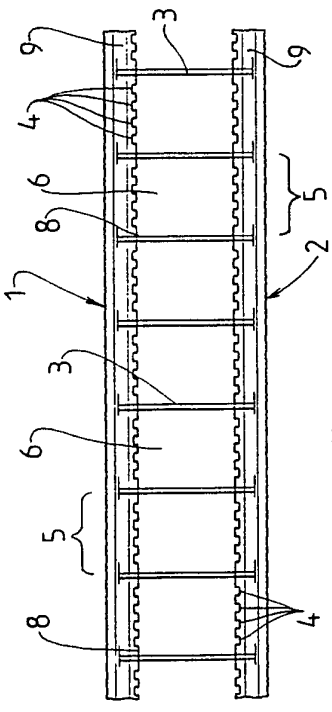


FIG.2

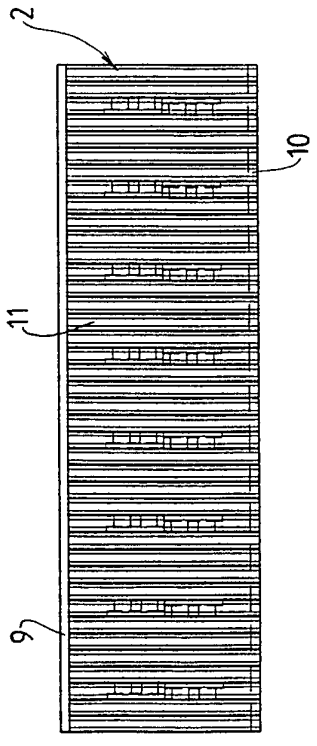


FIG.1

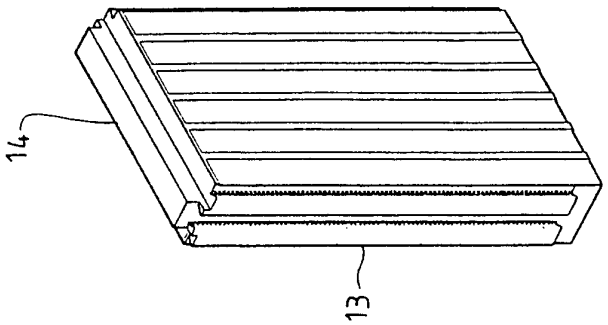


FIG.8

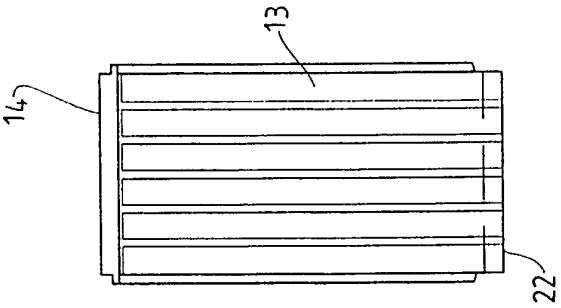


FIG.7

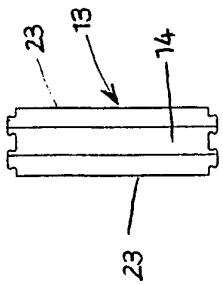


FIG.5

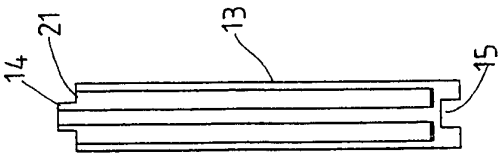


FIG.6

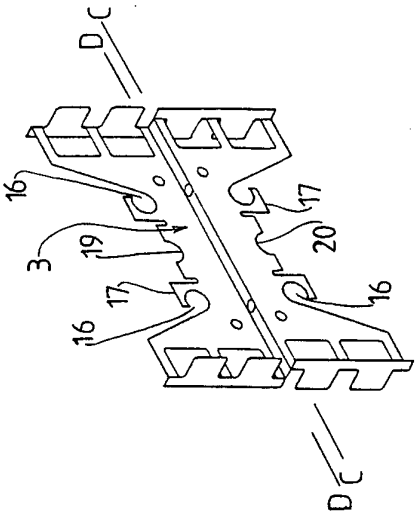


FIG.11

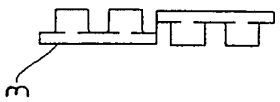


FIG.10

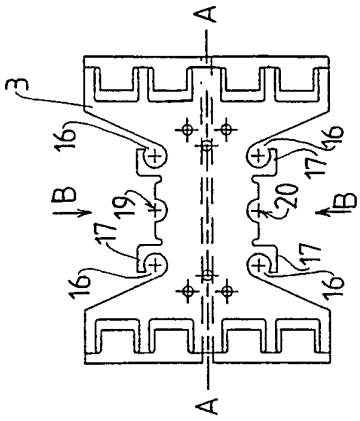


FIG.9

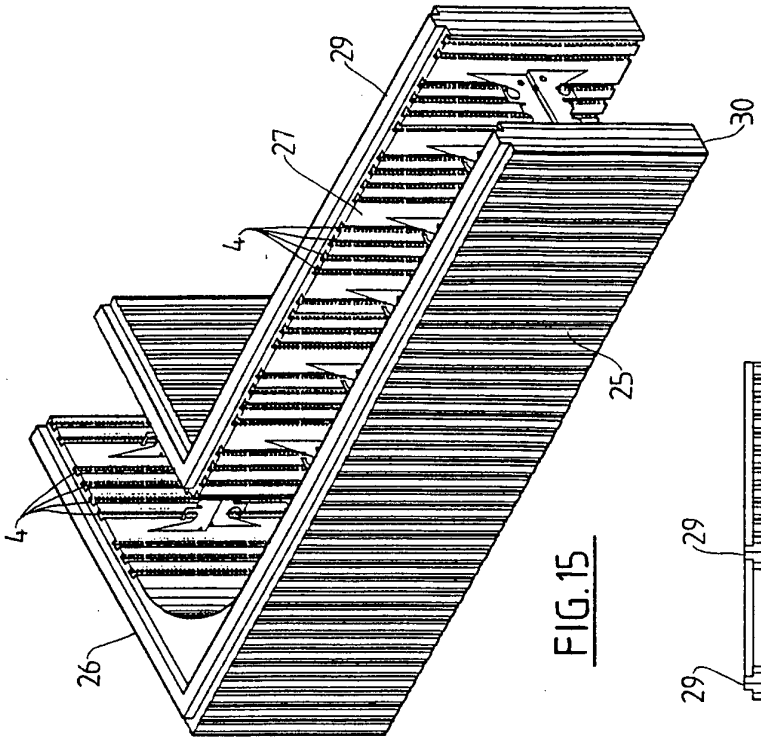


FIG.15

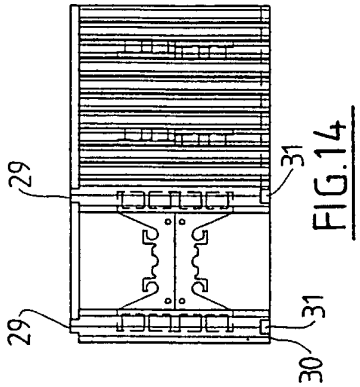


FIG.14

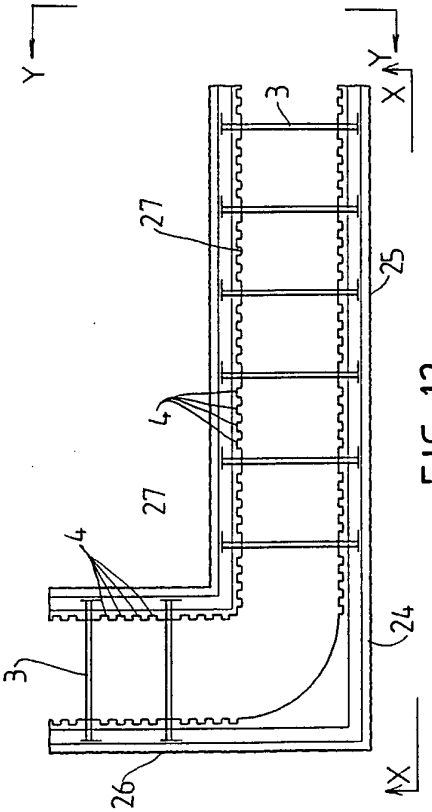


FIG. 12

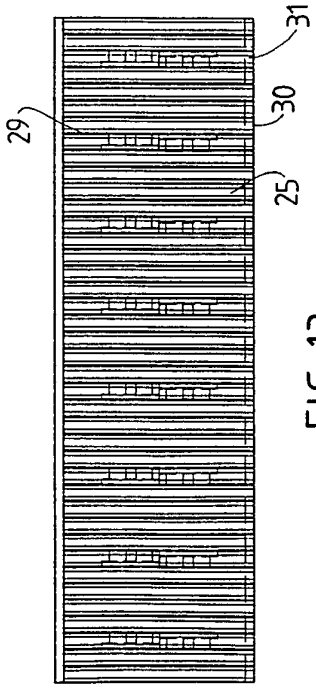


FIG. 13

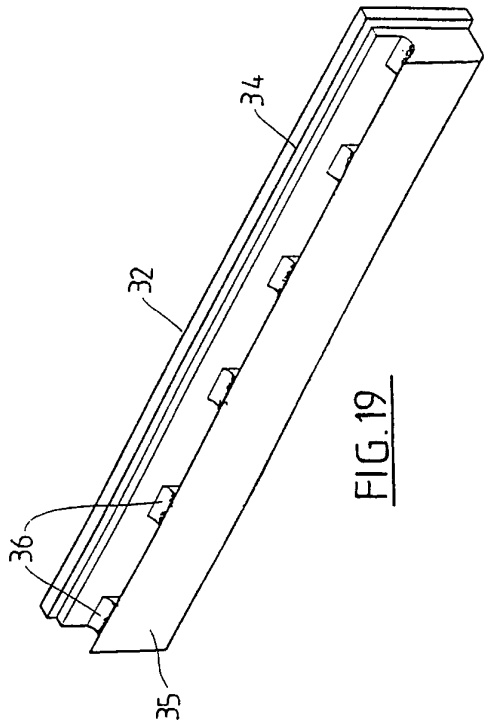


FIG. 19

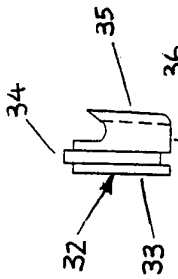


FIG. 18

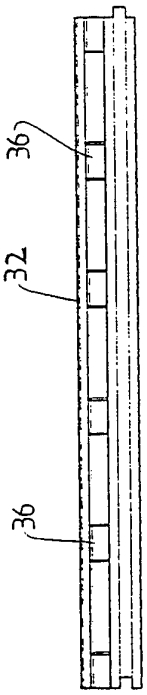


FIG. 16

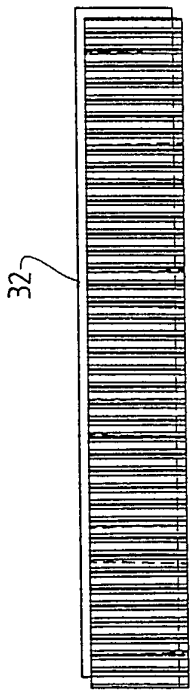


FIG. 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ 94/00128

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.[6] E04B 2/86

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 : E04B 2/86, E04C 1/00, 1/40, 1/14, B29C 67/20, B29L 31:10, B29D 27/08, B29K 25:00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC E04B 2/86, E04G 9/05

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)
DERWENT Search terms:- web: spacer: bridge: rib: bracket

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	AU,B, 19246/67 (428781) (GREGORI) 26 September 1968 (26.09.68). See figures, claims 4, 5, 6 and pages 4, 6	1, 2, 3, 5
X	DE,A, 2150874 (ERGENZINGER) 19 April 1973 (19.04.73). See figure 1	1
X	DE,A, 2349601 (ISOPER KUNSTSTOFF GmbH) 10 April 1975 (10.04.75). See figure	1, 2, 3

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 January 1995 (27.01.95)	10 Feb 1995 (10.02.95)

Name and mailing address of the ISA/AU	Authorized officer
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	**Citation of document, with indication, where appropriate of the relevant passages**	**Relevant to Claim No.**
X	US,A, 4223501 (De LOZIER) 23 September 1980 (23.09.80). See figure 2, claims 1 and 3	1, 5, 6
X	US,A, 4229920 (LOUNT) 28 October 1980 (28.10.80). See claim 1 and figure 2	1, 5
X	DE,A, 3502415 (EISENHAMMER) 31 July 1986 (31.07.86). See figure 2	1, 5, 6
A	EP,A, 71886 (KAUFMANN) 16 February 1983 (16.02.83)	
A	WO,A, 86/01243 (IVYPLACE LTD) 27 February 1986 (27.02.86). See figure 4.	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ 94/00128

Box I **Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)**

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

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

Box II **Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

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

The common features between claims 1 and 10 are a shutter block with two walls with at least one interconnecting web. These common features are not novel in the light of the following citations.

AU,B, 19246/67 (428781) (GREGORI) 26 September 1968 (26.09.68)

DE,A, 2349601 (ISOPER KUNSTSTOFF GmbH) 10 april 1975 (10.04.75)

US,A, 4223501 (De LOSIER) 23 September 1980 (23.09.80)

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.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ 94/00128

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
DE	2150874						
DE	2349601	AT	6501/74	CH	582288		
CH	616981	AT NL	2286/77 7704374	BE	853979	FR	2349707
US	4229920	CA	1092846				
EP	71886	DE	3130926				
WO	8601243	AU	46739/85	EP	190250		
DE	3502415						

END OF ANNEX