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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 July 2001 (19.07.2001)

PCT

(10) International Publication Number
WO 01/51729 A1

(51) International Patent Classification[7]: E04C 3/34, E04G 13/02

(21) International Application Number: PCT/AU01/00025

(22) International Filing Date: 12 January 2001 (12.01.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PQ 5056 12 January 2000 (12.01.2000) AU

(71) Applicant and
(72) Inventor: KOSZO, Nandor [AU/AU]; 5 Pictum Street, Shailer Park, Queensland 4128 (AU).

(74) Agent: PIZZEYS PATENT & TRADE MARK ATTORNEYS; Level 11, Telstra House, 167 Eagle Street, Brisbane, Queensland 4217 (AU).

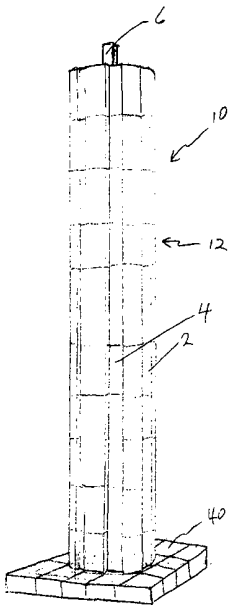
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

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.

(54) Title: ARCHITECTURAL COLUMN AND METHOD AND APPARATUS FOR PRODUCTION



(57) Abstract: A column comprising courses of building blocks such as bricks is arranged with the long axis of each block parallel to the axis of the column and filled with a substrate such as concrete with an axial structural member. The column may be produced with the aid of a cage including spaced apart hoops or rings used to position blocks during column construction. The cage includes indenters for offsetting some of the blocks in order to form aesthetically pleasing grooving along the finished column.

WO 01/51729 A1

ARCHITECTURAL COLUMN AND METHOD AND APPARATUS FOR PRODUCTION

Field of the Invention

The present invention is concerned with columns used in buildings and in particular with a column composed of bricks or blocks and with a method and apparatus for forming said column.

Background to the Invention

Simulated decorative columns or pillars are well known in the prior art. For example in US Patent No. 5,568,709 there is described a column comprising an axial member surrounded by a jacket composed of a plurality of wedge shaped elongated rigid foam members. Upon assembling the jacket around the axial member the outer surface of the jacket is sanded to provide a smooth surface and the smooth surface is provided with an overcoating resembling a cut surface of stone. A problem with this system is that the columns are not particularly sturdy or weatherproof, composed as they are of foam, so that their longevity is limited. Furthermore a special manufacturing process is required to produce the columns prior to their transportation to the site where they are to be installed.

Alternatively in US Patent No. 5,934,035 there is described a modular column of rectangular cross section assembled by overlaying precast brick layers, one on top of the other to form a column. A problem with this column and system of construction is that it is not aesthetically pleasing as the resulting column has an appearance somewhat similar to that of a typical rectangular brick chimney stack.

Traditionally columns have been produced of circular stone cross-sections stacked upon each other. While columns produced by such a method are regarded as being aesthetically pleasing, they are expensive and difficult to construct.

It is an object of the invention to provide a column which overcomes at least some of the problems of those described in the prior art and to provide a useful alternative to known column structures and methods of forming same.

Summary of the Invention

In the following description and claims the term "block" is to be understood as including any building component suitable for the construction of a column of the type described herein. Accordingly, and without limitation, the term "block" refers at least to a brick, including a glass brick, a tile or a stone slab such as a marble slab. Furthermore the term "wedge" is to be understood to encompass trapezoidal shapes.

According to a first aspect of the invention there is provided a column including blocks, wherein the longest dimension of each block is arranged parallel to the axis of the column.

Preferably the blocks are formed in courses with one course on top of another.

In one embodiment the courses are of square or rectangular cross section. In another embodiment the courses may include wedge-shaped components positioned alternatively between the blocks in order to form courses of generally circular cross section. Alternatively the column may be comprised entirely of the wedge-shaped components. The wedge-shaped components are typically of the same material as the blocks.

Usually the column has an axial structural member which the courses surround. Typically the interior of the column is filled with concrete.

The wedge shaped components may be inwardly offset from adjacent blocks in order to form longitudinal channels along the outside of the column. Alternatively the wedge shaped components may be located so that their outer surface is adjacent that of neighbouring blocks thereby forming a column with a smooth sides.

If it is desired a render may be applied to the finished column.

The column may be combined with a base and a head.

According to a further aspect of the present invention there is provided a column formation apparatus or "cage" for facilitating production of the previously described column including a number of first retaining members interconnected by a number of longitudinal members arranged transversely relative to said first retaining members.

Preferably the first retaining members are rings. Preferably the rings include opening and closing means. The opening and closing means are conveniently provided by at least one hinge and flanges which may be secured together, for example by bolting or clipping. Other opening and closing means are also possible however, for example rather than use a hinge a further flange and bolt arrangement could be provided.

Preferably the longitudinal members are comprised of metal rods attached to the rings. The longitudinal members may be attached to the inner walls of the rings. In that case the longitudinal members may act as indenters during construction of a column by means of the cage. For example, the metal rods could be aluminium or steel rods of square cross section. Alternatively the longitudinal members could be attached to the outer walls of the rings with separate indenters attached around the inner wall of each ring.

The column formation apparatus may include a stabilising means for securing to the axial structural member of the column. Such a means will typically be a metal member extending from a ring to the axial member and boltable or otherwise attachable to the axial member.

In order to form columns of the generally circular cross section the rings will also be circular. Alternatively columns of other cross sections, such as rectangular may be formed by means of a cage having rings of corresponding cross-sections.

Preferably the rings are spaced apart no further than the long dimension of the building components used to produce a column.

In a preferred embodiment the column formation apparatus is configured to allow adjustment of the spacing between rings along the longitudinal members.

Preferably indenters are also adjustable so that the depth of offset may be varied.

According to a further aspect of the invention there is provided a method of forming a column as described above, the method comprising the steps of:

forming closed courses of blocks on top of each other wherein the long dimension of each of the blocks is parallel to the axis of the column to be formed;

upon completion of each course filling the space defined by that course with a substrate such as concrete.

Preferably the method is performed with the aid of a cage as previously described and includes the steps of:

locating the cage in a position where a column is to be formed;

arranging building components such as blocks and/or wedges against the inner limits of the cage, the longest dimension of the building components being orientated parallel to the axis of the column; and

mortaring adjacent building components to each other during the arrangement step.

Preferably the step of locating the cage includes locating the cage about an axial structural member for the column by opening the rings and placing the cage around said member.

Alternatively the cage may be lowered over the axial structural member.

The cage may be stabilised by securing it to said structural member.

If the hoops are of a circular shape then the arranging of the building components will include positioning wedges and blocks adjacent each other in order to form courses of generally circular cross section. If the cage is of the type wherein the longitudinal members are fixed to the internal walls of the hoops then the arrangement step will produce longitudinal channels due to indentation of some of the components.

In order that this invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a typical embodiment of the present invention.

Brief Description of the Drawings

Figure 1 is a perspective view of a column formed in accordance with the present invention.

Figure 1A is a perspective view of a building component, being a brick or block, used in the formation of the column of Figure 1.

Figure 1B is a perspective view of a further building component, being a wedge, used in the formation of the column.

Figure 2 is a cross-section through a column similar to that of Figure 1 and in accordance with the present invention.

Figure 3 is a simplified perspective view of a cage used in the production of the column of Figure 1 (in the interests of clarity some of the longitudinal members 24 have been omitted from the figure).

Figure 3A is a simplified perspective view of a cage used in the production of a column of non-uniform cross-section (in the interests of clarity some of the longitudinal members 24 have been omitted from the figure).

Figure 4 is a plan view of a hoop of the cage of Figure 3.

Figure 5 is a plan view of the hoop of Figure 4 in place around a column.

Figure 5A is a plan view of a hoop similar to that of Figure 4 wherein the longitudinal members are of a size facilitating placement of wedges against the inner periphery of each ring.

Figure 6 is a perspective view of a cage according to a further embodiment of the invention.

Figure 7 is a plan view of a cage according to yet a further embodiment of the invention.

Figure 8 is a close-up of a region of Figure 7.

Figure 9 is a perspective view of a longitudinal member of the cage of Figure 7.

Figure 10 is a perspective view of a portion of the cage of Figure 7.

Figure 11 is a perspective view of a portion of a ring of Figure 7.

Detailed Description of Preferred Embodiments

Referring now to Figure 1, there is depicted a column 10 according to an embodiment of the present invention. Column 10 is composed of a number of courses 2 of blocks laid end to end with their long dimension vertical and parallel to the axis of the column. Preferably an axial steel structural member 6 extends throughout the column. With reference to Figure 2 there is shown a plan view of a single course 12. It will be noted that between blocks 2 are wedges 4 conveniently formed by cutting standard blocks, for example ceramic bricks may be cut with a diamond-saw, so that they have a trapezoidal cross-section.

A building material which is particularly convenient to use in the formation of columns of the type discussed herein is Autoclaved Aerated Concrete such is as available under the trade mark HEBEL manufactured in Australian by CSR Limited of level 4, 9 Help Street Chatswood, NSW 2067, Australia.

Typically about 10mm of mortar separates wedges 4 from adjacent blocks 2. The interior of the course is filled with concrete 8. In the embodiment of Figure 2 the wedges are offset into the interior of the course thereby producing decorative vertical channels in the finished column 10. As will be explained, the courses may also be formed without this offset so that the finished column would not include the vertical channels but would have a smoother appearance.

Referring now to Figure 3 there is shown an apparatus or "cage" 20 for forming the column of Figure 1. Cage 20 comprises a number of rings supported by a plurality of longitudinal members 24. Apart from the top and bottom rings the ring spacing corresponds to the height of each course of column 10, that is the dimension "B" of the blocks and wedges shown in Figures 1A and 1B. The top and bottom rings of cage 10 are located closer to their neighbouring rings as will be explained further shortly.

Figure 3A depicts an apparatus or cage 13 having rings of different diameters for the formation of a column of non-uniform cross-section such as are known in Mexican architectural styles for example.

At Figure 4 there is shown a plan view of cage 20. Each ring 22 comprises two hinged portions 26 and 28 including hinges 30 and 32. Portions 26 and 38 are bolted together at flanges 36 and 34 by means of bolts 46 and 44. Nineteen longitudinal members 24 comprising, for example steel rods of square cross-section are welded or otherwise attached, for example by riveting, to the inner periphery of the rings. The rods are spaced in order to support the blocks and wedges that will be used to construct a column.

With reference to Figure 5 there is shown a plan view of cage 20 around a completed column 10. It will be noted that the inner surface of ring 22 prevents blocks 2 from falling out of the column prior to setting of the concrete 8. Longitudinal members 24 act to hold blocks 22 vertical and retain wedges 4 from falling outwards from the cage. It will be noted that a longitudinal member is omitted from the position indicated at 38. This is to make it easier for a blocklayer to insert blocks and wedges into the cage through the resulting gap, when forming the courses.

A portion of an alternative construction of the cage is shown in Figure 6. In the interests of clarity the hinges 30, 32 and retaining bolts and flanges 36 shown in Figure 5 have been omitted from Figure 6. It will be noted that indenters 23 are positioned around the inner wall of the ring at the positions occupied by rods 24 in the embodiment of Figure 3. Indenters 23 comprise short rod sections that are preferably dimensioned so that they are shorter than the height of the rings. By so dimensioning the rods an offset between their upper and lower limits and the upper and lower edges of the rings is produced, preferably of about 5mm. This offset, while not essential, acts as an aid to bricklayers when positioning blocks about the rings. The rings 22 are interconnected by means of longitudinal members 37. An advantage of the cage of this embodiment is that it affords bricklayers ready access to the interior of the rings in order to facilitate easy placement of blocks and wedges during column construction.

In the event that it is desired to produce a column in which wedges 4 are not indented from blocks 2 then rods 24 may be reduced in cross section so that wedges 4 may be placed between them and against the inner wall of ring 22. This situation is illustrated in Figure 5A where rods with a width of 8mm have been used. In that case mortar joints of approximately 10mm result between adjacent wedges and blocks.

Referring again to Figure 3, in use cage 20 is mounted in a position where a column 10 is to be erected such as on a base 40 (Figure 1). Typically internal column structural member 6 is already in place and the cage 24 is placed around the structural member by undoing either set of bolts 44, 46 so that the cage may be opened and placed about member 6. As previously mentioned clips or other removable fixing means may be used in place of bolts and flanges. Preferably the uppermost ring is bolted to the top of member 6 to stabilise the cage. If required, other stabilisation methods are also possible, such as tethering of the cage to pegs fixed in the surrounding ground.

A first course of blocks and wedges is then formed to produce an arrangement as shown in Figure 5. The lowermost ring of cage 20 is spaced from the next ring a distance such that the upper limit of the first course is situated halfway up the wall of the second ring. Apart from the uppermost ring, subsequent rings are then spaced apart the height of a course so that each course ends halfway up the inner wall of a ring. The uppermost ring is half a ring-height closer to the ring beneath it, so that the uppermost course of blocks ends flush with the top of the uppermost ring. After arranging and mortaring the wedges and blocks in position, with the assistance of the rings and longitudinal members as positioning and retaining guides, the interior of the course is filled with concrete which acts to push the wedges and blocks out against the ring and retaining members. Consequently the cage facilitates the accurate and regular arrangement of the blocks and wedges in order to form a column such as that shown in Figure 1.

Once the first course has been laid a second course is formed upon it with the guidance of a retaining ring and the longitudinal members. A mortar layer separates the adjacent courses.

After the blocks and wedges of the second layer have been mortared into place the internal void is filled with concrete. The process is continued until the column is completed.

Preferably after sufficient time has been left for the concrete and mortar to set, cage 20 is removed from the newly formed column. In order to remove the cage the bolts securing each of the two halves of each ring together are unfastened. Each half of the cage is then pivoted about the hinges of the rings thereby freeing longitudinal members 24 from the column. The two halves of the cage are then removed leaving the column in place.

It is convenient that a cage be formed in two hinged portions in order that longitudinal members 24 may be readily swung free of the vertical channels of the column which are formed by the offsetting of the wedges.

If it is desired to construct a very tall column then the cage may be used to initially form a first lower stage of the column and then be raised to form a subsequent stage. This procedure avoids the necessity of producing a cage of unwieldy length.

Using 10 standard size blocks, which, with reference to Figure 1A have dimensions of A=110mm, B=230mm and C=76mm and 10 a column with an outer diameter of 570mm will result. The cage of Figure 5 is designed for production of a such a column. It will be understood that larger numbers of blocks and wedges may be used in each course in order to produce columns with larger diameters if required. In each case a cage of suitable diameter and number of rods or spacers will be required.

It will be realised that in the embodiments of the cage discussed thus far the distances between the rings has been fixed. Furthermore with reference to Figure 5, the depth to which a building component such as wedge 4 has been indented relative to adjacent building block 2 has depended on the dimensions of longitudinal rods 24.

A preferred embodiment of the apparatus in which the distance between adjacent rings and the indentation depth is adjustable will be explained with reference to Figures 7 to 11.

With reference to Figure 7, there is depicted a plan view of a cage according to a further embodiment. The cage includes rings 40, the uppermost one of which is visible in Figure 7. Adjacent rings 40 are interconnected by longitudinal members 42 in the form of U-channels located on the outside of the rings. Figure 8 illustrates a close-up view of region "A" identified in Figure 7.

Each ring 40 is made up of two identical semi-circular portions which are bolted or clipped together at flange pairs 44 and 46.

A radial portion of a ring is depicted in Figures 10 and 11. It will be noted that paired slots 54, 56 are present in the portion depicted. The inner wall of each slot is lipped to engage a square nut. The arrangement of slots depicted continues around the circumference of the ring. Adjustable indenters 48 are slideable about each groove. The indenters are each comprised of square nut 52, screw 50 and wing nut 58 (visible in Figure 8). Screw 50 may be rotated to vary its depth of insertion through bolt 52. Once the desired depth is achieved the screw is locked in place by tightening wing-nut 58 against the outer surface of the ring. By providing paired grooves at different levels each with an indenter it is possible to vary the indentation of wedges of adjacent courses of a column formed with the aid of the cage.

With reference to Figure 9, U-channels 42 include a series of longitudinally spaced slots 60. As shown in Figure 8, each ring is attached to the U-channels by means of bolts 62 and wing-nuts 64. The bolt heads 62 may be accommodated in the lipped slots 56, 54 so that the head of each bolt does not protrude into the circle defined by the inner circumference of the rings. Alternatively countersunk holes may be formed into the ring for bolts 62. For the purposes of stability and accuracy it is preferable that at least four equispaced U-channels be used to space the rings as is shown in Figure 7.

The finished column may be left with the blocks exposed as shown in Figure 1, or may be covered with a render to produce a stonework or stucco, or other desired, finish. Finishes suitable for application to brickwork are well known in the field of building and so will not be discussed in detail here.

While the cages described above have been of circular cross-section it is also possible to produce cages having square rings in order to form columns of square cross section. Square cross section columns do not require the incorporation of wedges but only of regular blocks. Polygonal rings may also be used in order to produce columns of polygonal cross-section.

It will of course be realised that the above has been given only by way of illustrative example of the invention and that all such modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as is herein set forth.

Claims:

1. A column of blocks, wherein the longest dimension of each block is arranged parallel to the axis of the column.

2. A column according to claim 1, wherein the blocks are formed in courses with one course on top of another.

3. A column according to claim 2, wherein the courses are of square or rectangular cross section.

4. A column according to claim 3, wherein the courses include wedge-shaped components positioned alternatively between the blocks in order to form courses of polygonal or generally circular cross section.

5. A column according to claim 4, wherein the column is comprised entirely of the wedge-shaped components.

6. A column according to claim 4, wherein the wedge-shaped components are of the same material as the blocks.

7. A column according to claim 3 further including an axial structural member which the courses surround.

8. A column according to claim 1, wherein the interior of the column is filled with concrete.

9. A column according to claim 4, wherein the wedge shaped components are offset from adjacent blocks in order to form longitudinal channels along the outside of the column.

10. A column according to claim 4, wherein the wedge shaped components may be located so that their outer surface is adjacent that of neighbouring blocks thereby forming a column with smooth sides.

11. A column according to claim 4 further including an outer render coating.

12 A column according to claim 4, further including a base and/or a head.

13. A column formation apparatus for facilitating formation of a column including a number of first retaining members interconnected by a number of longitudinal members arranged transversely relative to said first retaining members.

14. An apparatus according to claim 13, wherein the first retaining members are rings.

15. An apparatus according to claim 14, wherein the rings include opening and closing means.

16. An apparatus according to claim 15, wherein the opening and closing means comprise least one hinge and flanges which may be secured.

17. An apparatus according to claim 14, wherein the longitudinal members are comprised of metal rods attached to the rings.

18. An apparatus according to claim 17, wherein the longitudinal members are attached to inner walls of the rings.

19 An apparatus according to claim 18, wherein the longitudinal members act as indenters during construction of a column by means of the cage.

20. An apparatus according to claim 17, wherein the longitudinal members are attached to the outer walls of the rings

21. An apparatus according to claim 20, wherein indenters are attached around the inner wall of each ring to offset a building block from said ring.

22. An apparatus apparatus according to claim 14 including a stabiliser for securing to an axial structural member of the column.

23. An apparatus according to claim 22, wherein the stabiliser comprises a member extending from one of said rings for attachment to the axial member.

24. An apparatus according to claim 14, wherein the rings are of circular configuration.

25. An apparatus according to claim 14, wherein the rings are spaced apart no further than the long dimension of building components used to produce the column.

26. An apparatus according to claim 14 arranged to allow adjustment of the spacing between rings along the longitudinal members.

27. An apparatus according to claim 21 wherein the indenters are adjustable for varying the depth of offset.

28. A method for forming a column, the method comprising the steps of:
forming closed courses of blocks on top of each other wherein the long dimension of each of the blocks is parallel to the axis of the column to be formed;

upon completion of each course filling the space defined by that course with a substrate such as concrete.

29. A method according to claim 28 performed with the aid of an apparatus according to claim 14 and including the steps of:

locating the apparatus in a position where a column is to be formed;

arranging building components such as blocks and/or wedges against the inner limits of the apparatus, the longest dimension of the building components being orientated parallel to the axis of the column; and

mortaring adjacent building components to each other during the arrangement step.

30. A method according to claim 29, wherein the step of locating the apparatus includes locating the apparatus about an axial structural member for the column.

31. A method according to claim 30, wherein the step of locating the apparatus includes opening the rings and placing the apparatus around said member.

31. A method according to claim 30, wherein the step of locating the apparatus includes lowering the apparatus over the axial structural member.

32. A method according to claim 30 wherein the method includes the step of stabilising the apparatus by securing it to the axial structural member.

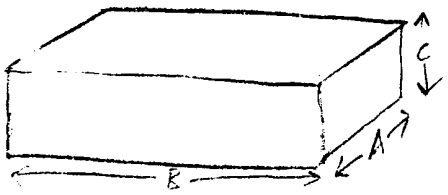


Fig 1A

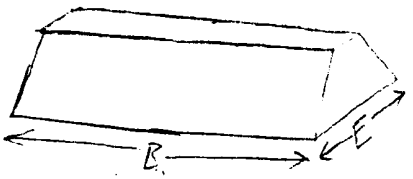


Fig 1B

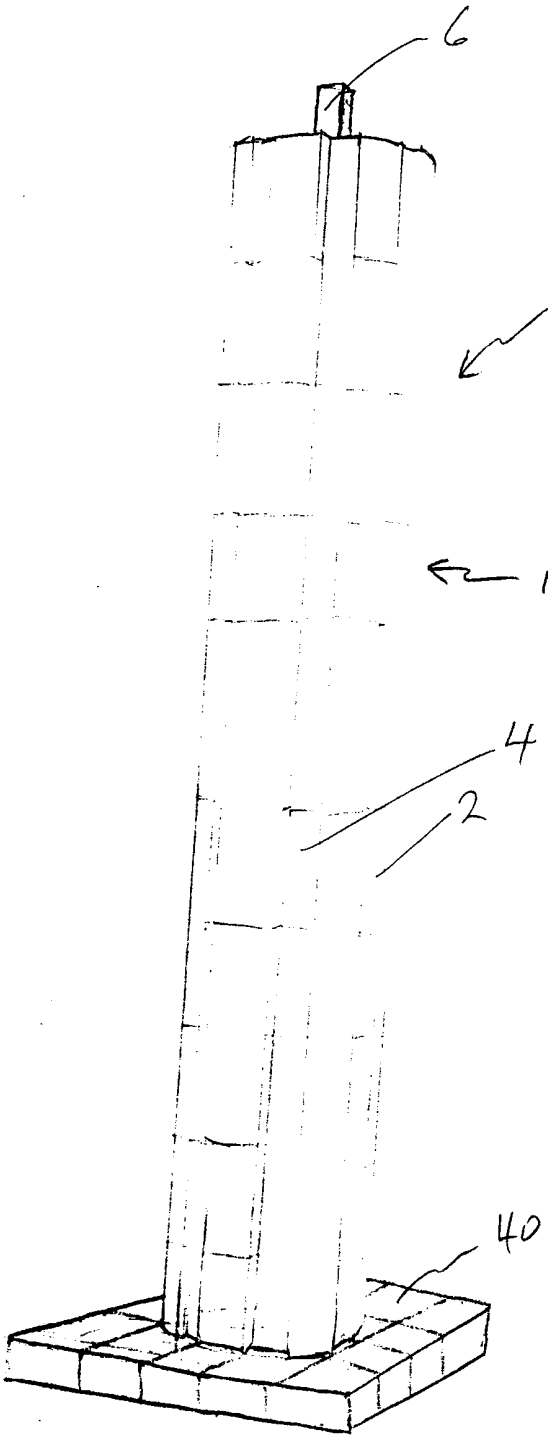


Fig 1

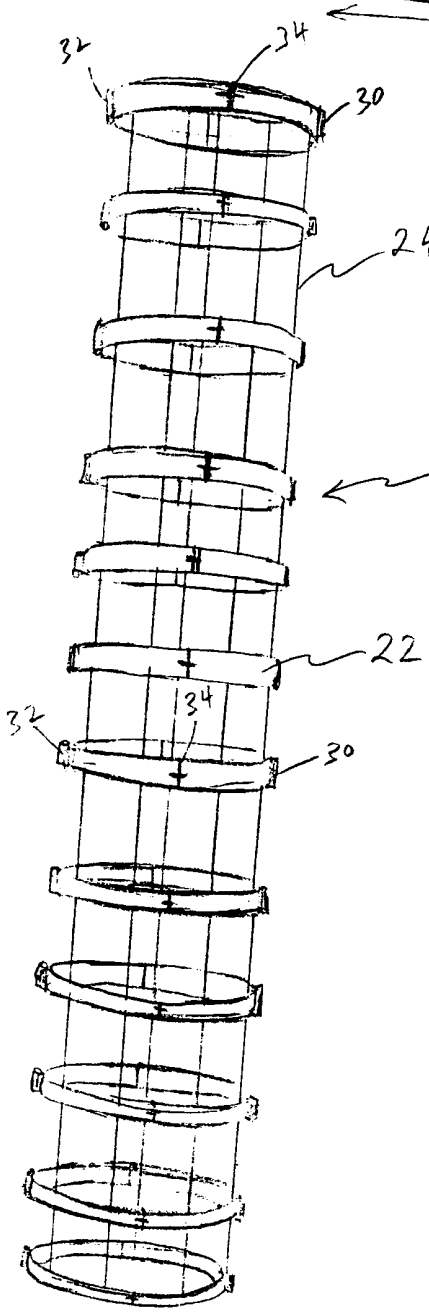


Fig 3

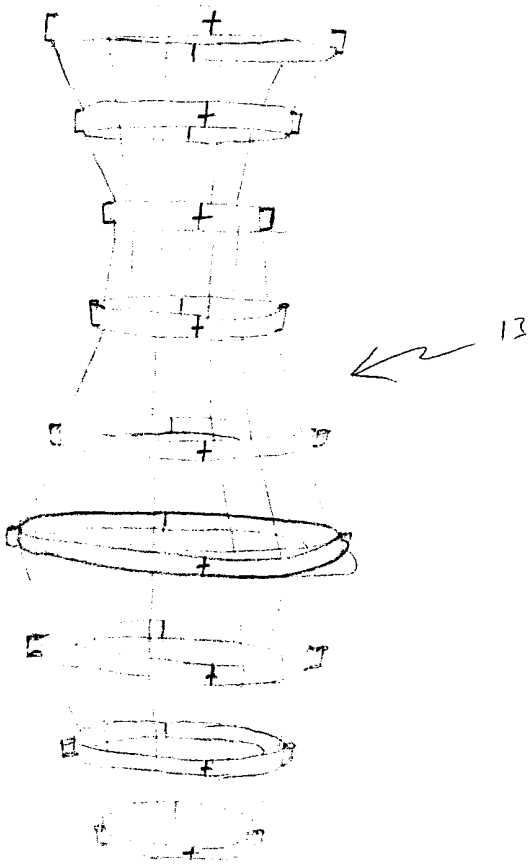


Fig 3A

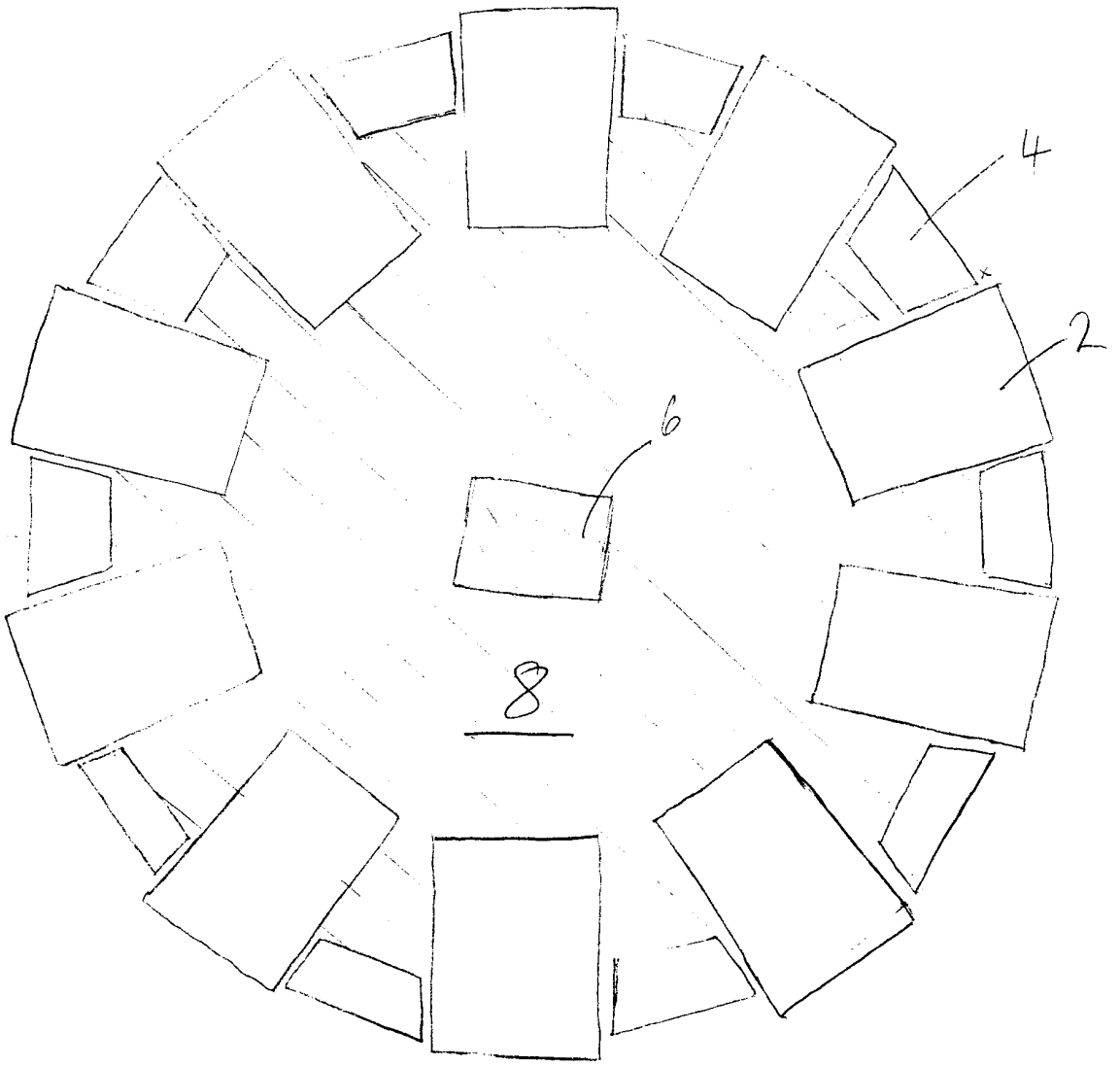


Fig 2.

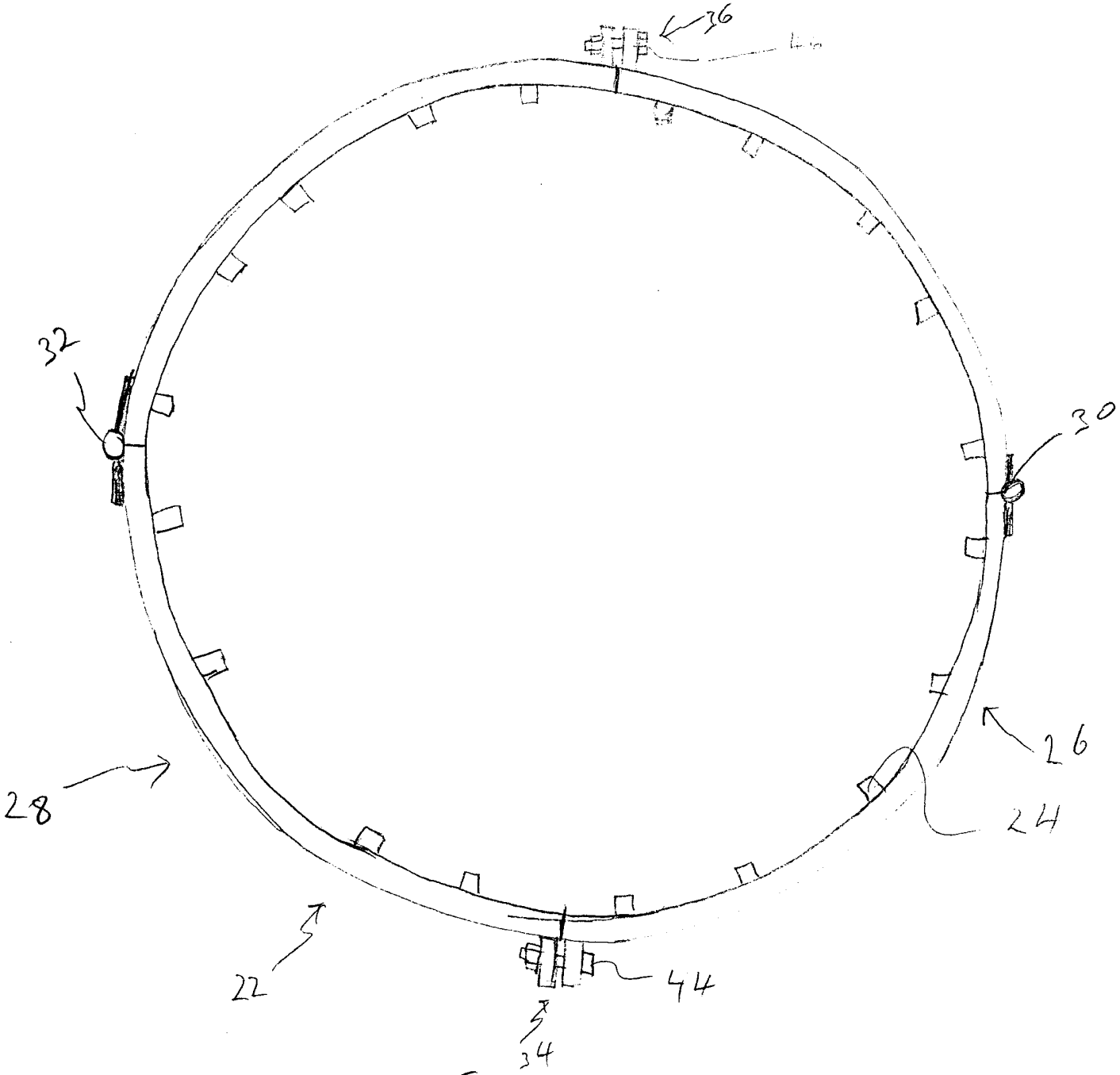
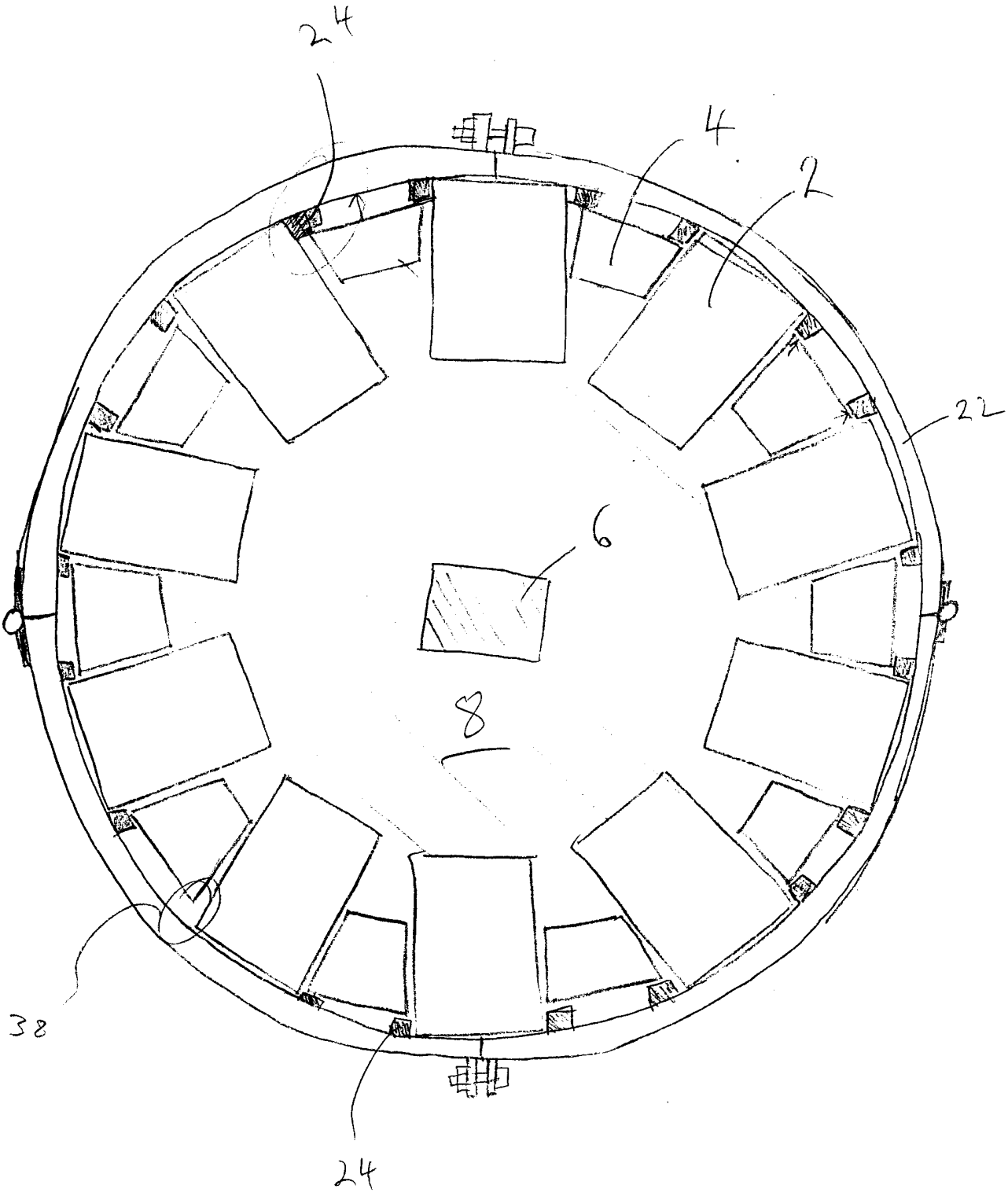


Fig 4

Fig 5



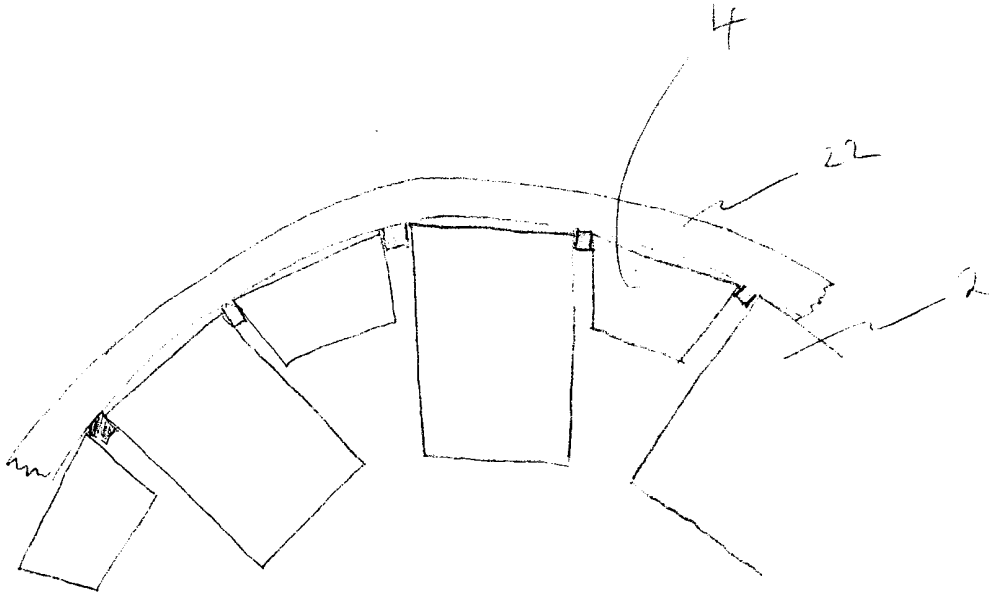


Fig 5A

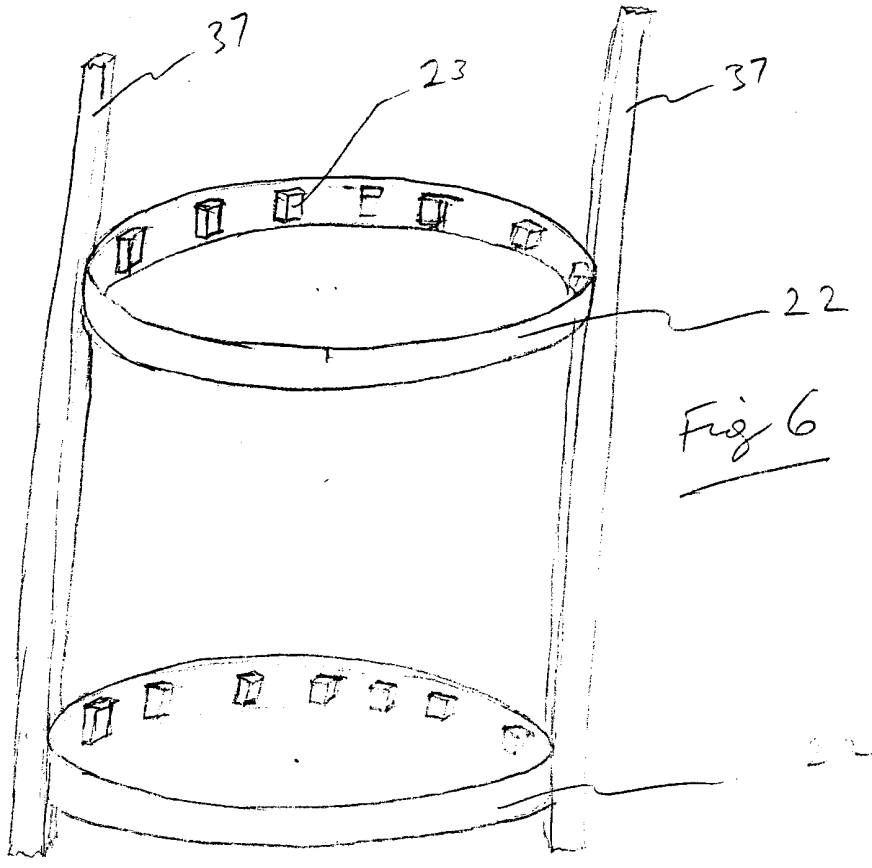


Fig 6

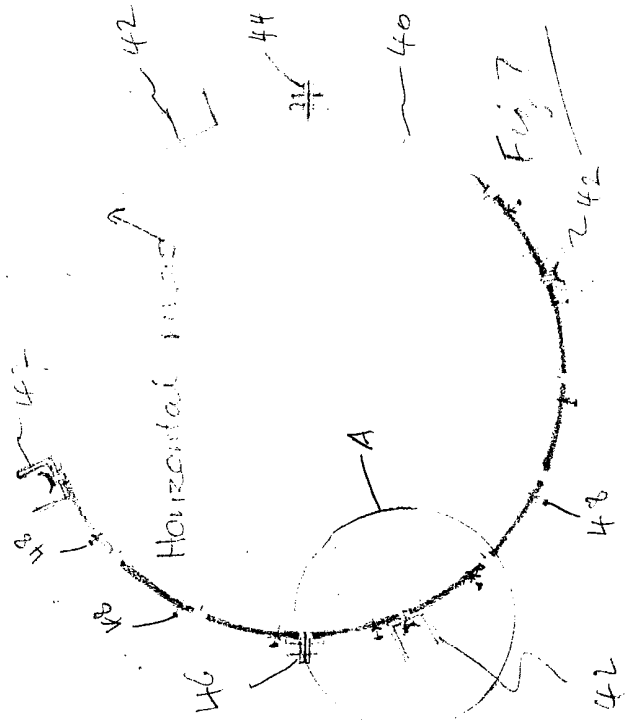


Fig 7

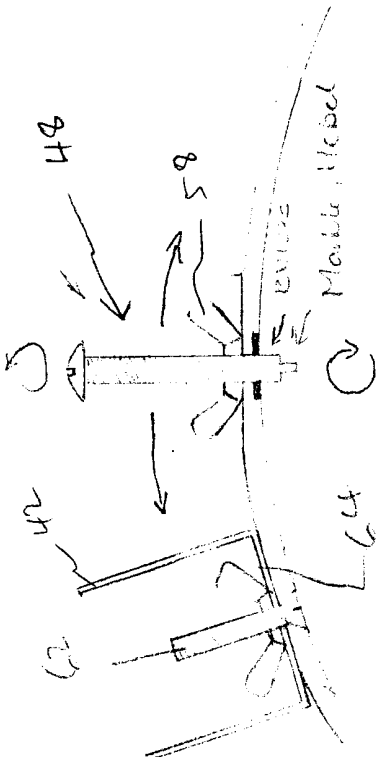


Fig 8

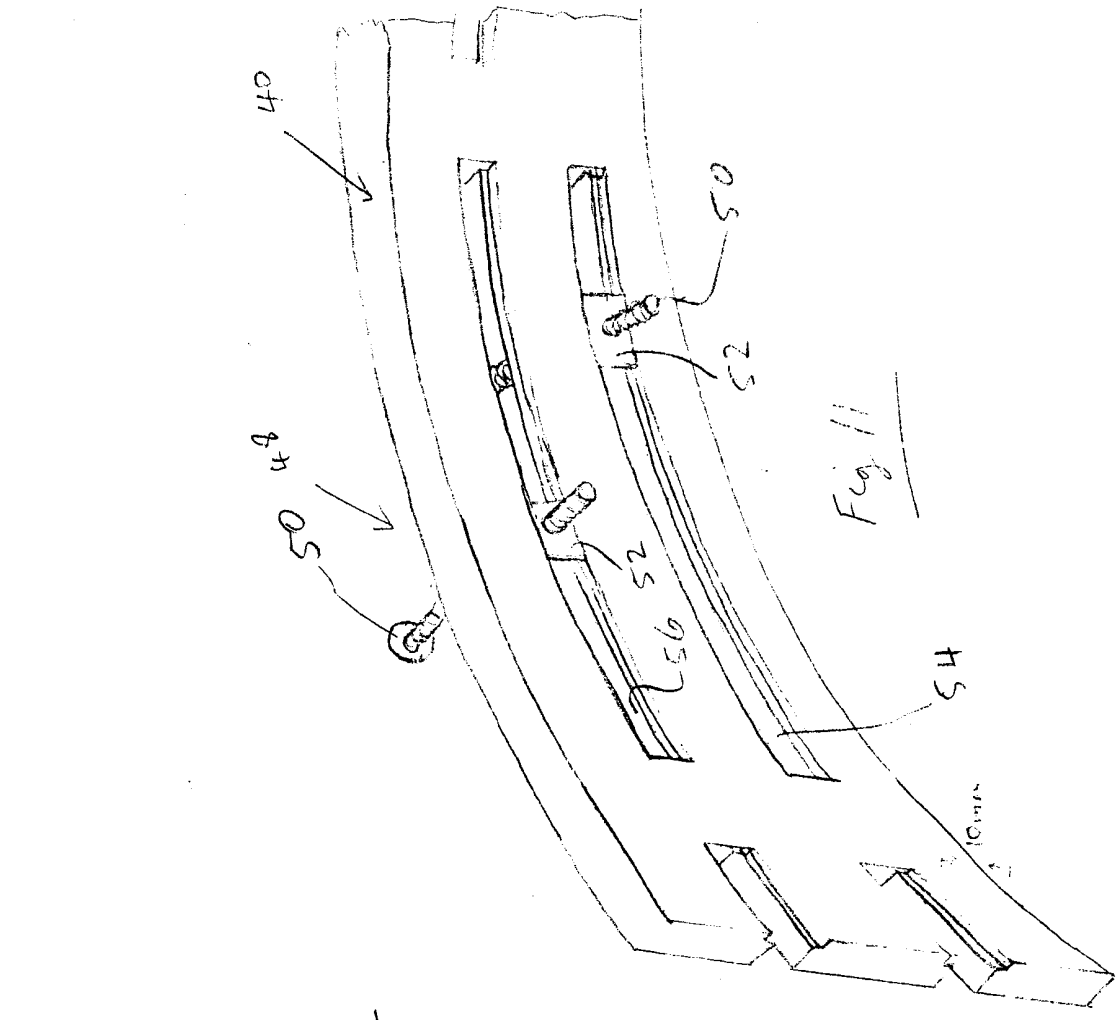


Fig 11

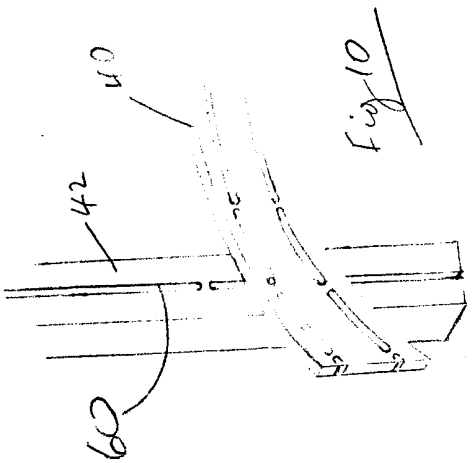


Fig 10

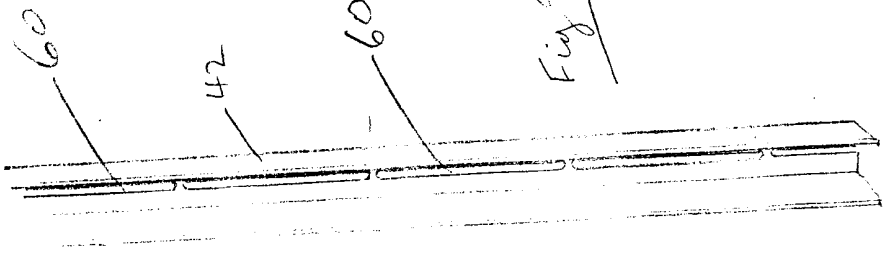


Fig 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00025

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: E04C 3/34, E04G 13/02

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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

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

DWPI + keywords

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 3325252 A (Weinerberger Baustoffindustrie AG) 16 February 1984 See whole document	1-3,7
X	US 3590547 A (Molyneux et al) 6 July 1971 See figure 5	1-3,7
X	FR 2299477 A (Escriba) 27 August 1976 See figures 1-3, lines 91-105	1-3,7,8,28

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

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

"E" earlier application or patent 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

Date of the actual completion of the international search
22 March 2001

Date of mailing of the international search report
28 MARCH 2001

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

A.R. HENDRICKSON

Telephone No : (02) 6283 2415

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00025

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 5438812 A (Erickson) 8 August 1995 See figure 4, column 2 lines 36-48	1,2,4-6,10-12
A	US 5568709 A (Steckler) 29 October 1996	1-12
X	US 4897140 A (Opsvik) 30 January 1990 See figure 2a, column 7 lines 33-65	13-20,22-26
X	AU 87046/82 A (Francis et al) 12 May 1983 See figures 1-3, pages 8,9	13-18
X	AU 64771/60 B (Williams) 27 September 1962 See figures 1-4	13

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU01/00025

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	3325252	AT	2754/82	CH	662148		
US	3590547	BE	722816	CH	500358	DE	1803478
		FR	1588059	GB	1201820	NL	6814897
FR	2299477	NONE					
US	5438812	CA	2178204	WO	95/17565		
US	5568709	NONE					
US	4897140	NONE					
AU	87046/82	NONE					

END OF ANNEX