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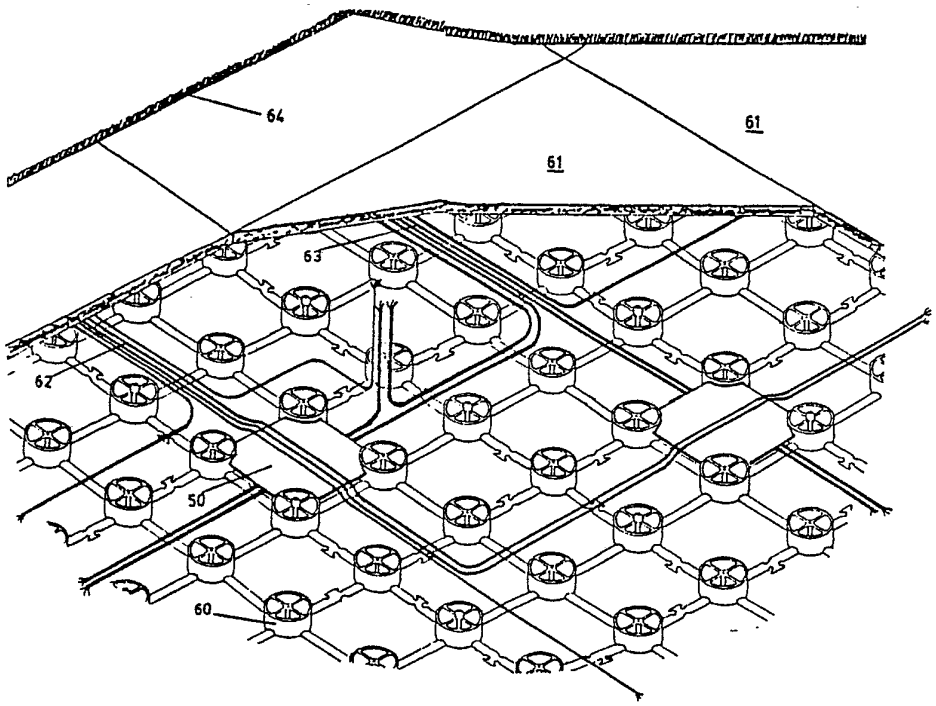
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(54) Title: FLOORING SYSTEM



(57) Abstract

A false floor system comprised of a series of floor support units each of which has a number of posts (21, 22) in a grid matrix and joined together by a frame (23, 24). Attachment means (26) is provided to join the units to adjacent units and location means (25) on each unit is provided to positively locate a floor panel. Services such as electricity, telephone and computer cables may be laid in the false floor cavities.

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"FLOORING SYSTEM"

This invention relates to flooring systems and more particularly to false flooring systems suitable for installation of services thereunder or therein

There exists a problem in the installation, in offices and work areas, of services such as electricity, telephone, computer wiring, water, gas and refrigeration systems for machines such as computers and particularly the provision of these services into spaces such as open plan offices, shops with island type displays, factories, classrooms, exhibition stands and similar environments. The problem of installation is further exacerbated in open space areas when there is no prior knowledge of the tenant or users requirements at the time of building construction.

There are systems to provide services around the periphery of such an area but where such a service is required within the area, then the flooring must have ducts pre-laid or outlets must be suspended from a ceiling or roof to provide services to such points. The ducts cannot be moved once they are installed and are often spaced at too great an interval to provide a flexible solution to the problem. The supply of services from the ceiling is usually unsightly.

There are false flooring systems for power stations and main frame computer installations but these false flooring systems comprise substantial and tall pedestals at the corners of thick flooring panels and possibly stringers between the pedestals and such systems have not been suitable for economic installation within offices.

Australian Patent Specification NO. 458973 entitled MODULAR FLOORING, shows a floor module to mount on an existing floor. This includes a rigid slab of floor material with supports underneath fixed to the rigid slab. The supports are designed to be affixed on to the floor and hence access to the under floor region can only be obtained around the edges of the region covered by the modular flooring and hence it is very difficult to install new services once this flooring has been fastened in place.

United States Patent Specification No. 3943673 entitled ELEVATED FLOOR ASSEMBLY defines a series of large panels on pedestals with interlocking means between the panels. This type of arrangement is particularly adapted for main frame computer installations and is not suitable for general office environments.

Australian Patent Specification No. 484603 corresponding to United States Patent Specification No. 4573299 entitled FLOOR COVERING ARTICLE provides a matrix base for a false floor which includes a plate like upper surface integral with the base elements. This article requires that services first be laid down on a floor surface and then the upper surface with the integral base elements laid down to provide a false floor. Some difficulty occurs in positioning the services so that they do not interfere with the base elements and in fact these systems are particularly difficult to use.

Some unique problems exist with the installation of false flooring arrangements for electricity and telephone services and obtaining permission from the relevant authorities to install these services within a false floor. An arrangement having an upper surface affixed to legs or posts and fastened to the floor to prevent movement creates spaces or voids between the legs or posts. These may be classified as ducts and hence require special mechanical separation of the different types of services contained therein. If the floor surface is easily removable, however, then even if the support unit is fastened to the floor, the false floor space or voids may alternatively be classified as a cavity. Hence in Australia, for instance, it is only necessary for spaces classed as cavities that services be separated by 50 millimetres of air space and that at cross-over points there be provided at least 6 millimetres of insulating material.

It is the object of the present invention to provide a more adaptable flooring system which produces cavities rather than ducts in the false floor arrangement, thereby simplifying and economising on the time required for the initial and subsequent installation of services, and to overcome some of the problems discussed above.

In one form therefore the invention is said to reside in a false floor support unit comprising a plurality of posts of equal length arranged perpendicular to and extending from a common plane and joined by and spaced apart by a frame arrangement, connection means to interconnect the support unit to at least one adjacent support unit, at least one location means extending from at least one of the posts to positively locate flooring on the support unit and voids between the posts to enable the placement of services, cabling and duct work within the false floor region.

In one preferred embodiment there may be further provided an attachment means on the frame arrangement to enable the positioning and retention of services, cabling and duct work.

The attachment means may for instance comprise an extension from the frame arrangement about which cable ties may be secured.

There may be further provided post extension means mountable on each post, whereby to increase the length of the respective posts and hence the volume of voids produced therebetween.

In one preferred embodiment the posts may be arranged in a square grid arrangement, and the frame work may comprise rigid arms extending between adjacent posts in the square grid arrangement. Alternatively the grid arrangement may be based on a hexagonal or triangular basis.

The rigid arms may be positioned adjacent the base of each of the posts and extending between the bases of the post, such that the services, cabling and duct work may be laid in the voids over the arms.

The location means to locate a section of floor may comprise a rim extending around the periphery of the unit to define a space therebetween into which a flooring panel may be received and to define the void therebelow.

Alternatively the location means may comprise a peg extending from one of the posts on each false floor support unit, the post to be received in an aperture in a flooring panel to thereby positively locate the flooring panel.

In a preferred arrangement of the false flooring support unit according to this invention, the unit may comprise a central post, three further posts, with the four posts arranged in a first square grid arrangement, the posts being interconnected by a frame arrangement, three post interconnection means with the three post interconnection means and the central post arranged in a second square grid arrangement having a grid spacing substantially the same as the grid spacing of the first grid arrangement, the first grid arrangement being on an opposite side of the central post from the second grid arrangement, the post interconnection means comprising the means to interconnect the unit to adjacent units and the three post interconnection means joined to each other and to the central post by the frame arrangement.

In this embodiment the frame arrangement may comprise rigid arms extending between adjacent posts and post interconnection means.

In an alternative form the invention may be said to reside in a false floor arrangement comprising a plurality of false floor support units as defined above, each unit being interconnected to adjacent units by means of the connection means and a plurality of flooring panels on an upper surface of the post, the location means being received in apertures in the flooring panels to positively locate the flooring panels on the posts.

By this unit it will be seen that there is provided a false flooring unit which can be used as a series of separate units on a floor with flooring panels laid over the units, with the flooring panels either being of a size to extend over two or more of the units or a size to extend only over one unit. Beneath the flooring panels is defined a space or voids, access to which may be maintained by lifting a flooring panel.

The length of the posts may be relatively short, perhaps in the order of 20-50 millimetres but this is sufficient to provide space for services such as electricity, telephone and computer wiring to run. Where greater volume of cavity is necessary to provide for instance for gas or plumbing or airconditioning refrigeration ducting, then the post extension means as discussed above may be used to extend the posts to a total length of perhaps 100 millimetres.

In the embodiment discussed above in which an edge is provided around each flooring unit, the edge may make a tray structure and hence the top of the edge may provide part of the final false floor surface when the flooring unit is fully installed or alternatively some embodiments may have a very low edge with the flooring member having a rebate to fit over the low edge so that no edges of the support unit may show between the flooring members.

The false flooring unit according to this invention may be constructed from wood or metal or plastics material by any of the known manufacturing techniques. These may include injection moulding of thermosetting or thermoplastics materials with suitable fillers as desirable or may comprise die casting from metal such as aluminium or zinc or they may be fabricated from wood or metal. Alternatively the units may be manufactured from dough moulding compound or sheet moulding compound with suitable press arrangements to press out the desired shapes.

The flooring panel above the unit may be made substantially from wood, or steel or plastics material as desired and may be provided with an existing grid of apertures for passing services through the panel from the floor voids to a required position or they may be of such material that holes can be drilled in any desired position. The flooring panels may be provided in a finished condition with a polished wood top or vinyl or any other suitable top surface or may have laid thereupon carpet squares or carpet or some alternative floor material. The edges of the panels may be protected by plastics edging and non-metal panels may be encased in a sheet steel or an aluminium finish. There may be provided removable fastenings to fasten

the flooring panels to the false floor support unit with the fasteners in one embodiment extending into apertures provided in the posts.

It may be desirable to prevent movement of the false flooring units when they are installed on a floor and hence the false flooring units may be provided with apertures to enable fastening screws to fasten the false flooring members to an existing floor or may be adhered by any known adhesive suitable for the purpose.

Each of the posts may be provided with some form of shock absorbent padding such as an elastomeric pad and such an elastomeric pad may assist with the taking up of any minor variations in floor level so that the resultant false floor can be made level and will be evenly based.

It will be realised that a flooring unit according to this invention may be made of any suitable dimensions and in one preferred embodiment a unit may be of a size of 600 millimetres square.with a height of 48 millimetres. Alternatively a unit having a module size of 300 millimetres may be used with the unit having a thickness of 28 millimetres.

A feature of this invention is that by having a plurality of posts to support the undersurface of each floor panel, rather than pedestals at the corners of larger and thicker panels, is that the thickness and strength of the floor panel can be reduced and economies made in the component parts of the invention.

In one embodiment for instance the posts may be spaced at 150 millimetre centres but with 50 millimetre diameter posts the unsupported distance between posts is only 80 millimetres. Hence a floor panel thickness of about 18 millimetres has proved to be quite acceptable in accordance with Australian Standards for Dead and Live Loads in buildings.

There may be provided ramped flooring unit to place around the periphery of a false floor region to raise an existing floor to the height of the false floor, particularly at entrances and lift doors and the like.

This then generally describes the invention but to more clearly assist with understanding of the invention, reference will now be made to the accompanying illustrations which show preferred embodiments of the invention.

In the drawings:

FIG. 1 shows a first embodiment of the invention.

FIG. 2 shows a cross-section of the embodiment shown in FIG. 1.

FIG. 3 shows an alternative embodiment of the invention.

FIG. 4 shows a clip and location means arrangement for the embodiment shown in FIG. 3.

FIG. 5 shows an alternative embodiment of the false flooring support unit according to this invention.

FIG. 6 shows an underneath view of the embodiment shown in FIG. 5.

FIG. 7 shows a perspective view of an alternative embodiment of a false flooring support unit according to this invention.

FIG. 8 shows a connection unit suitable for FIG. 7.

FIG. 9 shows an underneath view of the embodiment shown in FIG. 7.

FIG. 10 shows an underneath view of the connection unit as shown in FIG. 8.

FIG. 11 shows the underside of the cross-over plate or bridge suitable for using with the embodiments shown in FIGS. 3 to 10.

FIG. 12 shows an extension post suitable for use in the embodiments shown in FIGS. 3 to 10.

FIG. 13 shows a method of retaining services according to one embodiment of the invention and

FIG. 14 shows a general layout of a false floor using the false flooring support units according to this invention.

Now looking more closely at the various embodiments, a first embodiment is shown in FIGS. 1 and 2.

In this embodiment the false floor support unit is substantially rectangular and includes a rectangular frame 1, having a raised edge 2, into which a flooring panel 3 (shown broken away) is placed. The flooring panel 3 sits on a framework 4 which is supported by a plurality of legs or posts 5. The false floor support units of this embodiment may be connected to adjacent false floor support units by means of plugs 6 on the rectangular framework extending into sockets 7 on adjacent units.

Cabling or services such as telephones may be installed underneath the framework 4 to travel along in the cavities formed between a floor and the unit and where it is desired to extend the service into an office space or work space above the floor, suitable apertures may be drilled in the floor panel 3.

The FIG. 2 shows a cross-sectional view of the embodiment shown in Figure 1 and the size of the cavities formed under the unit may be more easily seen in this view.

A further embodiment of the false floor support unit is shown in FIGS. 3 and 4. As can be seen in FIG. 3 the false floor support unit comprises a central post 10, having a series of arms 11 extending therefrom to half posts 12, with further rigid arms 13 extending to quarter posts 14 at the corners of a square false floor support unit. The false floor support unit according to this embodiment is used the way up that it is shown in this

embodiment, so that the rigid arms 11 and 13 go nearest the floor so that cables and other services are able to be laid over the arms. A flooring panel is laid over the false floor support unit to rest onto the posts 10, 12 and 14. Adjacent false floor units are connected together by means of a bracket 15 extending from two of the half posts received in recess 16 on a half post of an adjacent false floor support unit.

There is further provided a corner joining fastener 17 as shown in FIG. 4 which includes four downwardly depending catch arms 18, which engage into the recesses 19 of four adjacent quarter posts 14 of four adjacent false floor support units when placed together. This fastener 17 provides corner connection for the false floor support units and also by means of the spigot or peg 20, which extends above the planar surface of the top of posts enables a flooring panel to be positively engaged so that it will not move around on the false floor support unit.

A further embodiment of the false floor support unit is shown in FIGS. 5 and 6. In this embodiment a single false floor support unit includes a central post 21 and three further posts 22. The central post and the three further posts 22 are held in a square grid arrangement by means of rigid arms 23 extending from the central post 21 and rigid arms 24 around the periphery of the square grid arrangement. It will be noted that the arms 23 and 24 are semi-circular in cross-section so that once the false floor support unit is laid down and a flooring unit placed over, then cables being pushed or slid under the floor will not engage or be caught up on the arms. It will be noted that one of the further posts 22 includes a spigot or peg 25 to engage into an aperture in a floor panel when placed on the false floor suppport unit. There are further included three post interconnection means 26 on further arms 27 and 28 in a further square grid arrangement with the central post 21, having the same square grid arrangement size as the first mentioned in relation to the four posts but spaced on the other side of the central post from the three further posts 22.

The post interconnection means 26 include a planar plate having extending therefrom four engagement clips 29. In use the post engagement means 26 fit within the further posts 22 of the adjacent floor support units

with the diameter of the post interconnection means being such as to just fit in the internal diameter of the further posts 22, with the engagement clips 29 engaging over the rim 30 of boss 31 underneath the three further posts 22. It will be noted that the arms 28 fit into recesses 33 in the underside edges of the posts 22.

It will be noted that on the frame arms 24 and 28 there is provided attachment means comprising an extension 34, extending from one side of the arm 28 for instance with recesses 35, 36 and 37 formed adjacent the extension 34. A cable tie to fasten cables to the framework may be passed under the extension 34 to extend out of the recesses 35 or 36 or if a cable is to be laid diagonally, to extend either from the recess 35 or 36 to the recess 37.

It will be noted that apertures 38 are provided in the base of the post interconnection plates 26 and also in the base of the central post 21. If the false floor support unit is to be laid onto a wooden floor then suitable screw fastening means may be provided to fasten the false floor support unit to the floor. Alternatively on any floor surface adhesive may be placed underneath the plates 26 and the central posts 21 and when the unit is placed onto the floor, adhesive may ooze through the apertures 38 to provide, when the adhesive has set, better adhesive fastening which will in turn provide mechanical as well as adhesive fastening.

FIGS. 7, 8, 9 and 10 show an alternative embodiment of the false floor support unit according to this invention. In this embodiment a first part of the unit 40 as shown in FIG. 7 includes four posts 41 spaced apart in a square grid arrangement by means of rigid arms 42 with one of the posts 41 including a spigot 43 for engaging a floor panel. The other part of the floor support unit shown in FIG. 8 comprises an interconnection unit 44, comprising four interconnection plates 45 spaced apart by rigid arms 46. A similar connection arrangement by the use of engagement clips 47 on the plates 45 engaging over the rim 48 of spigot 49 on the underneath of the posts 41 to the embodiment shown in FIG. 5 is provided.

FIG. 11 shows a cross-over plate or bridge for the embodiments of the false floor support unit shown in FIGS. 3 to 10. The cross-over plate 50 has recesses 51 in each corner which positively locate the cross-over plate within the square defined by four adjacent posts and the legs 52 provide a space underneath the plate in which cables may be passed in one direction and over the plate cables may be passed in a transverse direction. The plate is used the other way up than that is shown in FIG. 11.

FIG. 12 shows an extension post 53 which may be placed onto the top of any of the posts shown in the embodiments in FIGS. 3 to 10 so that the cavity under the false floor may be increased where necessary. A spigot or peg 54 may be provided on the top of the extension post 53 to enable engagement of floor panels.

FIG. 13 shows how cables 55 and 56 may be tied by means of ties 57 to the frame arms 58 and it will be noted that with the spacing of attachment means as shown in FIGS. 5 and 6 the cables may be fastened on alternate arms which will give good rigid fastening.

FIG. 14 shows an overall view of a false floor arrangement as provided by the false floor support units of the present invention. The plurality of posts 60 support floor panels 61 which are of greater area than just one of the false floor support units and cables 62 and 63 for instance can be laid in any direction underneath the floor panels 61. Where cables cross, the cross-over plate or bridge 50 may be used to provide an insulated cross-over between the cables of different services. Carpet 64 or any other suitable floor covering may be placed over the panels 61 to provide a good finish for the false floor.

It will be noted that to provide further services it is only necessary to lift a floor panel 61 or a series of floor panels to install the new service, to tie the service down where necessary, to drill suitable apertures into the floor panel to extend the service to the work area and to replace the floor panel or panels with the service passing through the aperture.

Although the various embodiments of this invention have been discussed using a square grid arrangement of posts interconnected by a frame arrangement, it will be realised that other shapes such as rectangular, triangular or hexagonal spacings may be used.

As discussed earlier the false flooring support unit according to this invention is particularly adapted to be manufactured from injection moulding of plastics material or other suitable compound.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A false floor support unit comprising a plurality of posts of equal length arranged perpendicular to and extending from a common plane and joined by and spaced apart by a frame arrangement, connection means to interconnect the support unit to at least one adjacent support unit, at least one location means extending from at least one of the posts to positively locate flooring on the support unit and voids between the posts to enable the placement of services, cabling and duct work within the false floor region.

2. A false floor support unit as in claim 1, further including attachment means on the frame arrangement to enable the attachment of ties for the retention of the services, cabling and duct work.

3. A false floor support unit as in claim 1, further including post extension means mountable on each post whereby to increase the length of the respective posts and hence the volume of voids produced therebetween.

4. A false floor support unit as in claim 1, wherein the posts are arranged in a square grid arrangement and the framework comprises rigid arms extending between adjacent posts in the square grid arrangement.

5. A false floor support unit as in claim 1, wherein the frame arrangement comprises arms positioned adjacent the base of the posts.

6. A false floor support unit as in claim 1, wherein the location means to locate a section of floor comprises a rim extending around the periphery of the unit to define a space therebetween into which a flooring panel may be received and to define therebelow the voids.

7. A false flooring support unit as in claim 1, wherein the location means comprise a peg or spigot extending from one of the posts to be received in an aperture in a flooring panel to thereby positively locate the panel.

8. A false flooring support unit as in claim 1, wherein the unit comprises a central post, three further posts with the four posts arranged in a first square grid arrangement, three post interconnection means, with the three post interconnection means and the central post arranged in a second square grid arrangement having a grid spacing substantially the same as the grid spacing of the first grid arrangement, the first grid arrangement being on an opposite side of the central post from the second grid arrangement, the post interconnection means comprising the connection means to interconnect the unit to adjacent units and the three post interconnection means joined to each other and to the central post by the frame arrangement.

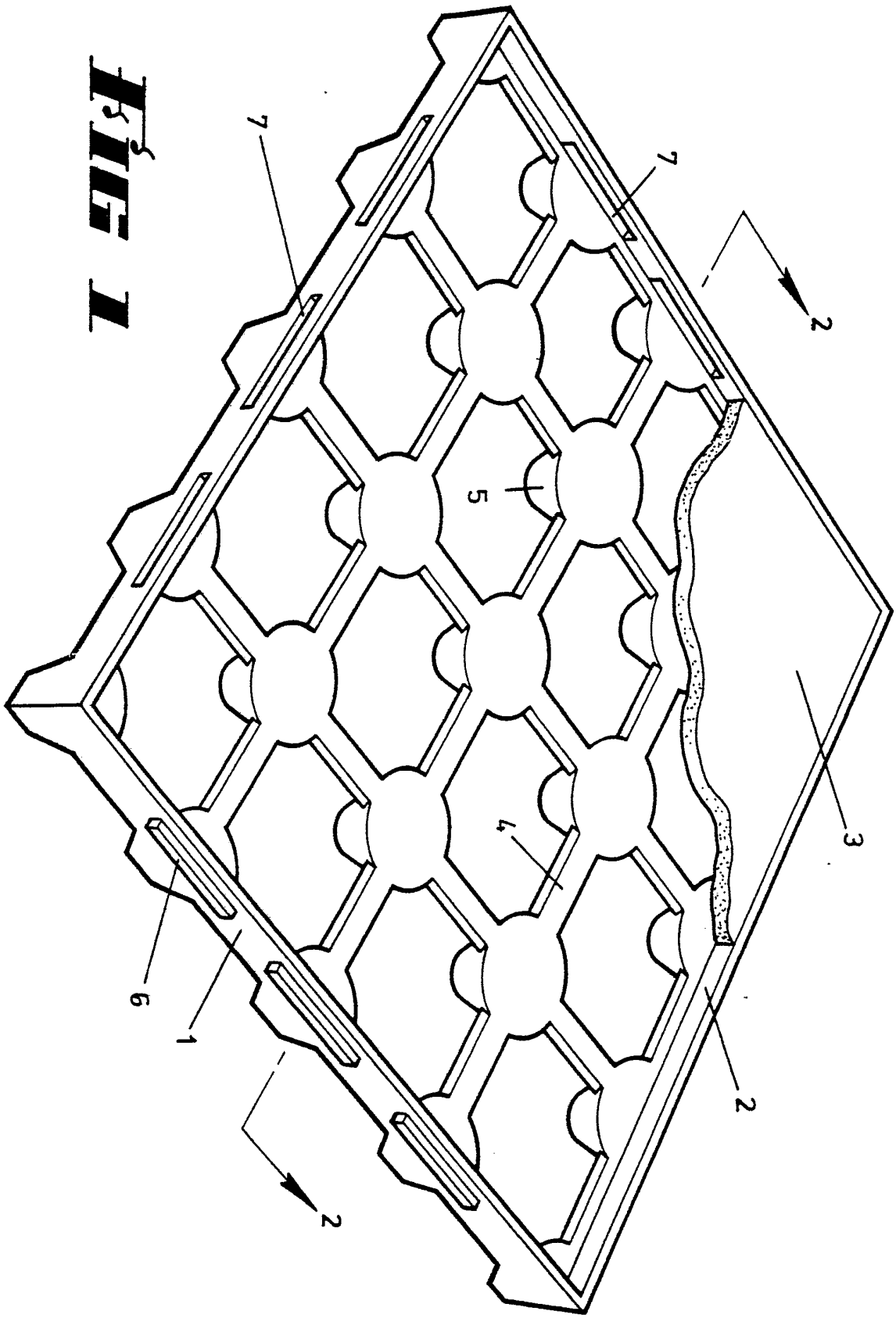
9. A false floor support unit as in claim 8 wherein the frame arrangement comprises rigid arms extending between adjacent posts and post interconnection means.

10 A false floor support unit as in claim 8, further including attachment means on the frame arrangement to enable the attachment of ties for the retention of the services, cabling and duct work.

11. A false floor arrangement comprising a plurality of false floor support units as defined in any one of claims 1 to 9, each unit being interconnected to adjacent units by means of the connection means and a plurality of flooring panels on an upper surface of the posts, the location means being received in apertures in the flooring panels to positively locate the flooring panels on the posts.

12. A false floor support unit substantially as herein before described with reference to the drawings.

FIG 1



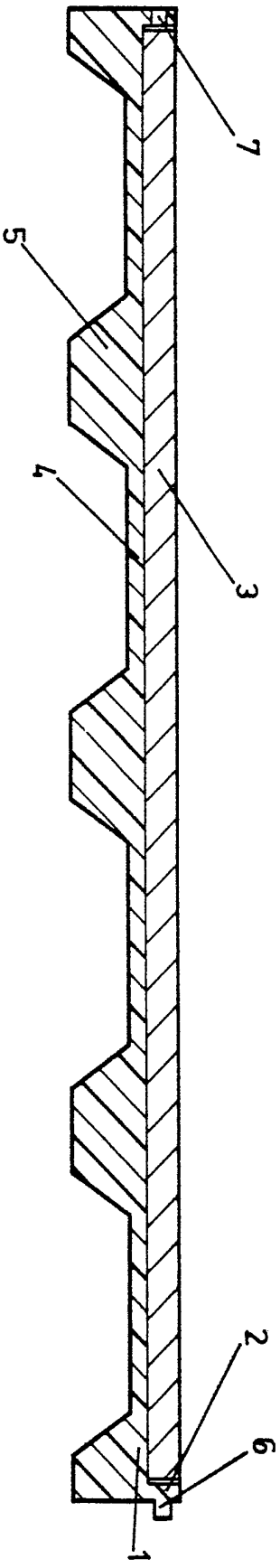


Fig 2

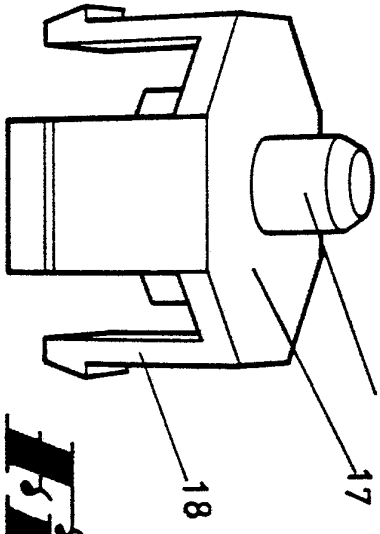


Fig 4

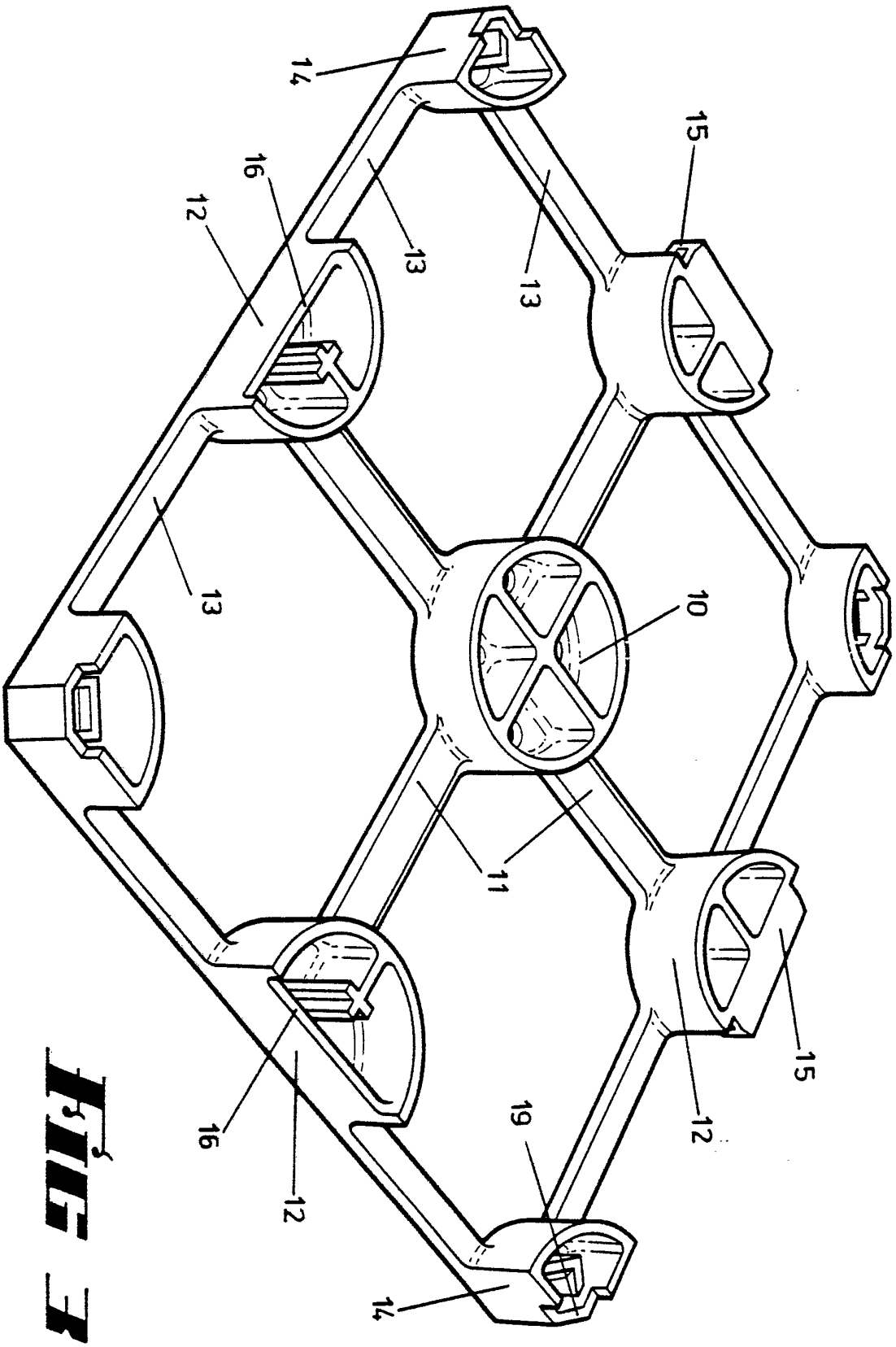


Fig 3

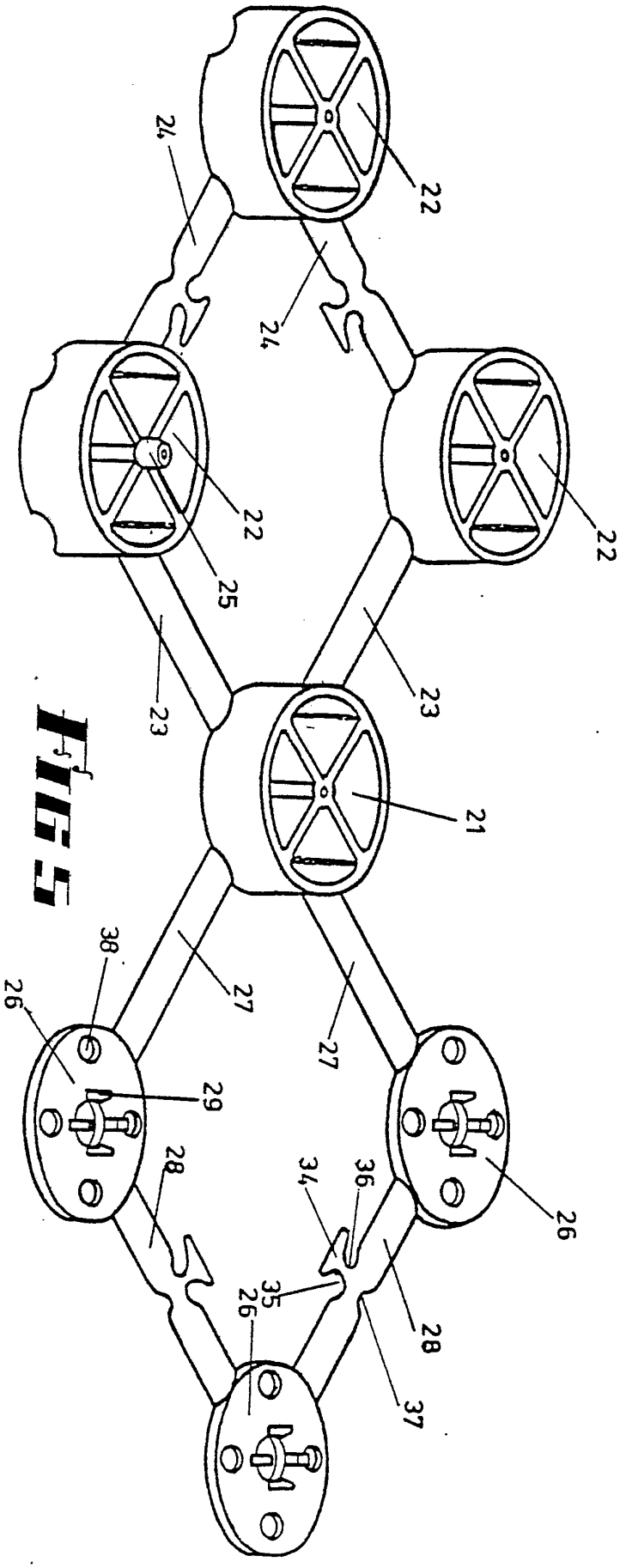


Fig 5

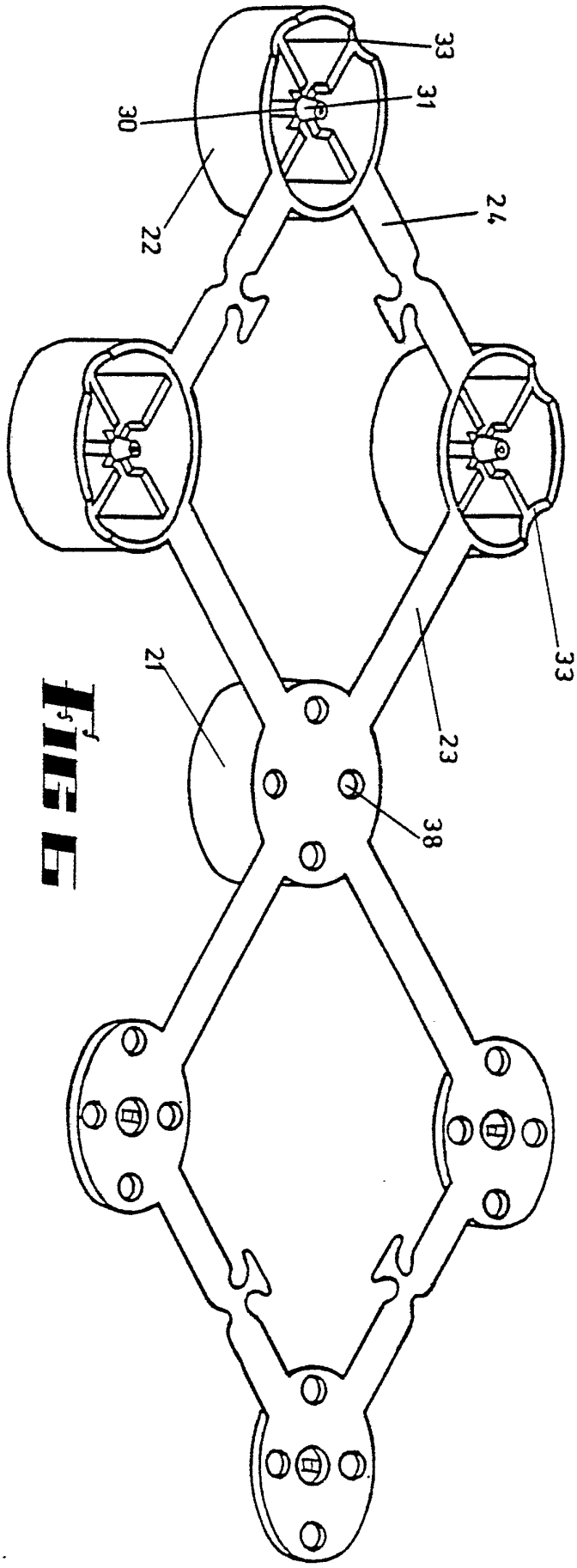
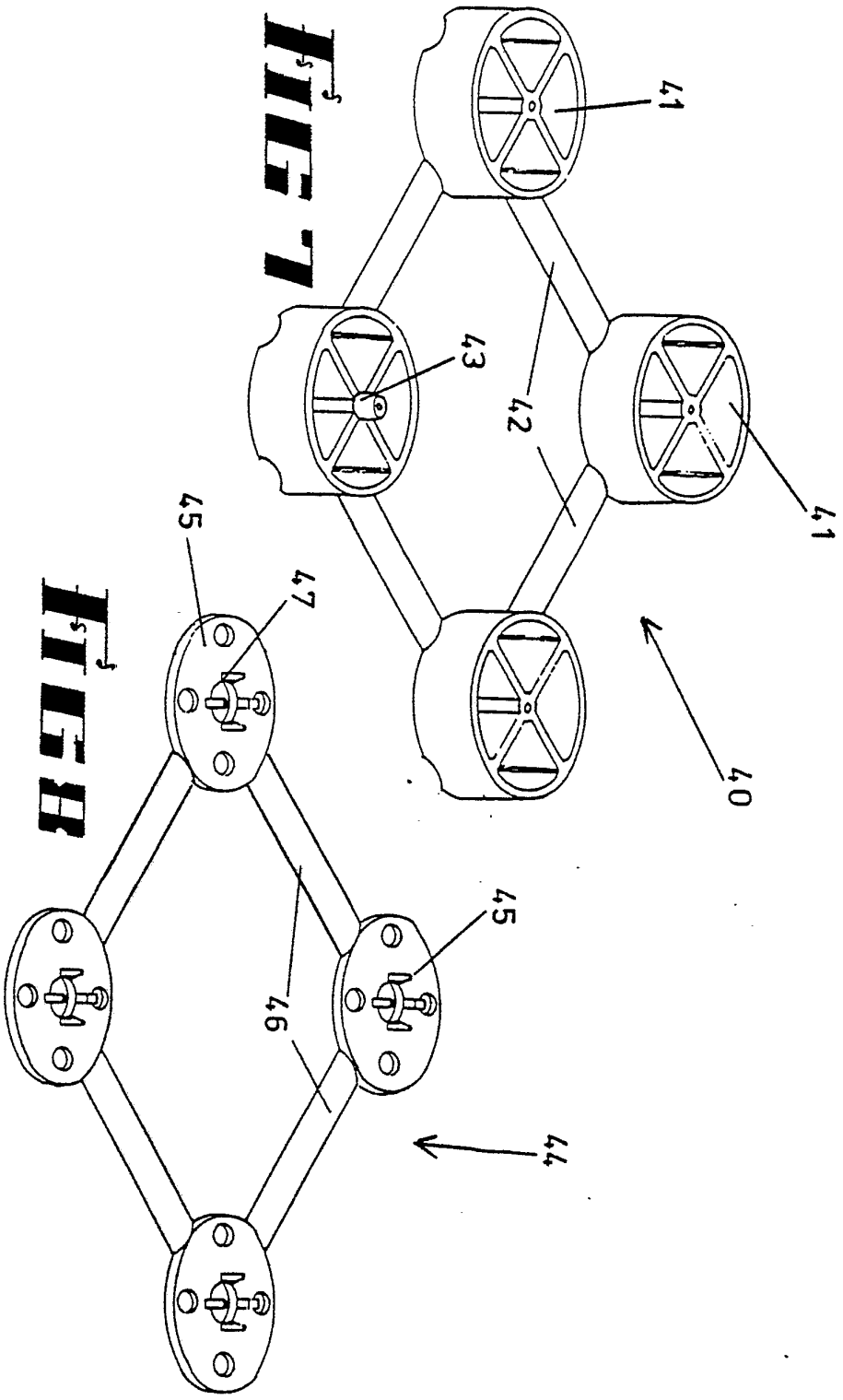


Fig 6


FIG 7
FIG 8
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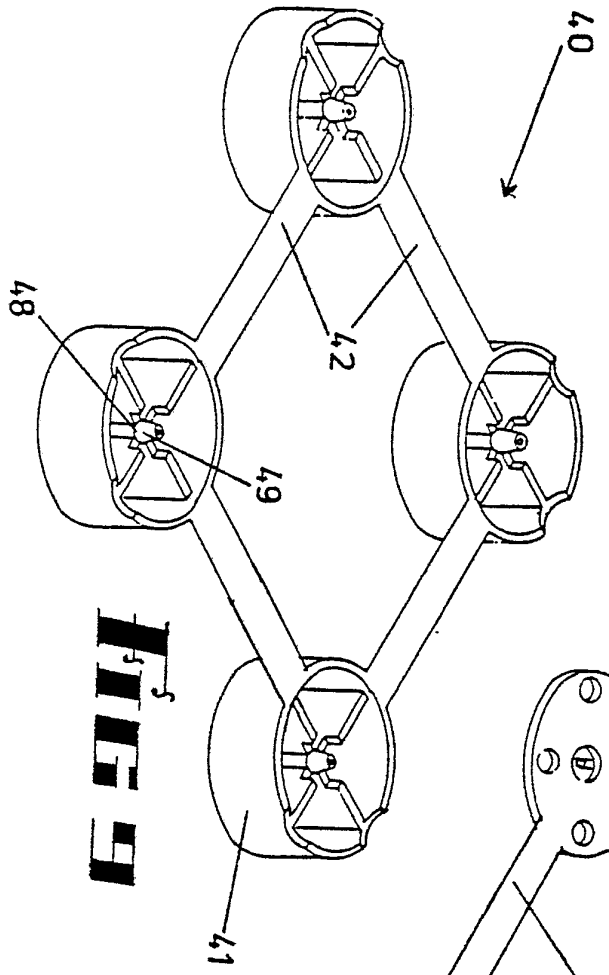


FIG 9

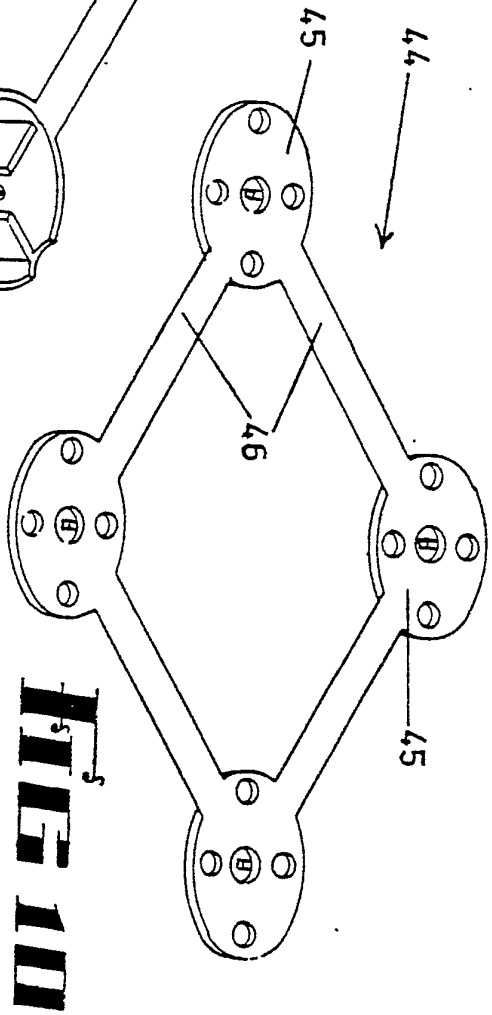


FIG 10

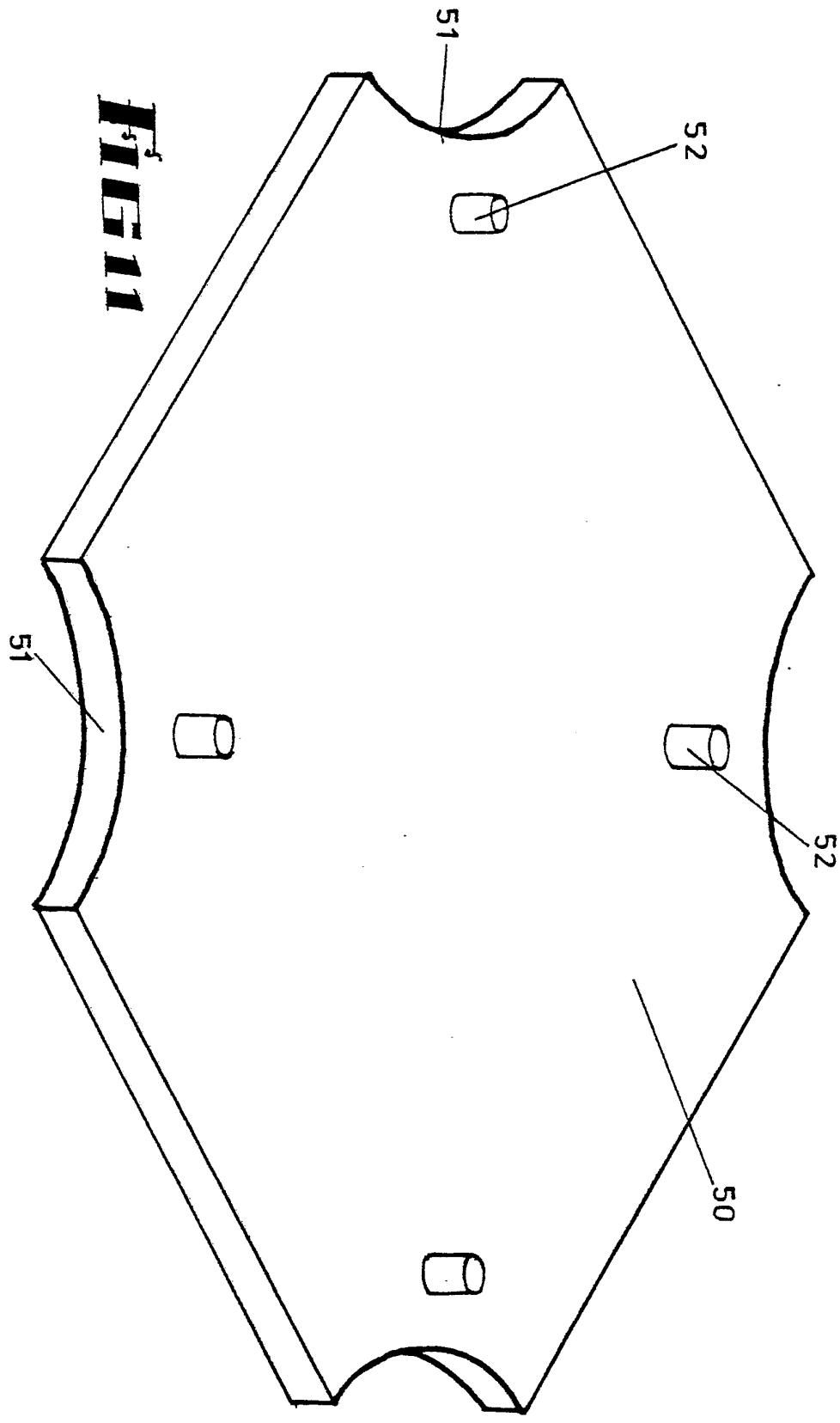


FIG 11

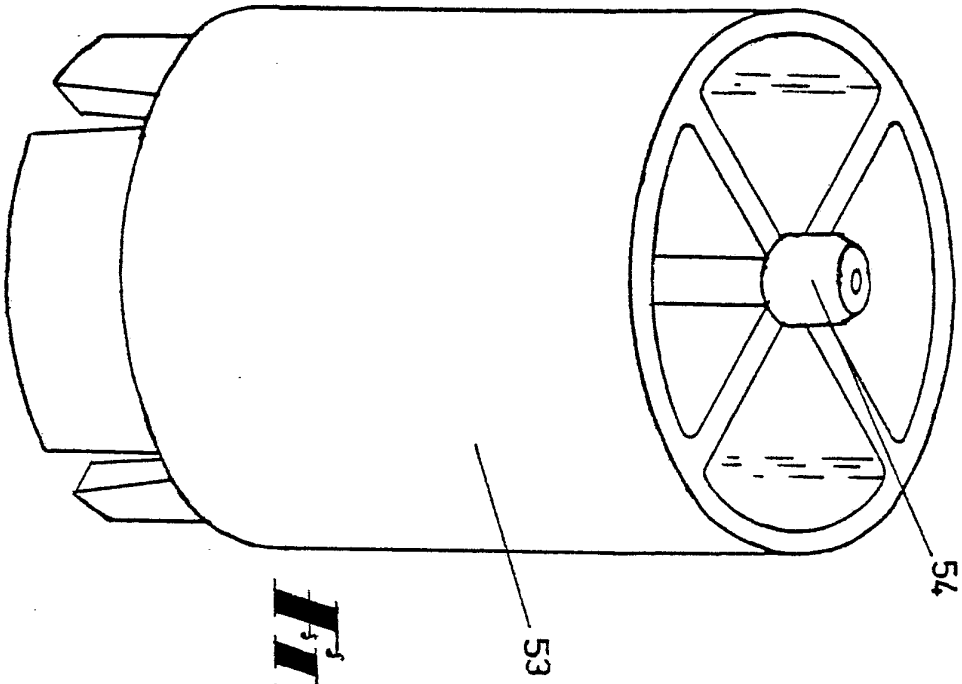


FIG 12

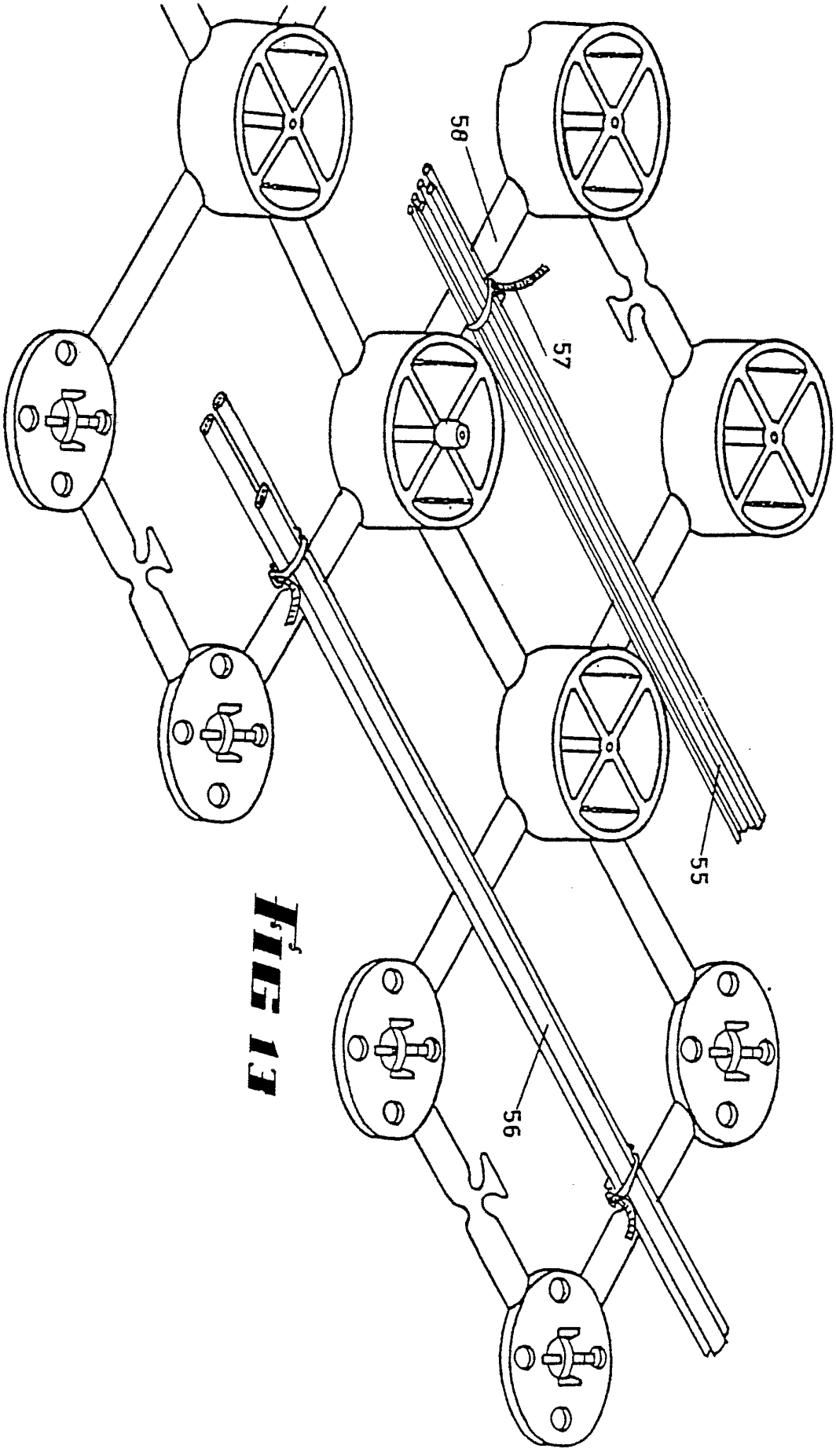


Fig 13

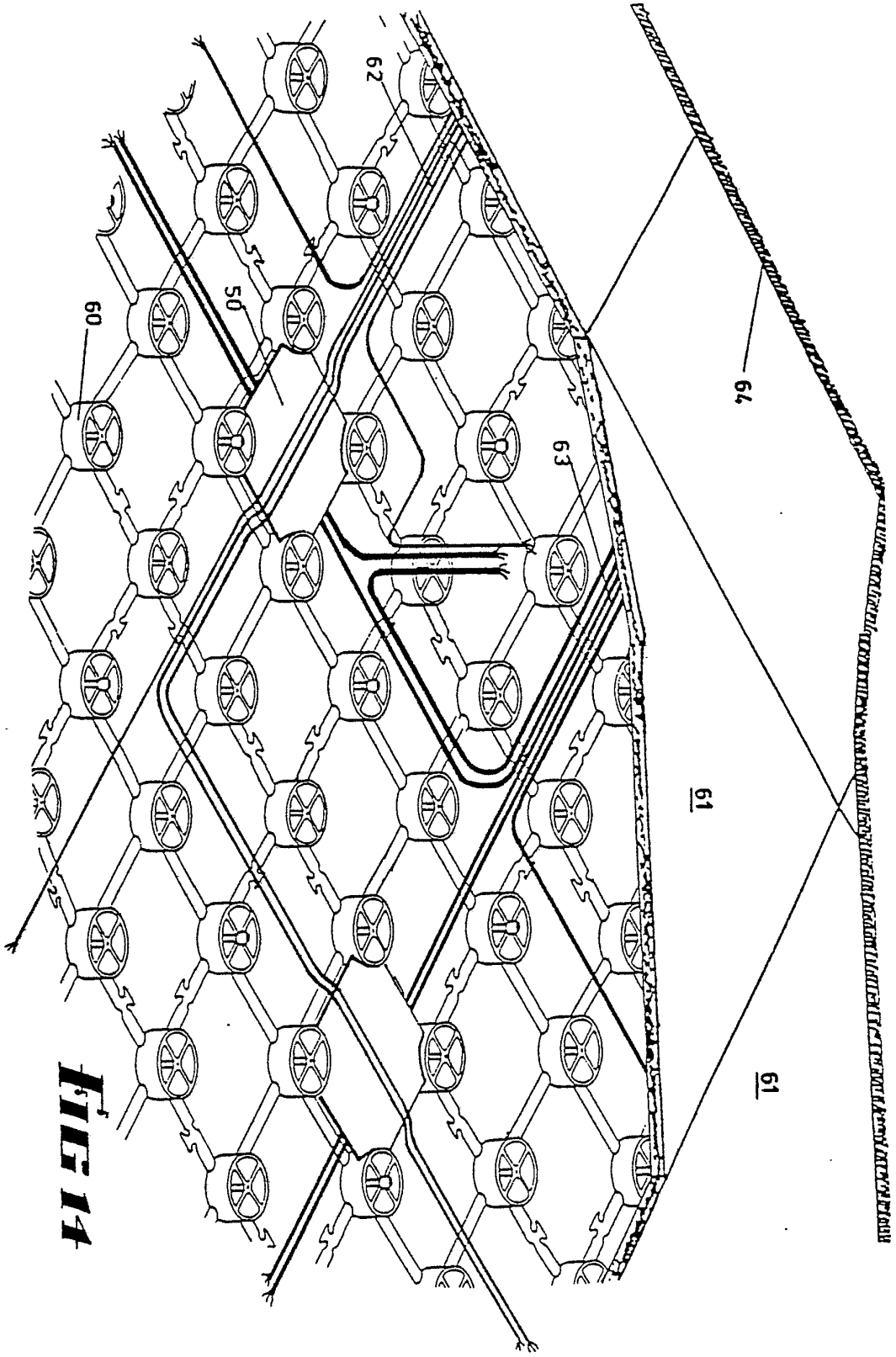


FIG 14

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 86/00334

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[4] E04F 15/024

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	E04F 15/024

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

AU; IPC as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	EP,A, 013570 (MARBETON) 9 January 1980 (09.01.80)	(1,4,7,11)
X	SU,A, 903523 (VASILEV) 7 February 1982 (07.02.82) (Derwent English Language Abstract Q45 B4478J/51)	(1,3,4)
X	US,A, 2929529 (HUDSON) 22 March 1960 (22.03.60)	(1,7)
A	CH,A, 277554 (YOVANOVITCH) 1 December 1951 (01.12.51)	(1)
A	JP,A, 61-102962 (MATSUSHITA ELEC WORKS) 21 May 1986 (21.05.86) (Derwent English Language Abstract X12 86.171864/27)	(1)
A	SU.A, 590419 (IND BUILD CONS EXP) 8 February 1978 (08.02.78) (Derwent English Language Abstract Q45 K9449A/50)	(1)

* Special categories of cited documents: [10]

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

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"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

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
10 February 1987 (10.02.87)	3.3.87 3 MARCH 1987
International Searching Authority	**Signature of Authorized Officer**
Australian Patent Office	C.A. TARRANT

Form PCT/ISA/210 (second sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/AU **86/00334 (ISR)**

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 Members
EP 13570	DE 2900759

END OF ANNEX