

- [54] **EXPANDABLE PLATFORM WITH BUILDING STRUCTURES THEREON**
[72] Inventor: **Joseph J. Mangan**, 35-17 149th Place, Flushing, N.Y. 11354
[22] Filed: **Oct. 3, 1969**
[21] Appl. No.: **863,472**
[52] U.S. Cl.**52/80, 52/175, 52/236, 52/648**
[51] Int. Cl.**E04h 1/04**
[58] Field of Search.....**52/73, 17 S, 236, 122, 80, 52/81, 648, 650, 176, 174, 263, 287, 299**

[56] **References Cited**
UNITED STATES PATENTS

2,978,074	4/1961	Schmidt.....	52/81
3,349,527	10/1967	Bruns	52/648
2,837,776	6/1958	Klein.....	52/73
3,270,478	9/1966	Attwood.....	52/648
3,330,083	7/1967	Jaulmes.....	52/650
3,354,590	11/1967	Gilroy.....	52/73

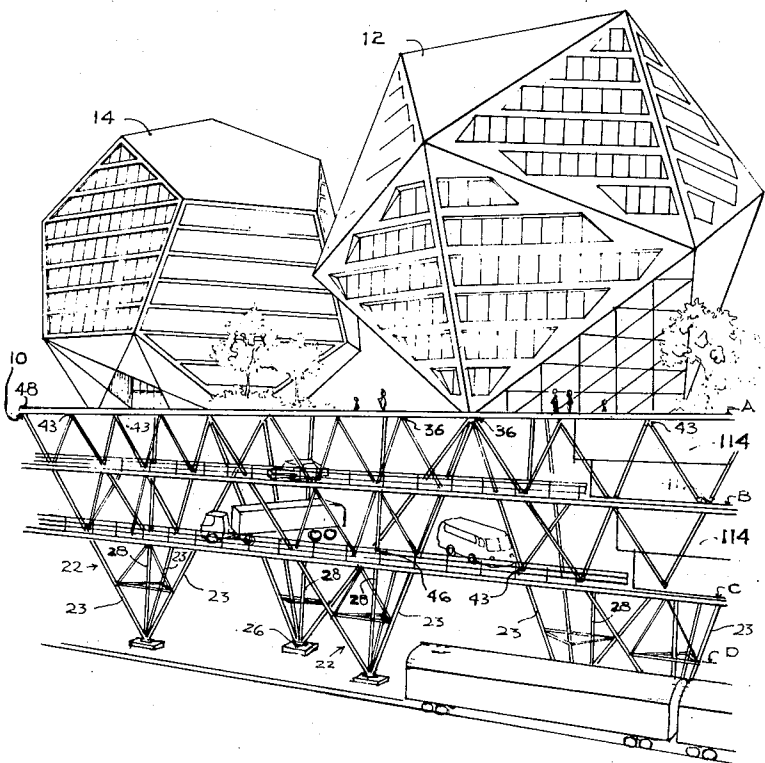
OTHER PUBLICATIONS

Engineering News-Record 7- 22- 48 p. 78
Architectural Forum Vol. 93, issue 5 Nov. 1950, page 14

Primary Examiner—John E. Murtagh
Attorney—Alfred E. Miller

[57] **ABSTRACT**
A platform being preferably in the form of a multi-level floors which serve as cover for both parking and storage areas, and provides for rapid lateral transportation therein. The top floor or level serves as a base for the various construction forms constituting offices, housing and the like. The platform is built on large tetrahedrons anchored into virtually unusable land areas. The various constructional components are standardized so that the entire structure may be easily expanded at will with selected number of standard components.

8 Claims, 30 Drawing Figures



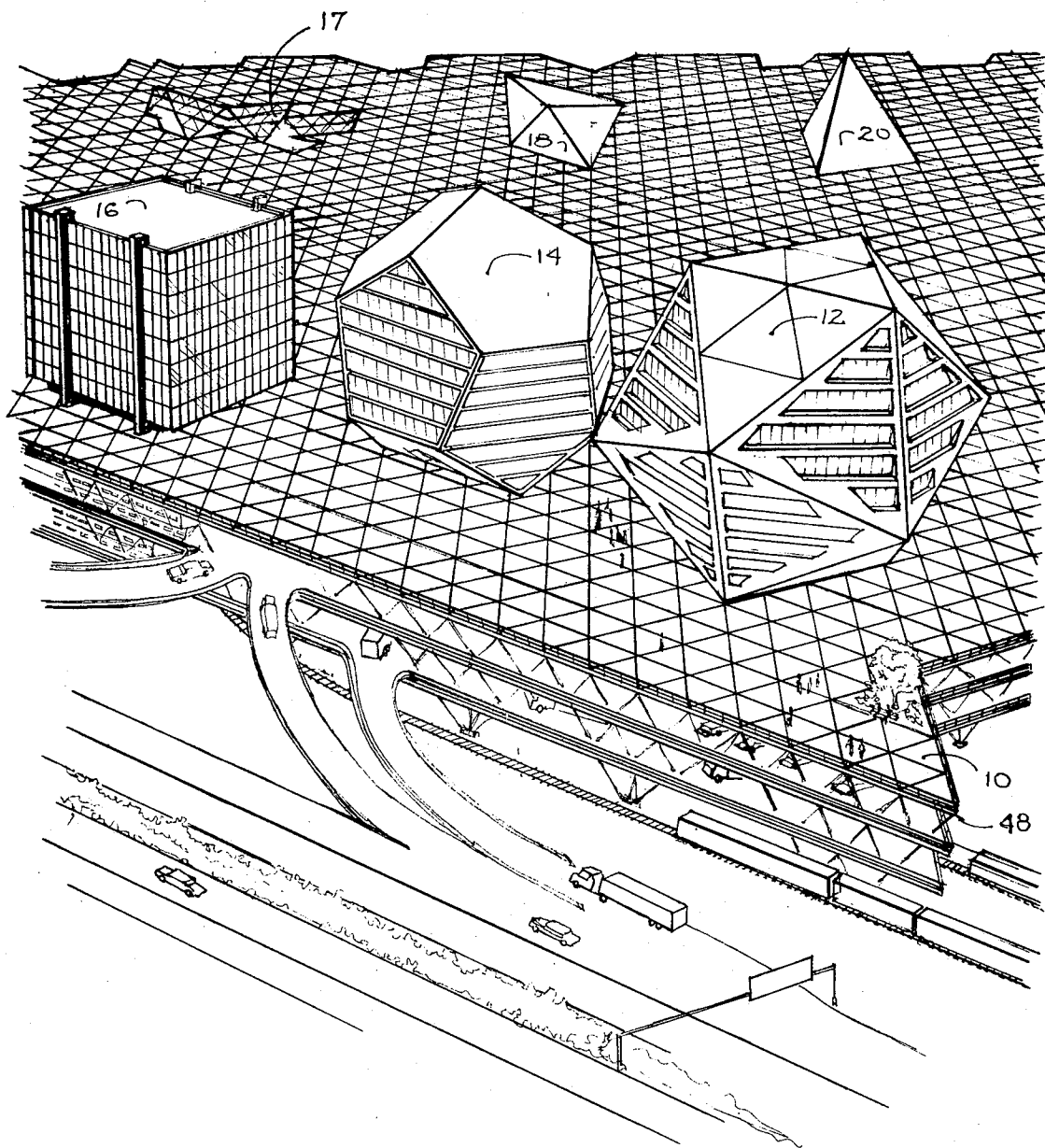


Fig. 1

Joseph Mangar
INVENTOR

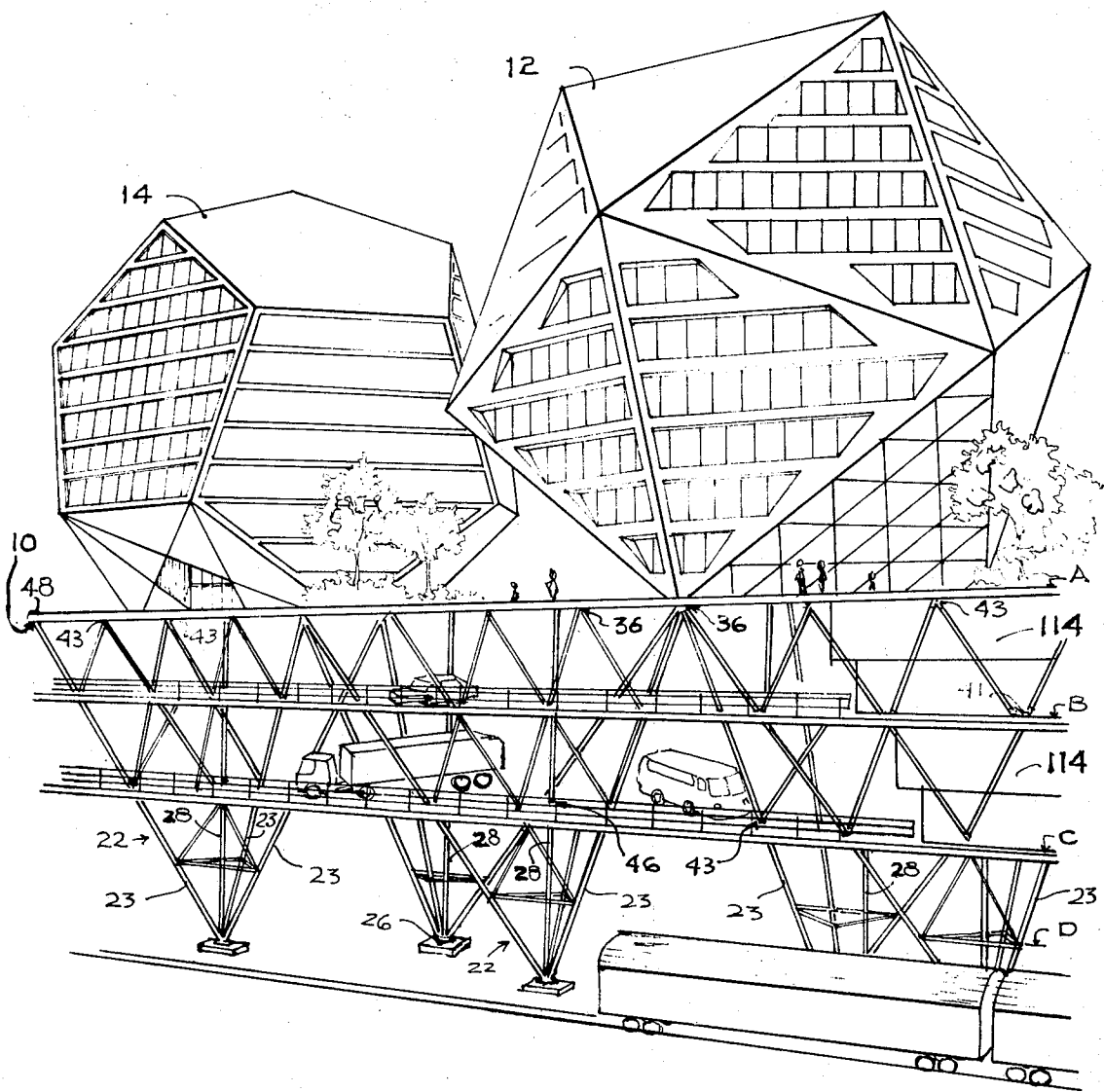


Fig. 2

Joseph Mangin
INVENTOR

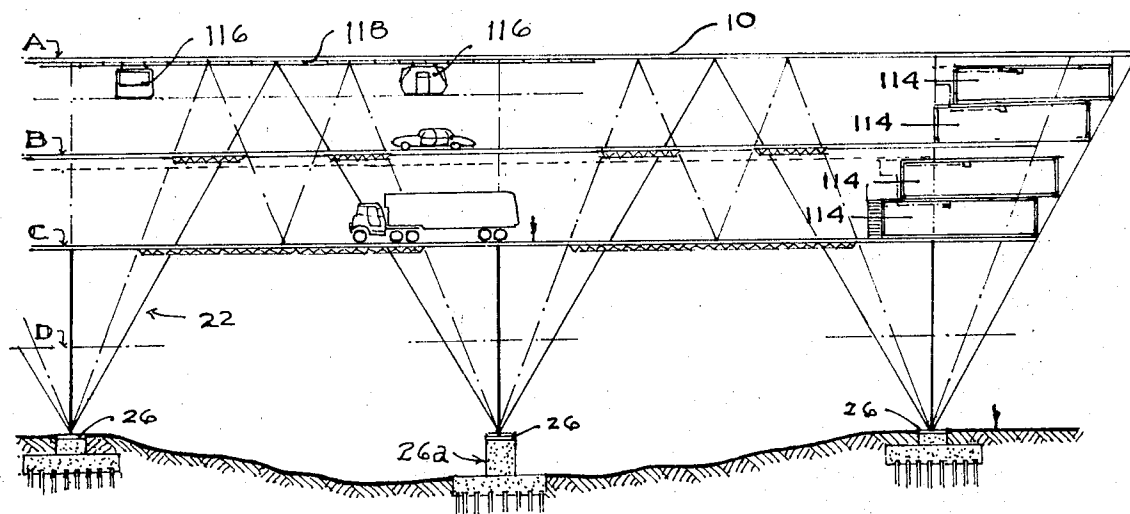


Fig 3b

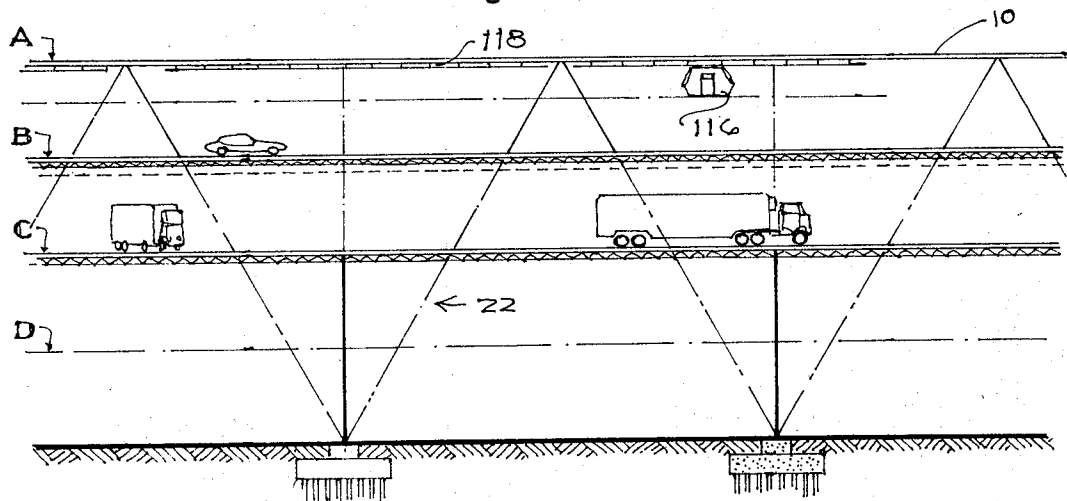


Fig 3a

Joseph J. Mangan
INVENTOR

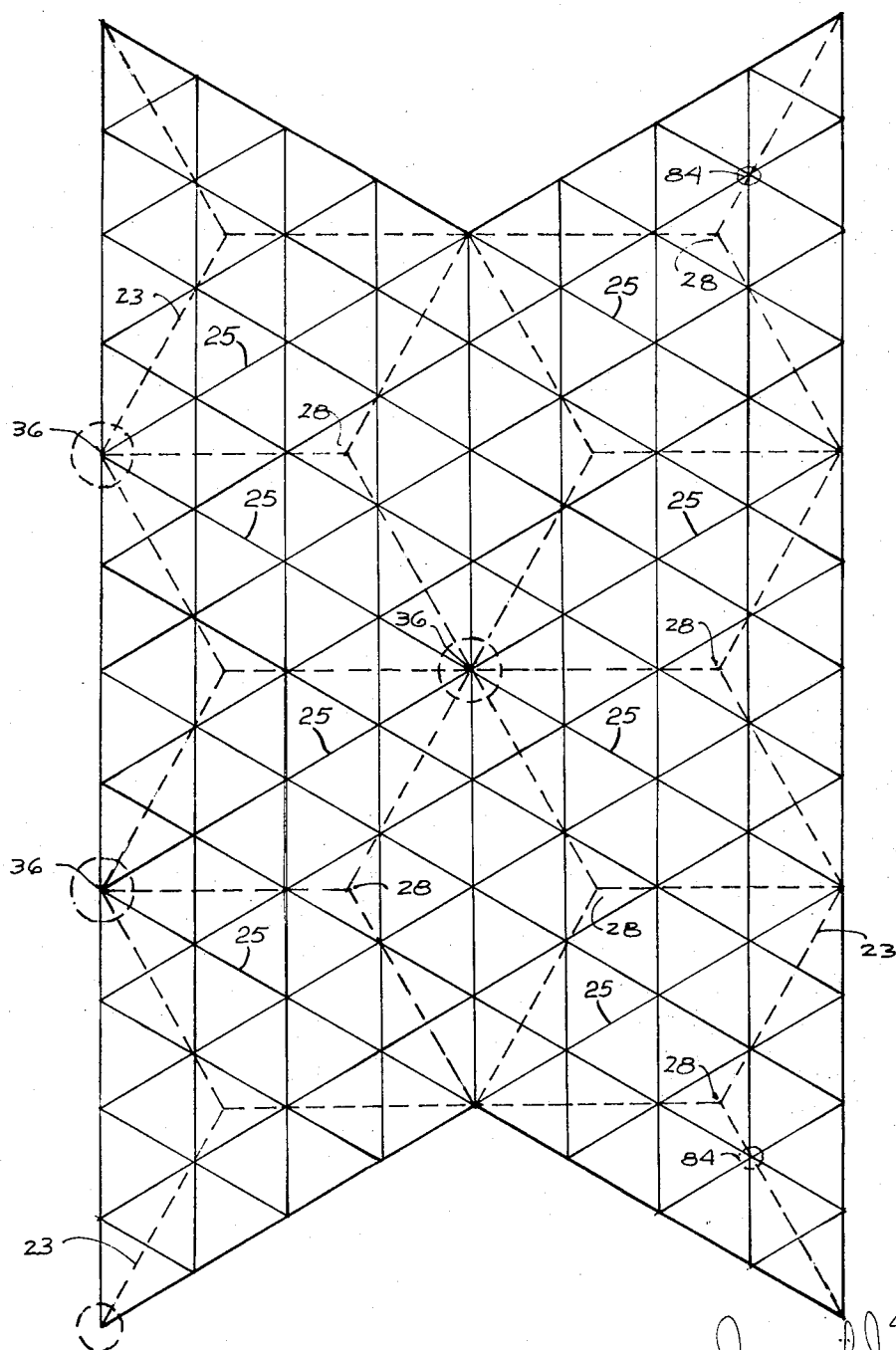


Fig. 4

Joseph W. Mangon
INVENTOR

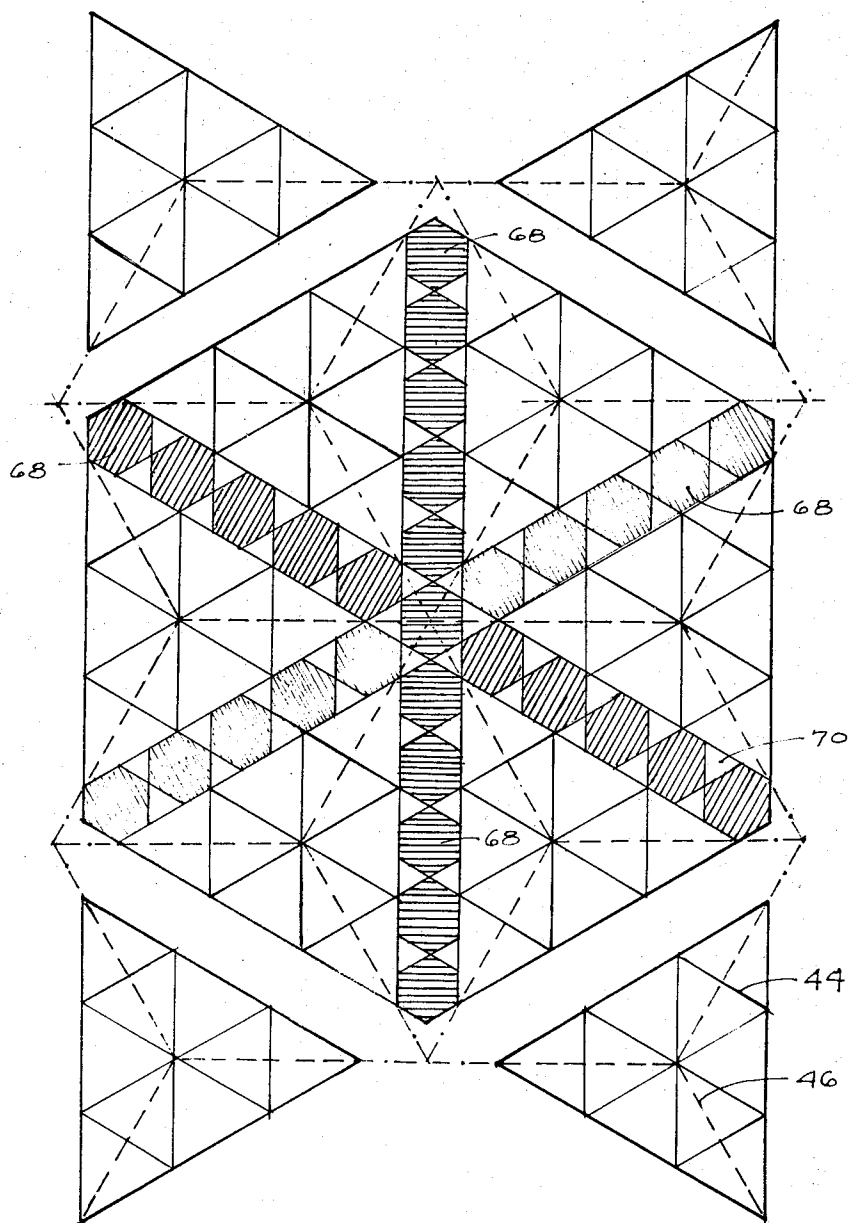


Fig. 5

Joseph L. Manson
INVENTOR

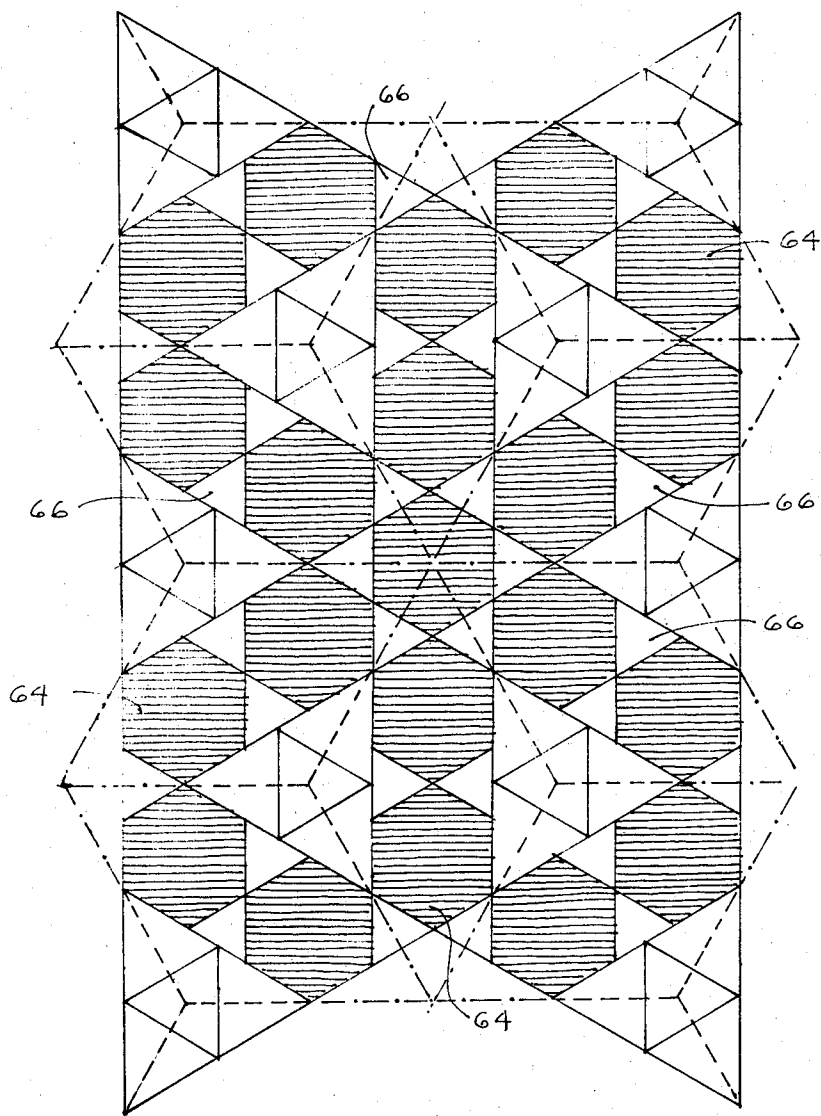


Fig. 6

Joseph L. Mangar
INVENTOR

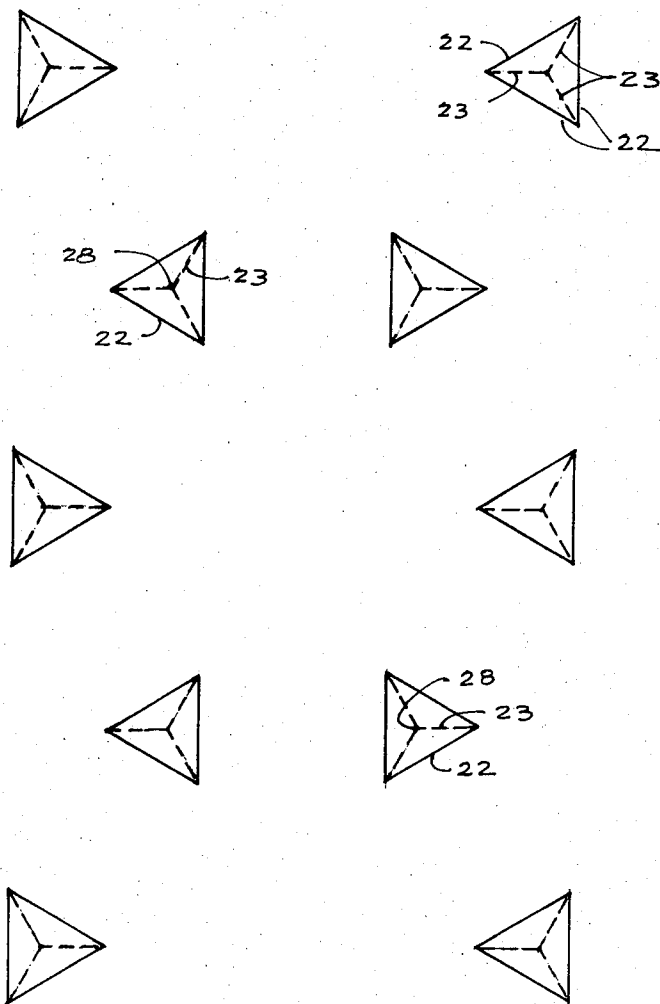


Fig. 7

Joseph J. Mangon
INVENTOR

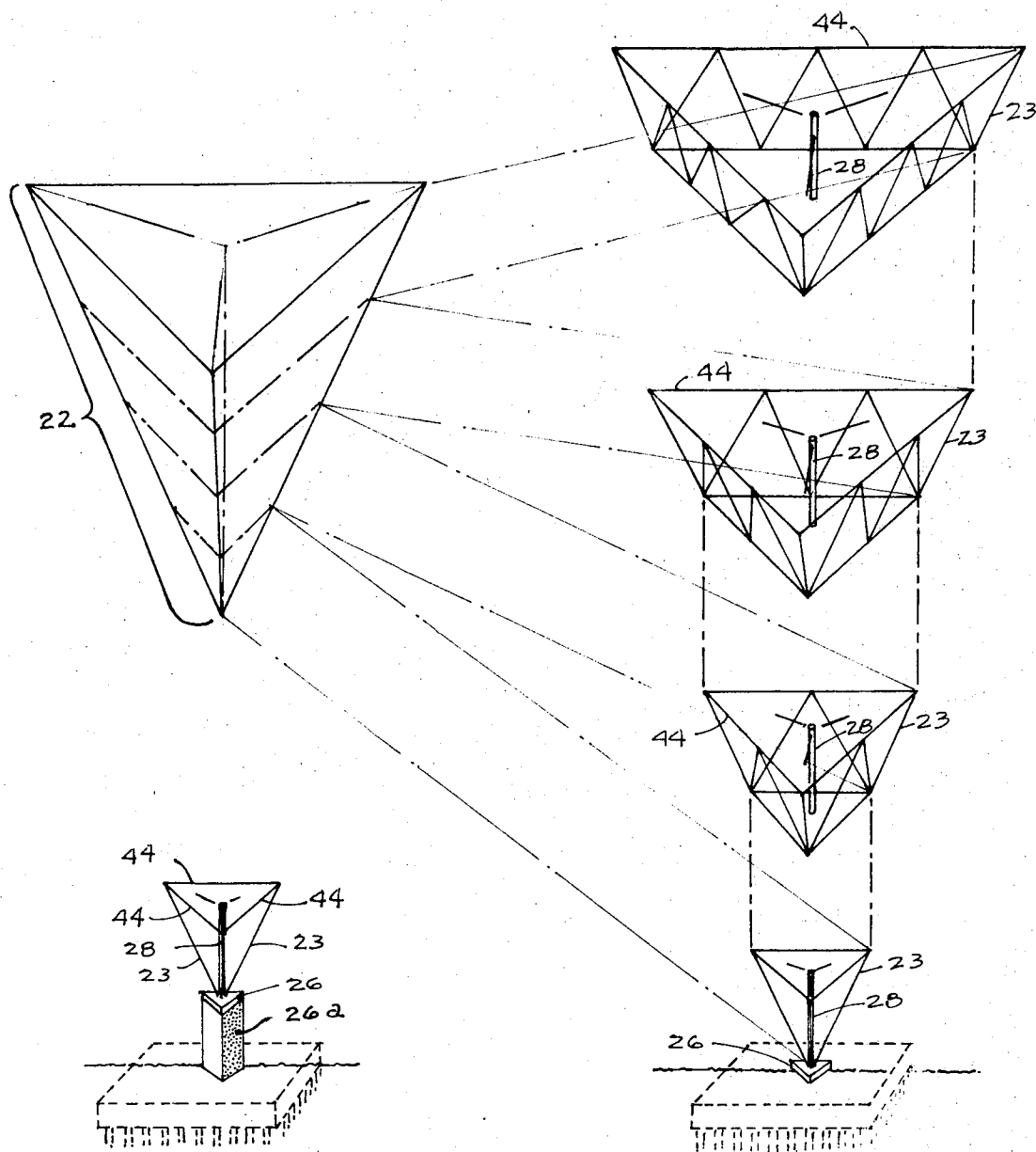


Fig. 8b

Fig. 8a

Joseph J. Moray, Jr.
INVENTOR

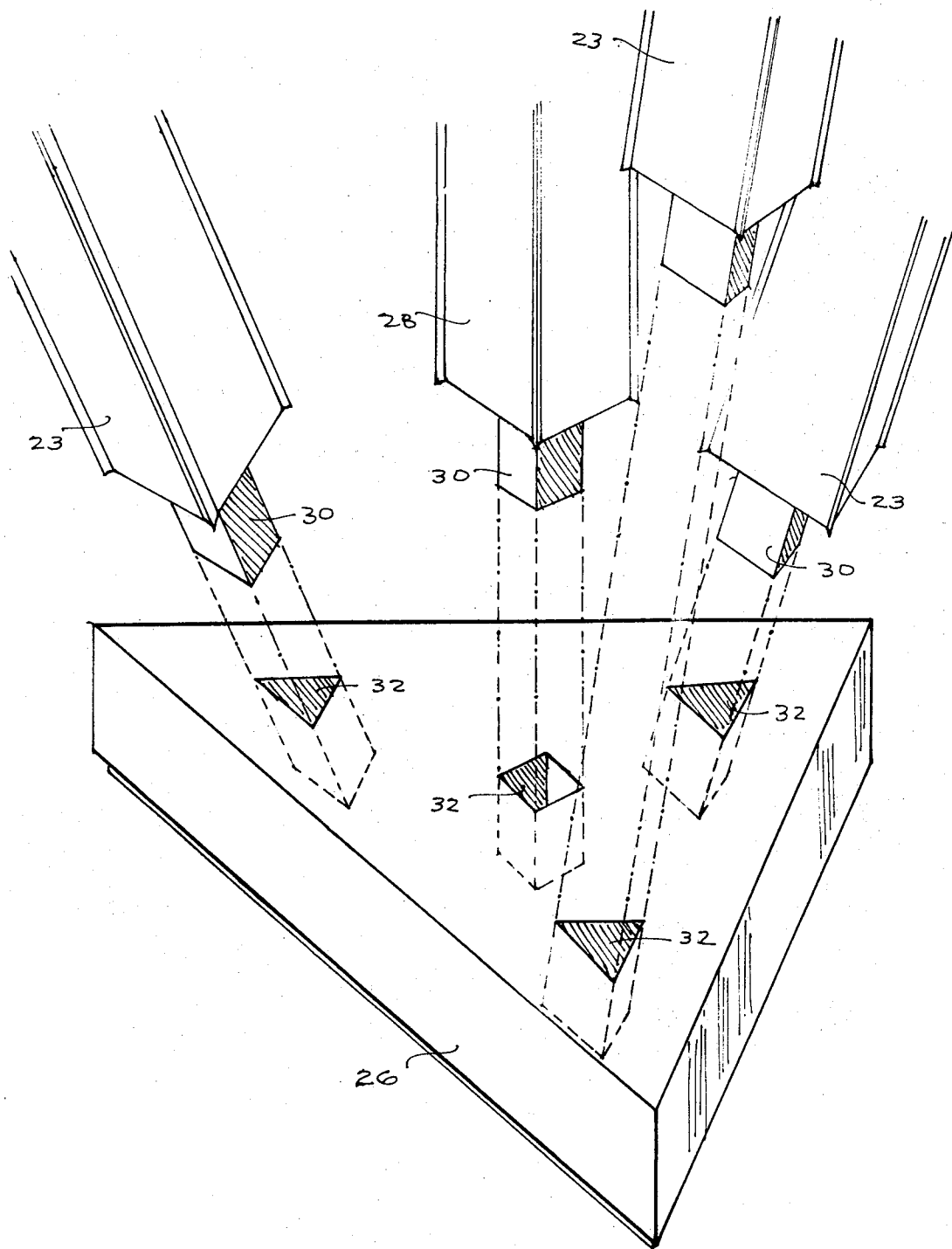
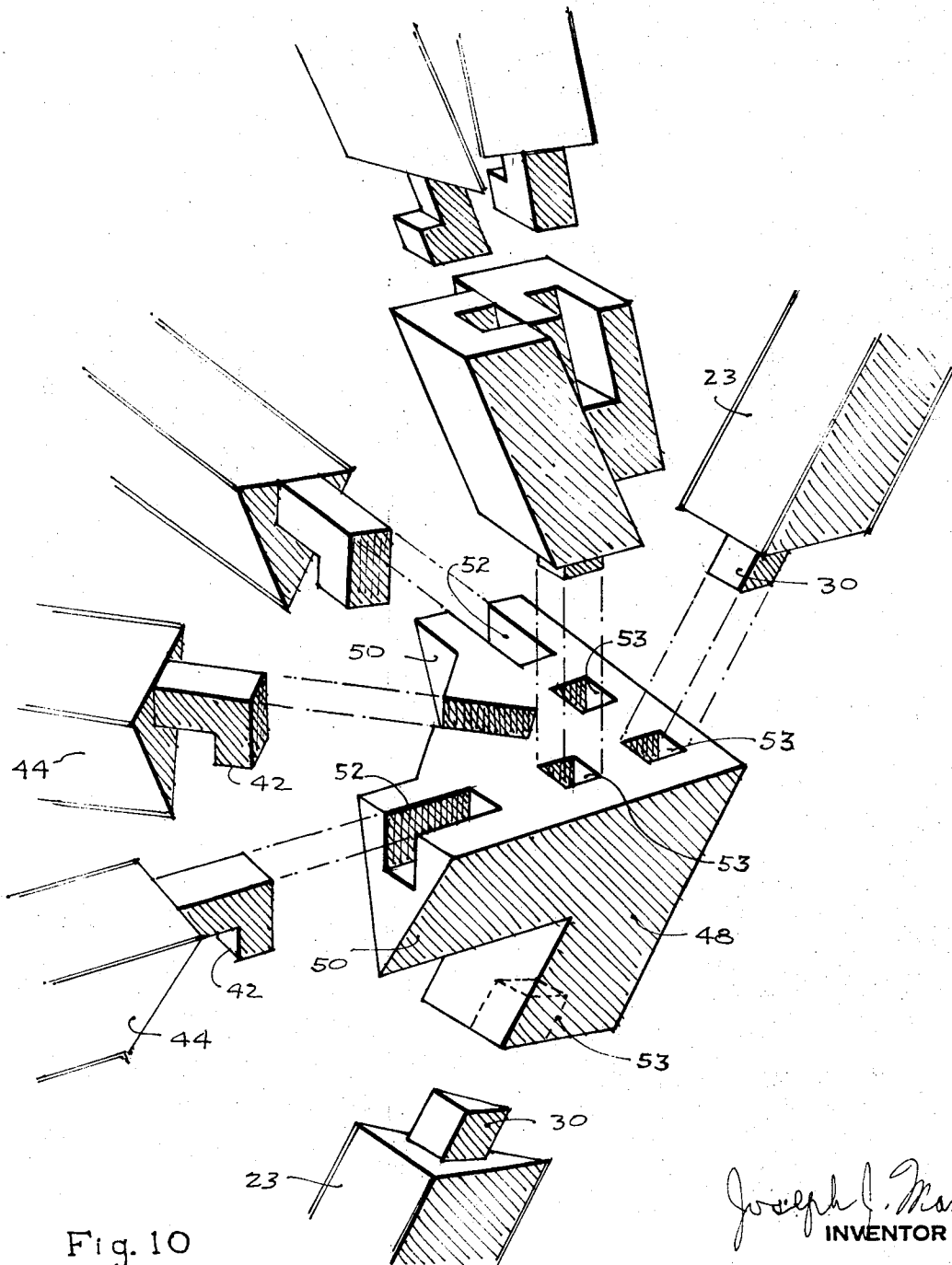
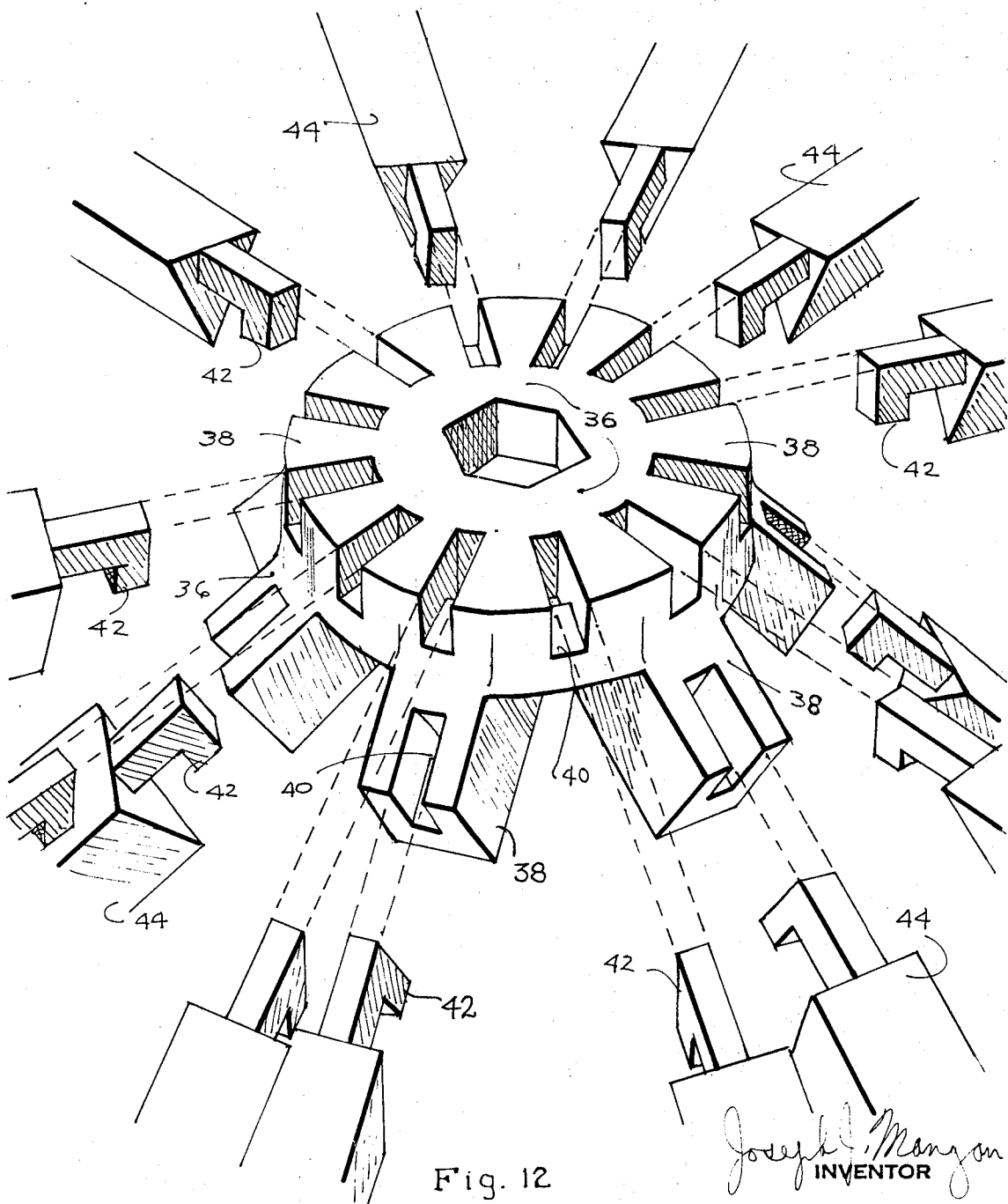


Fig. 9

Joseph F. Mangon
INVENTOR



Joseph L. Mangon
INVENTOR



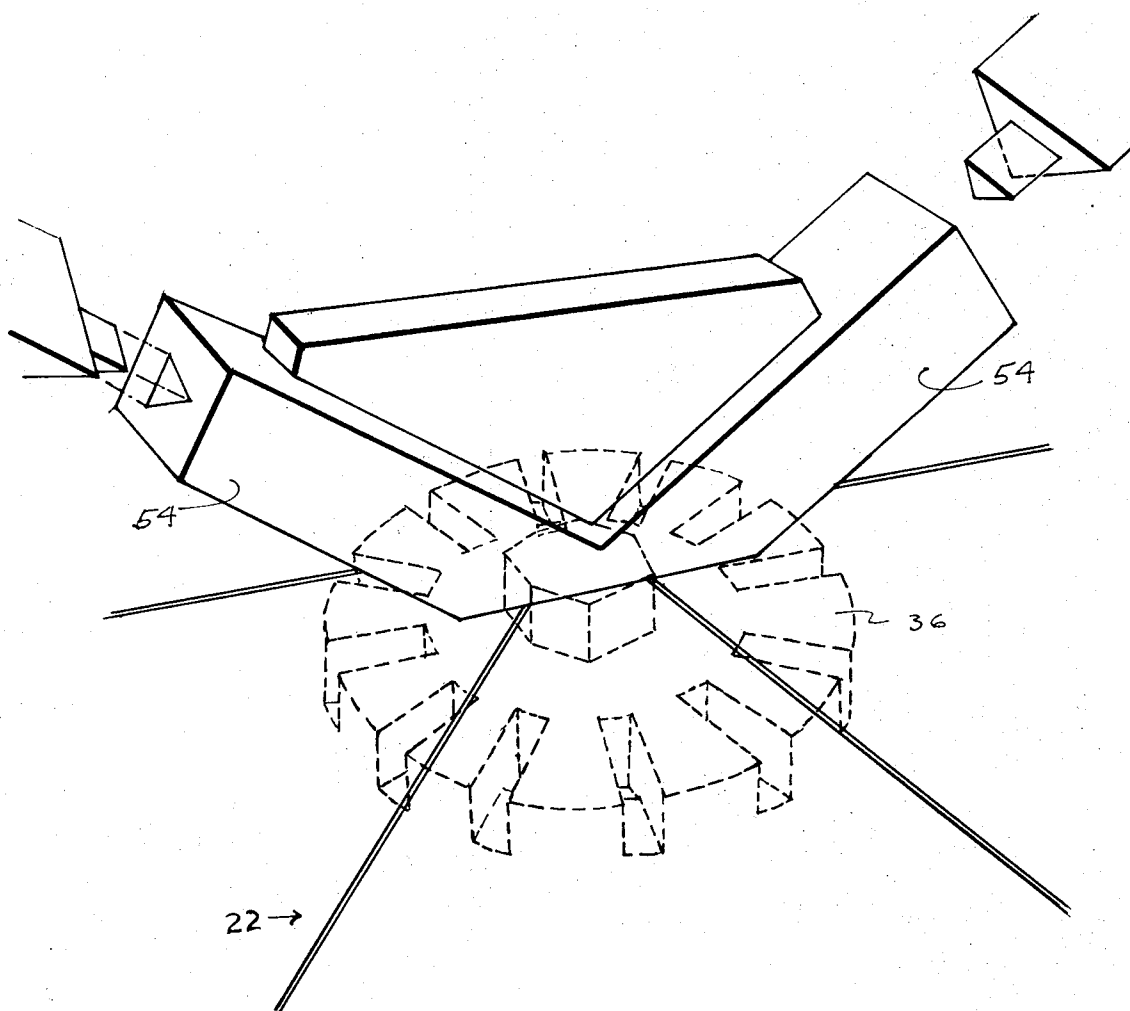


Fig. 13

Joseph J. Mangano
INVENTOR

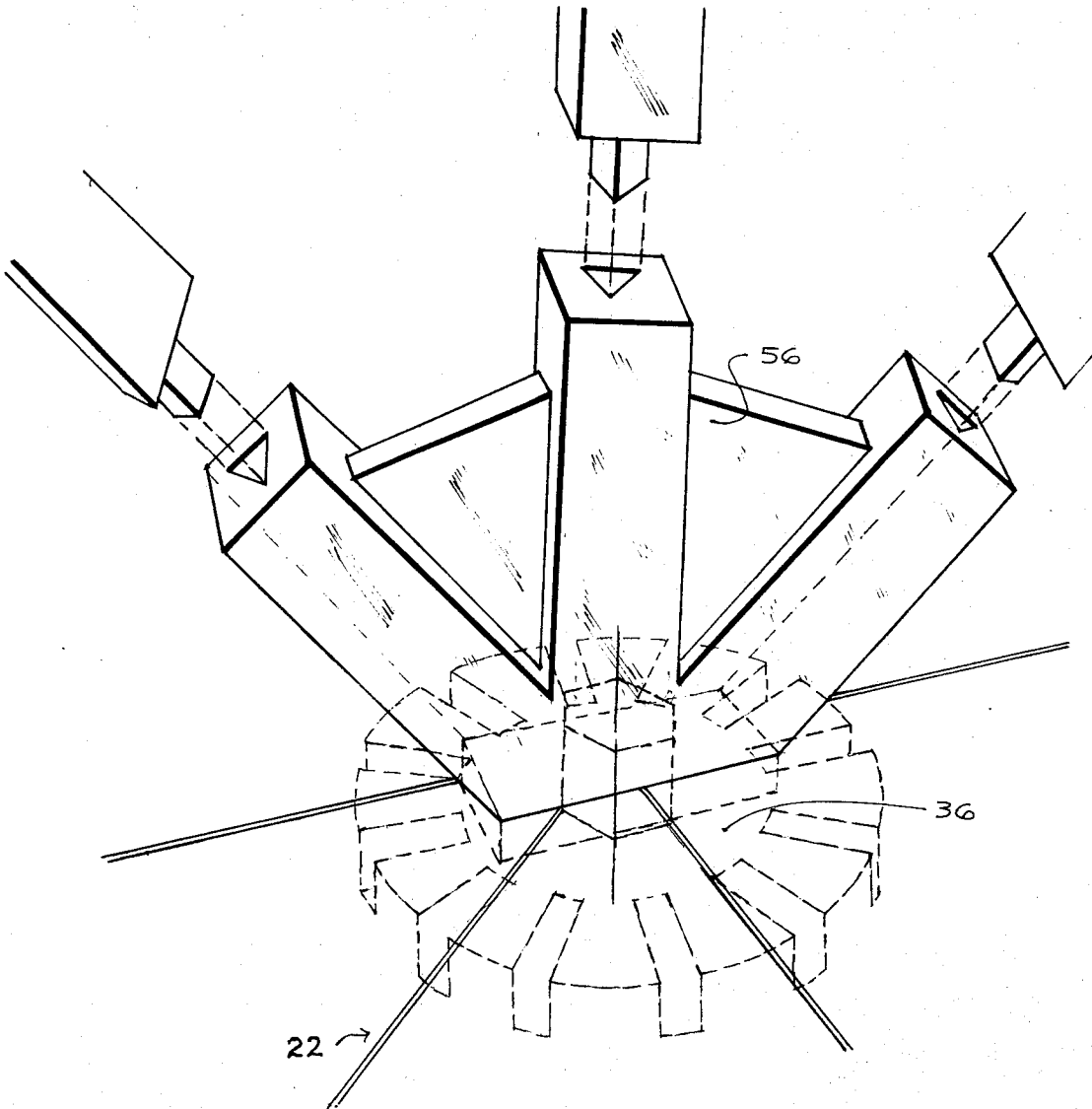


Fig 14

Joseph I. Mangon
INVENTOR

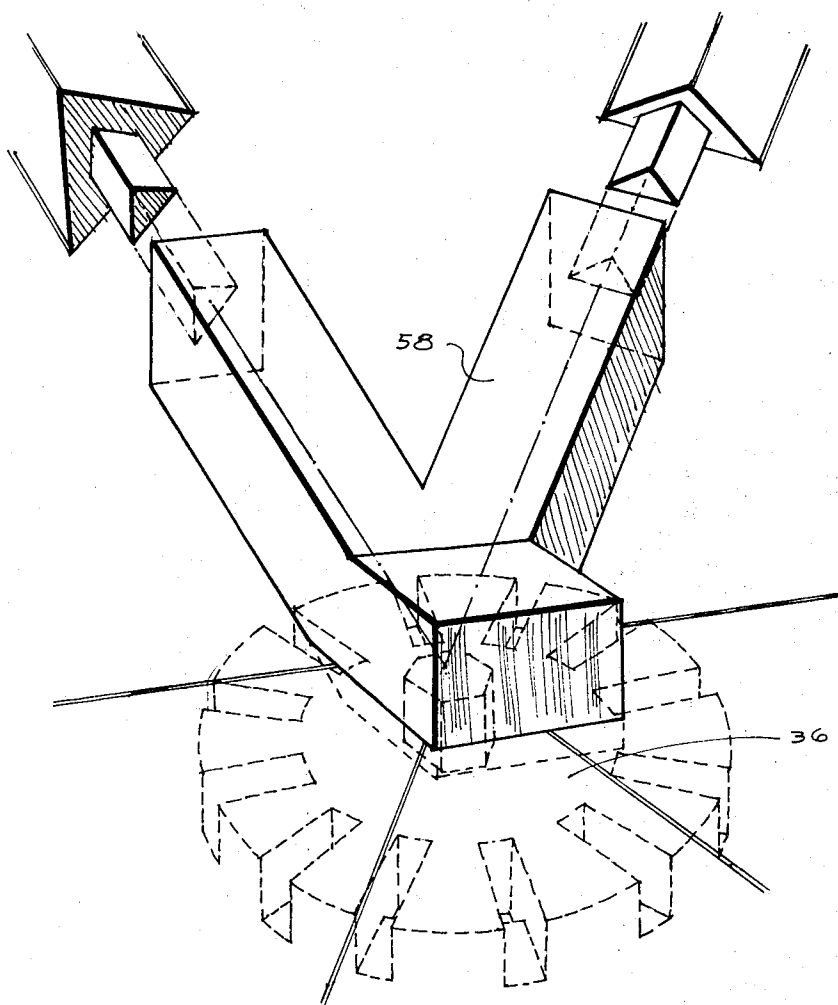


Fig. 15

Joseph Mangon
INVENTOR

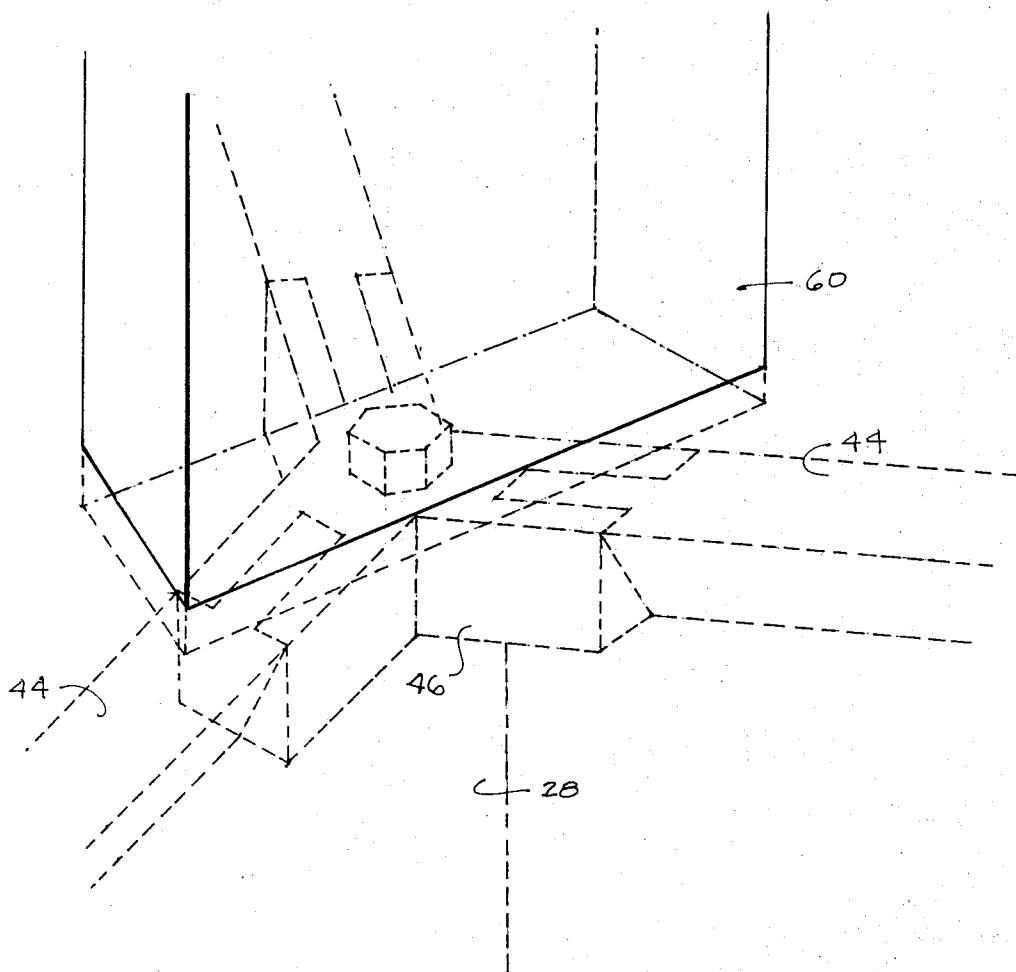
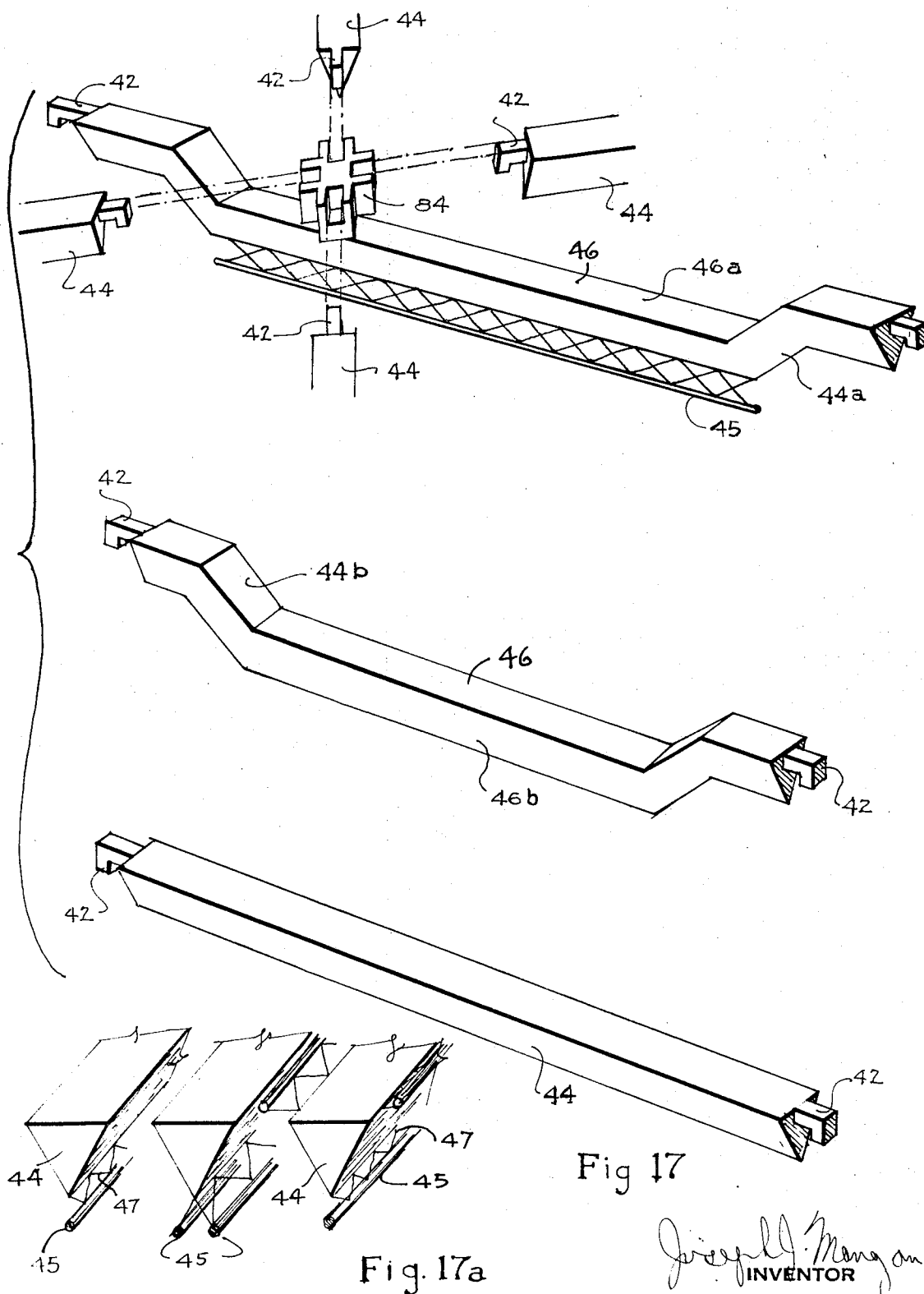


Fig 16

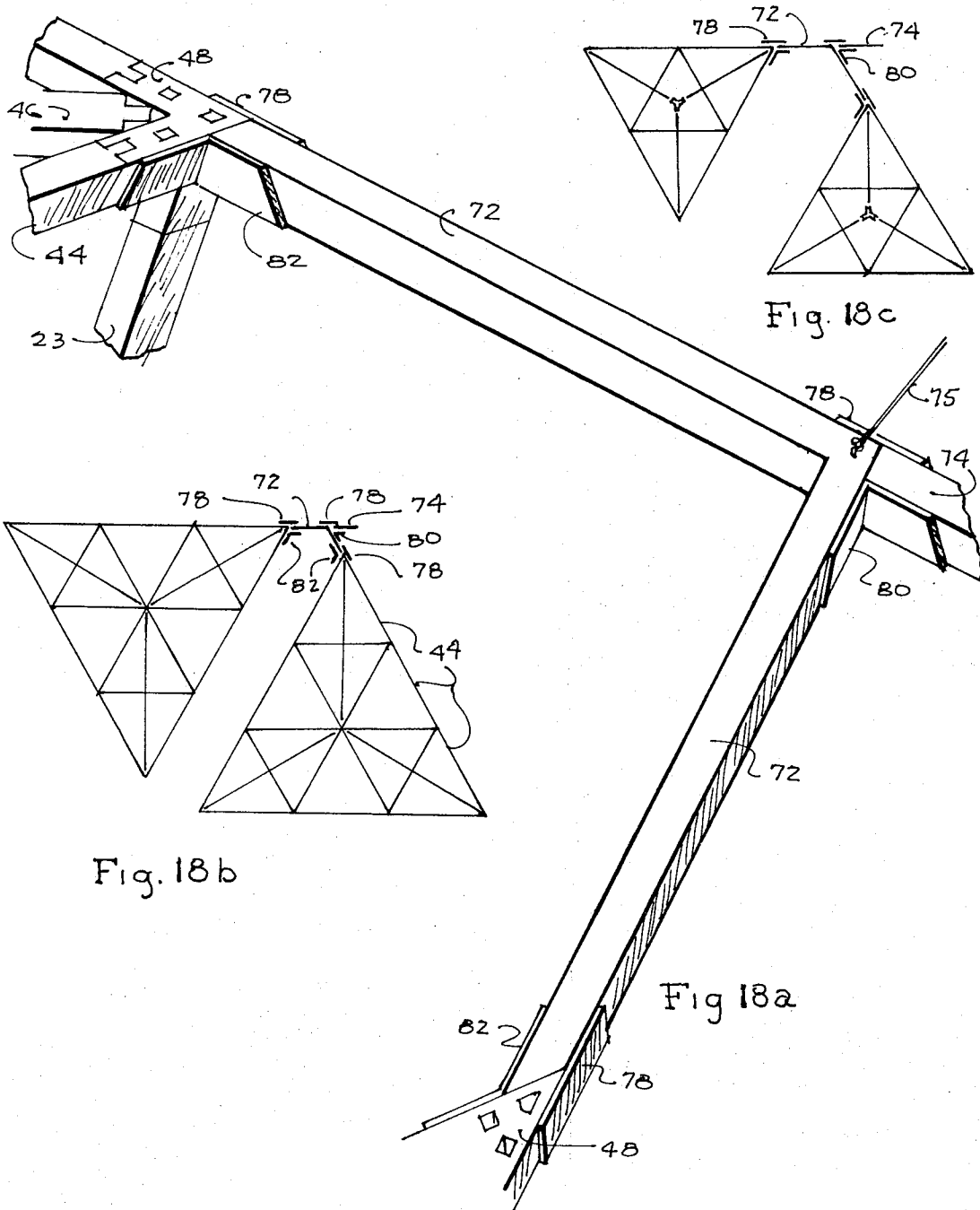
Joseph J. Mangon
INVENTOR



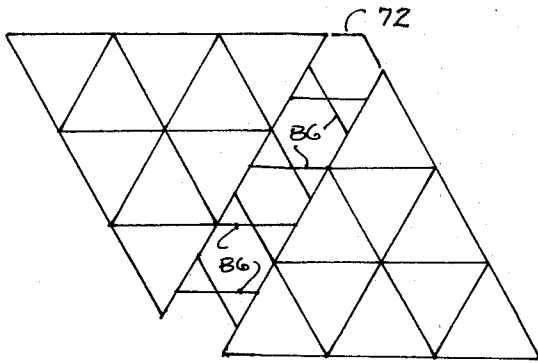
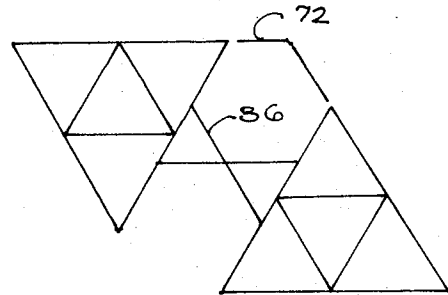
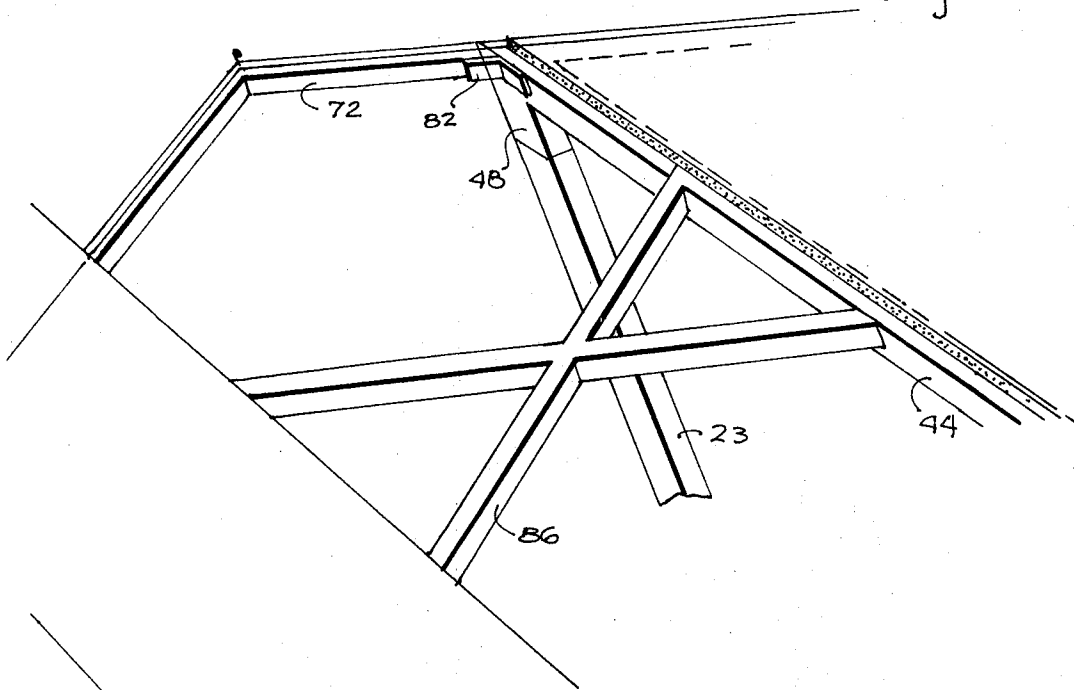
PATENTED AUG 22 1972

3,685,221

SHEET 18 OF 21



Joseph J. Mangon
INVENTOR



Joseph J. Mangon
INVENTOR

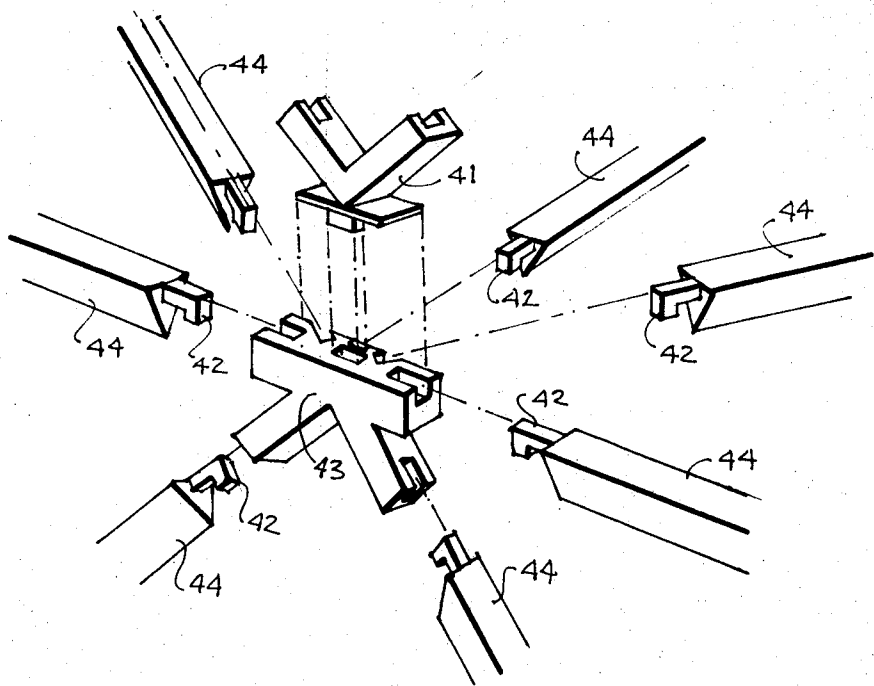


Fig 20a

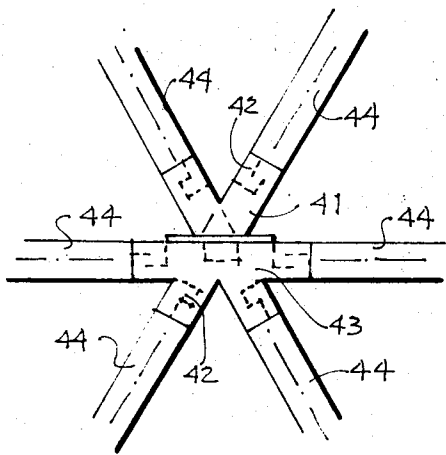


Fig 20b

Joseph J. Mangon
INVENTOR

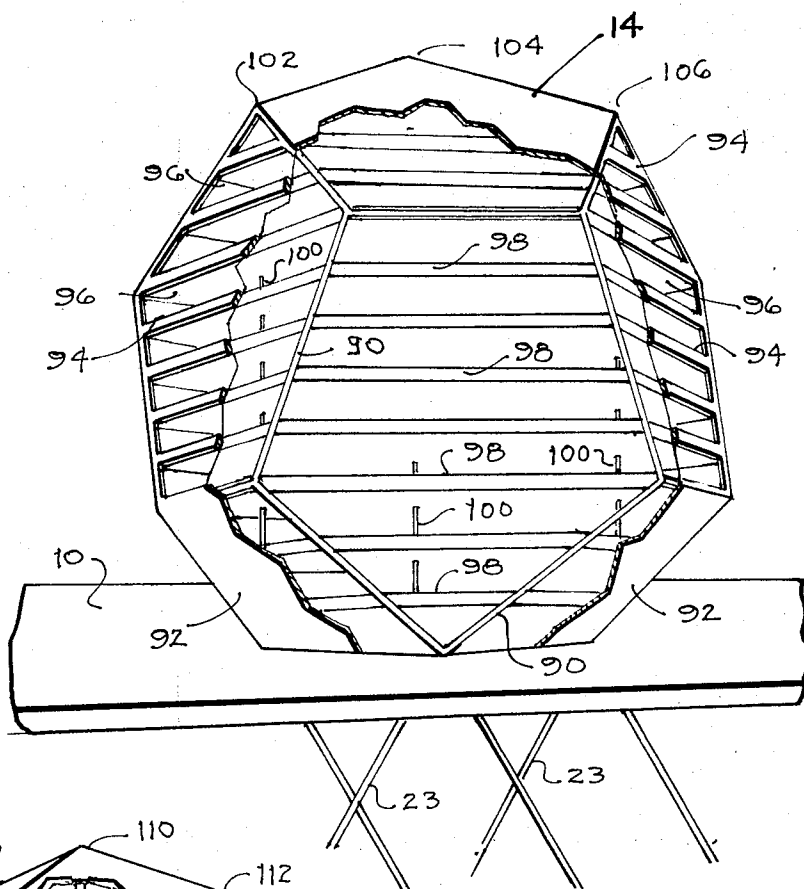


Fig 21a

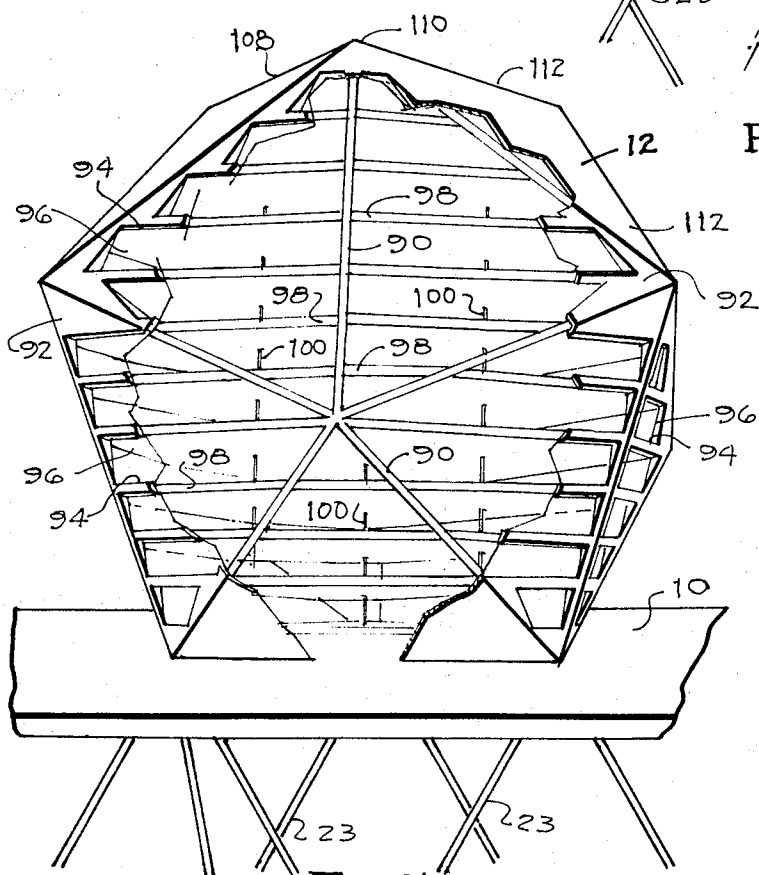


Fig. 21b

Joseph J. Mangon
INVENTOR

EXPANDABLE PLATFORM WITH BUILDING STRUCTURES THEREON

BACKGROUND OF THE INVENTION

In urban areas, there are many tracts of lands having high potential value but which are not useful since they are in swamp areas, large water areas, docks, junk yards, and rail freight yards. Since large tracts of land are very scarce and the likelihood of finding such large tracts of land for building is remote, the present invention is directed to a unique approach in building on air rights over virtually unusable land. Obviously, as time goes on, there is less and less available areas for building large installations. Thus by means of the present invention, virtually unusable lands are utilized by the use of the air rights above these tracts.

Accordingly, it is a principal object of the present invention to construct a platform, either on one lever, or by means of a multi-lever structure which serves as a cover for both parking, housing, industrial, and storage areas. The top level serves as a base for various construction forms constituting apartment houses, office buildings, schools, service buildings, or other like structures. Thus, this unique construction can be considered a series of buildings in various forms and optionally located on a large horizontal elevated structure.

Another object of the present invention is to provide a platform with building structures thereon that has flexibility to expand and contract as needs dictate.

It is another object of the present invention to provide a rapid internal transportation system, all climate-controlled, operating both laterally and vertically.

A further object of the present invention is to provide a platform supporting several different architectural forms, such as a cube, a dodecahedron, and an icosahedron, which makes a unique and attractive living and work area. Octohedron, tetrahedron forms may also be used.

It is another object of the invention to provide a platform which could be elevated over a tract of very large acreage. This horizontal platform is built on large tetrahedrons which are securely anchored in the prepared foundation.

A further object of the present invention is to provide a set of various constructional components for the entire structure. The same may be used readily and easily when it is desired to expand the platform. Thus, the constructional components are interfitting and easily assembled, and when assembled result in a rigid and heavy load-bearing structure. The framing members of the structure exhibit a unique versatility.

It is another object of the present invention to provide a complete city complex built on a platform over virtually unusable land, said complex being both attractive and productive.

The unique architectural forms for building structures are provided with suspended floors, therefore offering a large amount of usable space, inasmuch as columns, ducts, and shafts are held to a minimum. It should be noted that the whole structure is maintained in tension.

It is a further object of the present invention to provide module housing on the periphery of the various platform levels thereby providing additional housing facilities, if needed. The module housing is preferably prefabricated.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the multi-level platform with building structures thereon constructed in accordance with the teachings of the present invention;

FIG. 2 is another perspective view of the platform with building structures thereon, and also showing a housing module mounted on the peripheries of the platform level;

FIG. 3a is a sectional view of platform levels with support means therefor;

FIG. 3b is a sectional view taken at 90° to FIG. 3a of platform levels with support means therefor;

FIG. 4 is a top plan view of the top level A of the platform;

FIG. 5 is a top plan view of the second level B of the platform;

FIG. 6 is a top plan view of the third level C of the platform;

FIG. 7 is a top plan diagrammatic view of the fourth level D of the platform;

FIG. 8a is a diagrammatic view of the tetrahedron support members for the platform;

FIG. 8b is a diagrammatic view of the raised base for the tetrahedron;

FIG. 9 is an exploded view of the base connection for each tetrahedron;

FIG. 10 is an exploded view of the outside corner connection for levels B, C and D of the platform;

FIG. 11 is an exploded view of the intermediate connectors and vertical support for levels B, C and D of the platform;

FIG. 12 is an exploded view of a group connector for the tetrahedron at the upper platform or level A;

FIG. 13 is an exploded view of the connection for the dodecahedron structure;

FIG. 14 is an exploded view of the connection for the icosahedron structure;

FIG. 15 is an exploded view of connection for the octohedron structure;

FIG. 16 is an exploded view of the connection for the hexahedron structure;

FIG. 17 is a perspective view of various cross beam constructions;

FIG. 17a is a diagrammatic view of an alternate arrangement with stiffening members;

FIG. 18a is a perspective view of the end arrangement of a bent beam with connections;

FIG. 18b is a diagrammatic plan view of FIG. 18a at level B;

FIG. 18c is a diagrammatic plan view of FIG. 18a at level C;

FIG. 19a is a perspective view of the X-beam construction;

FIG. 19b is a diagrammatic view of the X-beams located at level C;

FIG. 19c is a diagrammatic view of the X-beams located at level B;

FIG. 20a is an exploded view of the strut connectors for levels B and C;

FIG. 20b is a side elevational view of the strut connectors shown in FIG. 20a, but in an assembled form;

FIG. 21a is a perspective view of a dodecahedron building form 14, with parts thereof broken away to reveal the interior thereof; and

FIG. 21b is a perspective view of an icosahedron building form 12, with parts thereof broken away to reveal the interior thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

Referring to the drawings, the platform 10, as seen in FIGS. 1, 2 and 3 comprises three levels A, B and C. However, it is within the scope of the present invention to provide a single level platform. As seen in FIGS. 1 and 2, several buildings, in various constructional forms, are located on the top level A. An icosahedron building form 12 is illustrated along with a dodecahedron building form 14, a cube building form 16, an octohedron building form 18, and a pyramid building form 20. It should be noted that adjacent building forms are complementary in design thereby presenting a pleasing appearance. As the platform is being built outwardly, natural obstructions may occur, such as a rock formation. In that event, an opening 17 in the platform is shown to permit the rock formation to project therethrough.

The platform 10 is supported by a plurality of tetrahedrons 22 made up of three sloped columns 23 and a vertical support 28 anchored at the lower end in suitable footings 24. The base connectors 26 for the tetrahedrons 22 are specifically shown in FIG. 9 in which the vertical supports 28 are provided with dovetail tenons 30 for insertion in correspondingly-shaped aperture 32 in the base connectors 26.

The upper end 34 of each tetrahedron 22 is provided with a group connector 36, as seen in FIG. 12. The group connector 36 is further provided with radial arms 38 having recesses 40 which are adapted to receive the hooks 42 of cross-connector ties 44. The group connectors 36 are all located directly underneath and abutting level A of the platform 10.

The vertical supports 28 of the tetrahedron 22 are provided with intermediate connectors 46 also having recesses 47 in the lateral arms 49 for receiving the hooks 42 of the cross-connector ties 44, at levels B and C (FIG. 11).

As seen in FIG. 10, the outside corner connector arrangement 48 is shown having lateral arms 50 provided with recesses 52 for receiving hooks 42 of cross-connector ties 44. The tenons 30 of the sloped columns 23 are inserted in apertures 53 of the corner connector 48.

In order to make a connection between the tetrahedrons and the group connectors to the various building forms located on the top level A of the platform 10, a number of connectors are available. In FIG. 13, a connector 54 is shown for a dodecahedron building 14. It will be seen that connector 54 is directly connected to group connector 36 of the tetrahedron 22 located directly under and abutting the undersurface of top level A.

Another connector 56 is shown in FIG. 14 for connecting to an icosahedron building structure 12 and is directly linked to the group connector 36 located underneath the platform level A as described above. A further connector 58 is illustrated in FIG. 15 for connection to an octohedron building structure 18. Another connector 60 is shown in FIG. 16 for connection to a cube building form 16. In this case, the connector is additionally connected to an intermediate connector 46 positioned on the vertical support 28.

As seen in FIG. 6, level C discloses a series of polygon infill panels 64 and 66. Similar shaped infill panels 68 and 70, respectively, appear on the level B. It is therefore apparent that the present invention is

directed to the arrangement in which standard infill panels may be used together with the various intermediate connectors, group connectors and building structure connectors in order to permit rapid expansion of the elevated platform, when required.

FIG. 17 illustrates several cross-connector ties and outside beams 44 and cross-connector ties 46a and 46b. The latter are provided with depressed intermediate portions 46. An intermediate connector 84 is adapted to rest on depressed intermediate portion 46 of the tie 46a in order to interconnect other ties 44 laterally extending therefrom.

In FIG. 17a the structural properties of the members may be increased by adding additional structural members 45 having web connections 47 to the framing member as load requirements dictate. This arrangement allows for an increase in sectional modulus or the L/R ratio.

FIGS. 18a, 18b and 18c are directed to the end arrangement of the cross-beam connections in which the end beams 72, 74 and 76 are interconnected by means of plates 78, 80 and 82. The reference numeral 75 is a cable which connects the bent beams to the outside corner connector at levels A, B and C. FIG. 18c refers to level C while FIG. 18b refers to level B.

FIG. 19a is a view showing a typical X-beam 86 utilized in the present multi-level platform. FIG. 19b is a diagrammatic view of the X-beams 86 utilized in level C, while FIG. 19c is a diagrammatic view of the X-beams 86 located in level B.

FIGS. 20a and 20b show the ties 44 interconnected into the strut connector assembly constituting inter-fitting parts 41 and 43. Thus, on the intermediate levels, the foregoing structure is utilized to interconnect the struts of the arrangement.

FIG. 21a illustrates a dodecahedron building structure 14 mounted on a platform 10, the building being illustrated with part thereof being broken away in order to reveal the interior construction. The building 14 has a framework or skeleton 90 of rigid structural material that is covered by an exterior skin 92 having elongated openings 94 for glass 96 or similar material. A multiplicity of floors 98 are suspended by cables 100 from three points 102, 104 and 106 on the roof of the dodecahedron building structure. FIG. 21b illustrates an icosahedron building form 12 which is also broken away to reveal the interior thereof. Like parts in FIG. 21b have the same reference numerals as those illustrated in FIG. 21a. In the building form of FIG. 21b the cables 100 are suspended from points 108, 110 and 112 of the roof. Thus, it should be clear that both structures shown in FIGS. 21a and 21b are under constant tension thereby creating a rigid structure having great strength characteristics, as well as permitting more usable floor space. Moreover, the building structures of the types shown herein are mounted on a platform supported by a tetrahedron.

Housing modules 114 may be inserted on either, or both, levels B and C. These housing modules may be prefabricated and located on the peripheries of the levels B and C in order to afford as much natural light as possible to the units.

Passenger transportation is available by means of ordinary elevators moving vertically in the building structures and as shown in FIGS. 3a and FIG. 3b horizontal

transporting passenger cars 116 move people from building to building, the cars 116 being preferably suspended from a monorail 118.

As seen in FIGS. 3b and 8b, there may be occasions when the tetrahedrons 22 may interfere with passage of vehicles due to angular positions of the columns 23. In that event, the base connector 26 is elevated by enlarging portion 26a to thereby raise the tetrahedron support 22 to clear a passage for trucks and other vehicles thereunder. Another way of achieving the same result is to make the apex of the tetrahedron 22 discontinuous, that is, insert a horizontal beam extending across to the vertical support 28 above the height of trucks and thereby eliminating the bottom parts of sloped columns 23.

What is claimed is:

1. A platform-building structure combination comprising a plurality of superposed, substantially horizontal structural levels, at least one convex polyhedron-shaped building on the top level of said superposed levels, a plurality of interconnected tetrahedron-shaped support members for said levels and said building, adjacent tetrahedron-shaped support members having a common edge at the top level comprising a common structural member, said levels below said top level being located within each tetrahedron-shaped support member and spanning the space between adjacent support members, first connecting means connecting adjacent support members at said top level, second connecting means connecting said building to

the support member directly underneath said building, and third connecting means connecting said support members to each of said superposed structural levels below said top level.

2. A platform-building structure as claimed in claim 1, further comprising a horizontal transportation system that is operative on at least one of said levels, and a vertical transportation means that is operative within said building and connects with said horizontal transportation system.

3. A platform-building structure as claimed in claim 1, wherein said building is a dodecahedron.

4. A platform-building structure as claimed in claim 1, wherein said building is an icosahedron.

5. A platform-building structure as claimed in claim 1, wherein said building is an octohedron.

6. A platform-building structure as claimed in claim 1, further wherein said housing comprises a plurality of additional housing modules located on the periphery of at least one of said horizontal levels.

7. A platform-building structure combination as claimed in claim 1 wherein the number of levels are selectively varied according to terrain said structure overlies.

8. An elevated platform structure as claimed in claim 1 wherein each of said tetrahedron-shaped support members is provided with three sloped columns and a centrally located, substantially vertical support.

* * * * *

35

40

45

50

55

60

65