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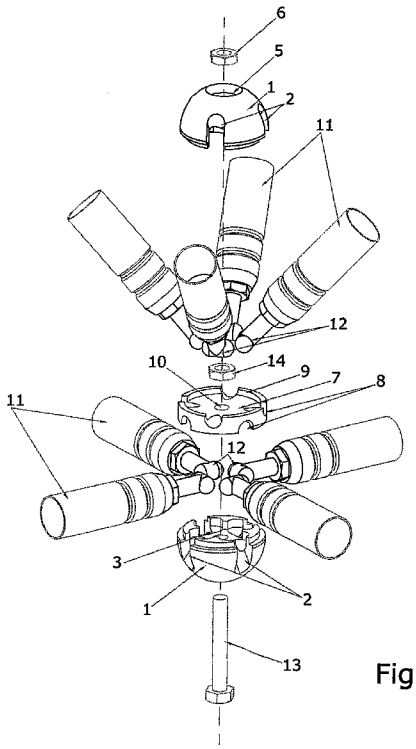


Fig. 2

(57) Abstract: The invention consists in a space frame system made up of plastic joints and aluminum beams, for the construction of light elements for the interior decoration and outdoors preparations in DIY kit, based on geometries with semi-octahedron and tetrahedron modules. The joint, made of plastic by hot injection process, is made up of two slotted hemispheres and a central plate, joined together through a single screw that allows the simultaneously tightening of eight or twelve plastic terminals, prearranged to aluminum beams, of small diameter and thickness, through cold seaming. The application is the DIY, for the kit construction of light elements for interior decoration (tables, chairs, shelving, false ceilings) and outdoors preparation (gazebos, canopies, glasshouses, garages, hangars) based on geometries with semi-octahedron and tetrahedron modules. The market is the large-scale retail trade. Since the known structures on the market are based on orthogonal geometries (shelving), we can affirm that, for the above-mentioned applications, it doesn't exists something similar to this invention. One of the advantages presented by this invention is that it allows the construction of tables, chairs, false ceilings, gazebos, glasshouses etc, with an extremely simplicity of transport, assembling, disassembling, inexpensiveness and lightness, thank to the universal joint system which allows the beams rotation after they have been locked in the node through one single screwing operation.

"STRUCTURAL SYSTEM MADE UP OF PLASTIC THREE-DIMENSIONAL SPHERICAL JOINTS AND ALUMINIUM BEAMS FOR THE DIY CONSTRUCTION OF ELEMENTS FOR INTERIOR DECORATION AND OUTDOORS PREPARATION"

Description text :

The invention consists of a system made up of spherical plastic joints for space frame structures, and of cylindrical hollow tubeshape beams in aluminum of small diameter and thickness, provided with plastic terminals, for the kit construction of light elements for interior decoration (tables, chairs, shelving, false ceilings) and outdoors and gardens preparation (gazebos, canopies, glasshouses, garages, small hangars).

The assembly of the above-mentioned elements is effected through the assemblage of a series of joints and beams, contained in the kit, with relative instructions and fixing elements to wall and pavement.

The joints and beams internal diameter is constant, while the beams length varies depending on the model to realize.

Joints and terminals are made of plastics and are obtained through the hot injection process, while the terminals are fixed to the cylindrical hollow tubeshape beams in aluminum through external cold seaming.

The geometries on which the realizations illustrated in this patent are based is that of space frames, with a tetrahedron and semi-octahedron basic module.

In each joint can converge from eight to twelve beams simultaneously.

The eight beams joint (Fig. 1) is made up of (Fig. 2) two hemispherical and symmetrical caps (1) each one fitted with four holes at 45°(2), ovoidal impressions, a central hole (4), a unit (5) for the nut housing (6), and by a central plate (7) fitted with holes (8), too, an elevated edge (9) and a central hole (10). The locking of the eight beams (11) is effectuated by putting the

terminals (12), seamed to them, in the corresponding holes locking , simultaneously, with the screw (13) the four horizontal beams with internal bolt first (14), and subsequently the diagonal ones with external bolt (6).

The twelve beams joint (Fig. 3) is made up of the same elements, beam and hemispherical caps, as the eight beams joint (Fig. 4), instead the central plate (7) is replaced by a plate (15) fitted with vertical holes (16) to which correspond the ovoidal impressions (17), and with a central hole (18) in which four more horizontal beams are inserted, hidden by the central disk (19). The twelve beams locking is effectuated by putting the central pin in (20) which fixes simultaneously the eight beams through the nut (21) and, subsequently, the other four diagonal beams by through the external nut (22).

The invention is shown further in more details with the assistance of pictures that represented just one way of execution of the several applications and models.

Fig. 1 represents closed joint axonometry in which eight beams converge.

Fig. 2 represents the exploded axonometry of the eight beams joint (11) hidden by two hemispheres (1), by the central plate (7) through one single screw (13), the median nut (14) and the external nut (6).

Fig. 3 represents the twelve convergent beams joint axonometry.

Fig. 4 represents the twelve beams joint exploded axonometry (11) hidden by the two hemispheres (1), the central plate (15) and the disk (19) through a single screw (20) and the external nuts (21, 22).

Fig. 5 represents the beams (11) with small thickness and variable length to the extremities of which are fixed, through seaming, the ovoid headed terminals (12) fitted with split to allow the seaming to the beam (23).

Fig. 6 represents the application of the system for the DIY construction of a 3 mt. x 3 mt. gazebo, fixed to the pavement through "L" shaped iron pressed

and bended flasks (28). These flasks are also provided with slots to allow both the insert of the node in the central pin, and to fix the structure to the pavement, by pickets (in case of soil) or by chemical or mechanical fischer (in case of more solid surfaces).

Fig. 7 represents the application of the system for the DIY construction of a 4.50 mt. x 4.50 mt. gazebo.

Fig. 8 represents the application of the system for the DIY construction of a 6 mt. x 6 mt. stand, fixed to the pavement through "Ω" shaped iron pressed and bended flasks (29), screwed to the central screws of the bearing nodes.

Fig. 9 represents the application of the system for the DIY construction of a garden cantilever roof.

Figs. 10, 11, and 12 represent the application of the system for the DIY construction of internal and outdoors tables structure, supported by "U" shaped pressed and bended flasks (30) to be leaned on the pavement. These flasks are also provided with rubber small blocks (31), used for the bearing of the shelf, too.

Fig. 13 represents the application of the system for the DIY construction of a tunnel shaped structure to use as greenhouse, potting shed, small hangar, fixed to the pavement by chemical or mechanical small blocks or by pickets, using the "L" shaped iron pressed and bended flasks (28).

Fig. 14 represents the application of the system for the DIY construction of false ceilings, fixed to the wall by small blocks, using the iron pressed and bended flasks (28).

Claims

1 – Structural system composed of plastic joint, obtained through hot injection, and aluminum beams, based on light frame structures with a semioctahedral and tetrahedral geometric modules to DIY construction of gazebos (Fig. 6 and Fig. 7), stands (Fig.8), cantilever roof (Fig. 9), tables (Fig. 10, Fig. 11, Fig. 12), greenhouses (Fig. 13), false ceilings (Fig. 14). The system is characterized by joints composed of two hemispheres (1) and a central plate (7) joined together by a central pin (13) to assembly 8 (Fig. 1 and Fig. 2) or 12 (Fig. 3 and Fig. 4) beams simultaneously.

2 – DIY structural system in compliance with the above mentioned claim characterized by a joint (Fig. 2) composed of asymmetrical hemispheres (1) fitted with orthogonal slots with a 45°about (2) which correspond to internal ovoidal impressions (3) for beams (11) terminals (12) housing, and a central hole (10) to insert a single passing pin (13) locked by an intermiedate bolt (14) and an external one (6), inserted in the hemisphere slot (5).

3 - DIY structural system in compliance with the above mentioned claims characterized by the joint central plate (7) which allows the insertion of 8 beams (Fig. 1 and Fig. 2). This plate is provided with four slots, which are orthogonal and symmetrical between them, with about 10°, and with an elevated edge (9) for the hemispheres matching (1).

4 - DIY structural system in compliance with the above mentioned claims characterized by the central plate (15) and the joint disk (19) to insert 12 beams (Fig. 3 e Fig. 4), characterized by 4 slots, orthogonal between them, 4 semiholes (8), a central hole (18), 4 ovoidal housings which allows beams (11) terminals (12) insertion.

5 - DIY structural system in compliance with the above mentioned claims characterized by the model beams (11) (Fig. 5) composed of an aluminum tube, with small thickness, constant diameter and variable length. To the

two extremities of the tube are fixed, through cold seaming, the plastic terminals (12) characterized by a cylindrical part engaged to the tube and provided with two runnings (26) to allow the double seaming (23). The model beams is also composed of cylindrical shank, to allow the engagement in the joint slots (2), and of an ovoidal top, to allow the insertion in the internal housing (3) of the hemispheres.

6 - DIY structural system in compliance with the above mentioned claims characterized by the vertical beam (27) (Fig. 5) composed of an aluminium tube, with small thickness, constant diameter and variable length. On one of the two tube extremities are fixed the plastic terminals (12) and on the other one the terminal (24), traversed by the pin (25) around which is assembled the model joint. Both the plastic terminals (12) and the terminal (24) are fixed to the tube through cold seaming.

7 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 3 mt. x 3 mt. gazebo structure (Fig. 6), composed, in the middle, of a beam reticule (11) with a semioctahedral module, of four top overhanging beams (11), of four vertical beams (27) and diagonal(11). The structure is also composed of nodes, as shown in figs. 1 and 3, and of four connections to the pavement (Part. A) characterized by nodes (Fig. 3) set out horizontally , whose central pin has slotted "L" shaped irony stalks to allow the locking to the pavement, through both tent pickets and chemical or mechanical small blocks.

8 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 4.50 mt. x 4.50 mt. gazebo structure (Fig. 7), composed, in the middle, of a beam reticule (11) with a semioctahedral module, of four top overhanging beams (11), of four vertical beams (27) and diagonal(11). The structure is also composed of nodes, as shown in figs. 1 and 3, and of four connections to the pavement (Part. A) characterized by nodes (Fig. 3) set out horizontally , whose central pin has slotted "L" (28) shaped irony stalks to allow the

locking to the pavement, through both tent pickets and chemical or mechanical small blocks.

9 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 6,00 mt. x 6,00 mt. exhibition stand (Fig. 8) composed of a stratified beam reticule (11) with a semioctahedral module. The structure is also composed of nodes, as shown in figs. 1 and 3, and of connections to the pavement (Part. B) characterized by nodes (Fig. 3) set out vertically, whose central pin has slotted "Ω" (29) shaped irony stalks to allow the locking to the pavement, through both tent pickets and chemical or mechanical small blocks.

10 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 1,00 mt. x 2,00 mt. cantilever roof structure (Fig. 9) composed of a beam reticule (11) with a semioctahedral module, of four vertical beams (27), of nodes, as shown in figs. 1 and 3, and of and of connections to the pavement (Part. A) characterized by nodes (Fig. 3) set out horizontally , whose central pin has slotted "L" (28) shaped irony stalks to allow the locking to the pavement, through both tent pickets and chemical or mechanical small blocks.

11 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 0,80 mt. x 0,80 mt. table structure (Fig. 10) composed of a beam reticule (11) with a semioctahedral module, of four vertical beams (27), of nodes, as shown in figs. 1 and 3, and of bearings to the pavement (Part. C) characterized by nodes (Fig. 3) set out horizontally whose central pin has slotted "U" (30) shaped irony stalks to allow the locking to the node, an by a central hole to allow the screwing of a rubber bulb (31) used also for the top reticule as a support of the shelf.

12 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 0,80 mt. x 1,20 mt. table structure (Fig. 11) composed of a beam reticule (11) with a

semioctahedral module, of four vertical beams (27), of nodes, as shown in figs. 1 and 3, and of bearings to the pavement (Part. C) characterized by nodes (Fig. 3) set out horizontally whose central pin has slotted "U" (30) shaped irony stalks to allow the locking to the node, an by a central hole to allow the screwing of a rubber bulb (31) used also for the top reticule as a support of the shelf.

13 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 0,80 mt. x 2,00 mt. table structure (Fig. 12) composed of a beam reticule (11) with a semioctahedral module, of four vertical beams (27), of nodes, as shown in figs. 1 and 3, and of bearings to the pavement (Part. C) characterized by nodes (Fig. 3) set out horizontally whose central pin has slotted "U" (30) shaped irony stalks to allow the locking to the node, an by a central hole to allow the screwing of a rubber bulb (31) used also for the top reticule as a support of the shelf.

14 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an about 5,00 diameter greenhouse tunnel (Fig. 13) composed of a beam reticule (11) with a semioctahedral module and set out into arcs, of nodes (Fig. 1) and of bearings to the pavement (Part. C)) characterized by nodes (Fig. 1) set out horizontally whose central pin has slotted "L" (28) shaped irony stalks to allow the locking to the node, an by a central hole to allow the locking to the pavement, through both tent pickets and chemical or mechanical small blocks.

15 - DIY structural system in compliance with the above mentioned claims characterized by the application to the kit assemblage of an internal false ceilings structure (Fig. 14) of any dimension, composed of a beam reticule (11) with a semioctahedral module, of nodes (Fig. 1) of which, the bearing ones, have "L" (28) shaped irony stalks with slots and holes to allow the locking to wall through chemical or mechanical small blocks.

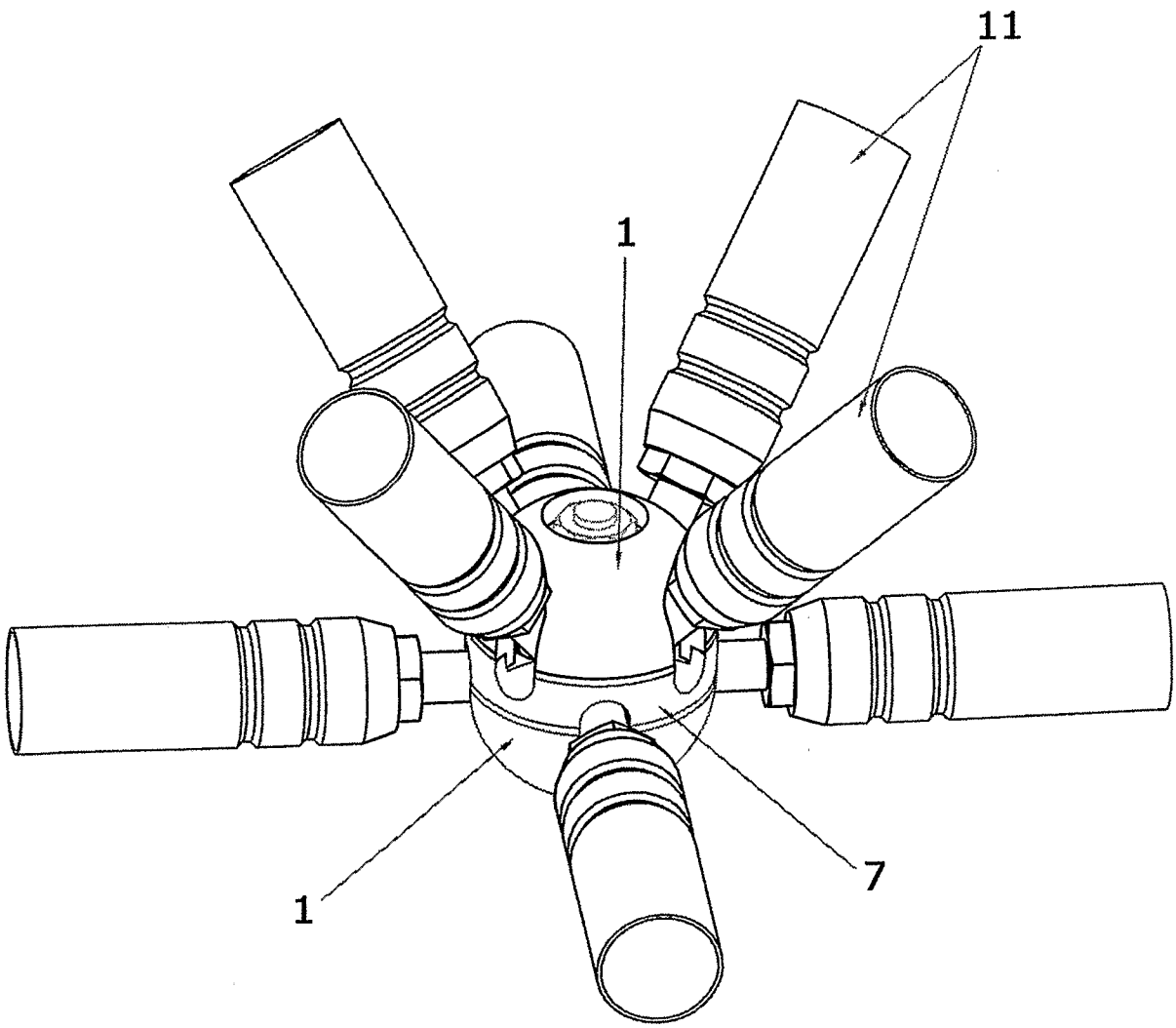


Fig. 1

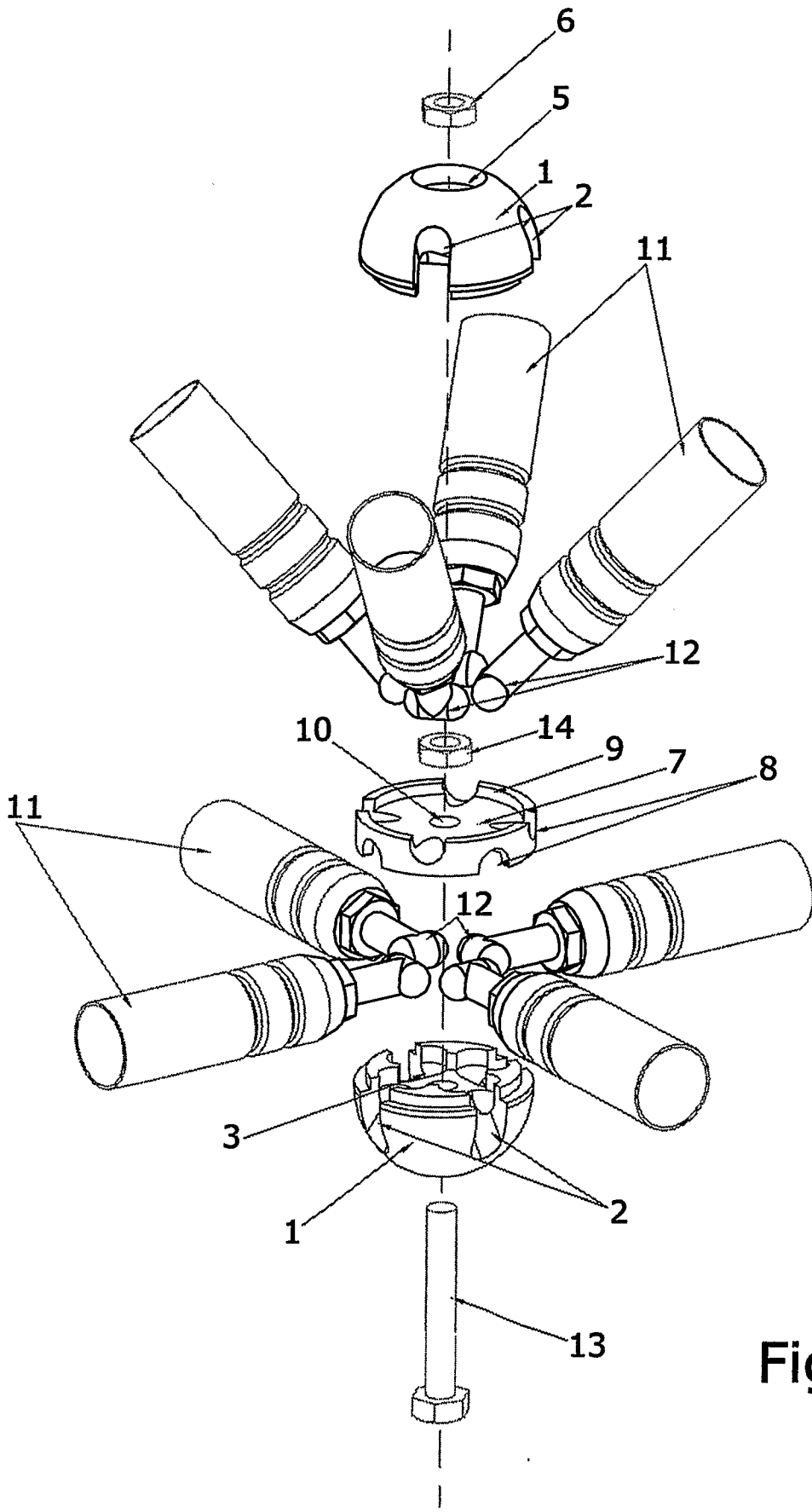


Fig. 2

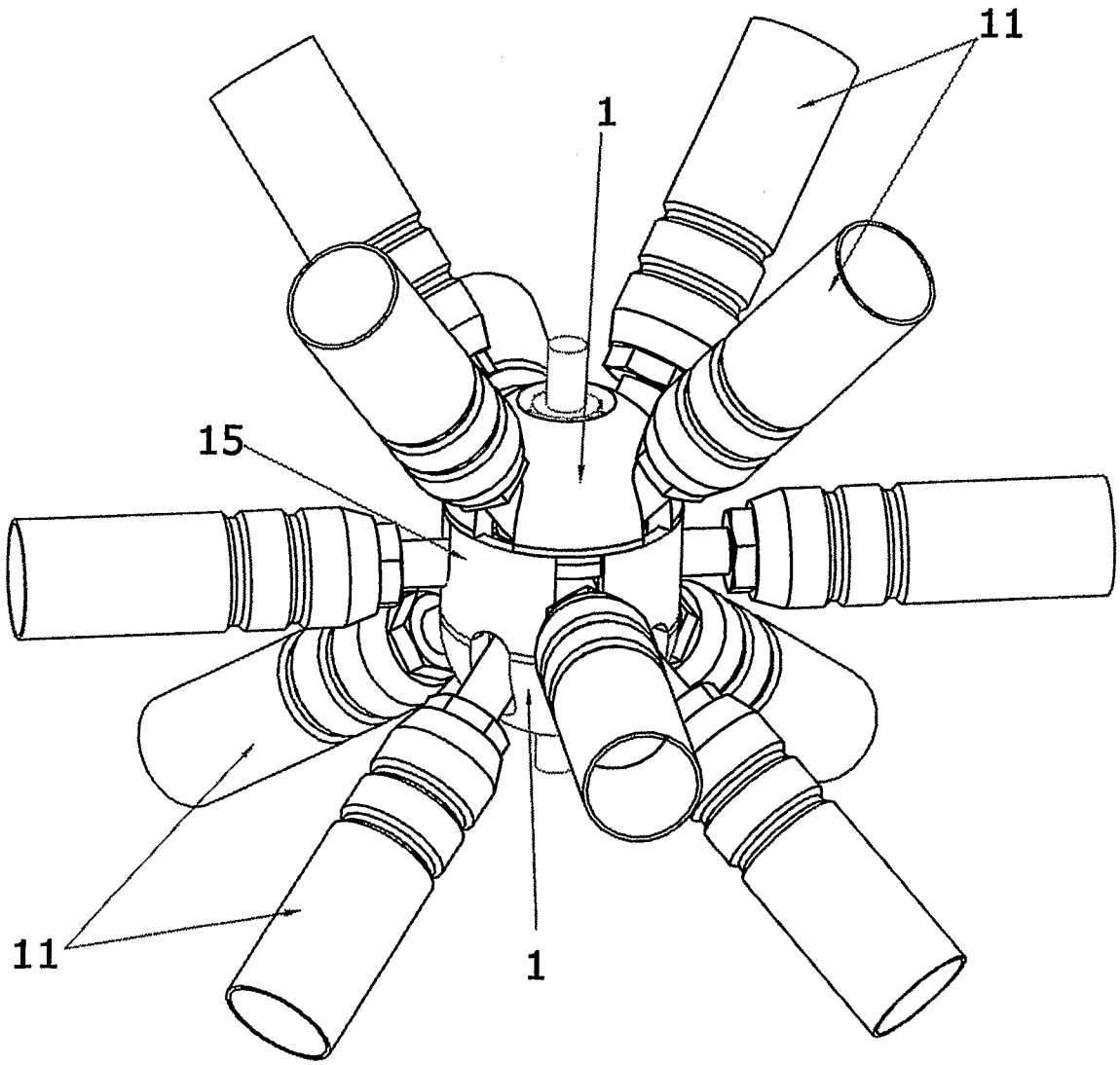


Fig. 3

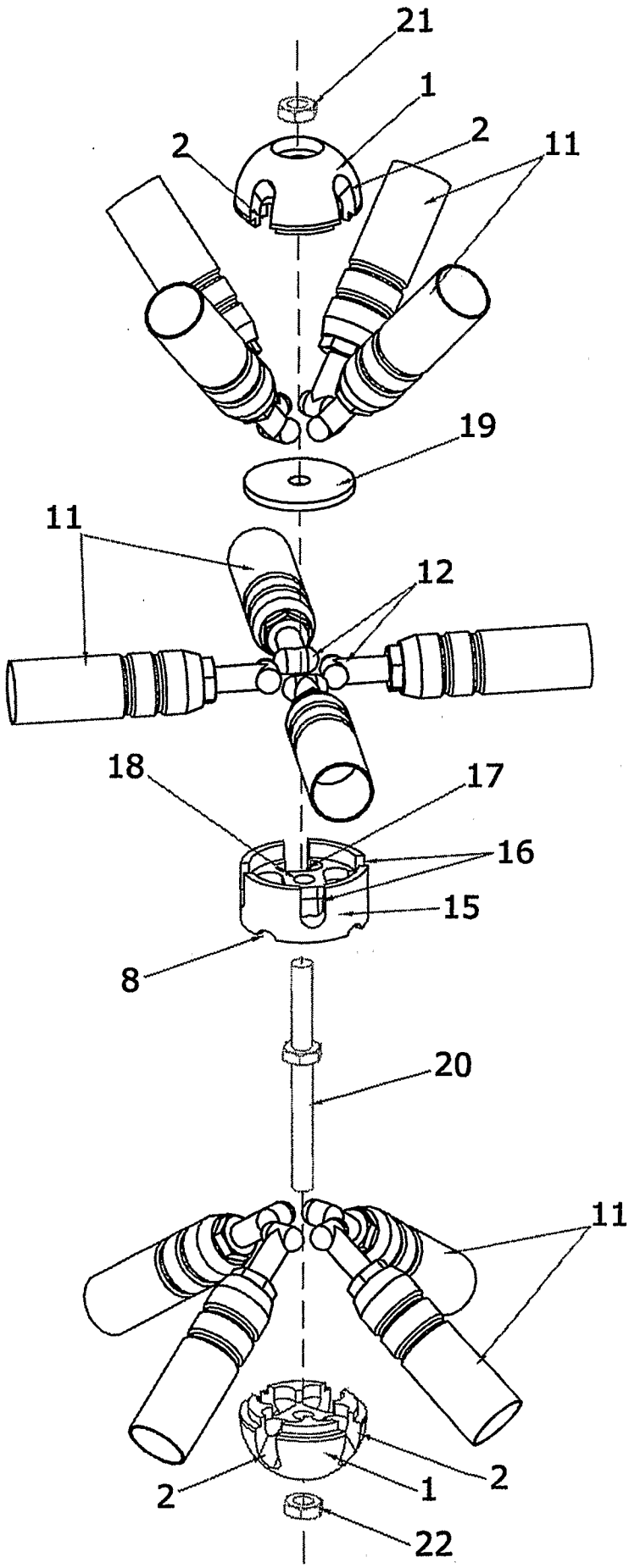
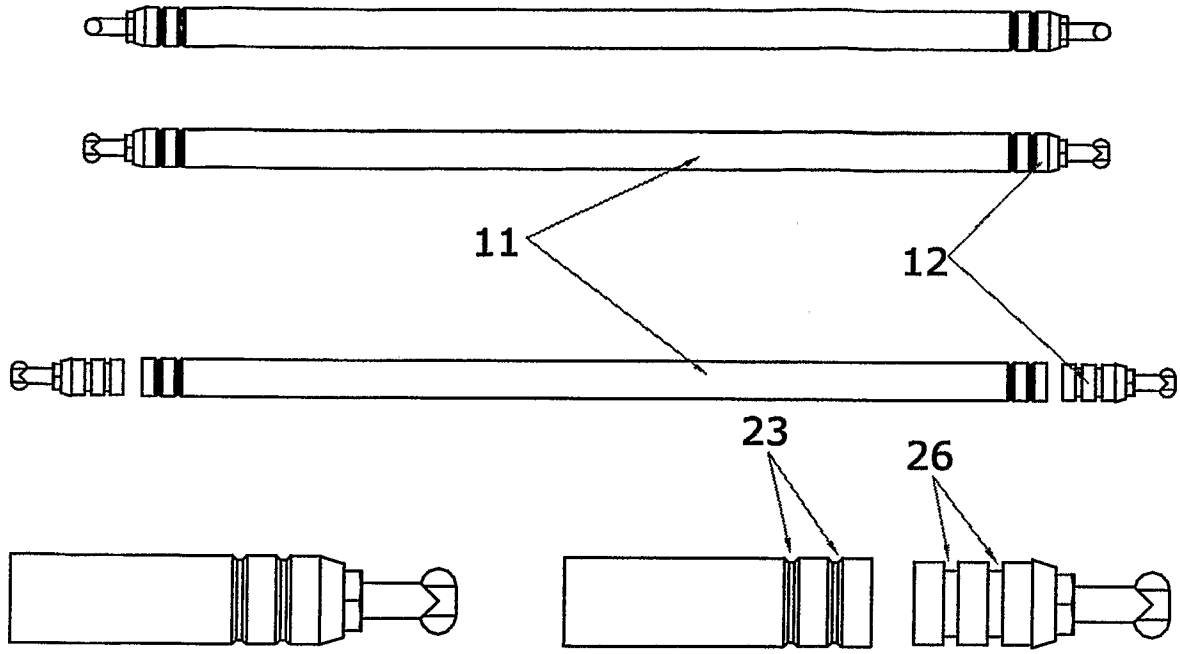
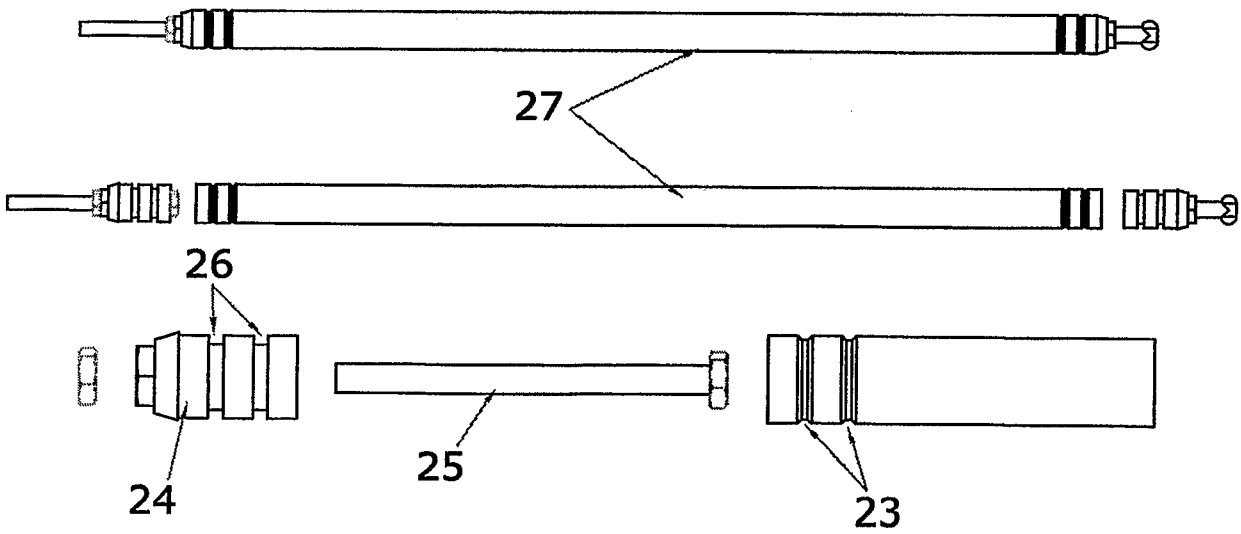


Fig. 4



standard beam



vertical beam

Fig. 5

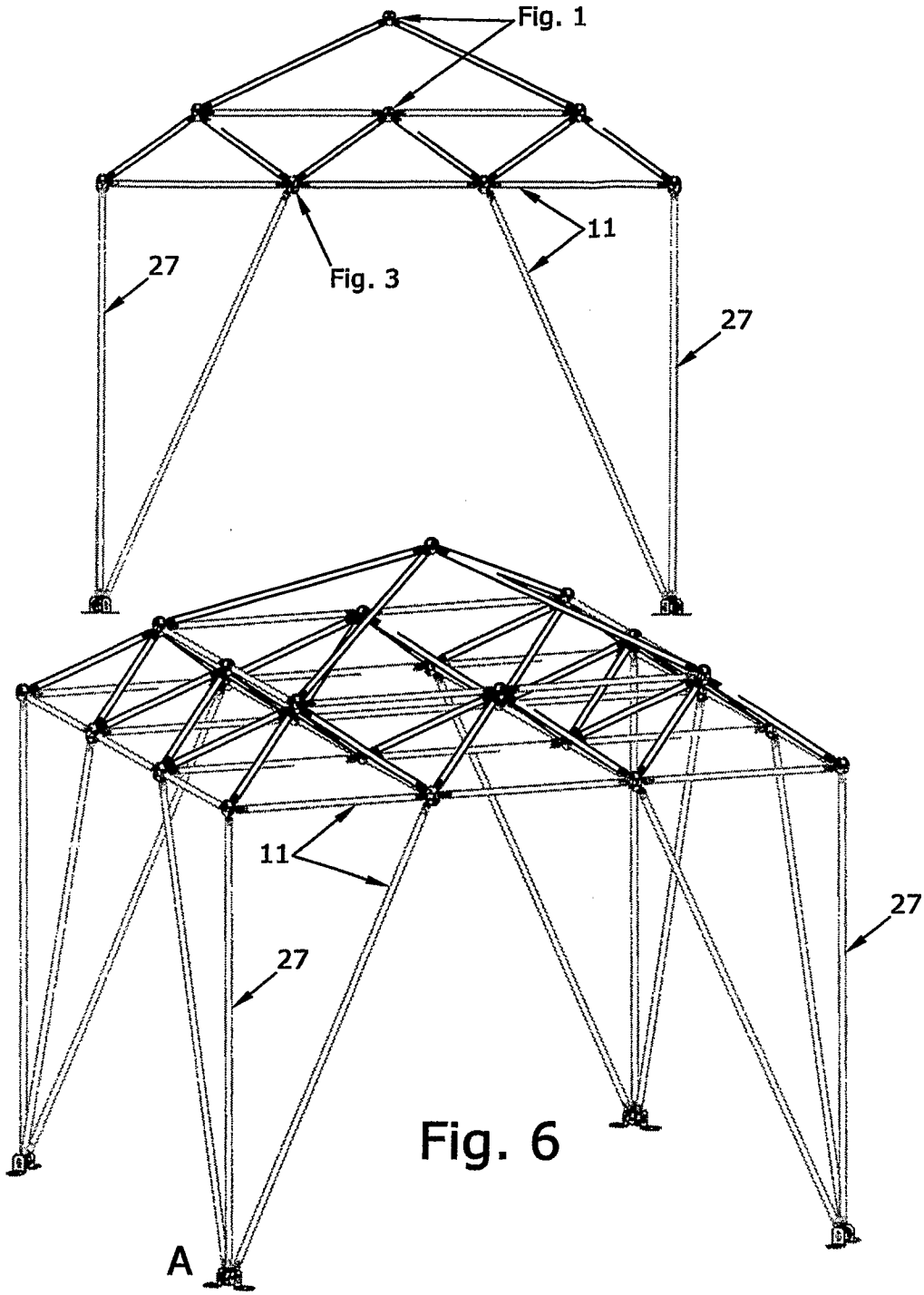
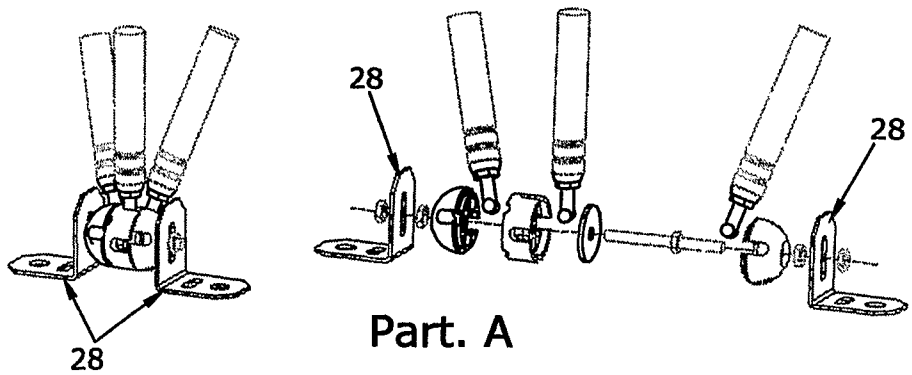


Fig. 6



Part. A

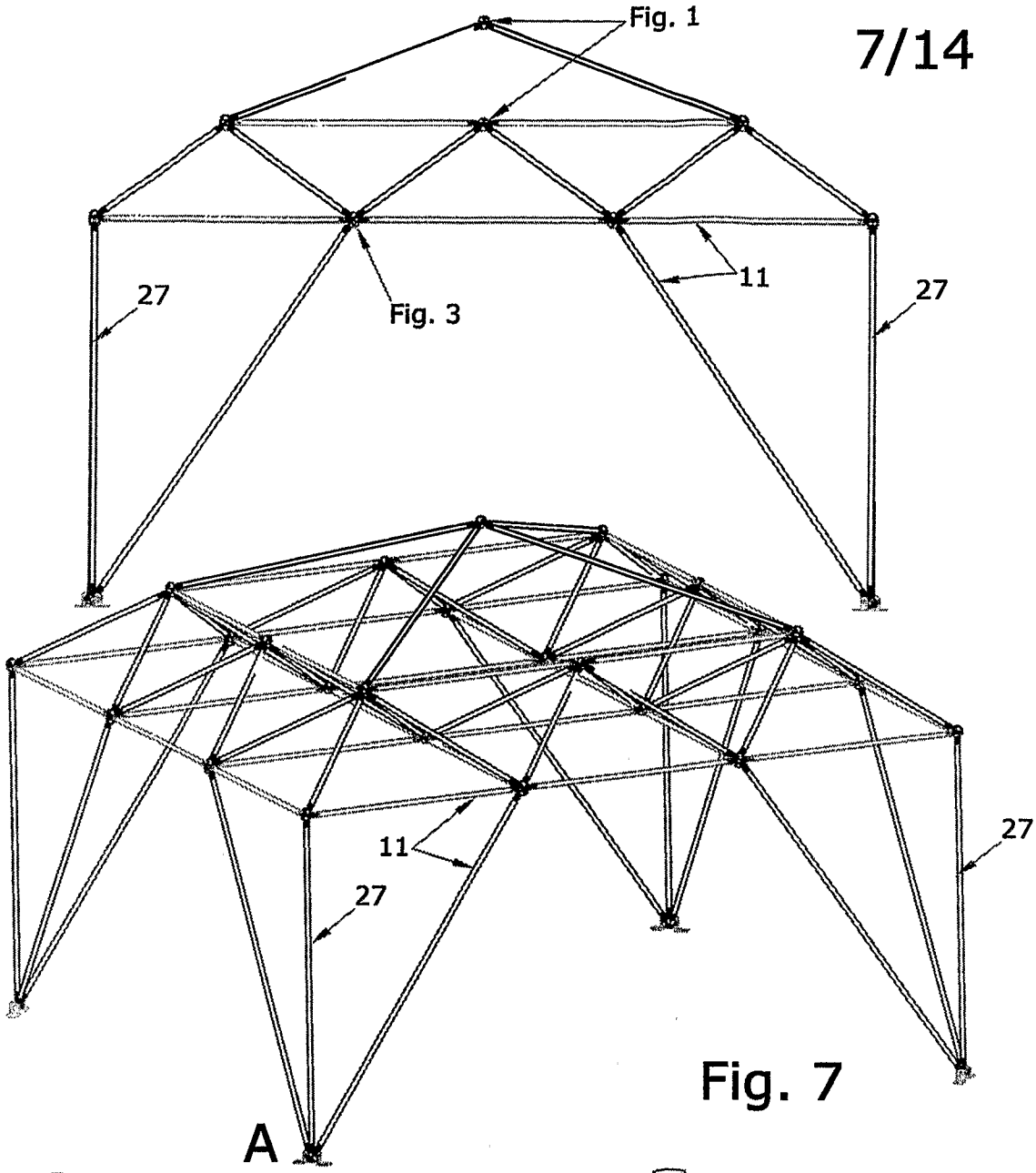
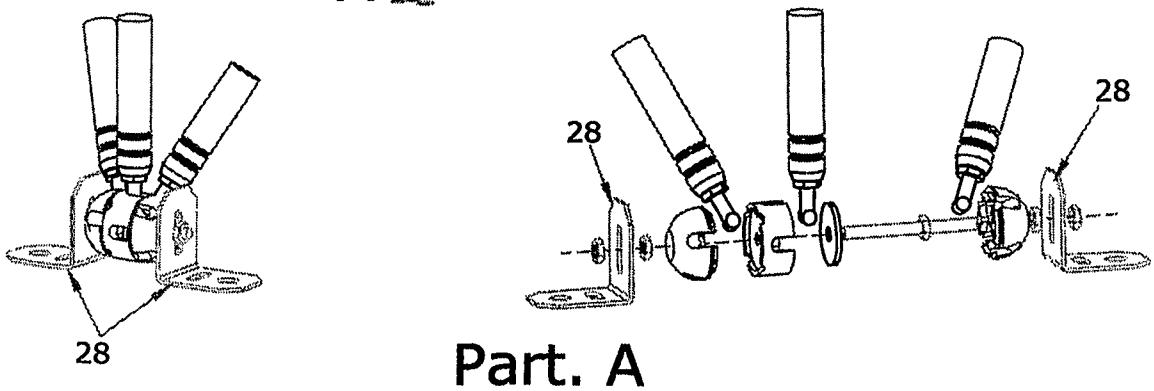


Fig. 7

A



Part. A

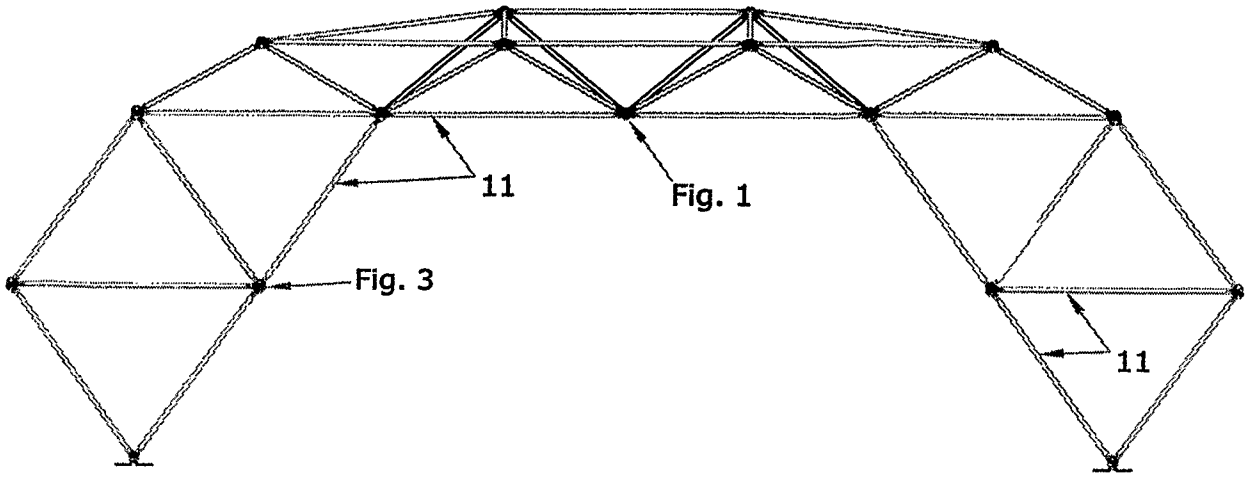
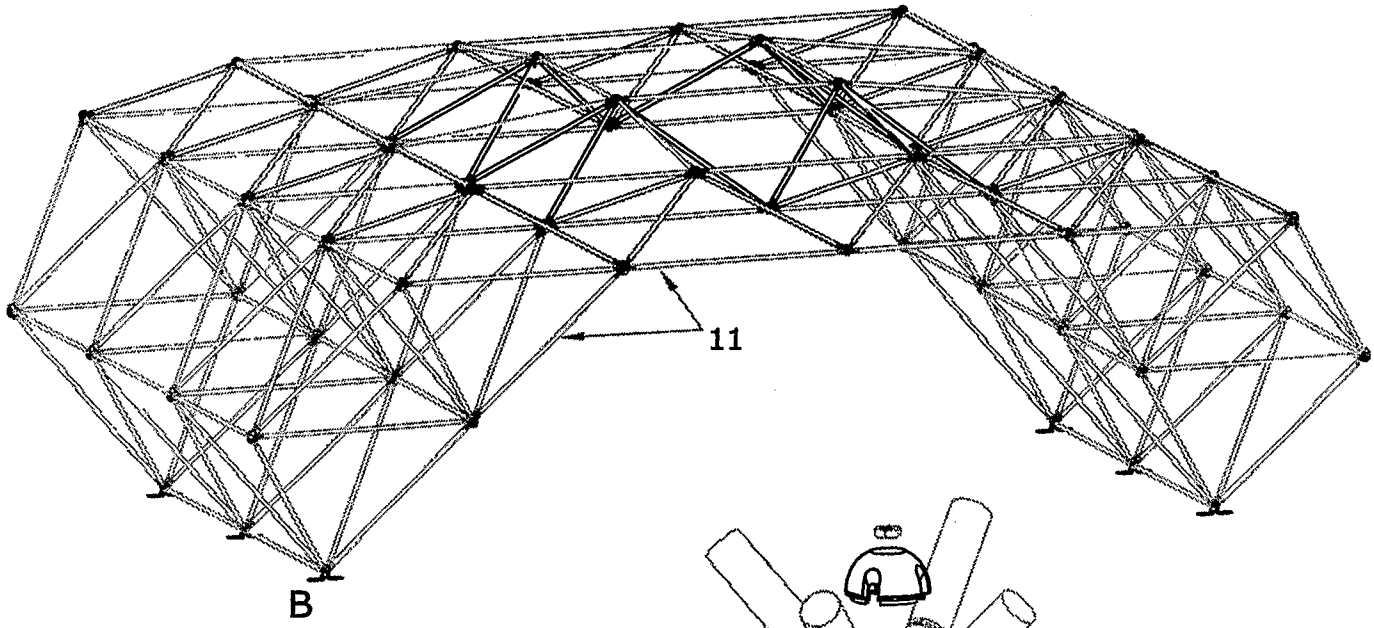


Fig. 1

Fig. 3



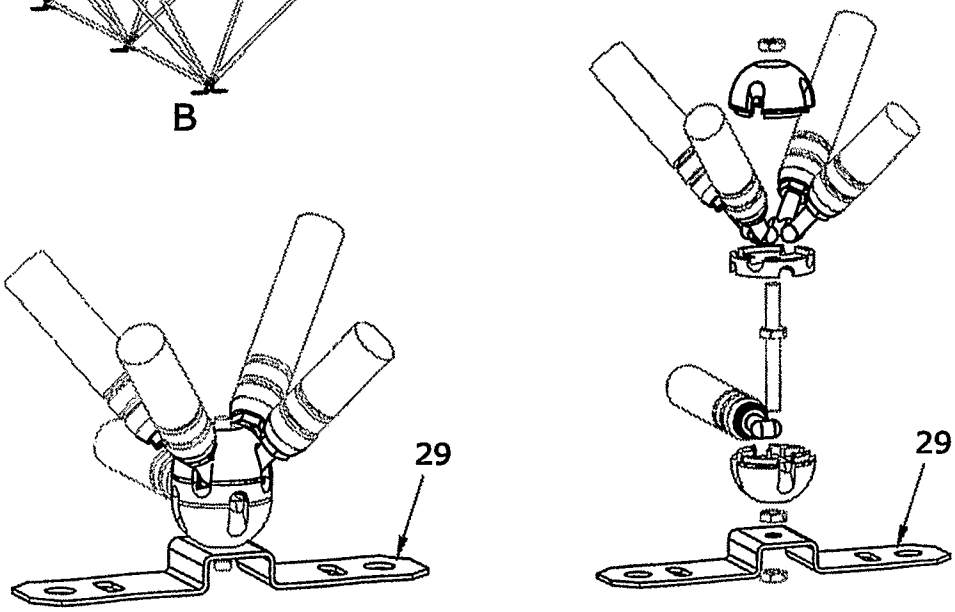
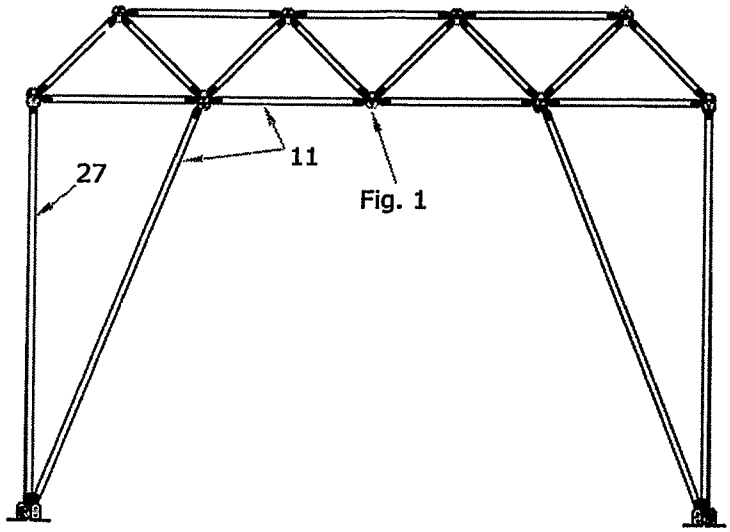
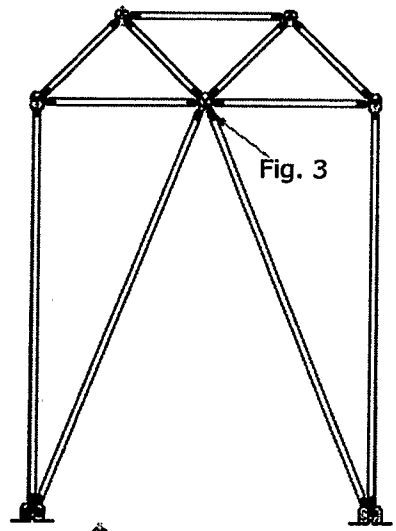


Fig. 8

Part. B





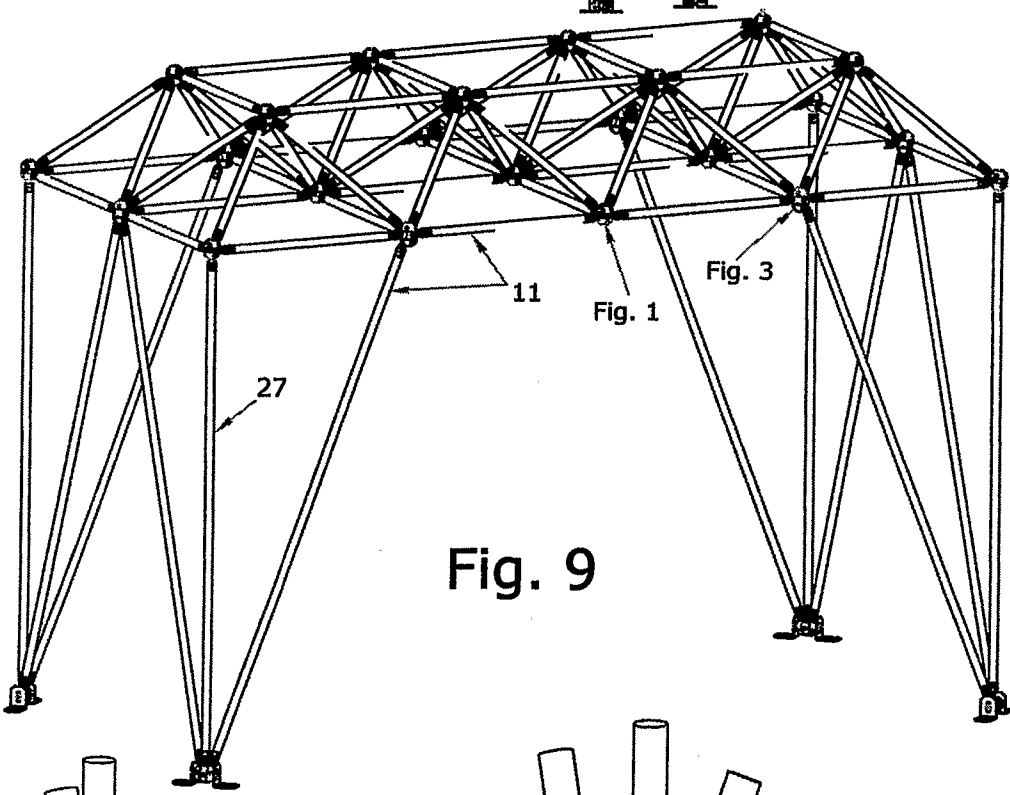
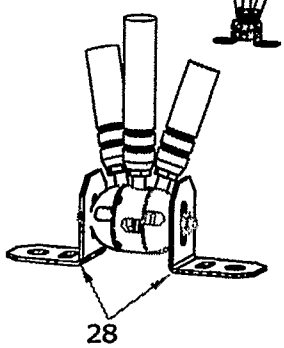
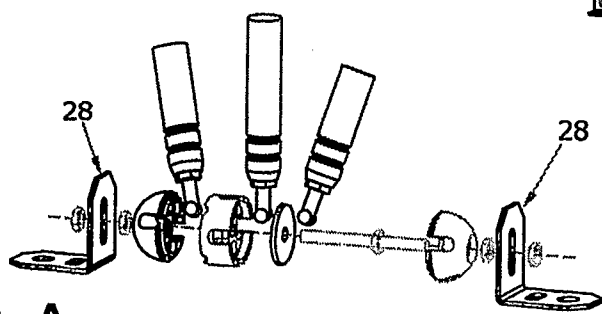


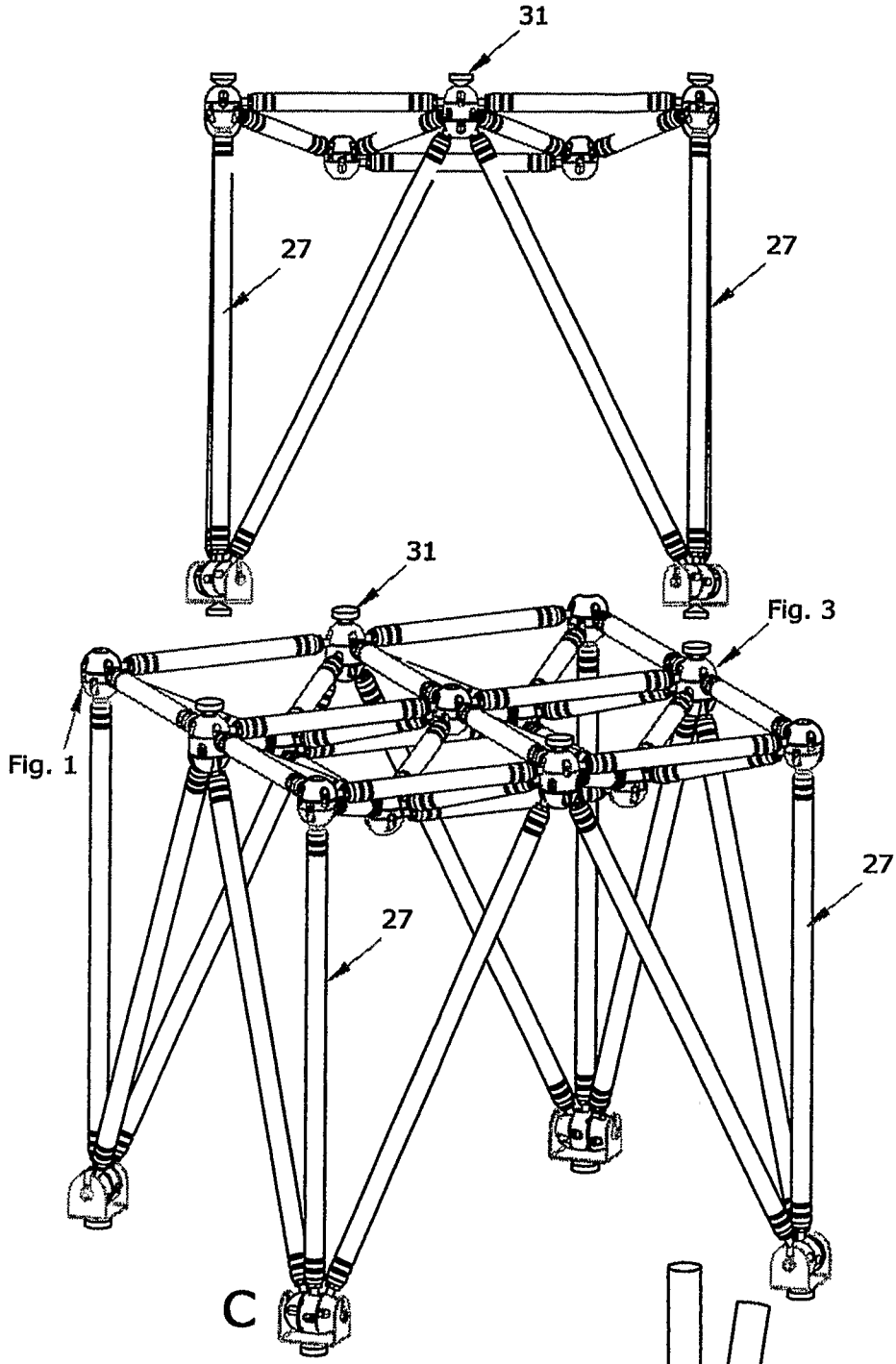
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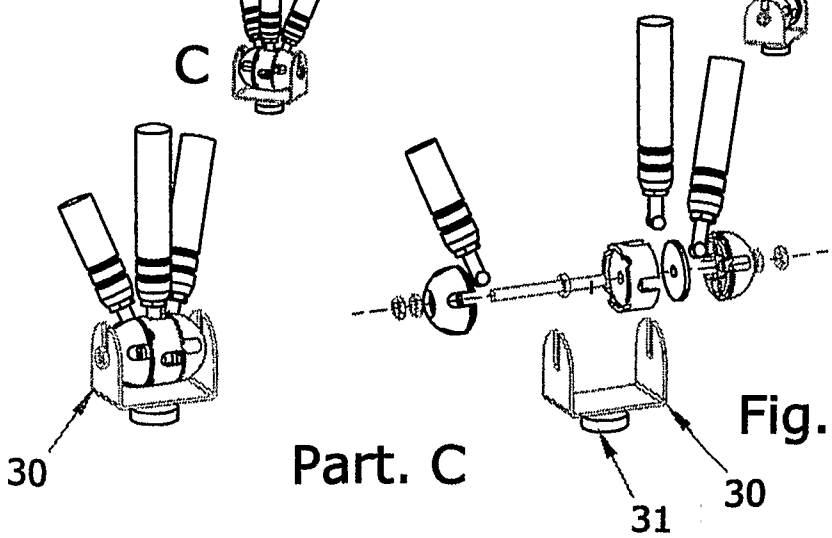
A





Part. A





Part. C

Fig. 10

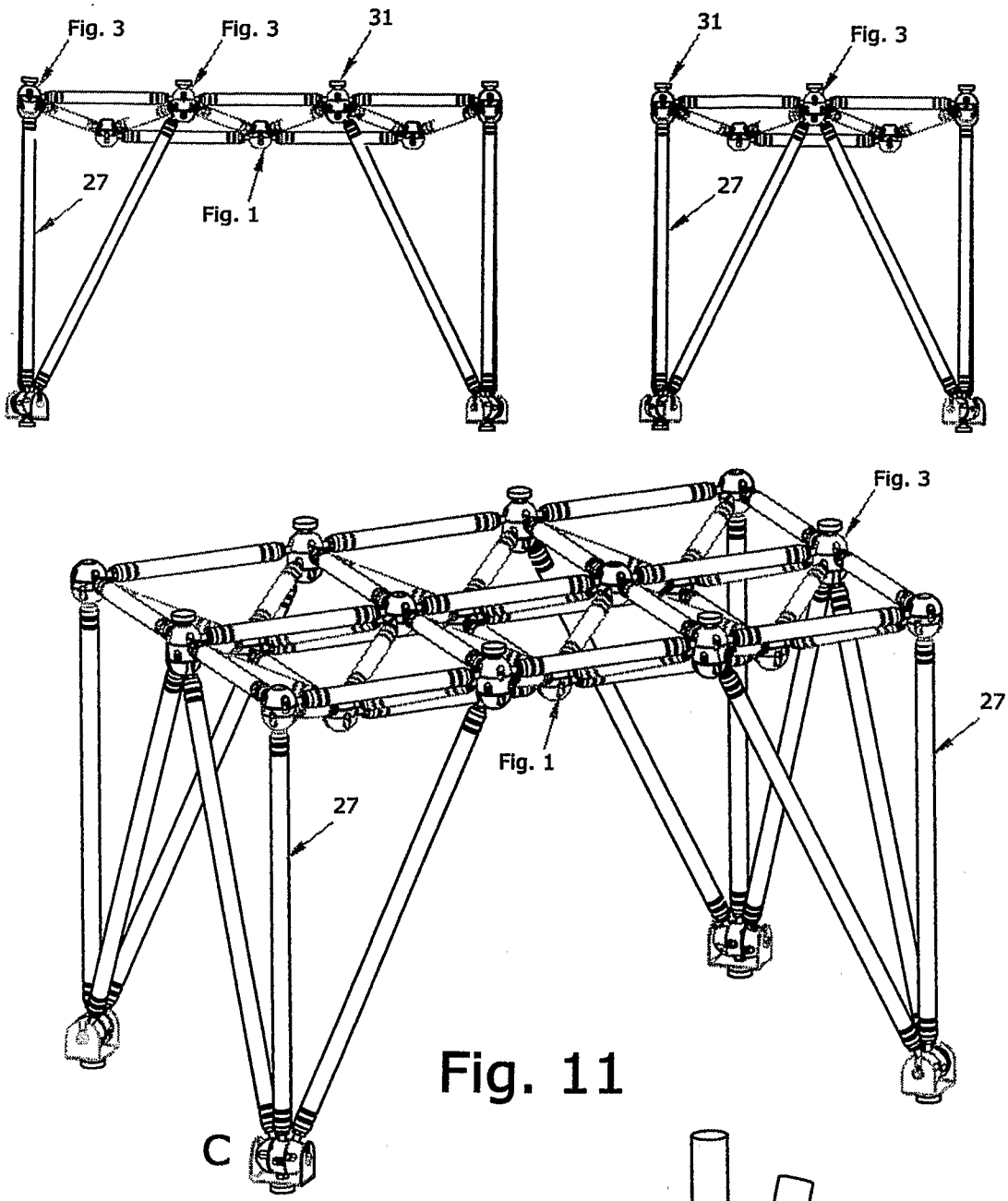
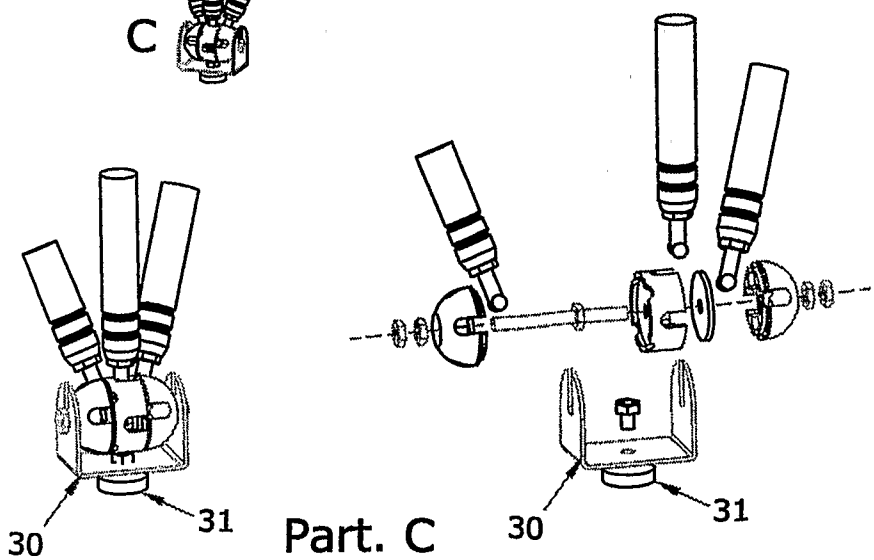
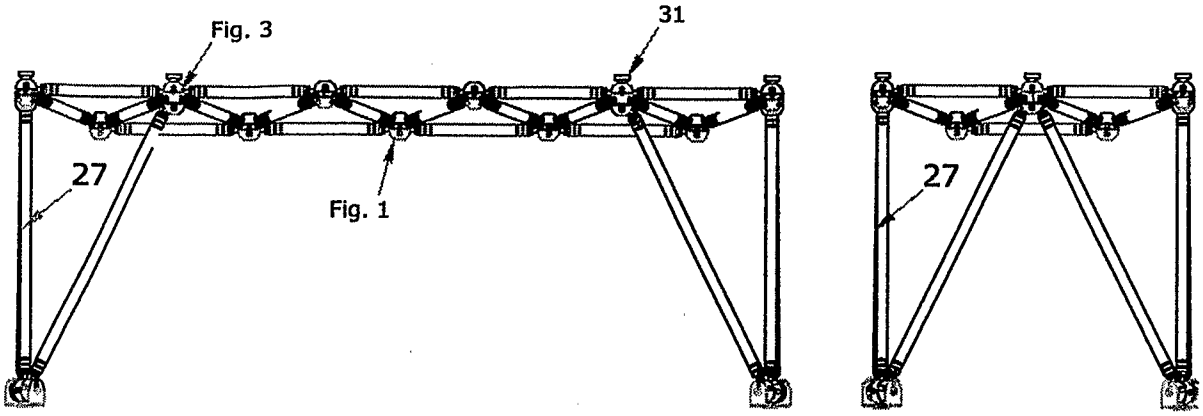


Fig. 11

C



Part. C



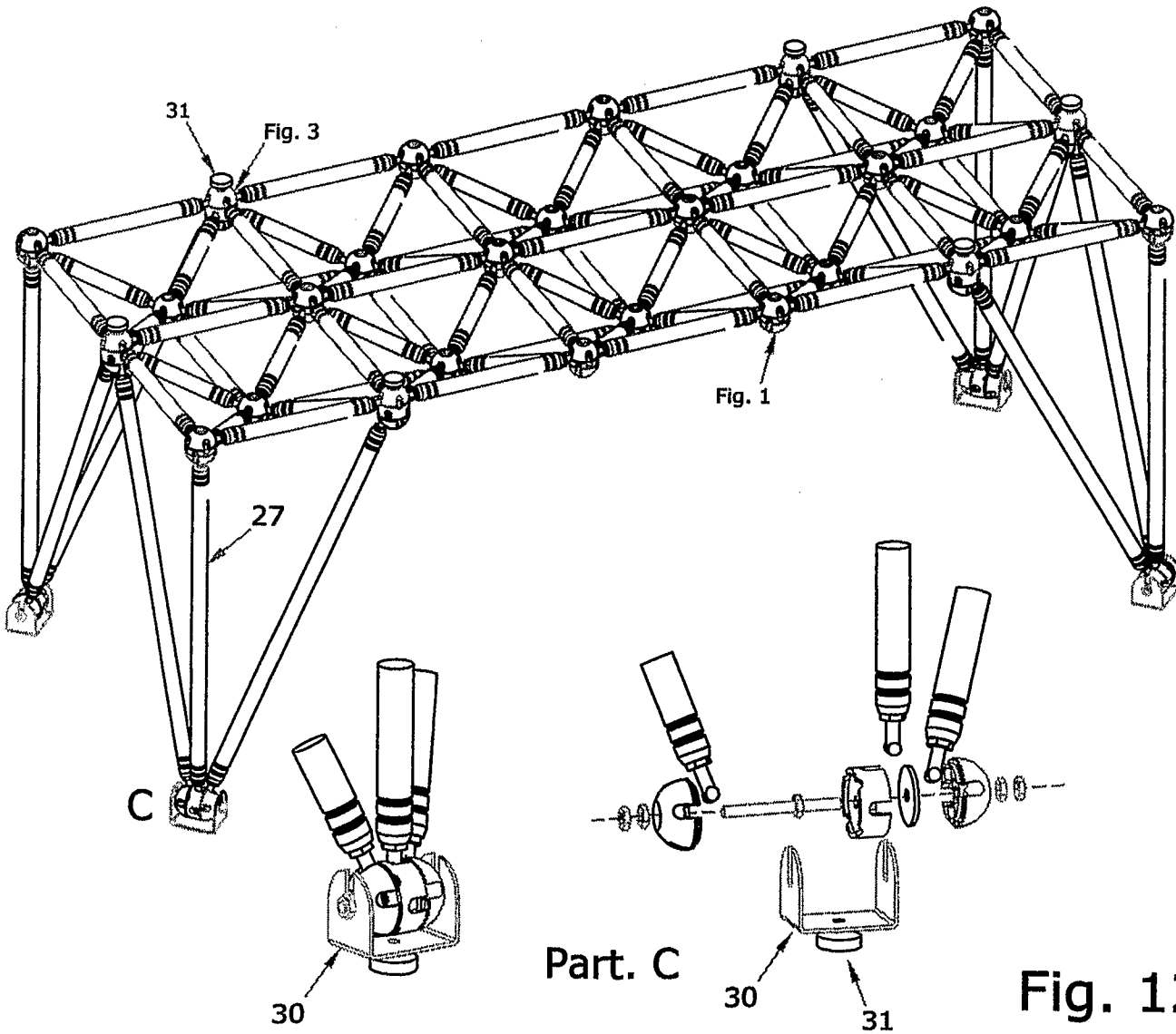


Fig. 12

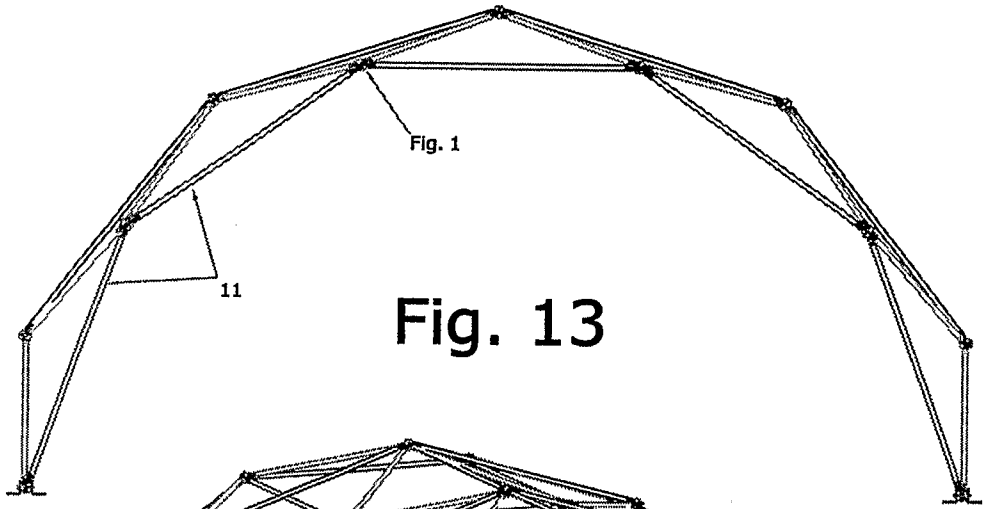
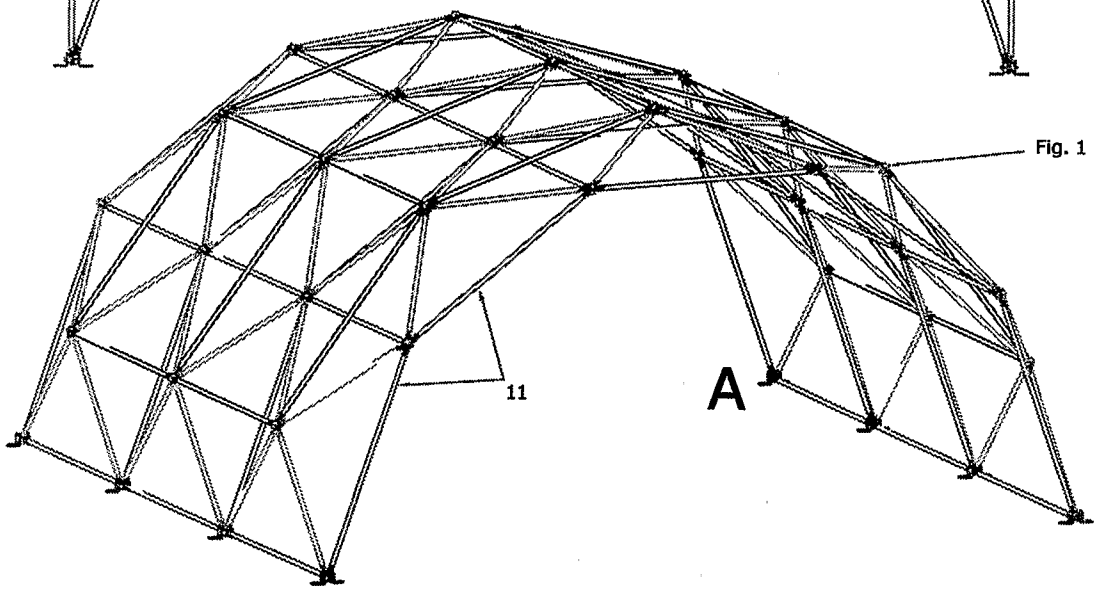
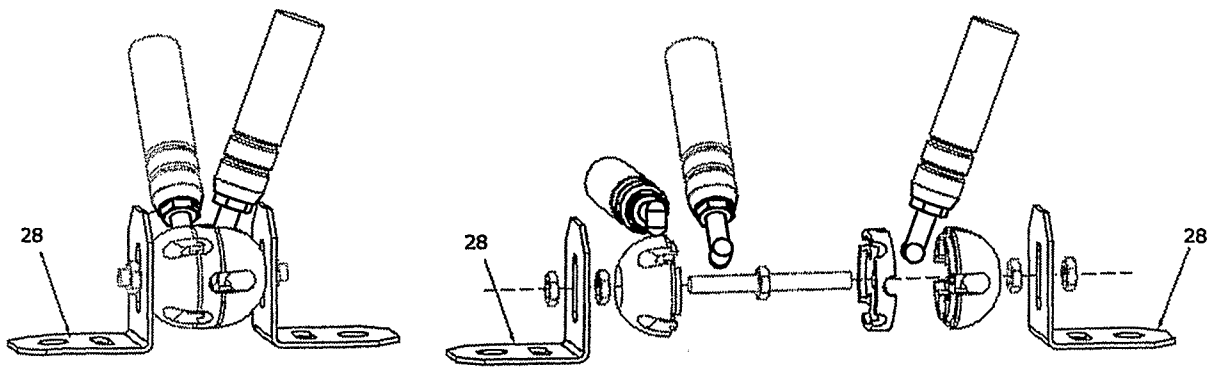


Fig. 13





Part. A

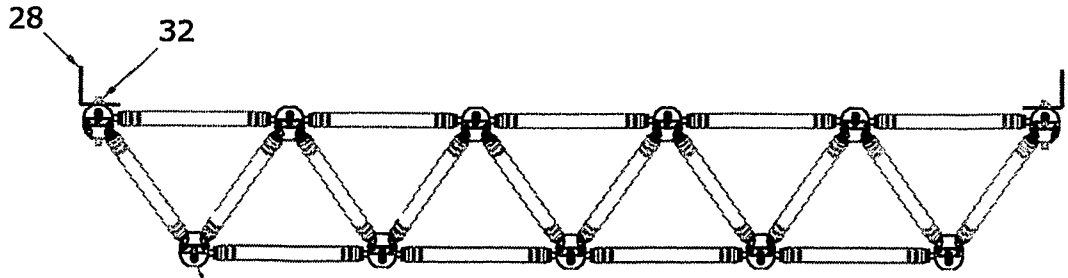
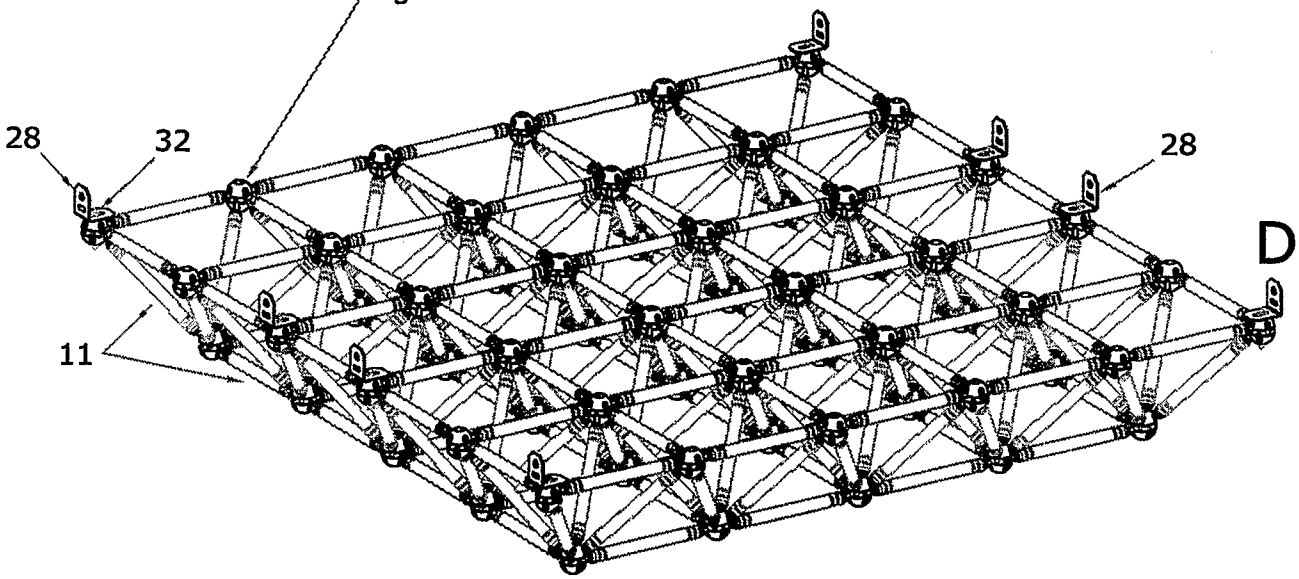
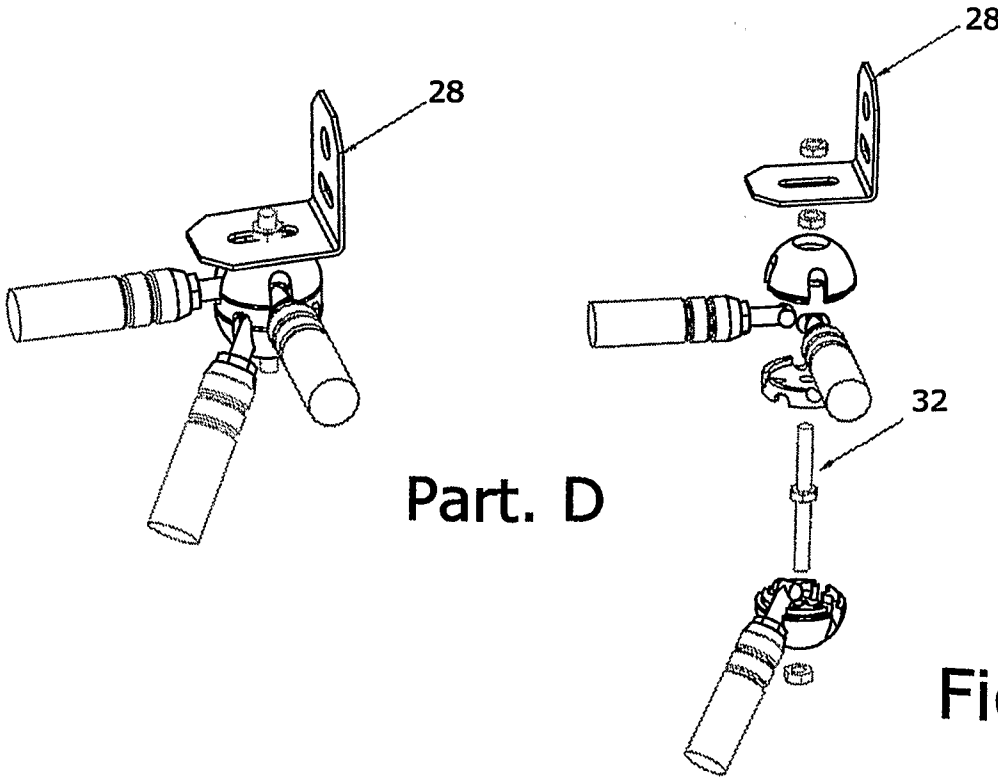


Fig. 1





Part. D

Fig. 14

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2009/000149

A. CLASSIFICATION OF SUBJECT MATTER
INV. E04B1/19
ADD. E04B1/32

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)
E04B

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 94/13895 A (VENTRELLA ETTORE [IT]) 23 June 1994 (1994-06-23) page 3, line 2 - page 6, line 26; claims 1-5; figures 1-7	1
Y	US 4 161 088 A (GUGLIOTTA PAUL F [US] ET AL) 17 July 1979 (1979-07-17) column 3, line 61 - column 4, line 1; figures 1,9 column 11, lines 40-51	1
Y	FR 2 576 342 A (CHATEAU STEPHANE DU [FR]) 25 July 1986 (1986-07-25) page 3, line 29 - page 4, line 13; figure 1	1

-/--

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

[X] See patent family annex.

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

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Date of the actual completion of the international search	Date of mailing of the international search report
6 August 2009	13/08/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Stern, Claudio

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2009/000149

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	EP 0 278 939 A (LAHAYE CLAUDE) 17 August 1988 (1988-08-17) figures	1
A	DE 86 16 463 U1 (FINK, DIETER, 7142 STEINHEIM, DE) 14 August 1986 (1986-08-14) page 13, line 10 - page 14, line 24; figures 2-5	1
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IT2009/000149

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