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Remarks:

- Claims 16 - 37 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).
- The references to the drawing(s) no. 10, 11, 16-22 are deemed to be deleted (Rule 56(4) EPC).

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(72) Inventor: **The designation of the inventor has not yet been filed**

(54) **A system of constructing furniture**

(57) A furniture system containing tie elements, connectors and walls, characterized in that two tie elements (1) are joined by at least one flexible connector including a line element (4) going through two longitudinal holes (5) and one transverse hole (6) of each tie element (1), forming an F-shape in cross section, with both ends of the line element (4) fixed to the tightening element (7), wherein the line element (4) and the tightening element (7) are located inside the closed or partially open space delimited by the walls (2) the edges of which come into

contact with the ties (1), wherein the walls (2) constitute a uniform whole of a composite laminated material bent along appropriate lines and the flexible connector (11) has a tightening element (7) including an oblong element (25) which at both ends has through holes (26) the line elements (14) go through, wherein in the middle part the oblong element (25) has a threaded hole with a screw element (27) driven in, equipped at the end with a guide (28) supporting the line element (14).

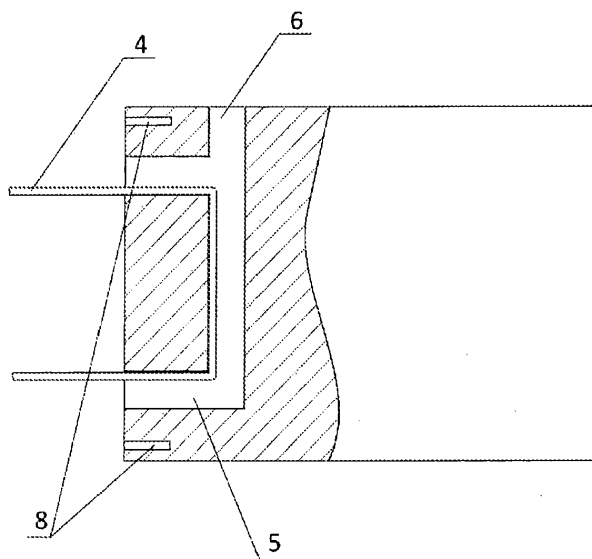


Fig. 4

Description

[0001] The invention relates to a system of constructing furniture, in particular wardrobes, cabinets, shelving and racks, as well as display windows and furniture units to meet individual needs.

[0002] Commonly known solutions of constructing furniture are characterised in that they consist of horizontal elements and vertical elements which have holes and pegs respectively at their edge joints, as well as of hinged connectors and ones usually made of metal or plastic to strengthen and reinforce the edge joints.

[0003] The furniture connector known from the description of Polish patent No 143485, joining two load-bearing walls, is characterised in that in the recess of one load-bearing wall is a cuboid-shaped plate featuring a perpendicular cylinder-shaped element with a hole of a rectangular cross-section. In order for a furniture tie to be fixed by means of a screw, the other load-bearing has a threaded hole, as well as a threaded hole and a cylindrical hole for a furniture side wall to be fixed with two screws so that a furniture moveable board element can be seated in the triangle notches and holes formed in the plate by means of a thread. Such a connector can be used to construct only simple furniture units.

[0004] Polish patent description no 170714 presents a set of furniture constructional elements, comprising boards, frames and connectors, characterized in that the straight connector is a channel section with the side walls provided with two pairs of opposite holes between which there is a protrusion, the frames featuring notches for the protrusions to be put in, and the boards having such holes that the bolts located in the holes of the connector can be fixed. Angle, cross, and semi-cross connectors are formed by the proper and permanent joining of straight connectors. This solution makes it possible to construct various arrangements of shelves and racks, above all for children, and to make furniture units tailored to the needs of the user and the location, as well as to be easily extended without effort and any tools.

[0005] A disadvantage of this system is that it can be used to construct units of small sizes and heights because such connectors are unable to bear large loads.

[0006] The solution according to the invention described below lacks such disadvantages.

[0007] According to the invention, the idea behind the solution is that two tie elements are joined by at least one flexible connector including a line element going through two longitudinal holes and one transverse hole of each tie element, forming an F-shaped cross-section with two ends of the line element fixed to the tightening element, wherein the line element and the tightening element are inside the closed or partially open space delimited by the walls whose edges are in contact with the ties, wherein the walls are made out of a laminated composite sheet material bent along appropriate lines.

[0008] Preferably, the tightening element is a screw element ended with a hook, driven in the threaded hole

of the eye element.

[0009] Preferably, the tie elements have grooves of a shape matching the cross section of the laminated board walls so that the edges of these walls can be fixed in them.

[0010] Preferably, the tightening element comprises two screw elements, each ended at one side with hooks screwed into the short sides of the elongated rectangular or oval element.

[0011] Preferably, the tightening element is a turnbuckle.

[0012] Preferably, the tightening element is an oblong element featuring through holes at both ends, ones which the line elements go through, and a threaded hole in the middle part with a male screw element provided at the end with a guide supporting the line element.

[0013] Very preferably, the guide has a longitudinal groove supporting the line element.

[0014] Very preferably, the guide has a longitudinal through hole the line element goes through.

[0015] Preferably, the walls forming the space where the line element and the tightening element are located have at least one lip extending beyond the outline of the faces of the tie elements.

[0016] Preferably, the walls forming the space where the line element and the tightening element are located have two lips going beyond the faces of the tie elements in the opposite directions.

[0017] Preferably, the two tie elements are in the form of boards and are connected by at least two flexible connectors, each located on the opposite edge of each tie element.

[0018] Preferably, the walls of both spaces containing both flexible connectors are joined together, forming a uniform whole seen as a broken line in cross section.

[0019] Preferably, the wall lips of both spaces containing both flexible connectors come into contact with each other, forming one line in cross section.

[0020] Preferably, the walls of both spaces containing both flexible connectors form a separate whole and are joined by a wall made out of a separate section of a laminated board or a different material.

[0021] Very preferably, each flexible connector is in the form of a closed rectangular or square line.

[0022] Preferably, at the opposite sides each tie element has two through holes connected by a groove where the line element of the flexible connector is located.

[0023] Very preferably, each groove is positioned along the edge of the flat tie element.

[0024] Preferably, in the groove, along its whole length, is positioned an oblong profile element with a longitudinal hole the line element of the flexible connector is put through.

[0025] Preferably, each tie element has a through slit at the opposite sides, one in which there is the oblong profile element featuring the longitudinal hole the line element of the flexible connector is put through, with the width of the upper part of the oblong profile element larger than the width of the slit.

[0026] Preferably, between the ties in the form of boards are positioned transverse boards provided with through holes the line elements go through.

[0027] Preferably, at its edges, each tie element has two through holes in which bolts are positioned featuring flanges and a transverse hole at its end the line element of the flexible connector goes through.

[0028] Very preferably, the middle section of the bolts with the flanges and the transverse hole at the end is threaded in such a way that a nut used fixes the bolt from the inner side of the tie element.

[0029] Preferably, at the opposite edges, each tie element has two blind holes from within, ones in which mandrels are screwed down that feature the eyes the line elements of the flexible connector go through.

[0030] Very preferably, the mandrel with the eyes are screwed into the blind holes of the tie elements through threaded sleeves.

[0031] Preferably, two tie elements have the form of boards and are joined by at least two flexible connectors, each located near the opposite edge of each tie element, wherein the walls of both spaces containing both flexible connectors are joined, forming a uniform whole seen as a broken line in cross section, with each flexible connector in the form of an open Z-shaped line.

[0032] In an variant of the invention two tie elements are joined by at least one rigid connector containing a rod element screwed at its ends into two holes, each located in one element, within the closed or partially open space delimited by the walls, with the edges of the walls in contact with the ties, and the walls constituting a uniform whole of a composite laminated material in the form of a sheet bent along proper lines, wherein the opposite ends of one rod element are threaded in the opposite directions.

[0033] Preferably, the rod element is fixed in the holes of the tie elements through the threaded sleeves.

[0034] Preferably, two tie elements are in the form of boards and are joined by at least two rigid rod connectors, each located near the opposite edge of each tie element.

[0035] Very preferably, the two tie elements are in the form of boards and are joined by at least two pairs of rigid rod connectors, with each pair located near the opposite edge of each tie element.

[0036] Preferably, the walls of both spaces containing both rigid connectors are joined together, forming a uniform whole seen as a broken line in cross section.

[0037] Preferably, the lips of the walls of both spaces containing both rigid connectors are in contact, forming one line in cross section.

[0038] Preferably, the walls of both spaces containing both rigid connectors constitute a separate whole, and are joined with the wall made out of a separate section of a laminated board or a different material.

[0039] Very preferably, the composite laminated material of which the walls are made is the AL/LDPE/AL laminate.

[0040] Very preferably, at least one AL layer is covered

with an art decorative element.

[0041] Most preferably, one of the AL layers is printed over.

[0042] Such a structure of a furniture system makes it possible to construct diverse forms and shapes of furniture, using a laminate which can be cut and bent to meet the needs and demands of the user, as is presented in the description and the drawing below. Moreover, any pattern or image may be printed on the surface of the laminate, providing a useful visual effect and a seamless transition of artistic creations from the front walls to the side ones.

[0043] The invention was presented in the drawing as its embodiments which do not limit it in any way, where:

fig. 1 presents a front perspective view of a single shelf made according to the system,

fig. 2 presents a back perspective view of a single shelf made according to the system,

fig. 3 shows a section of a shelf with the space featuring the flexible connector,

fig. 4 shows a half-section of the details of the tie element,

fig. 5 shows a perspective view of a single tie element,

fig 6 shows a front view of a shelf with the lips

fig. 7 shows a perspective view of a single shelf rack module,

fig. 8 presents a perspective view of the tie,

fig. 9 presents a view of the space containing the flexible connector of a shelf rack module with transverse shelving,

fig. 10 presents a view of the flexible connector with a line forming a closed shape,

fig. 11 presents a view of the flexible connector with the Z-shaped line,

fig. 12 presents the details of the connection of the line with the tie,

fig. 13 presents the details of the connection of the line with the tie in another version,

fig. 14 presents the details of the connection of the line with the tie in yet another version,

fig. 15 presents a single shelf rack module with the rigid connector

fig. 16 presents a perspective view of a single rack with transverse shelves,

fig. 17 presents a perspective view of a shelf rack with transverse shelves and a printed design on the outer layer of the laminated board,

fig. 18 presents a perspective view of a multi-shelf rack,

fig. 19 presents a fancifully bent laminated board,

fig. 20 presents a perspective view of a shelf rack featuring a laminated board of the shape as in fig 19, with the surface decorated with art elements,

fig. 21 presents a fancifully bent laminated board in a different shape version,

fig. 22 presents a perspective view of a shelf rack featuring a laminated board of the shape as in fig 21, with the surface of the laminated board decorated with art elements,

fig. 23 presents a perspective view of the single shelf rack module of fig. 7, with the back wall made out of a separate section of a laminated board or a different material,

fig. 24 presents the single shelf rack module with the rigid connector of fig. 15, with the back wall made out of a separate section of a laminated board or a different material,

fig. 25 presents a perspective view of the single shelf rack module of fig 7, with the walls made out of two sections of a laminated board,

fig. 26 presents a variant of the tightening element,

fig. 27 presents a perspective view of the single shelf rack module of fig. 7, featuring the tightening element shown in fig. 26.

[0044] The shelf of the system in fig. 1 has two cuboid tie elements 1 joined by walls 2 of an outline corresponding to the cuboid, ones which are secured by screws 3. Inside the space limited by walls 2 is positioned the flexible connector containing line 4 going through two longitudinal holes 5 and one transverse hole 6 of each tie element 1, forming an F-shape in cross section. Line ends 4 are fixed to tightening element 7. Ties 1 have grooves 8 of a shape corresponding to the cross section of laminated board walls 2 so that the edges of the walls can be seated in them.

[0045] In an embodiment, the shelf in fig. 6 has walls 2 which form a space where line 4 and tightener 7 are located, and which have two lips 9 extending beyond the

outline of the faces of the tie elements.

[0046] In the embodiment of fig. 7 ties 10 have the form of boards and are joined by two flexible connectors 11, each positioned near the opposite edge of each tie 10, with walls 12 forming a broken line in cross section, wherein each tie 10 has grooves 13 to receive the edge of wall 12. Lines 14 are fixed to ties 10 by catches 15, with flexible connector 11 in the form of a Z-shaped open line. In fig. 9 flexible connector 11 is in the form of a rectangular closed line.

[0047] Fig. 8 presents an alternative solution of joining flexible connector 11 with tie 10. Tie 10 has two through holes at each opposite side, ones joined by groove 16 where line 17 of flexible joint 11 is located.

[0048] In the alternative solution, in groove 16A, along its whole length, is positioned oblong profile element 18 with a longitudinal hole which line 17 of flexible connector 11 is put through.

[0049] Fig. 9 presents a solution where between ties 10 there are transverse boards 19 provided with through holes near the edges, at a distance corresponding to that of the through holes joined by groove 16 in ties 10 the lines of flexible connector 11 go through.

[0050] Fig. 10, 12 and 13 present an embodiment where at the opposite sides the tie has two through holes in which bolts 20 are located featuring flanges and a transverse hole at its end through which line 17 of flexible connector 11 goes. The middle section of bolts 20 featuring the flanges and the transverse hole at the end may be threaded in such a way that a nut used can fix bolt 20 from the inner side of tie 10.

[0051] Fig. 11 and 14 present an embodiment in which at the opposite sides the tie has two blind holes in which mandrels 21 are screwed featuring the eyes which lines 17 of the flexible connector are put through, wherein mandrels 21 featuring the eyes are screwed into the blind holes in ties 10 through threaded sleeves 22.

[0052] In the variant of the invention presented in fig. 15, the ties are joined by rigid connectors including rods 23 screwed at their ends into threaded sleeves 24, with the edges of walls 12 coming into contact with ties 10 through grooves 13.

[0053] As is shown in the embodiment of fig. 23 and 24, each flexible connector 11 of the shelf rack is surrounded by separate walls 12 joined by a section of board 12A constituting the back wall of the shelf rack, and fig 25 shows an embodiment with back wall 12 of the rack divided.

[0054] A variant of tightener 7 of connector 11 presented in fig. 26 contains oblong element 25 with through holes 26 lines 14 go through. In the middle part of oblong element 25 there is screw 27 driven in, equipped at the end with guide 28 featuring a longitudinal groove.

Claims

1. A furniture system containing tie elements, connec-

- tors and walls, **characterized in that** two tie elements (1) are joined by at least one flexible connector including a line element (4) going through two longitudinal holes (5) and one transverse hole (6) of each tie element (1), forming an F-shape in cross section, with both ends of the line element (4) fixed to the tightening element (7), wherein the line element (4) and the tightening element (7) are located inside the closed or partially open space delimited by the walls (2) the edges of which come into contact with the ties (1), wherein the walls (2) constitute a uniform whole of a composite laminated material bent along appropriate lines.
2. The furniture system according to claim 1 **characterized in that** the tightening element (7) is an eye and screw element ended with a hook screwed into the threaded hole of the eye element, with the shape of the cross section of the walls (2) corresponding to the shape of the tie (1).
 3. The furniture system according to claim 1 **characterised in that** the tie elements (1) have grooves (8) of a shape corresponding to the cross section of the walls (2) out of a laminated board so that the edges of these walls (2) can be seated in them.
 4. The furniture system according to claim 1 **characterised in that** the tightening element (7) comprises two screw elements, each ended at one side with hooks screwed into the short sides of an elongated rectangular or oval element.
 5. The furniture system according to claim 1 **characterised in that** the tightening element (7) is a turn-buckle.
 6. The furniture system according to claim 1 **characterised in that** the flexible connector (11) has a tightening element (7) including an oblong element (25) which at both ends has through holes (26) the line elements (14) go through, wherein in the middle part the oblong element (25) has a threaded hole with a screw element (27) driven in, equipped at the end with a guide (28) supporting the line element (14).
 7. The furniture system according to claim 1 **characterised in that** the guide (28) has a longitudinal groove supporting the line element (14).
 8. The furniture system according to claim 1 **characterised in that** the guide (28) has a through longitudinal hole the line element (14) goes through.
 9. The furniture system according to claim 1 **characterised in that** the walls (2) forming the space inside which the line element (4) and tightening element (7) are located have at least one lip (9) extending beyond the outline of the faces of the tie elements (1).
 10. The furniture system according to claim 9 **characterised in that** the walls (2) forming the space inside which the line element (4) and the tightening element (7) are located have two lips (9) extending beyond the outline of the faces of the tie elements (1) in the opposite directions.
 11. The furniture system according to claim 1 **characterised in that** two tie elements have the form of boards (10) and are joined by at least two flexible connectors (11), each located near the opposite edge of each tie element (10).
 12. The furniture system according to claim 11 **characterised in that** the walls (12) of both spaces containing both flexible connectors (11) are joined together, forming a uniform whole seen as a broken line in cross section.
 13. The furniture system according to claim 11 **characterised in that** the lips of the walls (12) of both spaces containing both flexible connectors (11) come into contact with each other, forming one line in cross section.
 14. The furniture system according to claim 11 **characterised in that** the walls (12) of both spaces containing the flexible connectors (11) constitute a separate whole, and are joined with the wall (12A) made out of a separate section of a laminated board or a different material.
 15. The furniture system according to claim 12 **characterised in that** each flexible connector (11) has the form of a closed rectangular or square line.
 16. The furniture system according to claim 11 **characterised in that** at the opposite sides each of the tie elements (10) has two through holes joined by a groove (16) in which the line element of the flexible joint is located.
 17. The furniture system according to claim 16 **characterised in that** each groove (16) is located along the edge of the flat tie element.
 18. The furniture system according to claim 16 **characterised in that** in the groove (16), along its whole length, is located an oblong profile element (18) with a longitudinal hole which the line element (17) of the flexible connector (11) is put through.
 19. The furniture system according to claim 11 **characterised in that** near the opposite edges each tie element (10) has a through slit (16A) in which the oblong profile element (18) is located featuring a lon-

gitudinal hole which the line element (17) of the flexible connector (11) is put through, with the width of the upper part of the oblong profile element (18) exceeding the width of the slit.

20. The furniture system according to claim 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 **characterised in that** between the tie elements (10) are located transverse boards (19) provided with through holes near the edges the line elements (17) go through.

21. The furniture system according to claim 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 **characterised in that** at the opposite sides each tie element (10) has two through holes in which bolts (20) are located featuring flanges and a transverse hole at its end which the line element (17) of the flexible connector (11) goes through.

22. The furniture system according to claim 18 **characterised in that** the middle section of the bolts (20) with the flanges and the transverse hole at the end is threaded in such a way that a nut used fixes the bolt (20) from the inner side of the tie element (10).

23. The furniture system according to claim 11 **characterised in that** at the opposite sides each tie element (10) has two blind holes from within, ones in which mandrels (21) are screwed in, featuring the eyes the line elements (17) of the flexible connector (11) are put through.

24. The furniture system according to claim 20 **characterised in that** the mandrels (21) with the eyes are screwed into the blind holes of the tie elements through the threaded sleeves (22).

25. The furniture system according to claim 1 **characterised in that** the two tie elements (10) are in the form of boards and are joined by at least two flexible connectors (11), each located at the opposite side of each tie element (10), wherein the walls (12) of both spaces containing both flexible connectors (17) are joined together, forming a uniform whole seen as a broken line in cross section, with each flexible connector (17) in the form of an open Z-shaped line.

26. The furniture system according to one of the previous claims **characterised in that** the laminated composite material of which the walls are made (2 and 12) is the AL/LDPEC/AL laminate.

27. The furniture system according to claim 26 **characterised in that** at least one AL layer is covered with an art decorative element.

28. The furniture system according to claim 27 **charac-**

terised in that at least one AL layer is printed over.

29. The furniture system containing the tie elements, connectors and walls, **characterised in that** the two tie elements (10) are joined by at least one rigid connector including a rod element (23) screwed at its ends into two holes, each located in one element inside the closed or partially open space delimited by the walls (12) which in cross section have a shape corresponding to the shape of the tie element (10), with the edges of the walls (12) in contact with the tie elements, and all walls (12) constituting a uniform whole of a laminated composite material in the form of a sheet bent along appropriate lines, wherein the ends of the rod element (23) are threaded in the opposite directions.

30. The furniture system according to claim 29 **characterised in that** the rod element (23) is screwed into the blind holes through the thread sleeves (24).

31. The furniture system according to claim 29 or 30 **characterised in that** the two tie elements (10) are in the form of boards and are joined by at least two rigid rod connectors, each located at the opposite side of each tie element (10).

32. The furniture system according to claim 29 or 30 or 31 **characterised in that** the walls (12) of both spaces containing both rigid connectors are joined together, forming a uniform whole seen as a broken line in cross section.

33. The furniture system according to claim 29 **characterised in that** the lips of the walls (12) of both spaces containing both rigid connectors come into contact with each other, forming one line in cross section.

34. The furniture system according to claim 29 **characterised in that** the walls (12) of both spaces containing both rigid connectors constitute a separate whole, and are joined by a wall (12A) made of a separate section of a laminated board or a different material.

35. The furniture system according to claim 29 or 30 or 31 or 32 or 33 or 34 **characterised in that** the laminated composite material of which the walls (12) are made is the AL/LDPE/AL laminate.

36. The furniture system according to claim 35 **characterised in that** at least one AL layer is covered with an art decorative element.

37. The furniture system according to claim 36 **characterised in that** at least one AL layer is printed over.

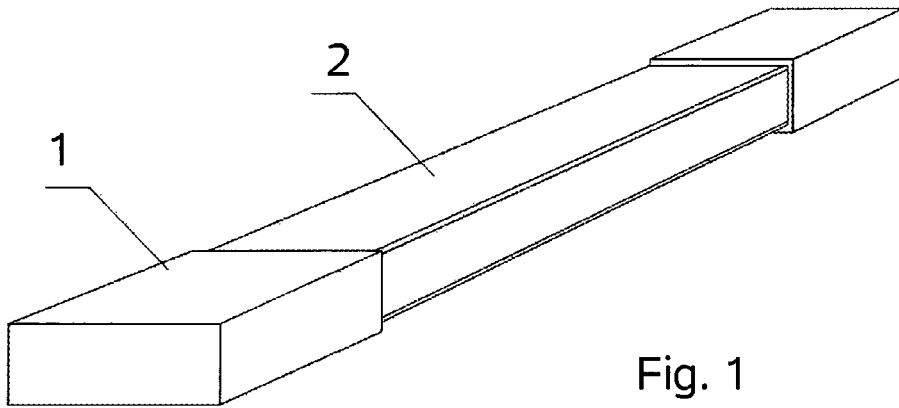


Fig. 1

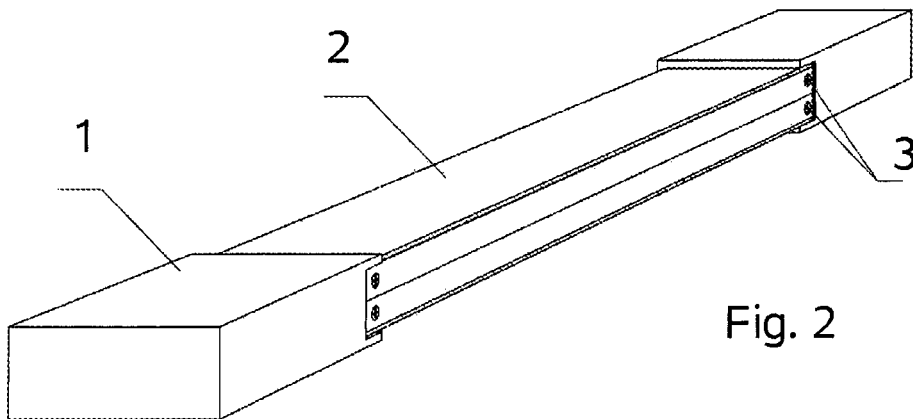


Fig. 2

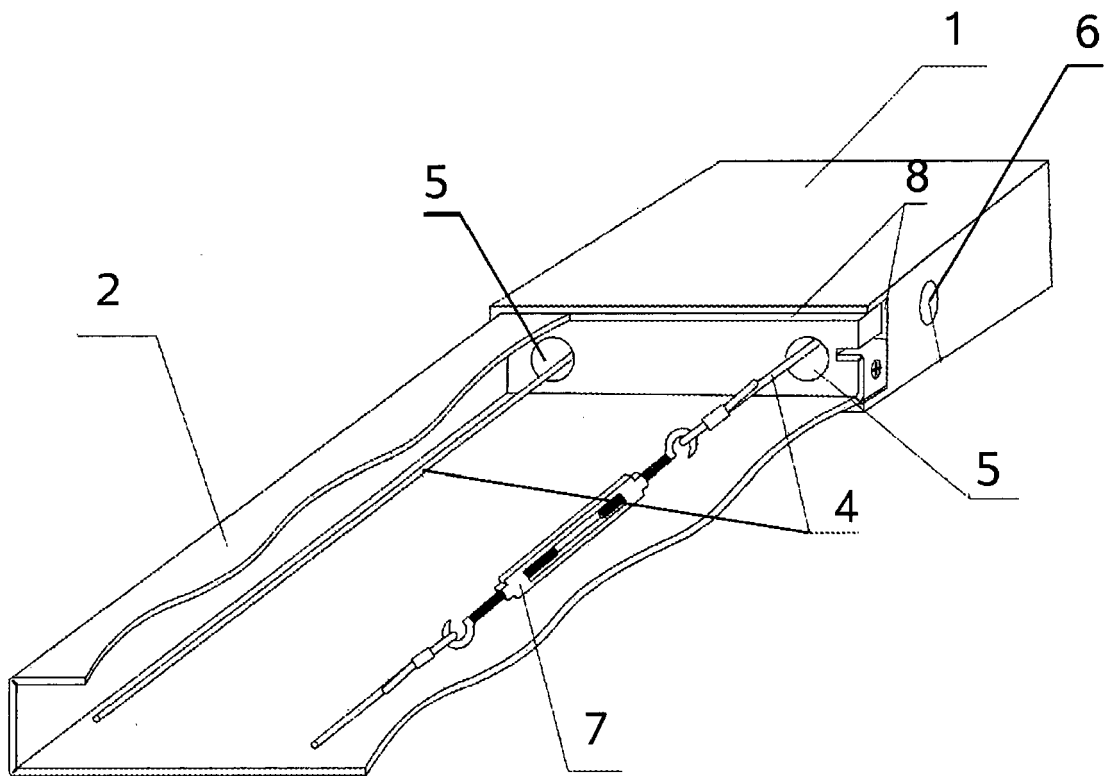


Fig. 3

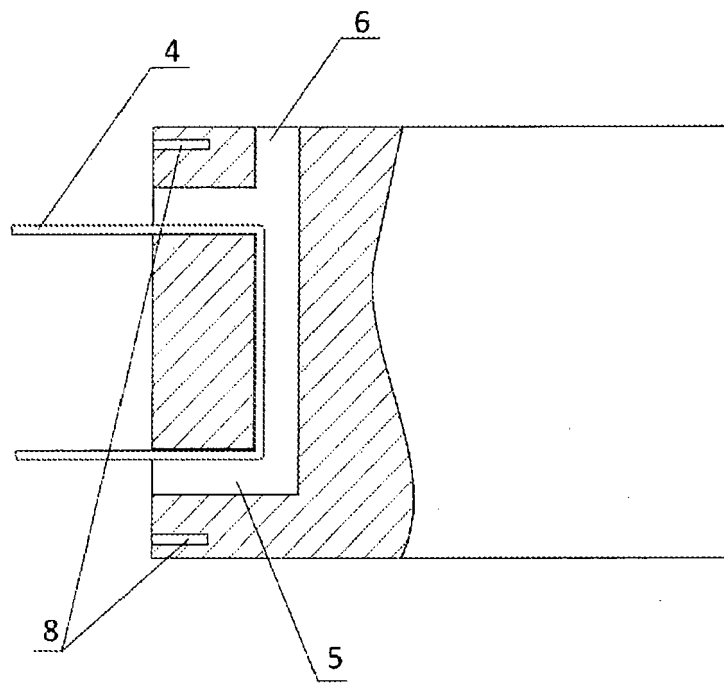
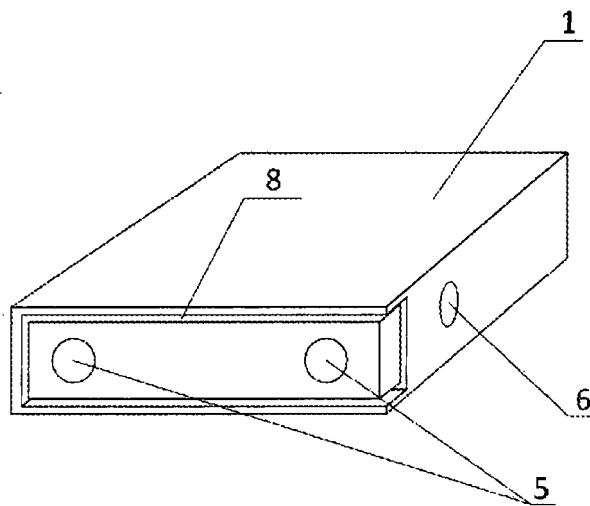
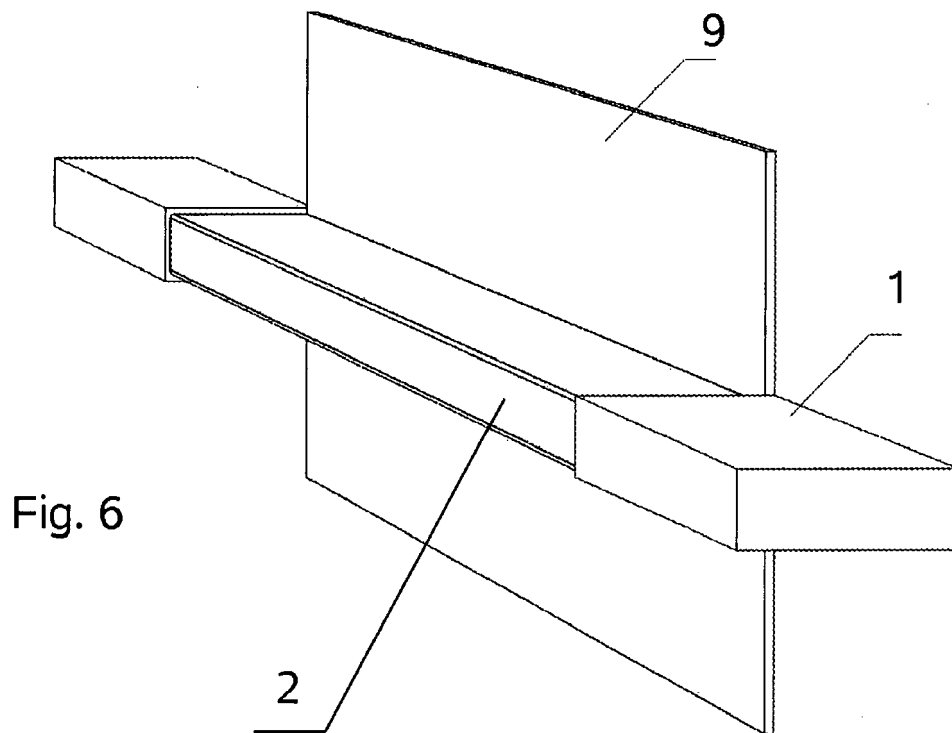


Fig. 4

Fig. 5





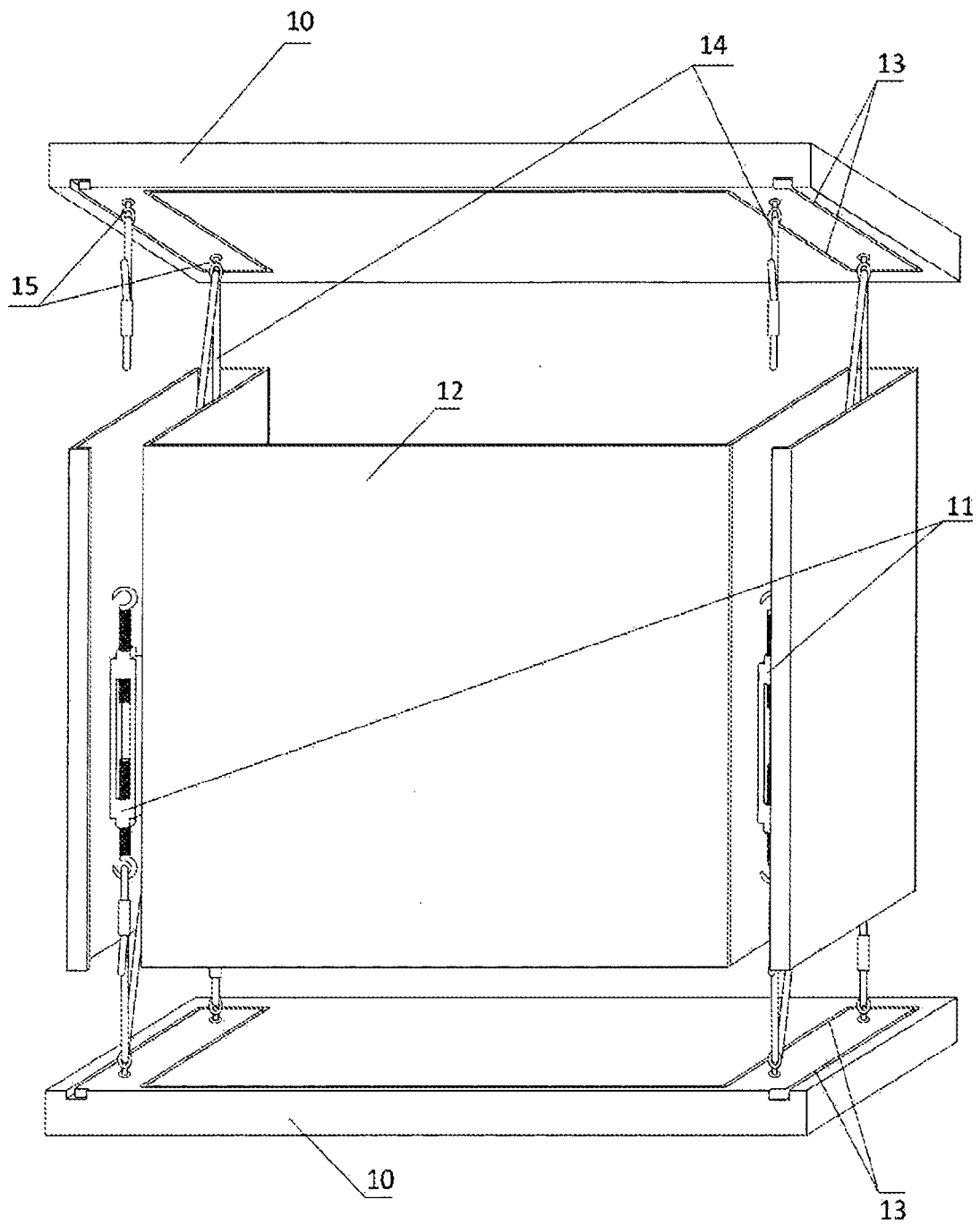
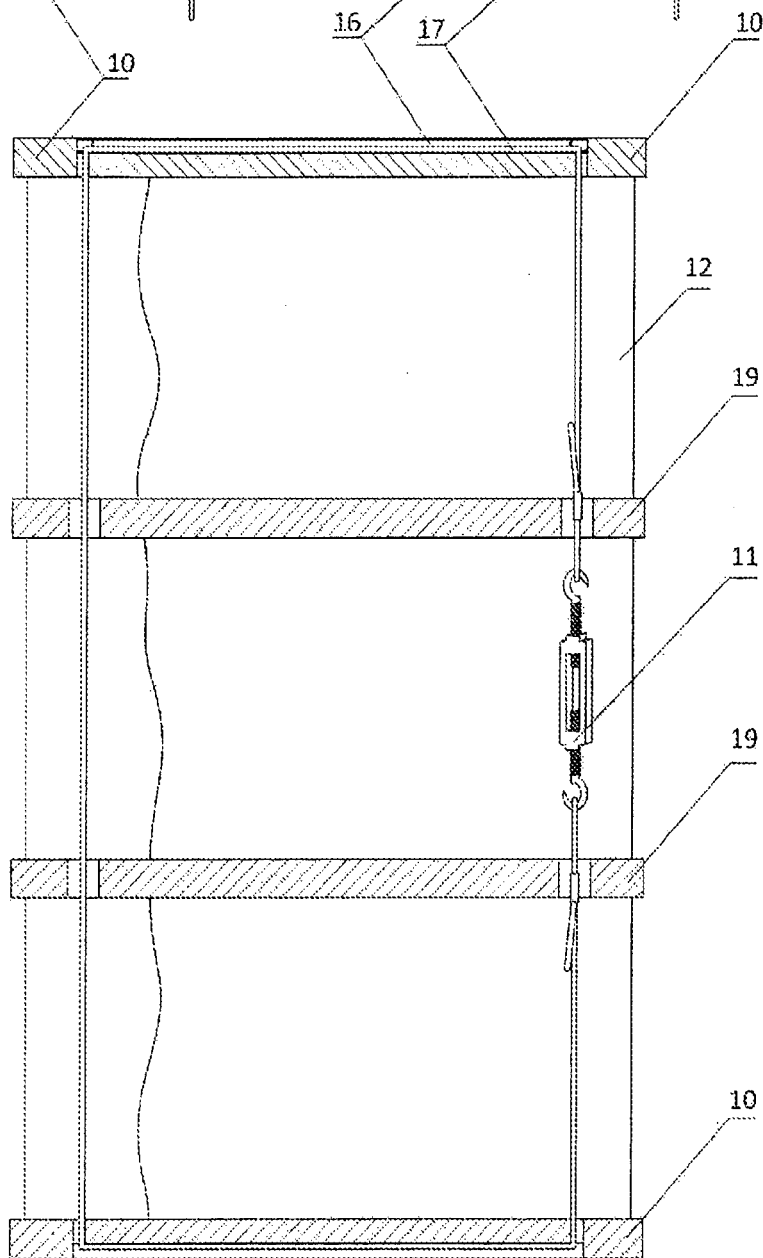
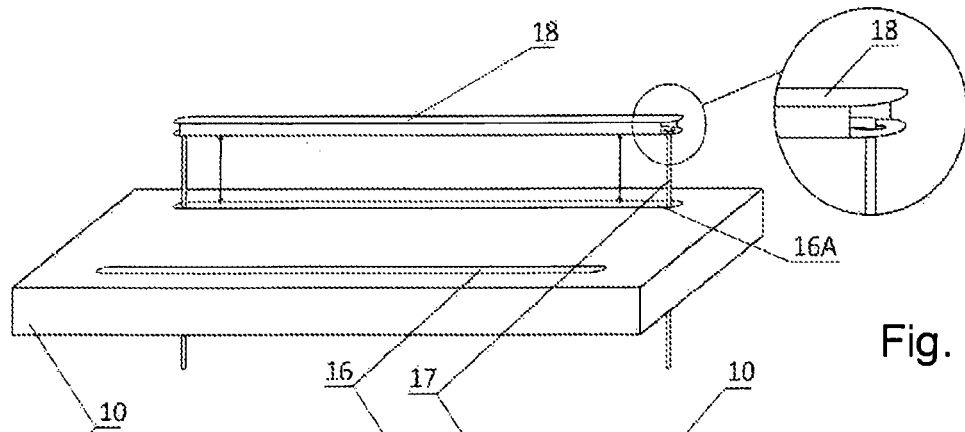


Fig. 7



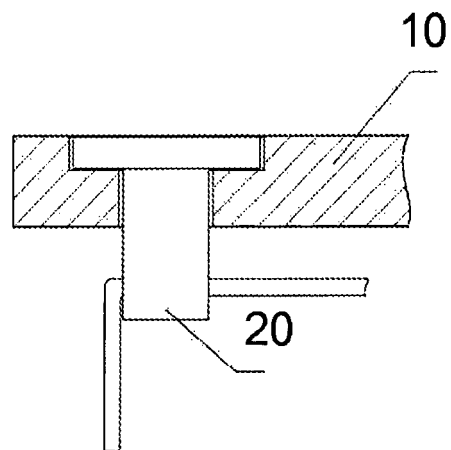


Fig. 12

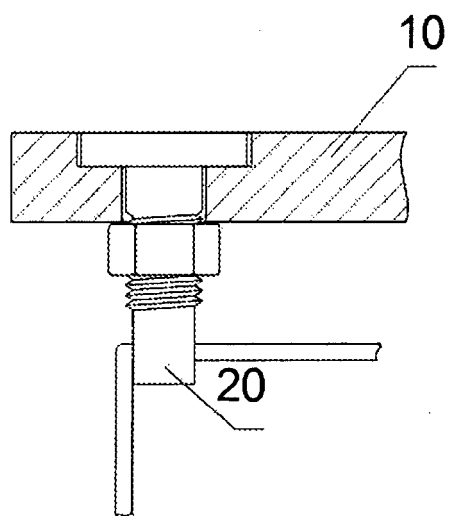


Fig. 13

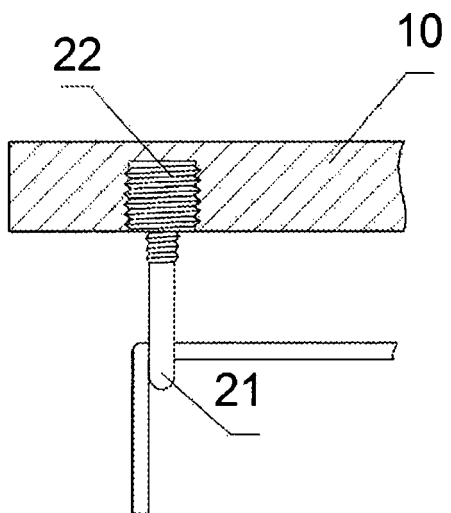


Fig. 14

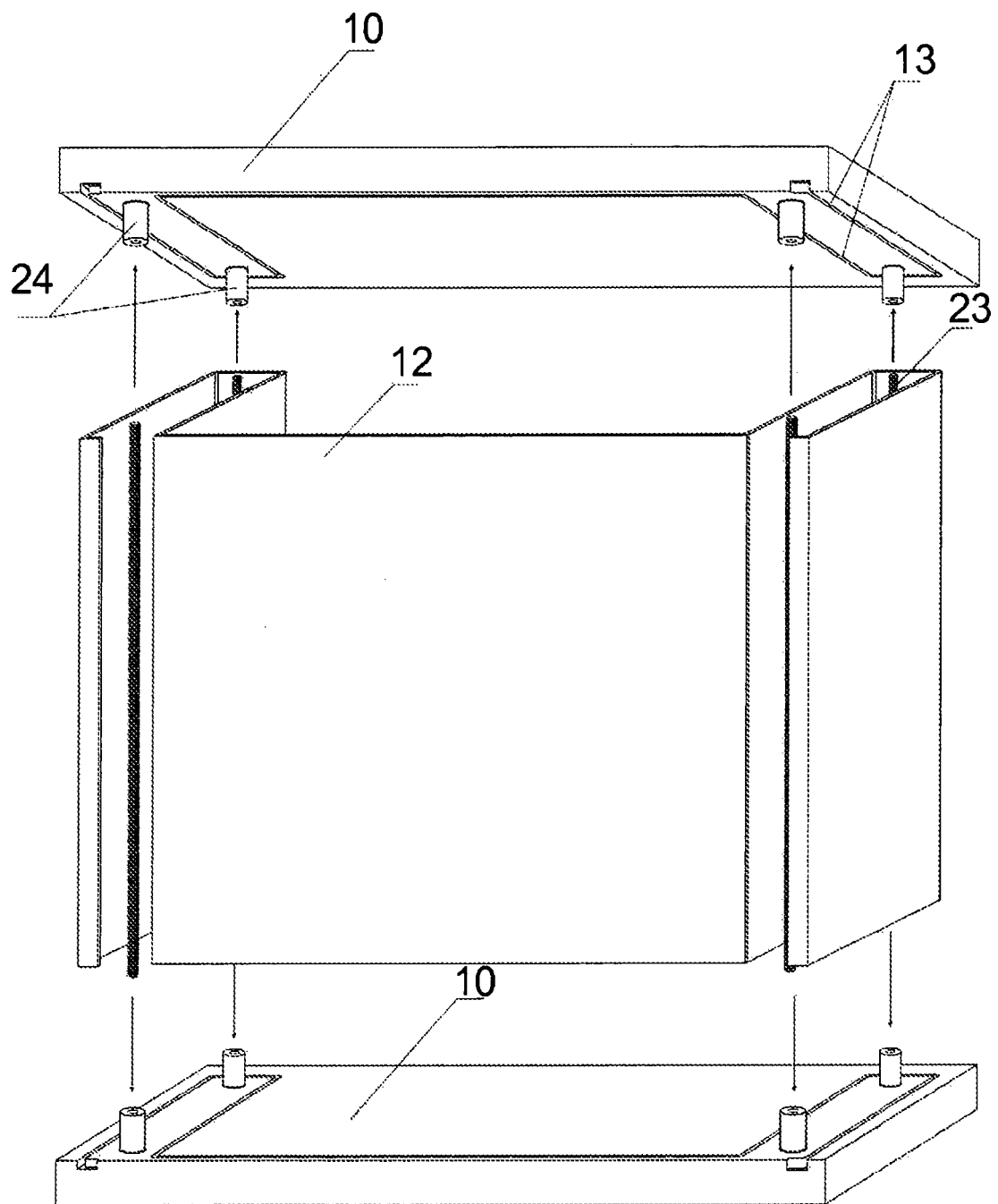


Fig. 15

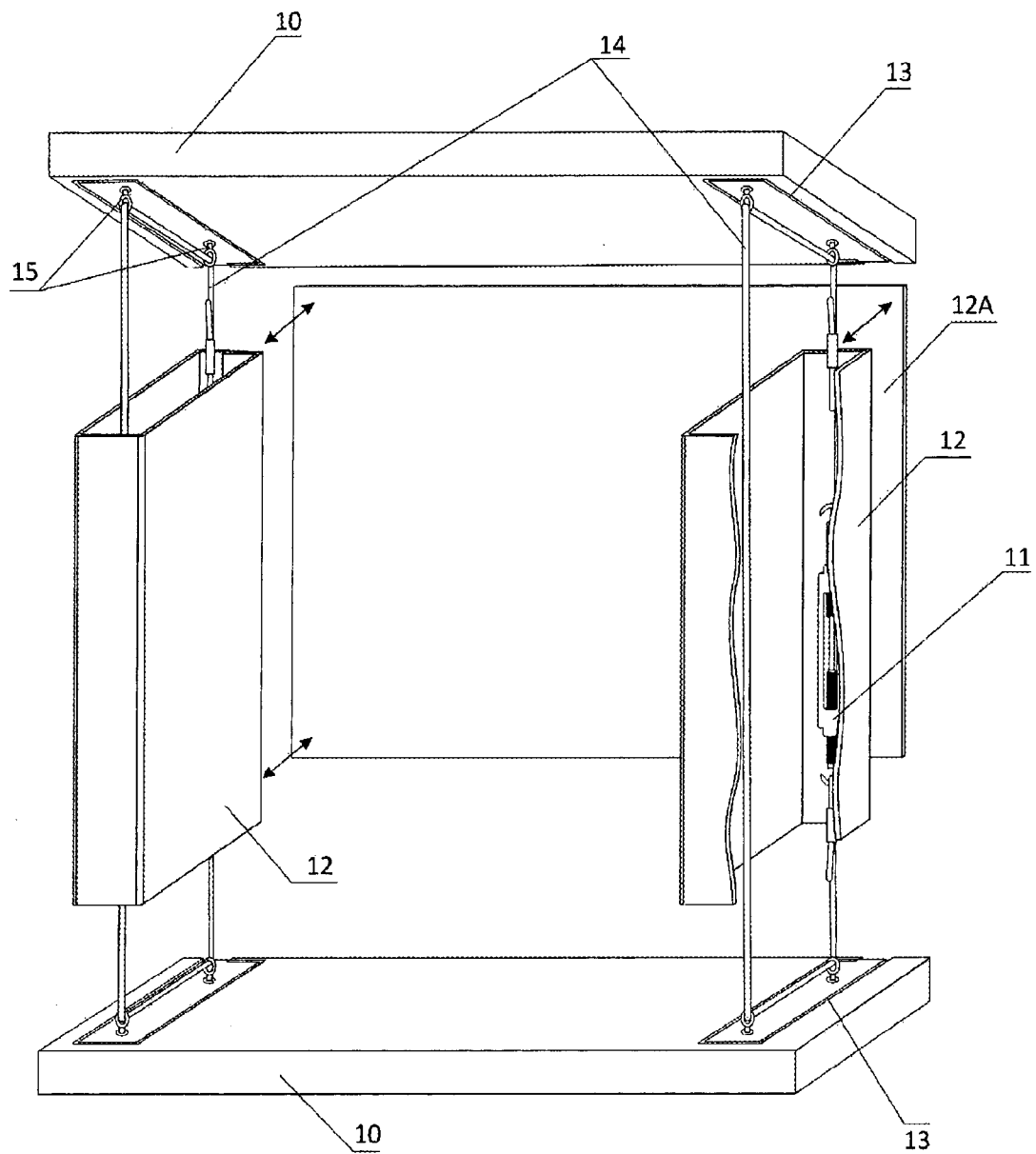


Fig. 23

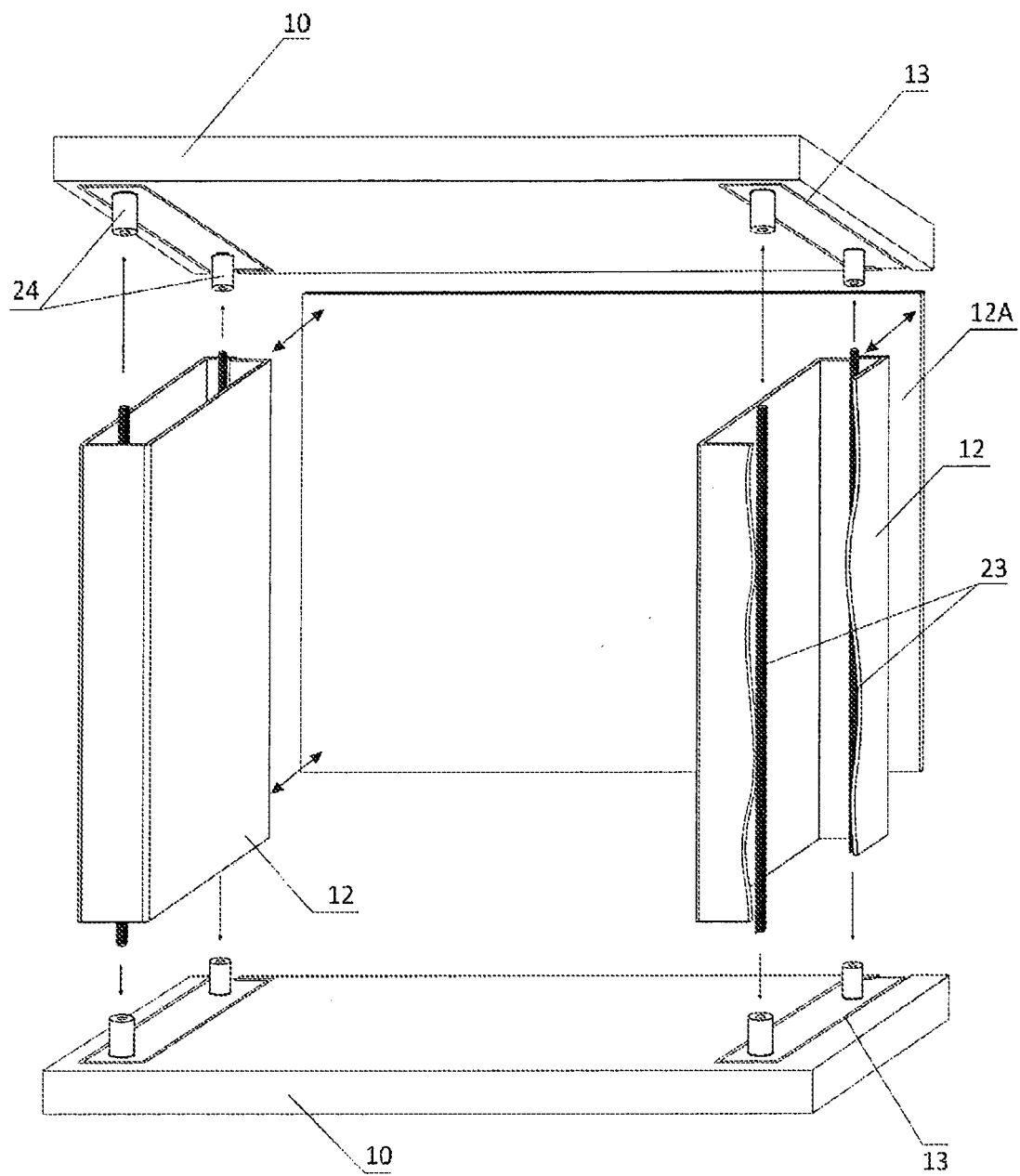


Fig. 24

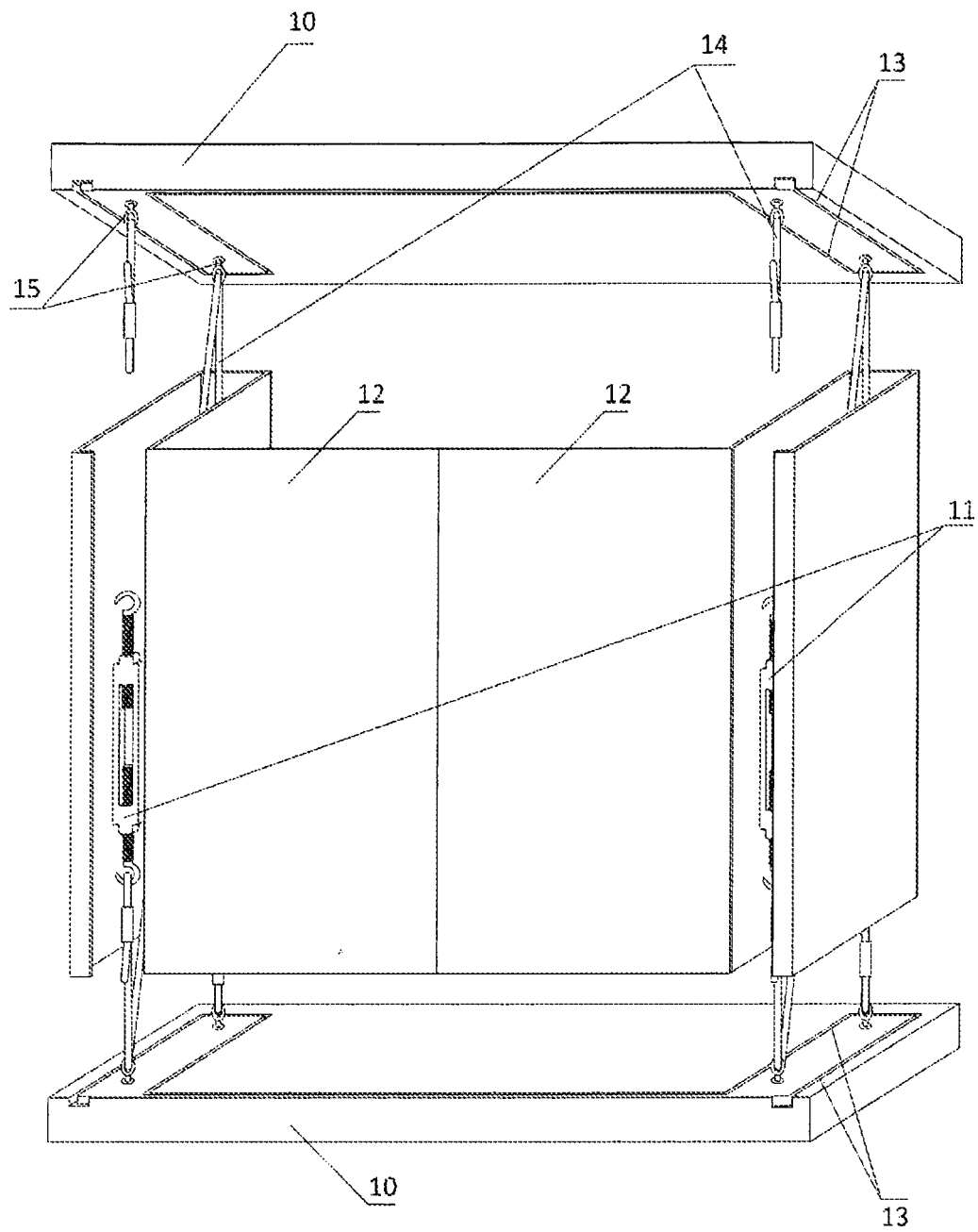


Fig. 25

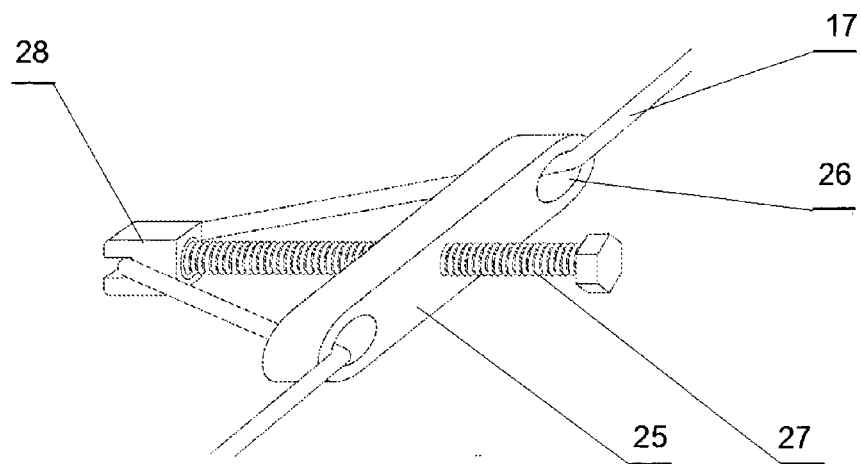


Fig. 26

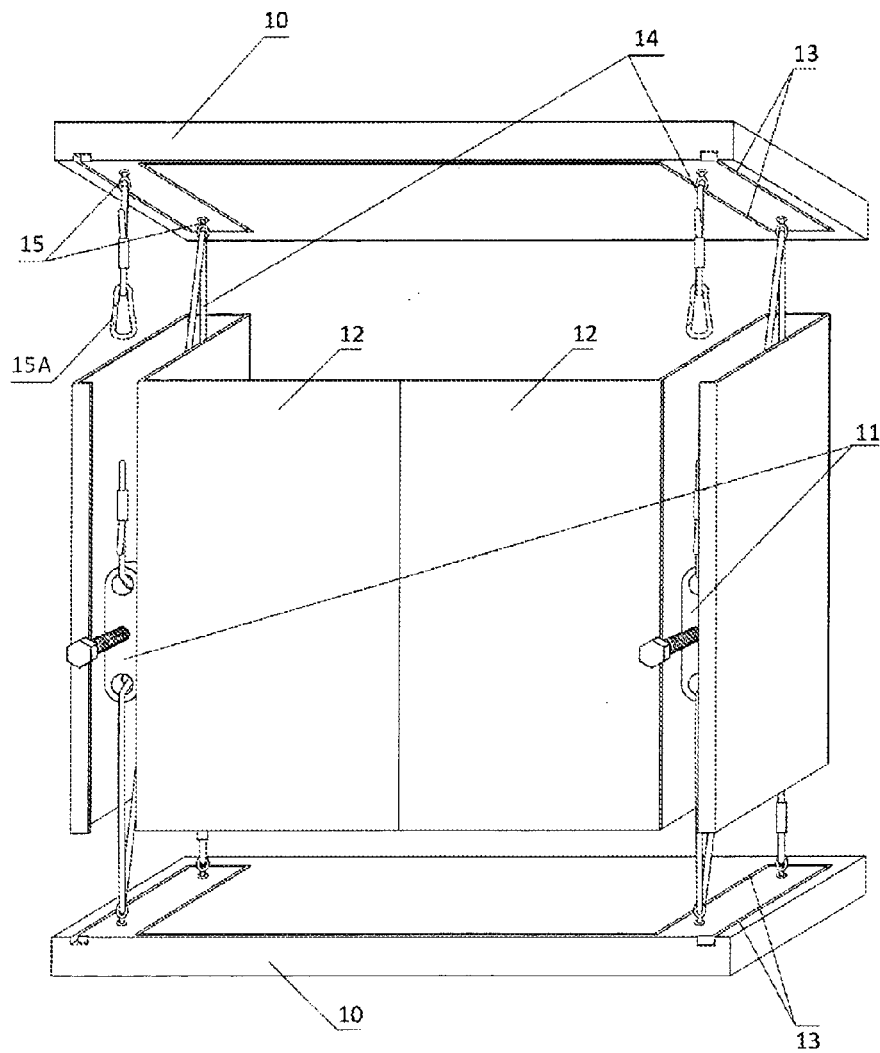


Fig. 27



EUROPEAN SEARCH REPORT

 Application Number
 EP 13 00 2212

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 632 179 A (VREDEV00GD JON D) 4 January 1972 (1972-01-04) * column 1 - column 4; figures 1-7 * -----	1-15	INV. A47B47/00
A	US 6 367 393 B1 (KASTEN DIANE [US]) 9 April 2002 (2002-04-09) * column 1, line 1 - column 5, line 28; figures 1-4 * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 March 2014	Examiner Kohler, Pierre
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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