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(54) **SUPPORT SYSTEM FOR PARTITION WALLS**

STÜTZSYSTEM FÜR TRENNWÄNDE

SYSTÈME D'APUI POUR CLOISONS

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EP 4 194 645 B1

Description

[0001] The present invention describes a particular equipped wall. This invention might be described as a conventional furniture wall, that however, in case of seismic events, reveals properties aimed to the safety of the nearby individuals, indeed, it guarantees their protection against falling object due to the damage of ceiling and it counteracts the overturning of the partition wall itself, just in case it is leaned to a partition wall.

[0002] WO9920859A1 discloses two bearing structures, mutually connected but free to move independently if dynamically stressed. WO9743928A1 discloses a structure which is intended to be installed next to an existing wall for protection in the case of a seismic event.

[0003] Generally, an equipped wall is settled next to a masonry or other partition wall, to which it is attached through mechanical fixings, otherwise, the equipped wall can be assembled by means of a from ceiling to floor connection with the upright height adjustment devices causing the independent support of the wall, thus defining a self-supporting structure.

[0004] The state of the art describes equipped walls that can be specified as resistant to the actions of an earthquake if they are anchored to partition walls that have been designed to be seismically resistant. An important drawback of these solutions is represented in that, if the partition walls do not meet the seismic requirements, the equipped walls anchored to them follow the fate of the partition walls as well as the equipped walls which, used as a dividing wall with a sky to earth connection, do not have elements capable of stabilizing their structural behaviour under seismic actions.

[0005] It is clear that a large part of existing buildings does not have earthquake-resistant partition walls. In this respect, the partition walls are likely to tip over in the seismic events, and so they are a danger for the safety of people nearby.

[0006] The purpose of this invention is to ensure that the structural elements of the equipped wall provide "*intrinsic anti-overturning*" properties on it, thanks to the union between structural metal elements defined as crossbeams (horizontal development) and the ones defined as uprights (vertical development), together they develop a frame which is able to withstand the stress induced by an earthquake.

[0007] This equipped wall is settled next to a masonry or other partition wall and it allows the anti-overturning property to be transferred to this partition wall in the seismic event actions.

[0008] The self-supporting partition wall cannot transfer the anti-overturning property, since it is not connected to any partition wall. However, if it is installed as a self-supporting partition wall, it is able to contribute to the safety of people nearby, since it expresses the other fundamental characteristic, which is the protection against falling bodies due to the ceiling damage.

[0009] This equipped wall has the advantage of not

transferring loads to the partition walls, as it can only be discharged onto the floor.

[0010] This equipped wall is set up to be modular and so it allows the composition of modelling as required.

[0011] Each module of the equipped wall can rigidly insert a shelter at its top with a structural function that makes it possible to contain any falls of bricks due to ceiling damage. It has the function of preventing the people below to be hit and thus creating a life-saving area. Another advantage of this system is that it is made up of prefabricated elements which are easy to assemble and transport.

[0012] The following part describes in more detail the elements that define this equipped wall; in this respect, please make reference to the graphical representations of the attached figures, which have the only purpose of simplifying the understanding of the representation, although they are not binding in terms of shape or dimensions.

[0013] The reference figures are:

Fig. 1 - represents an axonometric view of the metal structure with a life-saving function.

Fig. 2 - represents a side view of the uprights.

Fig. 3 - represents an axonometric and exploded view of the far-end elements of the uprights.

Fig. 4 - represents a view of the uprights/slab and uprights/floor coupling system.

Fig. 5 - describes the floating superstructure covering the main structure.

[0014] With reference to these figures, we can say that the equipped wall consists of a structure characterised by steel uprights 2 and crossbeams 1. The uprights are made up of three parts, two of them are of the same shape and they are the far-end of the uprights; they are made up of welded elements such as a tubular bar 2a with a rectangular cross-section with a welded rectangular plate 2b at one end that acts as a foot, and which allows it to be connected with both the ceiling and the floor; there are also two other tubular elements 2c with a circular cross-section welded to both the bar 2a and the plate 2b that act as struts - tie rods. The third part 2d is a tubular element that fits inside the rectangular profiles of the end parts, which allows them to be connected, making it possible to adjust the length of the whole uprights telescopically according to the height of the ceiling. Two further rectangular steel profile parts, which are called crossbeams 1, are arranged horizontally; they connect the various uprights used in the configuration with a removable fixing.

[0015] In order to ensure better alignment of the foot plates 2b with the surfaces of ceiling or floor, a movable plate 5 is interposed between said foot 2b and ceiling or floor. Said movable plate, on the side of interfacing with ceiling or with floor, has a suitable thickness of elastomeric material 4 with same surface dimensions. Said mobile plate 5 together with the elastomeric element 4

interposed, allows both to recover any misalignments with the interfaces plate / ceiling or plate / floor and to be able to apply a preload both with the surfaces of the ceiling and the floor thanks to the screw adjustment system of said movable plate 5. Said screw adjustment system allows the movable plate 5 to be moved away from the foot 2b. All this makes it possible to maintain contact even in conditions where dynamic stresses are applied to the structure as well as, due to the effect of the improved adhesion between the elastomer 4 and the contact surface, being more effective in counteracting mutual slip. Depending on the conditions encountered in the building, the fixings of the movable plates 5 to the ceiling and to the floor can be integrated with mechanical fixing dowels 6.

[0016] All this ensures that the structure of said equipped wall works according to the static arched scheme and also satisfies at best the purposes for which it has been conceived; here it is a short summary:

- it has the function of preventing the overturning of partition walls
- it has a life-saving function thanks to the presence of a structural shelter (3) and also thanks to the intrinsic anti-overturning condition.

[0017] So far, this is what the equipped wall offers in terms of safety, obviously it also guarantees functional aspects for housing accessories such as: shelves, containers and anything else that may be useful for the finalization of the wall system.

[0018] For this purpose, said equipped wall separates the life-saving structural function from the function of supporting the accessories. For this it makes use of a structure 7 (which can be made of various kinds of materials from wood to polymeric to metal as well as to composites) which is leaning directly on the ground and adds aesthetic value (it partially or totally hides the structural elements) as well as functional value allowing to support all the accessories provided for the customized set-ups. These accessories are fixed directly to the structure 7 without placing their weight on the steel structure. The fact that the structure 7 itself constitutes the structural part for the application of the accessories means that it does not affect the load transfers on the steel safety structure, which can carry out its functions freely.

[0019] The connection between the structure 7 and the steel structure allows the structure 7 to move on the floor plane independently from the movements of the steel structure, thanks to a floating coupling, which is defined according to the chosen geometry.

Claims

1. Modular system of equipped wall with intrinsic anti-overturning function comprising two bearing structures, a metal frame with adjustable height (1,2,3)

and a second structure (7), which structures are mutually connected but free to move independently if dynamically stressed thanks to a floating connection, the metal frame with adjustable height comprising:

(i) four vertical uprights (2), each composed of:

- two equal parts, that make up the ends of the upright, each obtained by welding one end of a tubular profile of rectangular section (2a) with a rectangular plate (2b) which acts as the foot of the upright and welding with two tubular elements with a circular section (2c) joined both to the profile (2a) and to the plate (2c),
- a part consisting of rectangular section tubular profile (2d) which fits inside the rectangular section tubular profiles (2a) of the said end parts of the upright, allowing the telescopic connection and guaranteeing the height adjustment of the upright,
- each rectangular plate (2b) being joined to a movable plate (5), joined on one side to said rectangular plate (2b) of the upright with height adjustable screw connection, bearing on the opposite side a coating in glued elastomeric material (4) which interfaces with the floor or with the ceiling respectively and which has at least one housing for fixings which can be integrated with mechanical anchors (6),

(ii) two horizontal crossbeams in rectangular section tubular profile (1) connected to the uprights (2) with removable fixing,

(iii) at least one protection shelter (3) connected to a pair of said uprights (2) with removable fixing, and said second bearing structure (7) comprising a plurality of vertical load-bearing elements in the installed condition leaning on the floor, made of various materials and various shapes, that are connected to the said first structure and contain anchors of the furnishing accessories, such as shelves, drawers, sliding doors etc.

2. Modular system of equipped wall according to claim 1 **characterized in that** said first structure is formed by a frame with adjustable height fixable to the floor and to the ceiling by said movable plates (5) and composed of four vertical uprights (2), two horizontal crossbeams (1) and a protection shelter (3) connected with removable fixings, designed to counter the overturning of non-earthquake-resistant partition walls against which said frame is leaning and to contain the fall of bodies from ceiling damage thanks to the said protection shelter (3).

3. Modular system of equipped wall according to claims 1 and 2 **characterized in that** said second supporting structure (7) leaning on the floor and connected to said first structure with floating connection and comprising a plurality of vertical elements of various shapes and materials, is able to support accessories such as panels, shelves, containers, etc. allowing them not to load their own weight and the weight of the accessories on the first structure. 5
4. Modular system of equipped wall according to one or more of preceding claims **characterized in that** said second structure has an aesthetic-functional value and is able to cover said first structure to improve the aesthetic appearance. 10
5. Modular system of equipped wall according to one or more of preceding claims **characterized in that** said elastomeric material (4) integrated with the mobile plate (5) interfaces both with the ceiling and with the floor in the installed condition, compensating geometric misalignments and improving adherence in interfacing both with the ceiling and with the floor. 20
6. Modular system of equipped wall according to one or more preceding claims **characterized in that** said movable plate (5) integrated with said elastomeric material (4), is connected to the foot of the upright (2b) with adjustment screws allowing to apply a compression preload between elastomeric material (4) and ceiling and elastomeric material (4) and floor. 25
7. Modular system of equipped wall according to one or more of preceding claims **characterized by** further comprising mechanical anchors (6) with which said movable plate (5) can be connected to the ceiling or to the floor to prevent the possible sliding if the admissible preload to the ceiling is not sufficient. 30

Patentansprüche

1. Modulares System einer ausgestatteten Wand mit intrinsischer Kippschutzfunktion, umfassend zwei Lagerstrukturen, einen Metallrahmen mit verstellbarer Höhe (1,2,3) und eine zweite Struktur (7), wobei die Strukturen miteinander verbunden sind, sich jedoch aufgrund einer frei beweglichen Verbindung unabhängig bewegen können, wobei der Metallrahmen mit verstellbarer Höhe Folgendes umfasst: 40
- i) vier vertikale Ständer (2), jeweils bestehend aus:
- zwei gleichen Teilen, aus denen die Enden jedes vertikalen Ständers bestehen, die jeweils durch Verschweißen eines Endes eines rohrförmigen Profils mit rechteckigem 45

Querschnitt (2a) mit einer rechteckigen Platte (2b), die als Fuß des vertikalen Ständers wirkt, und durch Verschweißen zweier rohrförmiger Elemente mit einem kreisförmigen Querschnitt (2c), der sowohl mit dem Profil (2a) als auch mit der Platte (2c) verbunden ist, erhalten werden,

- einem Teil, das aus einem Rohrprofil mit rechteckigem Querschnitt (2d) besteht, das in die Rohrprofile mit rechteckigem Querschnitt (2a) der Endteile des vertikalen Ständers passt und eine teleskopische Verbindung ermöglicht und die Höhenverstellung des vertikalen Ständers gewährleistet,

- wobei jede rechteckige Platte (2b) mit einer beweglichen Platte (5) verbunden ist, die auf einer Seite mit der rechteckigen Platte (2b) des vertikalen Ständers mit höhenverstellbarer Schraubverbindung verbunden ist und auf der gegenüberliegenden Seite eine Beschichtung aus geklebtem Elastomer material (4) trägt, die mit dem Boden bzw. der Decke in Verbindung steht und mindestens ein Gehäuse für Befestigungen aufweist, die mit mechanischen Ankern (6) integriert werden können,

ii) zwei horizontalen Querträgern in einem Rohrprofil (1) mit rechteckigem Querschnitt, die mit den vertikalen Ständern (2) mit lösbarer Befestigung verbunden sind,

iii) mindestens einen Schutzschirm (3), der mit einem Paar der vertikalen Ständer (2) mit lösbarer Befestigung verbunden ist, und wobei die zweite Lagerstruktur (7) im aufgestellten Zustand eine Vielzahl von vertikalen, auf dem Boden liegenden tragenden Elementen aus verschiedenen Materialien und verschiedenen Formen umfasst, die mit der ersten Struktur verbunden sind und Anker der Einrichtungszubehörteile, wie Regale, Schubladen, Schiebetüren usw., enthalten.

2. Modulares System einer ausgestatteten Wand nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste Struktur aus einem Rahmen mit verstellbarer Höhe besteht, der mittels der beweglichen Platten (5) am Boden und an der Decke befestigbar ist und aus vier vertikalen Ständern (2), zwei horizontalen Querträgern (1) und einem Schutzschirm (3) besteht, die mittels lösbarer Befestigungen verbunden sind, dazu ausgelegt, das Umkippen von nicht erdbebenresistenten Trennwänden, an die der Rahmen angelehnt ist, zu verhindern und dank des Schutzschirms (3) das Herunterfallen von Gegenständen durch Deckenschäden zu begrenzen. 50
3. Modulares System einer ausgestatteten Wand nach

- den Ansprüchen 1 und 2, **dadurch gekennzeichnet, dass** die zweite Tragstruktur (7), die auf dem Boden aufliegt und über eine frei bewegliche Verbindung mit der ersten Struktur verbunden ist, eine Vielzahl von vertikalen Elementen verschiedener Formen und Materialien umfasst, dazu ausgelegt ist, Zubehörteile wie Paneele, Regale, Behälter usw. zu tragen, sodass deren Eigengewicht und das Gewicht der Zubehörteile nicht auf die erste Struktur einwirken.
4. Modulares System einer ausgestatteten Wand nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die zweite Struktur einen ästhetisch-funktionalen Wert aufweist und in der Lage ist, die erste Struktur zu verkleiden, um das ästhetische Erscheinungsbild zu verbessern.
5. Modulares System einer ausgestatteten Wand nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das mit der beweglichen Platte (5) integrierte Elastomermaterial (4) im montierten Zustand sowohl mit der Decke als auch mit dem Boden in Kontakt steht und geometrische Fehlausrichtungen ausgleicht sowie die Haftung an der Decke und am Boden verbessert.
6. Modulares System einer ausgestatteten Wand nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die bewegliche Platte (5), die mit dem Elastomermaterial (4) integriert ist, über Verstellerschrauben mit dem Fuß des Ständers (2b) verbunden ist, wodurch eine Druckvorspannung zwischen dem Elastomermaterial (4) und der Decke sowie zwischen dem Elastomermaterial (4) und dem Boden aufgebracht werden kann.
7. Modulares System einer ausgestatteten Wand nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** dieses ferner mechanische Verankerungen (6) umfasst, mit denen die bewegliche Platte (5) an der Decke oder am Boden verbunden werden kann, um ein mögliches Abrutschen zu verhindern, falls die zulässige Vorspannung an der Decke nicht ausreicht.
- Revendications**
1. Système modulaire de paroi équipée, avec fonction intrinsèque anti-basculement, comprenant deux structures portantes, un cadre métallique avec hauteur ajustable (1, 2, 3) et une seconde structure (7), lesquelles structures sont mutuellement reliées mais libres de se mouvoir indépendamment si elles subissent une contrainte dynamique, grâce à une liaison flottante, le cadre métallique avec hauteur ajustable comprenant :
- (i) quatre montants verticaux (2), chacun composé de :
- deux parties égales, qui constituent les extrémités de chaque montant, chacune obtenue en soudant une extrémité d'un profilé tubulaire de section rectangulaire (2a) avec une plaque rectangulaire (2b) qui sert de pied du montant et soudant avec deux éléments tubulaires, avec une section circulaire (2c), joints à la fois au profilé (2a) et à la plaque (2c),
 - une partie constituée d'un profilé tubulaire de section rectangulaire (2d) qui s'ajuste à l'intérieur des profilés tubulaires de section rectangulaire (2a) desdites parties d'extrémité du montant, permettant la liaison télescopique et garantissant l'ajustement de hauteur du montant,
 - chaque plaque rectangulaire (2b) étant jointe à une plaque mobile (5), jointe sur un côté à ladite plaque rectangulaire (2b) du montant avec liaison par vis ajustable en hauteur, supportant, sur le côté opposé, un revêtement en matériau élastomère collé (4) qui effectue une interface avec le plancher ou avec le plafond, respectivement, et qui a au moins un logement pour des fixations qui peuvent être intégrées avec des ancrages mécaniques (6),
- (ii) deux traverses horizontales dans le profilé tubulaire de section rectangulaire (1) relié aux montants (2) avec fixation amovible,
- (iii) au moins un dispositif de protection (3) relié à une paire desdits montants (2) avec fixation amovible, et ladite seconde structure portante (7) comprenant une pluralité d'éléments portants verticaux dans la condition installée s'appuyant sur le plancher, faits de divers matériaux et de diverses formes, qui sont reliés à ladite première structure et contiennent des ancrages des accessoires d'ameublement, tels que des étagères, des tiroirs, des portes coulissantes, etc.
2. Système modulaire de paroi équipée selon la revendication 1, **caractérisé en ce que** ladite première structure est formée par un cadre avec hauteur ajustable fixable au plancher et au plafond par lesdites plaques mobiles (5) et composée de quatre montants verticaux (2), deux traverses horizontales (1) et un dispositif de protection (3) relié avec des fixations amovibles, conçu pour contrer le basculement de parois non parasismiques contre lesquelles

ledit cadre s'appuie et pour contenir la chute de corps de dégâts de plafond grâce audit dispositif de protection (3).

3. Système modulaire de paroi équipée selon les revendications 1 et 2, **caractérisé en ce que** ladite seconde structure de support (7), s'appuyant sur le plancher et reliée à ladite première structure avec liaison flottante et comprenant une pluralité d'éléments verticaux de diverses formes et de divers matériaux, est capable de supporter des accessoires tels que des panneaux, des étagères, des contenants, etc. leur permettant de ne pas charger leur propre poids et le poids des accessoires sur la première structure. 5
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4. Système modulaire de paroi équipée selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite seconde structure a une valeur esthétique-fonctionnelle et est capable de couvrir ladite première structure pour améliorer l'apparence esthétique. 20
5. Système modulaire de paroi équipée selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit matériau élastomère (4) intégré avec la plaque mobile (5) effectue une interface à la fois avec le plafond et avec le plancher dans la condition installée, et compensant des désalignements géométriques et améliorant l'adhérence dans l'interface à la fois avec le plafond et avec le plancher. 25
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6. Système modulaire de paroi équipée selon une ou plusieurs revendications précédentes, **caractérisé en ce que** ladite plaque mobile (5) intégrée avec ledit matériau élastomère (4), est reliée au pied du montant (2b) avec des vis d'ajustement permettant d'appliquer une précharge de compression entre le matériau élastomère (4) et le plafond et le matériau élastomère (4) et le plancher. 35
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7. Système modulaire de paroi équipée selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'il** comprend en outre des ancrages mécaniques (6) avec lesquels ladite plaque mobile (5) peut être reliée au plafond ou au plancher pour empêcher le glissement éventuel si la précharge admissible sur le plafond n'est pas suffisante. 45
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Fig.1

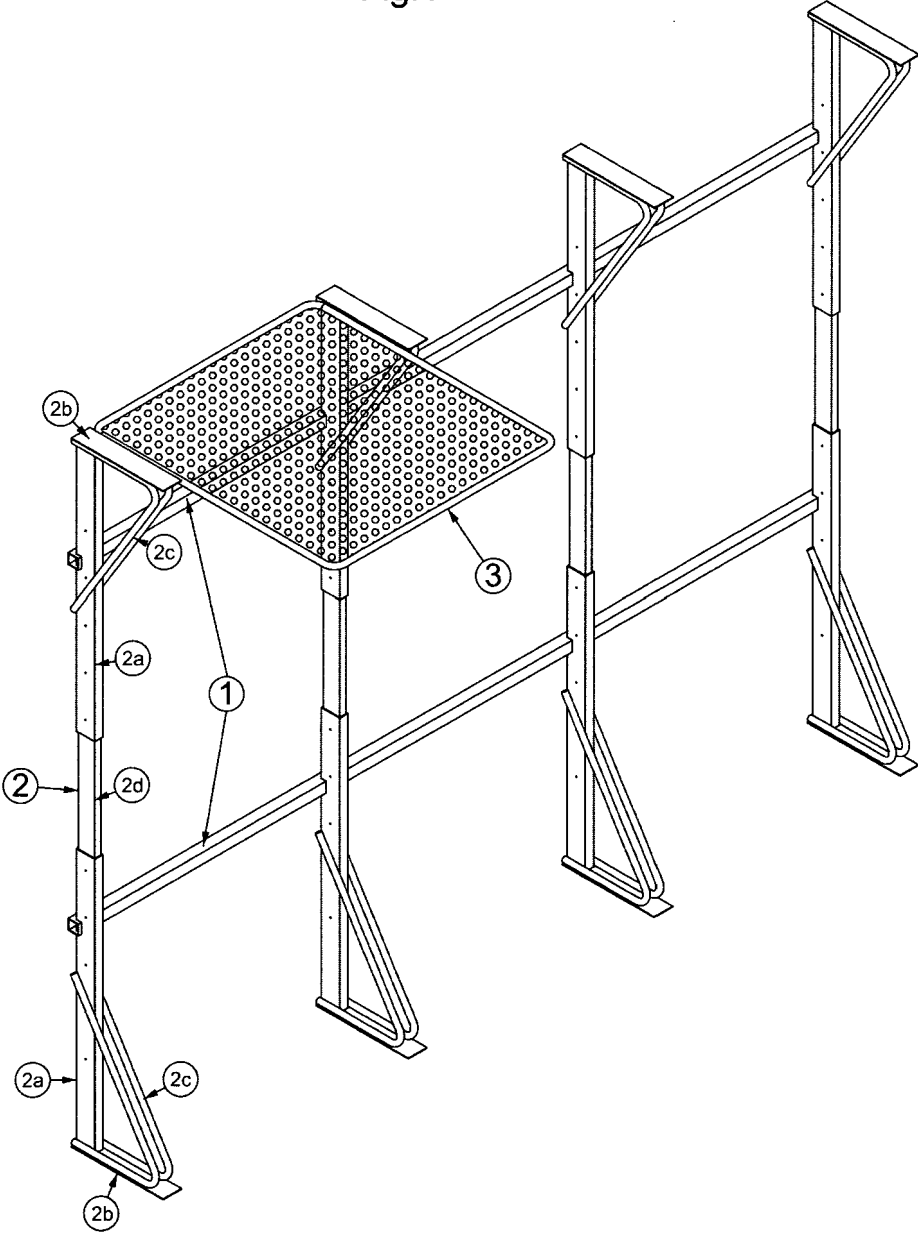


Fig.2

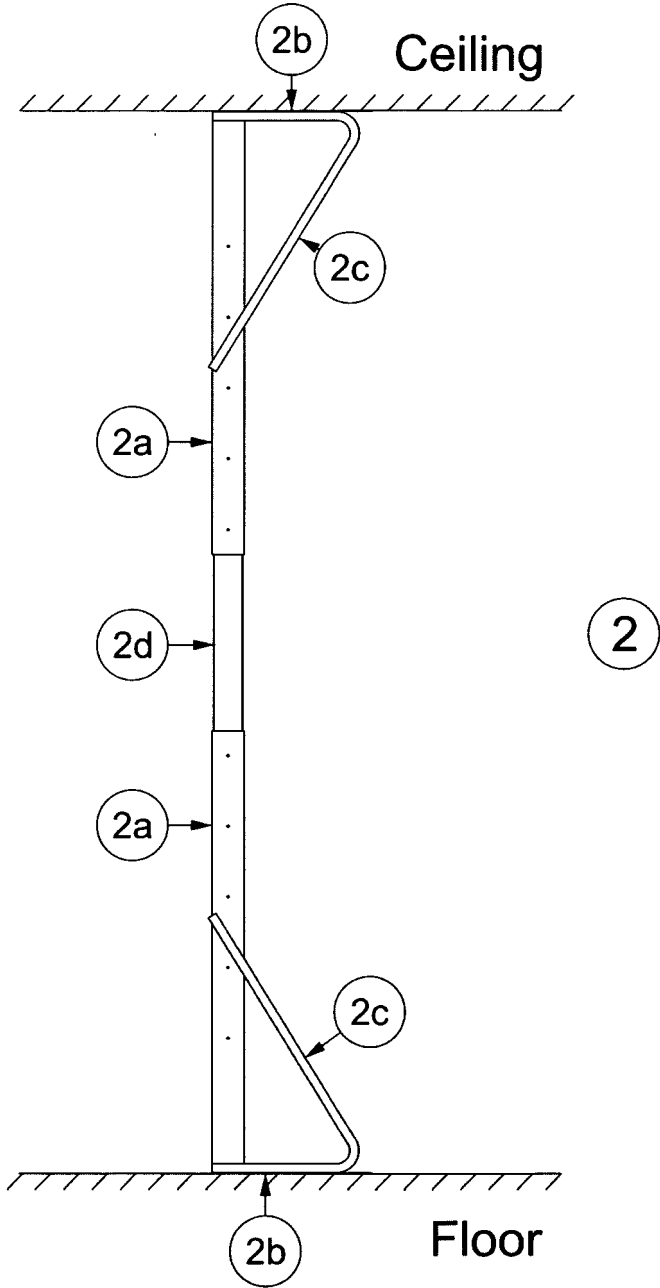


Fig.3

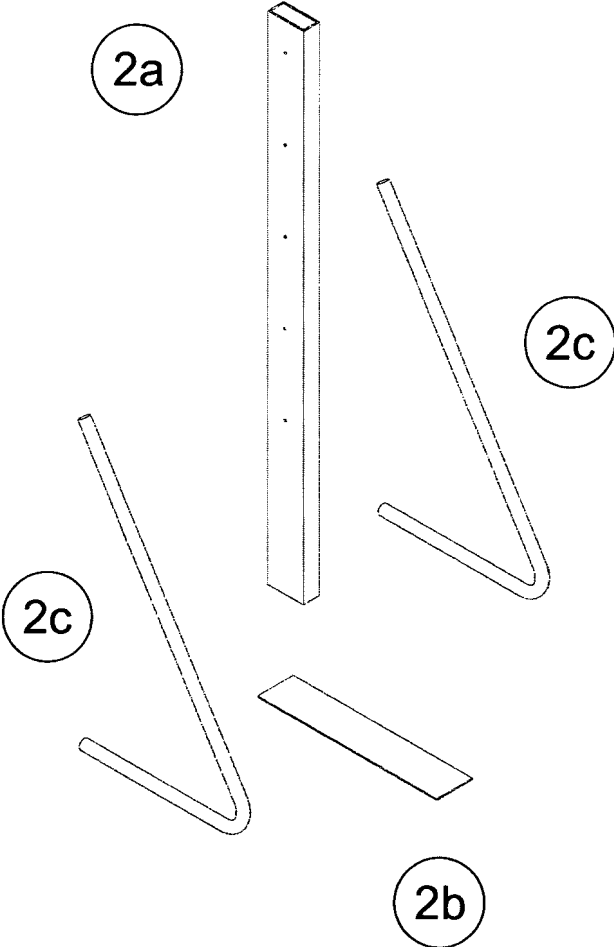


Fig.4

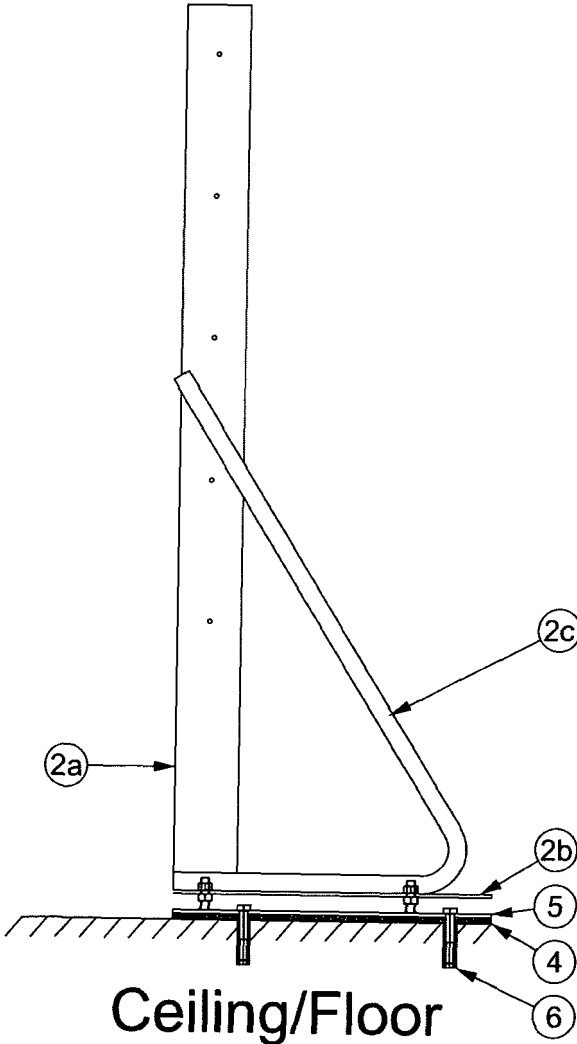
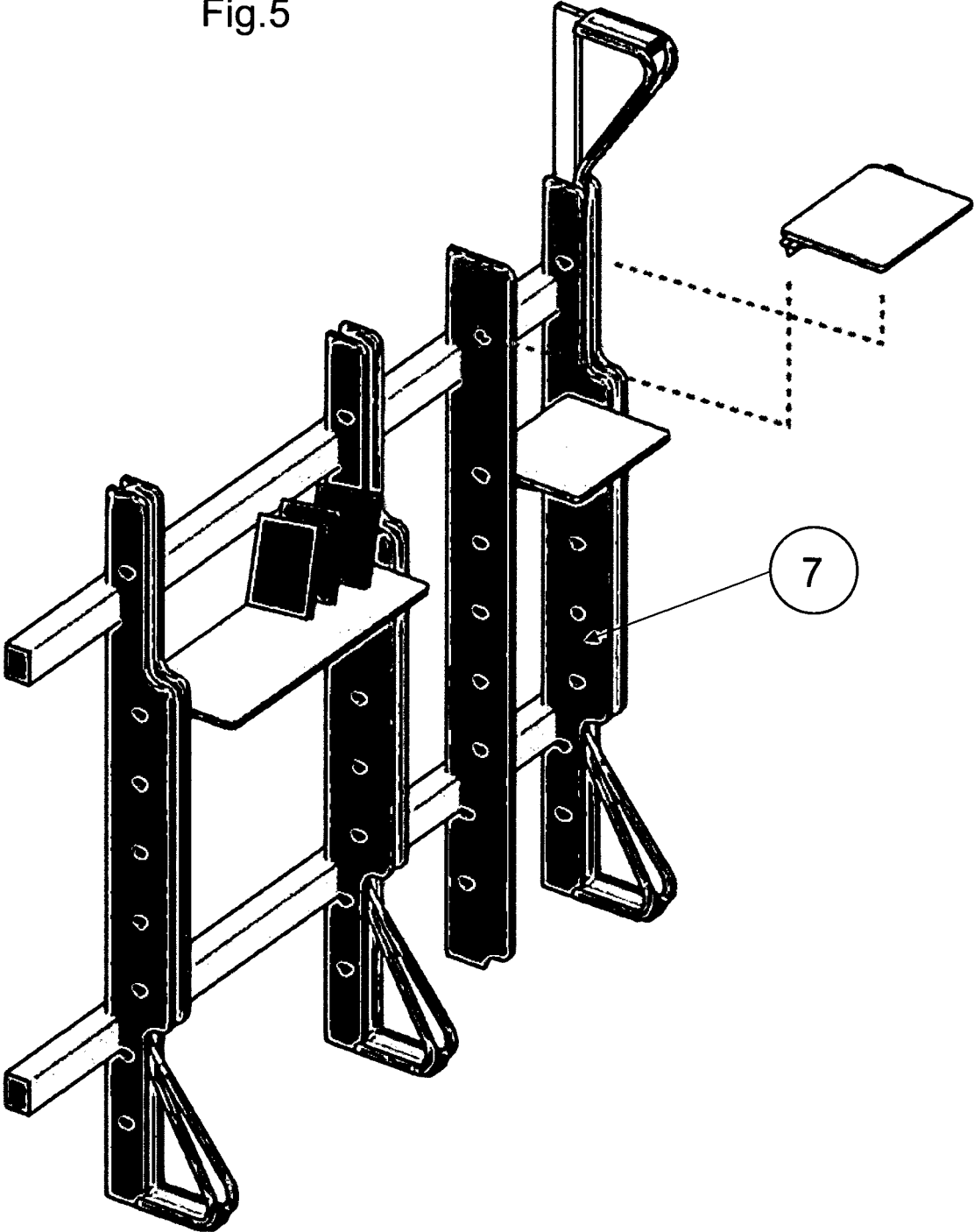


Fig.5



REFERENCES CITED IN THE DESCRIPTION

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