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(54) Dynamic system for supporting and anchoring movable partitions

(57) Dynamic system for supporting and anchoring movable partitions for compartmenting interiors, comprising panels, supporting uprights of said panels and coupling means of said uprights with the anchorage surfaces of the whole structure, and characterized in that said coupling means of the uprights to the anchorage surfaces are elastic hinge constraints which allow to modify the inclination of said coupling means with respect to the anchorage surfaces and to modify the adherence or parallelism conditions between the panel and the upright supporting the same, to absorb compression and traction stresses thus shortening or elongating both with static and impulsive stresses.

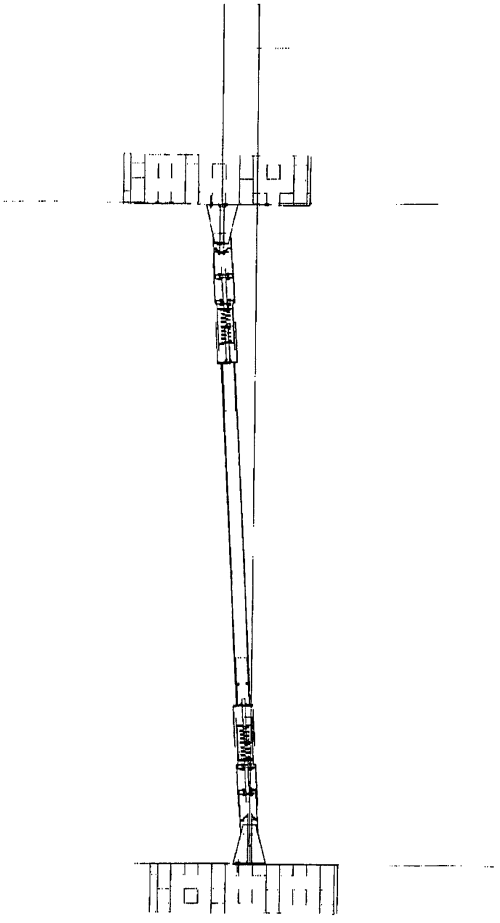

Fig. 3

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Description

[0001] Object of the present utility model is a dynamic system for supporting and anchoring movable partitions, designed to complete and improve the invention described in the European Patent n° EP 1562457.

[0002] Said Patent describes in fact a system of panels for compartmenting interiors, which can be assembled, disassembled and re-assembled elsewhere with a different lay-out rapidly, securely and in a versatile manner. It essentially consists of a metal structure comprising uprights having auto-leveling and telescopic feet and rods to allow its blocking and extension.

[0003] The invention described in said Patent uses a system, whereby structural elements can be assembled and/or disassembled or arranged elsewhere rapidly, securely and in a versatile manner in order to solve the problems caused by compartmenting fixed walls, thus satisfying the need for low partitions and providing at the same time a secure fixing to the surrounding structure. Moreover, said system of panels represents also a solution to improve the working spaces usage and the operativeness anywhere it is appropriate or necessary physically but not totally compartmenting the space.

[0004] The aforementioned invention is limited in that it is a rigid structure, neither capable of reacting to dynamic stresses (those, for example, typically induced by earthquakes), nor capable of finding a stable balance configuration after permanent strains suffered by floor and/or ceiling, due to settlement of the respective building (for example due to the underlying ground subsidence).

[0005] Object of the present utility model is a dynamic system for supporting and anchoring, conceived to allow the described compartmenting structures, realized according to the features of the European Patent n° 1562457, not to be damaged and not to collapse when assembled in not stably rigid environments, regardless of the mutual movement of the coupling points of the uprights upper and lower feet to the base structure.

[0006] The system object of the present invention comprises in fact an assembly of organs allowing the aforementioned partition panels to be adapted to the inclination variation of the uprights, both in case said partition is provided for the whole height between floor and ceiling (real partition), and in case the same is detached from the floor as well as from the ceiling.

[0007] This is because, according to the present utility model, said panels can be provided with particular oscillating jaws which, together with the uprights, allow to modify the inclination of the contact elements, without modifying the position of the same panels.

[0008] In other words, the invention allows to hold in loco the partition element (partition or panel), without deformations or with expected position modifications and therefore with annullable effects, even if the coupling points of the uprights to the ceiling and to the floor are relatively displaced.

[0009] By applying the inventive system to said compartmenting structures it is in fact possible for said structures to be easily adapted to the inclination variation of the uprights, whenever the coupling points of the upper and lower feet of the system are moved:

- in parallel but not with a mutually congruent movement
- in orthogonal direction to the laying plane varying the respective distance;
- inclined, by varying the original angle.

[0010] Said movements can be induced with static, dynamic and impulsive stress as well.

[0011] In the preferred but absolutely not limiting embodiment described in drawings 1/3, 2/3 and 3/3, the invention of the present utility model comprises the following elements:

- uprights (11)
- flat elements (12) (partitions or panel supported by said uprights).

[0012] In particular, in the drawings:

- fig. 1 shows the prospect of the whole system panel/upright in an elevation view;
- fig. 2 shows in particular an upright and respective coupling means to the anchorage surface, in the different elements provided in said mechanism;
- fig. 3 shows the same upright as fig. 2 in an oblique position.

[0013] In the preferred embodiment according to said figures, the uprights comprise a rod of suitable dimensions, realized in tubular in stainless steel or other material, and two coupling means mounted on the same at each end, which connect the same rod to the anchorage surfaces.

[0014] Said uprights can be mounted with any inclination with respect to the vertical and therefore also in horizontal, to provide coupling between vertical elements, since the coupling means acts as an elastic hinge constraint.

[0015] Said two coupling means of the rod of the upright to the anchorage surfaces comprise in going away order from the supporting surface:

- a plate (1) for load distribution, to be fixed to the ceiling or floor by means of three screw anchors (1.a) and a centrally welded nut (1.b) capable of receiving a fixing pin (3).
- A hollow frustum of cone (2) with a base diameter equal to the minor-base height and diameter equal to 2/5 of the major base diameter.
- A wholly threaded fixing pin (3) of the frustum of cone (2) to the plate (1), 35 mm longer than the height of the cone, with diameter equal to 2/5 of the frustum of cone minor base diameter, and comprising:

- a 5 mm thick collar (3.a), with hole diameter of the pin, tapped with the same thread as said pin; the collar diameter is 5 mm greater than the frustum of cone minor base one;
- a Belleville washer (3.b) (or a hard but elastic rubber pad) welded under the head of the pin (3) and having diameter equal to the cone blocking collar (3.a) one.
- A telescopic element (4) comprising a male socket (4.1) and a female socket (4.2).

[0016] The male socket (4.1) is made up of a steel tube section with diameter equal to 3/2 of the cone minor base diameter and length equal to 4/5 of the cone height. At 35 mm distance from the open edge of the socket, 3 screws (4.1.a) having length equal to 1/4 of the socket diameter are inserted in tapped holes at 120° to the axis, in radial position from outside inwards. One of the ends is closed by a 4 mm thick plate (4.1.b). In the closing plate a through-hole with diameter greater than the cone fixing pin one is provided in central position. A moving free bolt (4.1.c) of diameter equal to the aforementioned one to fix the cone to the base (1.b) is provided on the outer portion of the plate which closes the telescopic male socket (4.1). Even if free to move perpendicularly and in parallel to the plate (4.1.b), the bolt hole is coaxial to the above-described hole of the plate. A 3 mm thick circular plate (4.1.d) with diameter equal to 2/3 of the diameter of the plate closing the telescopic male socket (4.1.b) is fixed by screws and spacers to the closing bottom of the socket and holds the bolt in position. The plate has a central hole equal to the socket closing plate hole. The plate is such realized that the bolt can move freely with an amount of play of about 2 mm, according to the orthogonal axes, but it cannot go out from its housing, nor rotate freely therein.

[0017] The female socket (4.2) is made up of a tube section with 1 mm inner diameter greater than the outer diameter of the male element (4.1) and length equal to the height of the cone. A 4 mm thick steel disc (4.2.a) welded to the edge of the tube closes one of the ends. A plate (4.2.b) with a central hole through which a pin (5) passes freely to move, whose head, caged between said plate (4.2.b), the bottom of the female socket (4.2.a) and the fixing pins of the plate to the bottom, can move both in parallel and orthogonally to the supporting surface, but it cannot rotate.

- A pin (5) of length equal to 5/6 of the female socket of the telescopic element (4.2) is held pressed, in compression load phase against the closing plate of the socket (4.2.a). The plate (4.2.b) which holds its position fixed, allows it to be translated of maximum 2 mm in parallel and in perpendicular to the supporting plane, but does not allow it to be rotated.
- a section of pin (6) with the same diameter as the other pins of the telescopic system, and length not greater than 18 mm, is welded in axial position on the opposite side of the plate (4.2.a). Here there will be screwed a "high" type bolt (7.1.a) with diameter equal to the above-described pins, welded on the outer surface of the male element base of a shock absorber (7.1).
- A shock absorber (7) comprising two sockets, a male (7.1) and a female (7.2) one sliding between each other with opposite openings, is fixed to the pin (6) welded on the telescopic element (4.2) by means of a bolt (7.1.a) welded to the base of the male element (7.1) of the shock absorber. A 20 mm long neck (7.1.b) made up of an extension of the outer cylindrical surface of the element (7.1) allows to block said male element (7.1), screwed with the bolt (6) on the pin (5), against the base (4.2.b) of the telescopic element. Said two sockets (7.1, 7.2) which slide mutually, the one inside the other, are guided by a rod (7.2.a) with ground outer surface. Said rod (7.2.a) welded inside the base of the female socket (7.2) slides in an oil-sealed bushing (7.1.d) arranged in a closing plug (7.1.e) of the male socket (7.1), screwed on an inner thread (7.1.f) at the open end of the same socket. A circular plate (7.2.b) orthogonal to the axis of the pin (7.2.a) is fixed in position to its end, in resting phase, about at the middle of the male socket (7.1). Said plate (7.2.b) with slightly lower diameter than the inner one of the male socket (7.1) is provided with small diameter holes. In this way, when the sockets (7.1, 7.2) slide mutually between each other, the holed disc can cover the whole inner volume of the male socket (7.a). A helical cylindrical spring (7.1.g. 1) is arranged between the disc (7.2.b) and the base of the male socket (7.1.c). The spring is elongable both in compression and in traction. A second helical cylindrical spring (7.1.g.2) is arranged between the disc (7.2.b) and the closing plug of the male socket. The dimensional and mechanical features of said two springs (7.1.g.1, 7.1.g.2) are identical. In the assembling step, the springs are partially compressed at the same length, but can be further 3 cm shortened or elongated. According to said features the shock absorber traction or compression resistance varies.
- A liquid mass (8) of suitable viscosity fills the inner space of the male socket (7.1). When the disc (7.2.b) arranged at the end of the rod (7.2.a) is moved, the liquid (8) passes through the holes provided on the disc and in the space comprised between the disc and the inner surface of the male socket, from the lower chamber to the upper one and vice versa, thus creating a resistance to the downflow dependent from the features of fluid viscosity and from the dimensions of the through holes, The shock absorbing system can be also made up of a gas shock absorber.
- A section of pin (7.2.c) of the same diameter as the other pins of the telescopic system, with length not greater than 18 mm, is welded in axial position on the closing plate (7.2.d) of the shock absorber female socket. On said pin section, a "high" type bolt (9.a)

with the same diameter as the aforementioned pins is screwed, welded on the closing plate (9.b) of a square box profile section (9), with such outer dimensions that it adheres to the inner surface of the box (10) constituting the upright. The section is five time its side long which has to be lower than 0,5 mm with respect to the inner side of the square box (10) constituting the upright. In case it has to be used a circular plate, on the section screwed to the shock absorber it will be inserted a sleeve of the same length, of square profile suitable to the welded section. The circular tube constituting the plate has to have an inner diameter not greater than 0,5 mm with respect to the outer diagonal of the sleeve. A bolt (9.a) is welded on the closing plate (9.b) of the section (9).

- a square or circular tubular (10) of suitable dimensions and thickness is intended to act as upright of the system. A through-hole (10.a) is arranged in the section screwed to the shock absorber, in the sleeve, in the square plate or in the circular plate, so that they are crossed by a transversal peg made up of a countersunk head Allen screw and a sleeve with inner thread suitable to the pin one, this being provided with countersunk head and socket as well. On each elements, there has to be provided two opposite holes with countersunk edge such that it is possible to introduce and fix the Allen screw thus avoiding its unscrewing in case the system undergoes traction stresses.

[0018] The operation principle of the described system for supporting and anchoring ensures stability and repositioning of anchored panels to the supporting elements, in case the initial structure of the upright/supporting surfaces system to the ceiling and floor is modified.

[0019] This is because the fixing of the panels to the uprights is characterized in that passing threaded inserts with 10 mm diameter are fixed in the vertical elements (10). To these inserts, there are fixed Allen screws with 10 mm in diameter, 100 mm in length. The pin is inserted in two socket washers with 12 mm inner diameter and 32 mm outer diameter and 5 mm riveted edge.

[0020] The through hole on the upright of the panel frame has a diameter equal to double the pin diameter. Between the sockets of the two washers it is positioned a helical cylindrical spring having 30 mm outer diameter and 90 mm length in resting condition. As the pin is screwed, compression increases in the spring. By screwing the pin with a dynamometric key, the spring can be loaded until the coupling force needed is ensured, but the spring will be still capable of being shortened in case of greater compression, i.e. it is not subdued to buckling.

[0021] The thus described upright/panels system is stable since in case the mutual position between the uprights and the anchoring surfaces of the cones/feet to the floor or ceiling is changed, the springs can absorb possible variations of adherence or parallelism which could occur between the uprights and the vertical sides of the panels, thus ensuring stability.

[0022] In order to ensure the oscillations on the upright surface and of the uprights, the vertical ends of the panels are made up of jaws rotating around an axial horizontal pin. Therefore it is obtained that the right angles of the quadrilateral vertexes constituting the panel become acute and obtuse angles without the real panel undergoes stresses according to the diagonals.

Claims

1. Dynamic system for supporting and anchoring movable partitions for compartmenting interiors, comprising panels, supporting uprights of said panels and coupling means of said uprights with the anchorage surfaces of the whole structure, and **characterized in that** said coupling means of the uprights to the anchorage surfaces are elastic hinge constraints which allow to modify the inclination of said coupling means with respect to the anchorage surfaces and to modify the adherence or parallelism conditions between the panel and the upright supporting the same.

2. System according to claim 1, wherein said coupling means further comprise a shock absorber which absorbs plastically the distance variations between the coupling points of the outer structure to the system and damps the amplitude of the elastic oscillations of the same system.

3. System according to claim 1 or 2, wherein said coupling means between the uprights and the anchorage surfaces comprise telescopic elements **characterized by** the possibility to be slanted when the anchorage points of the uprights undergo stresses of dynamic kind, while maintaining the applied force axial component in the upright and discharging the transversal shearing component on the feet couplings to the outer structure.

4. System according to any one of the preceding claims, wherein said coupling means of the panels to the uprights comprise an oscillating jaw and a pin leaning on the upright, two socket washers introduced in the pin and a helical cylindrical spring positioned between the two washers, whose compression increases while screwing the pin, thus absorbing possible variations of adherence or parallelism between the partitions and the upright supporting it.

5. System according to any one of the preceding claims, wherein each supporting upright comprises a rod and two coupling means mounted on its ends, which couple the same upright to the respective anchorage surfaces.

6. System according to claim 5, wherein said supporting uprights can be mounted both in vertical and horizontal direction or with another inclination and the anchorage surfaces can be ceiling and floor or walls or uprights.

7. System according to claim 5 or 6, wherein said movable partitions cover the whole length between the floor and the ceiling or they are detached from the floor and/or the ceiling.

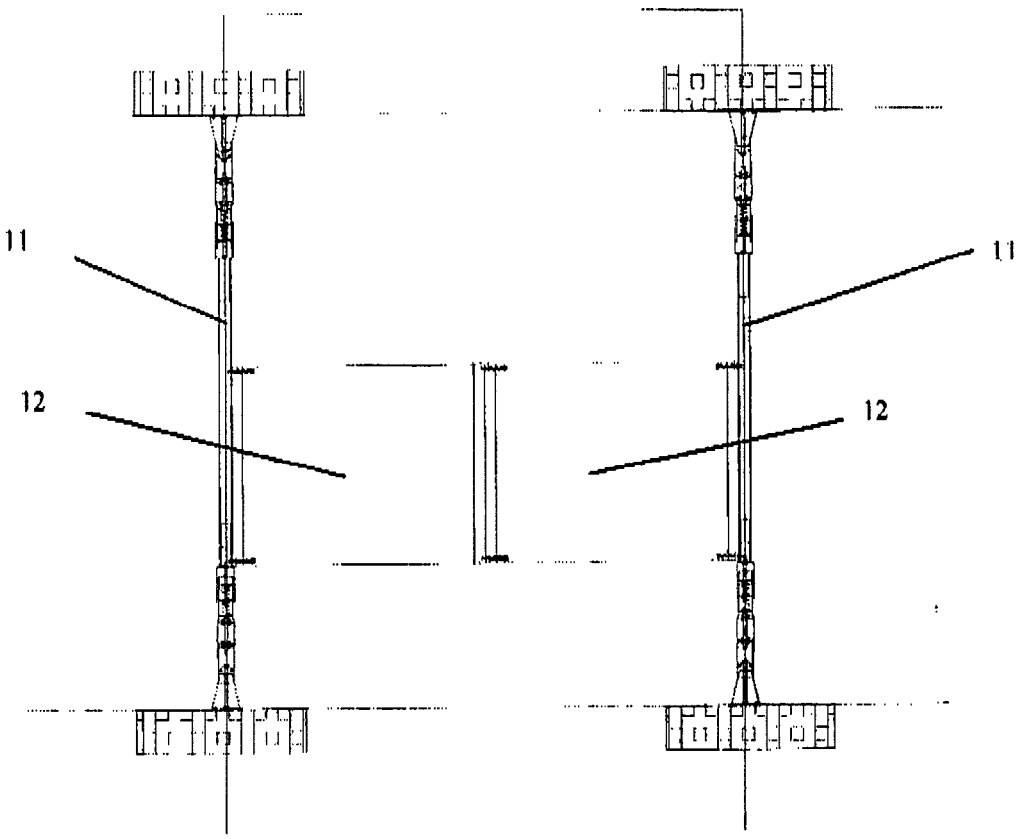

Fig. 1

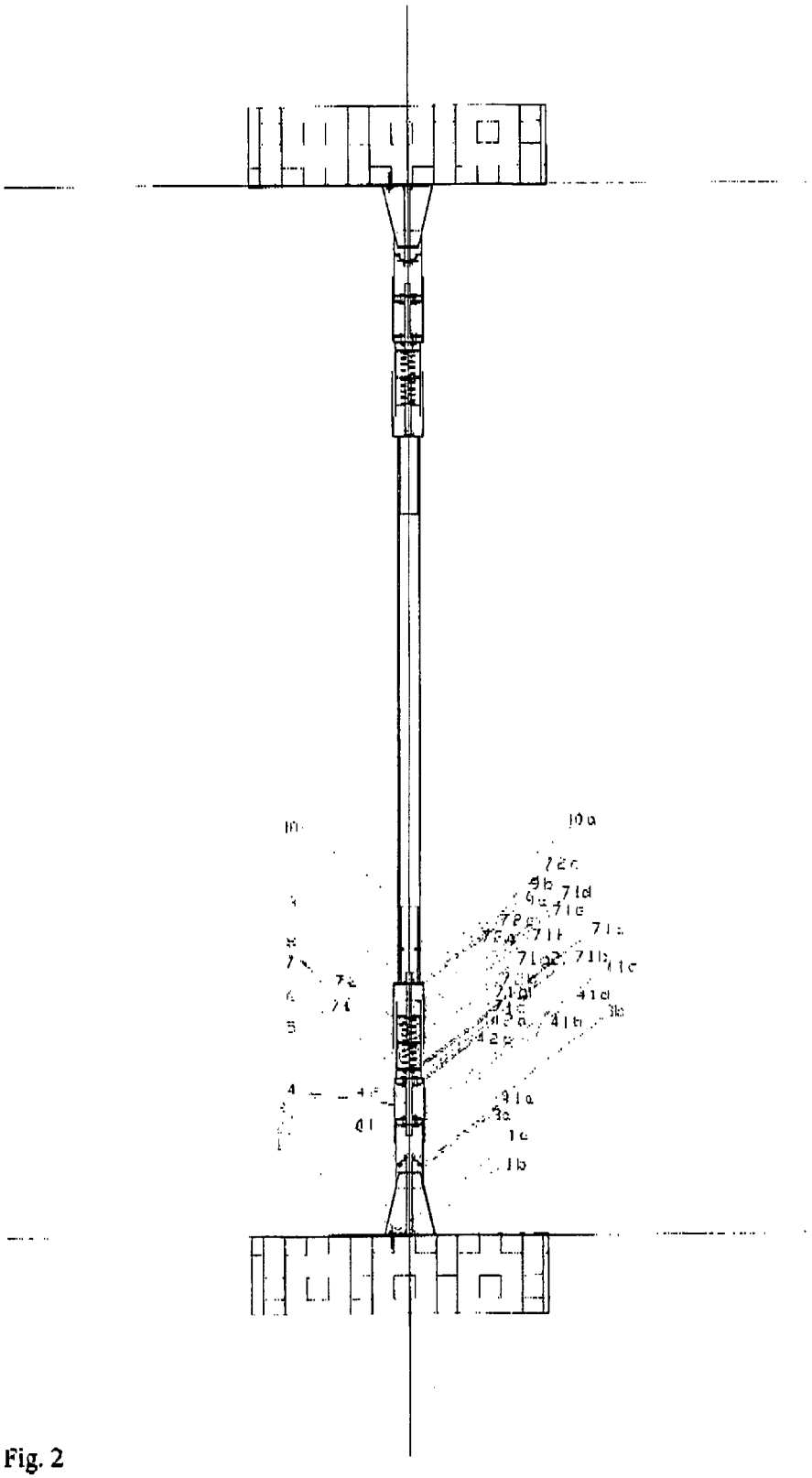

Fig. 2

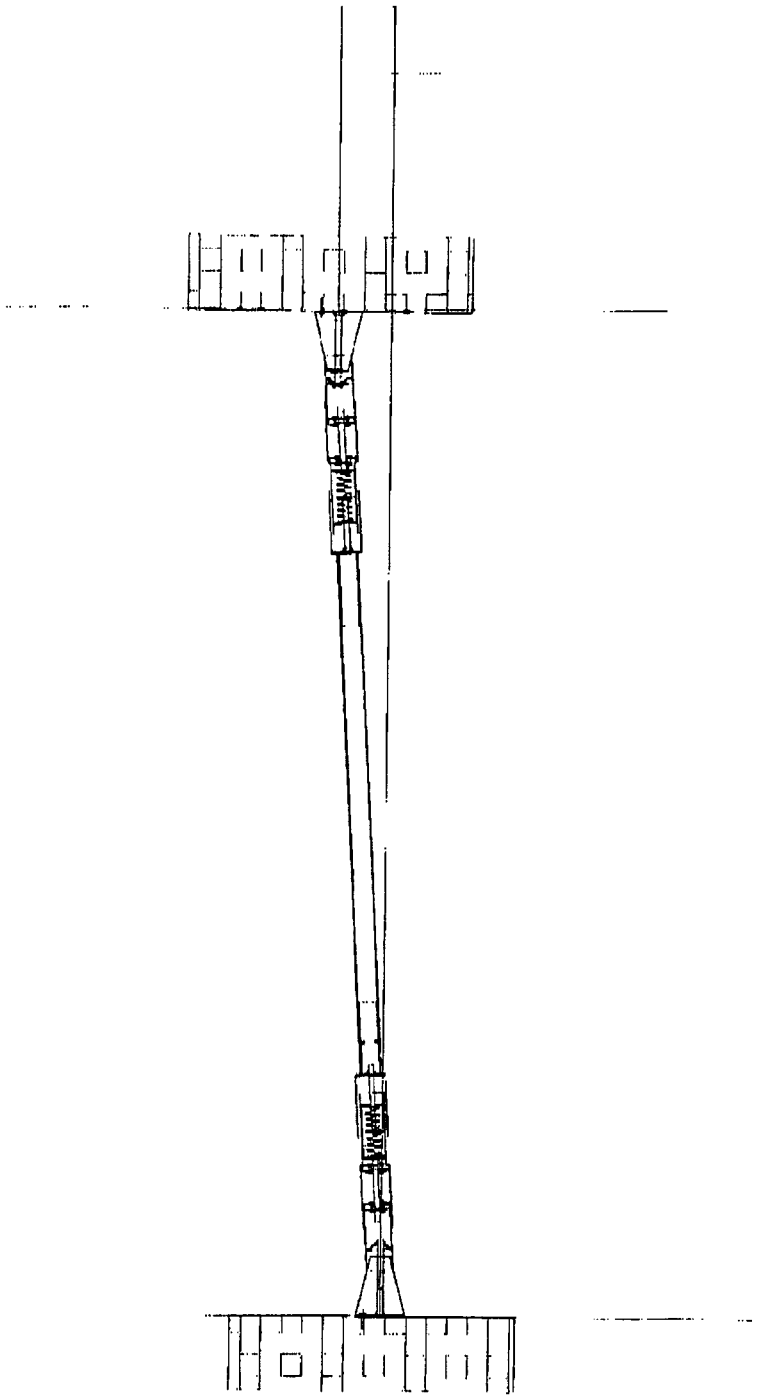

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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