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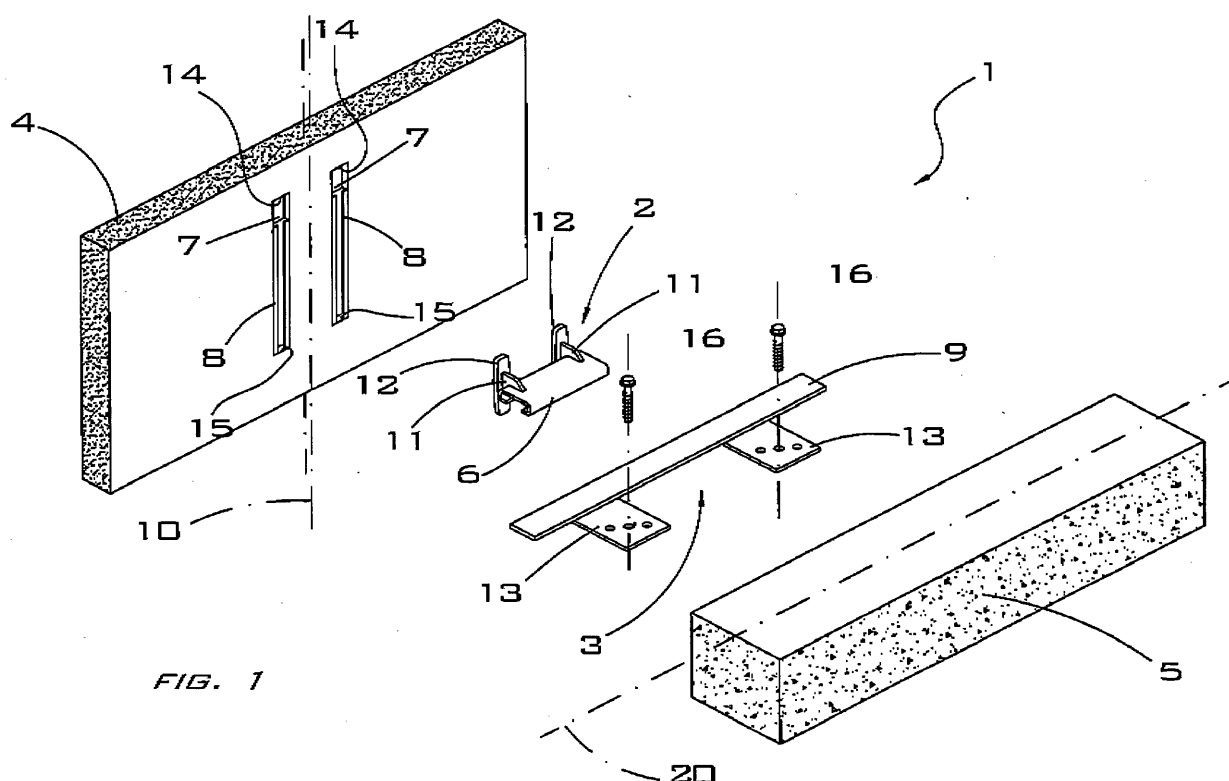
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(54) **A SEISMIC FIXING DEVICE, PARTICULARLY FOR PREFABRICATED BUILDINGS**

(57) The present invention relates to a seismic fixing device, particularly for prefabricated buildings, which comprises a slider (2) adapted to be moved along the vertical direction (10) substantially normal to the ground, by first guide means (7, 8, 12). The slider (2) is also adapted to be moved by second guide means (6, 9) along the horizontal direction (20) substantially normal to the ver-

tical direction (10). Such first guide means (7, 8, 12) are associated with a wall (4) of a building, while the second guide means (6, 9) are associated with a floor (5) of the building.

A feature of the invention is given by the fact that the second guide means (6, 9) are protruding from the floor (5).



Description

[0001] The present invention relates to a seismic fixing device, particularly for prefabricated buildings.

[0002] The seismic action may be subdivided in a first component substantially parallel to the surface of the walls composed of prefabricated panels, and in a second component, normal to the first one, substantially perpendicular to the surface of such panels.

[0003] For the seismic action being parallel to the surface of the panels, the walls, by unloading their weight to the ground, have a high stiffness, so that it is indispensable the use of connections allowing the structure to move independently from the panels, which are instead fixed, otherwise their mass will move.

[0004] In contrast, the panels not provide any stiffness to the seismic action perpendicular to their surface, and their connection to the structure must be dimensioned according to their mass, with constraints that must be related to the acceleration of the design.

[0005] In the current state of the art, the tried and tested and commercially available anchorages involve the manufacturing of a seismic node that can translate both along the direction of propagation of seismic action parallel to the panel and along the normal direction by a double slider, which is engaged to a horizontal guide integrally associated with the floor, e.g. by means of screws and bolts and/or embedded in the concrete, and on a vertical guide likewise associated to the wall. Devices of this type have serious problems.

[0006] This type of panels are prepared in factory, bored according to a pattern, and then mounted in the yard. During the installation, few millimetres of mismatch between the guides, which are very frequent for many reasons (independent also from the manual skills of the operators, such as the ground, the type of concrete used, the air humidity, etc.), are enough to cause the device to be badly positioned, resulting in strains in the panel during the seismic phase.

[0007] The joint, in fact, is a fixed constraint, and earthquakes of small intensity may also cause an oscillation up to tens of centimetres with serious consequences for the buffering walls and subsequent risks for those who are in these buildings.

[0008] Furthermore, as already mentioned, this type of seismic fixings are difficult to be placed and mounted, but even more fragile and complex to be replaced or restored, precisely because a complete integration (by embedding) within the walls on which they are mounted is required. The task of the present invention is to eliminate the above drawbacks of the known types of seismic fixing device, particularly for industrially prefabricated buildings, in order to ensure the proper operation during the seismic phase, without producing strains in the walls, and especially to withstand the stresses caused by an earthquake, and that allows relative displacements of the structure and the panels without compromising the building and the safety of people who live there. Within the

scope of the above task, an object of the present invention is to provide a prefabricated seismic fixing, particularly for prefabricated buildings, which can be installed more easily and precisely with respect to the commercially available devices, without the risk of an incorrect positioning due to issues independent from the ability of the assembly workers.

[0009] Another object of the present invention is to provide a seismic fixing device, which is simple, practical and economical to be mounted, but also to be replaced or restored.

[0010] Another object of the invention is to provide a seismic fixing device, particularly for prefabricated buildings, by using readily commercially available means and commonly used materials, so that the device is economically competitive.

[0011] This task, and these and other objects, which will become apparent in the following, are achieved by a seismic fixing device, particularly for prefabricated buildings, according to the invention, comprising a slider adapted to be moved along the vertical direction substantially normal to the ground by first guide means associated with a wall of a building, and adapted to be moved along the horizontal direction substantially normal to the vertical direction by second guide means associated with a floor of said building, characterized in that said second guide means are projecting from said floor.

[0012] Further features and advantages of the invention will be more apparent from the description of a preferred but not exclusive embodiment of the seismic fixing device, particularly for prefabricated buildings, illustrated by way of non-limiting example with the aid of the accompanying drawings, wherein:

figure 1 is an exploded perspective view of the seismic fixing device;

figure 2 is perspective view of the mounted seismic fixing device;

figure 3 is an elevational cutaway view of the seismic fixing device;

figure 4 shows the section IV-IV of the device shown in figure 3.

[0013] With reference to the attached figures, the seismic fixing device, particularly for prefabricated buildings, according to the invention, which is referred to by the reference numeral 1, includes a slider 2 that by first guide means is adapted to be moved along the vertical direction 10 substantially normal to the ground. The slider 2 is also adapted to be moved by second guide means along the horizontal direction 20 substantially normal to the vertical direction 10 and thus substantially parallel to the ground. The first and second guide means are respectively associated to a wall 4 and a floor 5 of the same building.

[0014] A critical feature of the invention is given by the second guide means being protruding from the floor 5.

[0015] Of course, the movements of the slider 2 along the vertical 10 and horizontal 20 directions may also be

independent from each other.

[0016] Advantageously, the first guide means comprise at least one housing compartment 7, defined in the wall 4, for at least a shoe 12 projecting from the slider 2. The housing compartment 7 is provided with a respective binary 8 adapted to be slidably engaged by the shoe 12 along the vertical direction 10.

[0017] In the embodiment proposed herein there are two shoes 12 that are positioned on opposite sides with respect to the axis of symmetry of the slider 2, each adapted to be received in the respective compartment 7 defined in the wall 4 and adapted to be slidably engaged with the respective binary 7 (figures 1 and 2).

[0018] Obviously, each of compartments 7 has a top end stop 14 and a lower end stop 15 which, in the exemplary embodiment shown herein, are composed of the inner walls of compartments 7 themselves (fig. 1). Advantageously, the second guide means comprise a sleeve 6, which:

- extends along a direction substantially parallel to the horizontal direction 20,
- is integral to the shoe 12, and
- is adapted to be engaged by a sled 3 in turn integral with the floor 5.

[0019] Preferably, the sleeve 6 has a substantially "C" shaped profile, with the "C" having the arc facing upwards, namely from the opposite side with respect to the ground (fig. 3)

[0020] Preferably, as shown in figure 4, the slider 2 has a support 11 interposed between the shoe 12 and the sleeve 6.

[0021] Advantageously, the second guide means comprise an elongated body 9, which is associated with the sled 3, and is adapted to be slidably engaged with the sleeve 6 along the horizontal direction 20, serving as a guide for the sleeve 6 itself.

[0022] Thus, it is contemplated that the elongated body 9 has at least a portion thereof having a profile than can be coupled (along the direction 20) to the profile of the sleeve 6.

[0023] In the example illustrated here, the profile of elongated body 9 is adapted to be slidably coupled to the profile of said sleeve 6, such that the length of body 9 can be used entirely, without having to use retainer means at the head and the tail of body 9.

[0024] With reference especially to figure 1, the body 9 is a beam extending along the horizontal direction 20 and having a continuous extension profile along the whole of its length, so that such a profile is adapted to be inserted within "C" defined by the profile of the sleeve 6, then to slide along the direction 20.

[0025] Preferably, the sled 3 comprises a setting plate 13 to the floor 5. The plate 13 will be attached to the floor 5 by the bolt and nut system 16, known per se.

[0026] As shown in the figures, the sled 3 comprises two plates 13, each having a flap bent 18 and welded to

the beam 9. The plates 13 are also positioned symmetrically with respect to the axis of the beam 9 itself, and allow then the sled 3 to be attached to the floor 4 by the bolt and nut 16.

[0027] In practice, the slider 2 is mounted so that the shoes 13, which are housed in the compartments 7, can engage the binary 8 along the vertical direction 10.

[0028] In the same manner, the slider 2 and the sled 3 are mutually positioned such that at least a middle of the beam 9 is slidably coupled within the "C" of the sleeve 6, so that the latter can engage slidably along the horizontal direction 20, defined by the beam 9 itself, as a guide.

[0029] In the case of earthquake, the seismic force will be subdivided into two components: the first component along the vertical direction 10, the second component along the horizontal direction 20.

[0030] The energy from the first component will be absorbed by the translation of the slider 2 on the first guide means, i.e. by the movement of the shoes 12 on the binaries 8 associated with the wall 5.

[0031] Instead, the energy from the second component will be absorbed by the movement of the slider 2 itself on the second guide means, that is, by the sliding of the sled 3, associated with the floor 2, on the sleeve 6.

[0032] As appears from the above description, the invention achieves the task and the proposed objects, and particularly it is pointed out that a seismic fixing device, particularly for prefabricated buildings, is provided that has a correct operation during the seismic phase, without producing strains in the walls and withstanding the stresses caused by the earthquake, allows relative displacements of the structure and panels without compromising the building and the safety of people who live there.

[0033] In particular, since such device should be mounted in the yard, since the elongated body is not embedded in the concrete forming the floor of the building, installation errors independent from the ability of the workers are avoided and ensures very high mounting accuracy. Another advantage of the invention is that it is suitable for any type of walls, whether horizontal (i.e., with the long side facing the ground) or vertical (with the long side disposed perpendicularly to the ground). Furthermore, another advantage of the invention is that it allows a rapid installation and an even more simple and quick substitution or repair, just in that the body 9 is mounted to the surface of the floor, protruding visually from and not embedded in the concrete.

[0034] Not least, the use of readily commercially available means and the use of common materials makes the device competitive in terms of cost. The so-designed invention is susceptible of numerous modifications and variations, all of which falling within the scope of the inventive concept.

[0035] Further, all the details will be replaced by other technically equivalent elements.

[0036] In practice, the materials employed, as well as

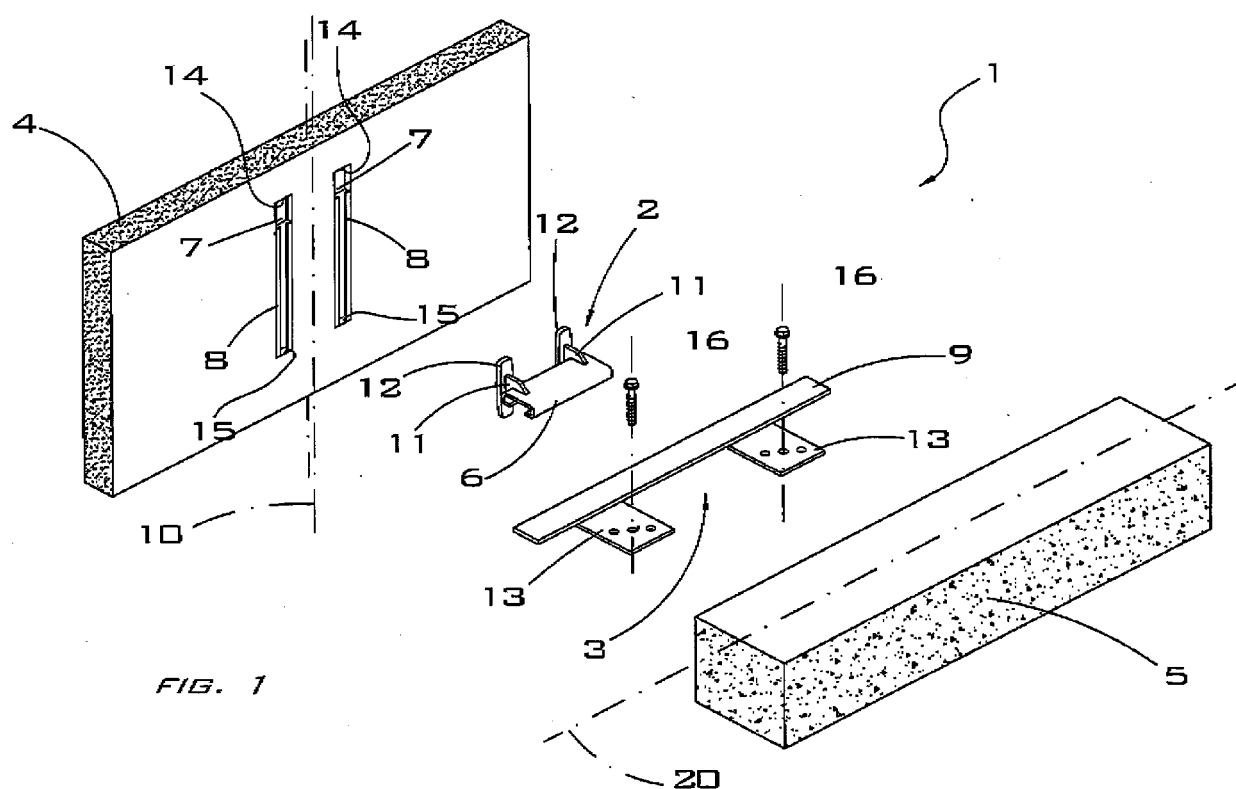
the dimensions, may be different according to requirements, provided they are consistent with the realization purpose.

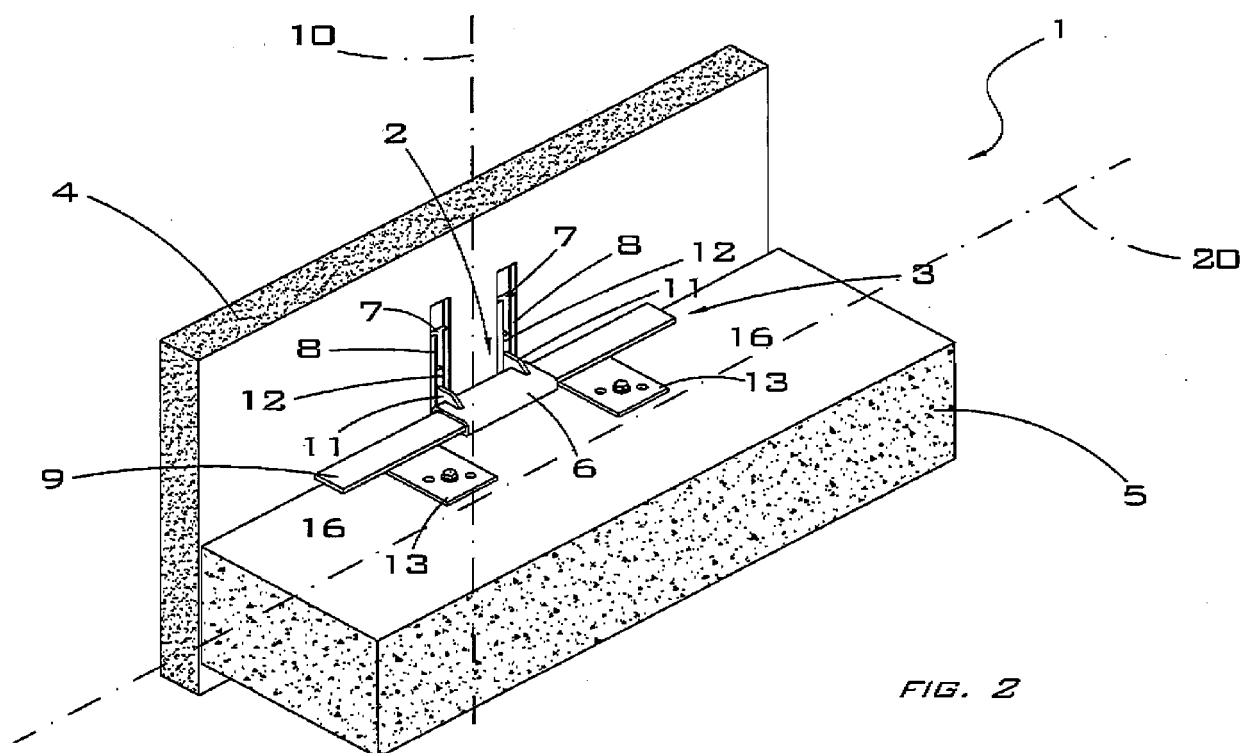
8. Device according to one or more of claims 3 to 5, **characterized in that** said sled (3) comprises a setting plate (13) to said floor (5).

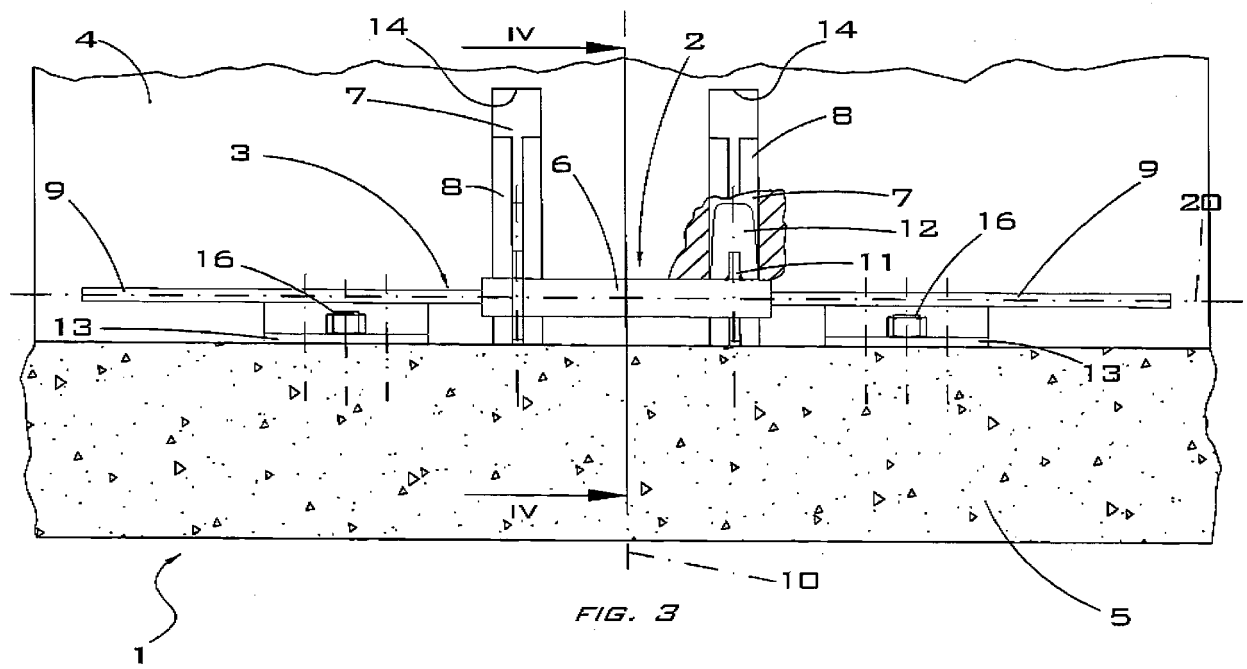
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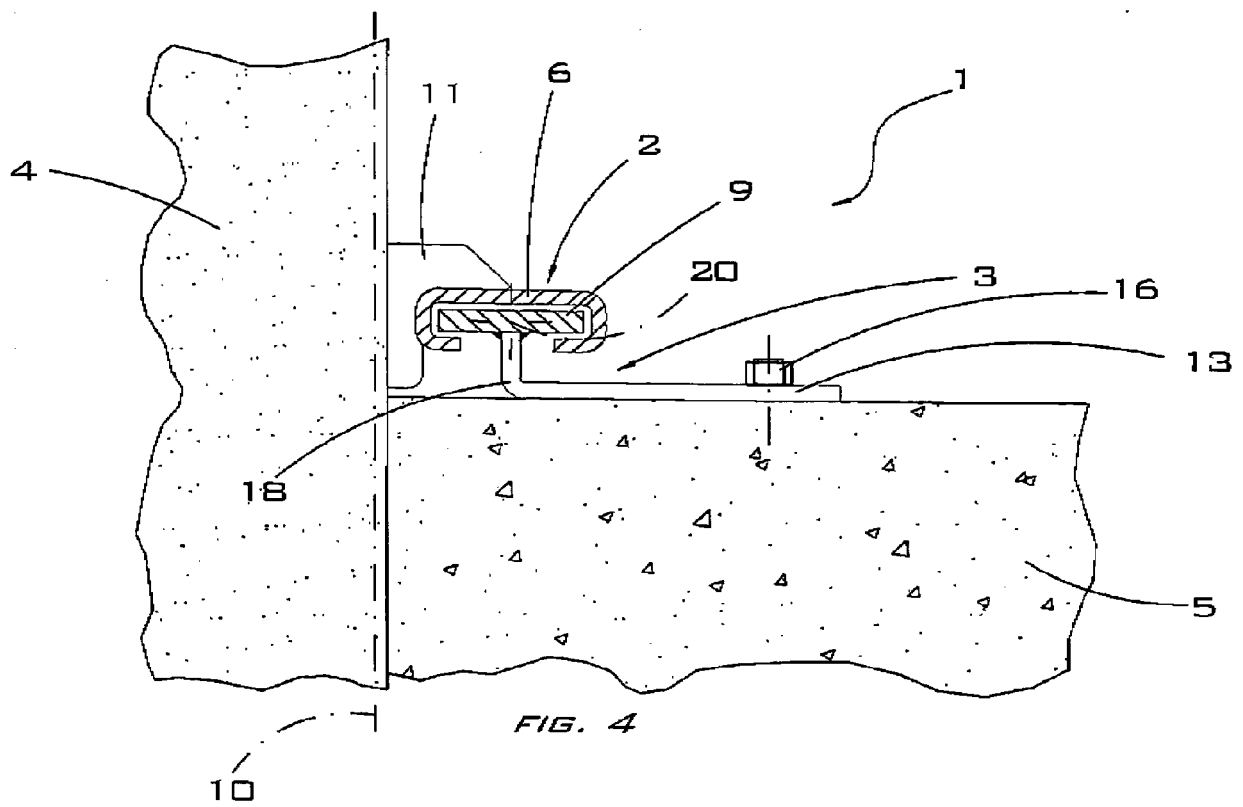
Claims

1. A seismic fixing device, particularly for prefabricated buildings, comprising a slider (2) adapted to be moved along the vertical direction (10) substantially normal to the ground by first guide means (7, 8, 12) associated with a wall (4) of a building, and adapted to be moved along the horizontal direction (20) substantially normal to the vertical direction (10) by second guide means (6, 9) associated with a floor (5) of said building, **characterized in that** said second guide means (6, 9) are projecting from said floor (5). 10
2. Device according to claim 1, **characterized in that** said first guide means (7, 8, 12) comprise at least one housing compartment (7) defined in said wall (4), for at least one shoe (12) projecting from said slider (2), said at least one housing compartment (7) being provided with a respective binary (8) adapted to be slidably engaged with said at least one shoe (12) along the vertical direction (10). 20
3. Device according to one or more of claims 1 and 2, **characterized in that** said second guide means (6, 9) include a sleeve (6): 25
 - extending along a direction substantially parallel to the horizontal direction (20),
 - integral with said at least one shoe (12), and
 - adapted to be engaged by a sled (3) integral with said floor (5). 30
4. Device according to claim 3, **characterized in that** said sleeve (6) has a substantially "C" shaped profile, with the arch of "C" facing the opposite side with respect to the ground. 35
5. Device according to one or more of claims 3 and 4, **characterized in that** said second guide means (6, 9) comprise an elongated body (9) associated to said sled (3) and having at least a portion adapted to be slidably engaged along the horizontal direction (20) to said sleeve (6). 40
6. Device according to claim 5, **characterized in that** the entire profile of said elongated body (9) is adapted to be slidably coupled to the profile of said sleeve (6). 45
7. Device according to claim 5, **characterized in that** said elongated body (9) is a beam extending along the horizontal direction (20). 50











EUROPEAN SEARCH REPORT

Application Number
EP 15 00 3413

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 March 2016	Examiner López-García, G
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	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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