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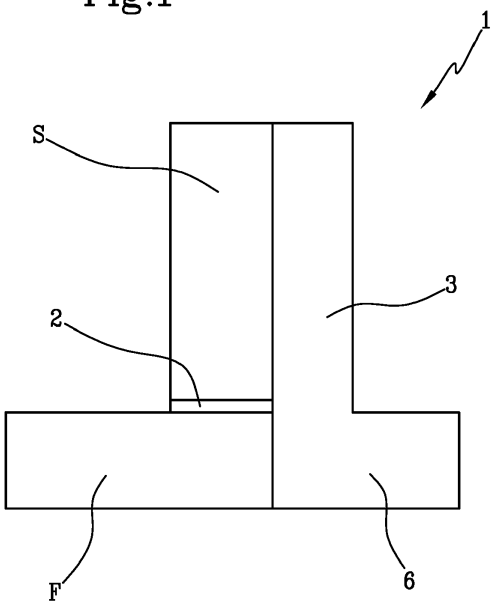
(54) **A METHOD FOR REALISING AN ANTISEISMIC SYSTEM**

(57) Method for realising an antiseismic system (1) for a structure (S) comprising the steps of realising an separating cut (2) in a base portion of said structure (S), realising an antiseismic structure (3) comprising the steps of fixing an exoskeleton (4) to the structure (S), fixing a plurality of panels (5) to the exoskeleton (4) maintaining a gap and introducing a cast of cement into the gap. The step of fixing the plurality of panels (5) and the step of introducing the cast of cement are realised gradually, from the bottom upwards, until the complete coating of the structure (S).

Fig.1



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Description

[0001] The present invention relates to a method for realising an antiseismic system for a structure.

[0002] The present invention also relates to an antiseismic system, preferably made with the above method.

[0003] The term "structure" is meant to indicate buildings and/or parts of buildings (e.g. the walls), located in seismic areas and that therefore require antiseismic consolidation.

[0004] The methodological approach is that of designing "in rigidity", i.e. making an outer casing from reinforced concrete, which is much more rigid compared to the horizontal actions of existing structures, and therefore able to "absorb" most of the seismic actions in place of the latter.

[0005] However, such as for example in the case of buildings with a masonry load-bearing structure, the existing masonry cube is often provided with high intrinsic rigidity. Therefore, to "discharge" the seismic actions affecting the existing structures, it is often necessary to design a casing with walls that have considerable thicknesses (typically 15 cm for buildings with two-brick-thick walls of a modest height). In this way, the desired antiseismic protection is obtained for the existing building but, disadvantageously, a notably oversized structure is obtained from the "resistance" point of view and which is also "bulky", as the larger concrete wall thicknesses combined with the thermal insulation require thicknesses of about 25 cm on average.

[0006] A further problem lies in the phenomenon of rising dampness. The realisation of a new outer casing made of concrete and insulating material with substantially "waterproof" characteristics can make the phenomenon worse if targeted contextual interventions are not envisaged.

[0007] However, such interventions can be invasive (e. g. the realisation of dehumidifying plaster inside rooms) or of doubtful effectiveness (through the injection of specific resins at the base of the walls). The technical task of the present invention is that of providing a method for realising an antiseismic system and an antiseismic system that can overcome the drawbacks that have emerged from the prior art.

[0008] The aim of the present invention is therefore that of providing a method for realising an antiseismic system and an antiseismic system that can reduce the overall dimensions of the structure while maintaining the required antiseismic resistance.

[0009] A further aim of the present invention is that of providing a method for realising an antiseismic system and an antiseismic system that can reduce or eliminate the problems connected with the phenomenon of rising dampness.

[0010] The specified technical task and specified aims are substantially achieved by a method for realising an antiseismic system and an antiseismic system comprising the technical characteristics set out in one or more of the appended claims. The dependent claims correspond to possible embodiments of the invention.

[0011] In particular, the specified technical task and specified aims are substantially achieved by a method for realising an antiseismic system for a structure comprising the steps of realising a separating cut in a base portion of the structure and realising an antiseismic structure. Such step of realising the antiseismic structure envisages fixing an exoskeleton to the structure, fixing a plurality of panels to the exoskeleton maintaining a gap, introducing a cast of cement into the gap. The step of fixing the plurality of panels and the step of introducing the cast of cement are realised gradually, from the bottom upwards, until the complete coating of the structure.

[0012] Furthermore, the specified technical task and the specified aims are reached by an antiseismic system, preferably realised with a method as above, comprising a plurality of panels, an exoskeleton fixed or fixable to the structure and structured to enable the fixing of the panels while maintaining a gap, a cast of cement which fills the gap, a separating cut arranged in a base portion of the structure. Advantageously, the synergistic action of the separating cut and of the antiseismic structure (exoskeleton, panels and cast of cement) enable capillary rising of dampness to be interrupted and the rigidity of the horizontal actions of the existing masonry wall to be reduced while leaving unvaried its load-bearing capacity towards vertical loads.

[0013] Advantageously, the separating cut enables the antiseismic structure to absorb all the horizontal seismic action using considerably lower thicknesses with respect to known structures.

[0014] Further features and advantages of the present invention will become more apparent from the indicative and thus non-limiting description of an embodiment of method for realising an antiseismic system and an antiseismic system.

[0015] Such a description will be set out below with reference to the appended drawings, which are provided solely for illustrative and therefore non-limiting purposes, in which:

- Figure 1 is a schematic representation of an antiseismic system subject-matter of the present invention;
- Figure 2 is a detail of an embodiment of the antiseismic system subject-matter of the present invention.

[0016] With reference to the appended figures, 1 denotes overall an antiseismic system. In particular, the antiseismic system 1 is applied to a structure "S". The term structure "S" is meant to indicate buildings and/or parts of buildings (e.g. the walls), located in seismic areas and that therefore require antiseismic consolidation. For example, the term structure "S" can mean a masonry wall. The method for realising the antiseismic system 1 comprises a step of realising a separating cut 2 and a step of realising an antiseismic structure 3. In particular, the

realisation method is realised on an existing structure "S".

[0017] The step of realising an separating cut 2 envisages realising the separating cut 2 itself in a base portion of the structure "S". The term base portion is meant to indicate a portion of the structure "S" comprised between the structure "S" itself and a foundation of the structure "F".

[0018] Preferably, the step of realising the separating cut 2 envisages realising a sliding surface between the structure "S" and the foundation "F" of the structure "S". Preferably, the step of realising the separating cut 2 is realised by inserting separating resins between the structure "S" and a foundation "F" of the structure "S".

[0019] The separating cut 2 is realised using appropriate techniques, by inserting resins able to definitively interrupt capillary rising of dampness in the structure "S". The separating cut 2 is realised specifically for the purpose of reducing the rigidity of the horizontal actions of the existing structure "S", leaving unvaried its load-bearing capacity towards vertical loads.

[0020] The reduction of the horizontal rigidity of the structure "S" by laying such "pad" (the sliding surface) enables the antiseismic structure 3, placed adjacent, to absorb all the horizontal seismic action using considerably lower thicknesses than known antiseismic structures.

[0021] In substance, if the rigidity of the existing structure "S" is reduced to a value tending to zero, the antiseismic structure 3 will be able to withstand all the horizontal seismic action while maintaining minimal thicknesses. Therefore, it is possible to obtain the same seismic performance with rather contained wall dimensions, with the design no longer governed by the rigidity but by the resistance that is strictly necessary.

[0022] Advantageously, the separating cut 2 on the existing structures "S" enables the horizontal actions induced by the earthquake on the superstructure to be reduced or cancelled (simultaneously the separating cut 2 can lead to a reduction/elimination of rising dampness). The separating cut 2 can be performed with the simultaneous interposition of an appropriate membrane which enables relative sliding with low friction coefficients and prevents rising dampness.

[0023] The step of realising the antiseismic structure 3 envisages fixing an exoskeleton 4 to the structure "S", fixing a plurality of panels 5 to the exoskeleton maintaining a gap and introducing a cast of cement into the gap.

[0024] The step of fixing the plurality of panels 5 and the step of introducing the cast of cement are realised gradually, from the bottom upwards, until the complete coating of the structure "S". In other words, the panels 5 are arranged in successive layers or levels "L" and upon the completion of the connection of each layer or level "L" a cast of cement is introduced.

[0025] Preferably, the method further comprises a step of realising a foundation kerb 6. Advantageously, such solution enables the antiseismic structure 3 not to weigh on the foundations "F" of the existing structure "S".

[0026] Preferably, the step of fixing the exoskeleton 4 is realised by fixing a plurality of vertical profiles 4a to the structure "S". Preferably, such step is realised by positioning and fixing angular plates appropriately spaced out from one another to the structure "S". Each vertical profile 4a has standard type dimensions (with overall variable lengths, preferably of 300 cm).

[0027] The step of fixing the plurality of panels 5 is realised in layers or levels "L" wherein each panel 5 is preferably fixed to the exoskeleton 4 by means of horizontal profiles 7. Preferably, each panel 5 is fixed to at least one portion of at least one horizontal profile 7. One or more horizontal profiles 7 define a layer or level "L".

[0028] Preferably, the step of fixing the plurality of panels 5 is realised by arranging horizontal profiles having an omega-shaped section or other shapes suitable for the purpose. The omega-shaped section is preferably delimited by a central, substantially C-shaped portion 7a and by a portion with a vertical extension 7b. Preferably, as shown in the appended figures, the omega-shaped section is delimited by an upper portion and a lower portion with a vertical extension.

[0029] It is underlined how the omega shape of the horizontal profiles 7 shown herein is a preferred but not exclusive shape of the profiles themselves; the patent holders reserve the right to modify the shape of said profiles, while maintaining the same functionalities.

[0030] Each panel 5 is fixed to a respective portion with a vertical extension 7b through a slot in the panel 5 itself.

[0031] Preferably, the step of fixing the panels 5 envisages arranging insulating panels 5 made of sintered expanded polystyrene (EPS), extruded polystyrene (XPS) or other materials with similar characteristics.

[0032] The panels 5 can be made of other materials having appropriate characteristics similar to those of the EPS panels 5.

[0033] For example, should a thermal insulation of the structure "S" not be required, the step of fixing the panels 5 is realised by arranging temporary formwork panels 5 (preferably made of wood), which are removed after the cast of cement before proceeding with the normal finishing processes. In other words, the method comprises a step of removing panels 5 subsequent to the complete coating of the structure "S" with the cast of cement, and subsequent finishing steps.

[0034] Preferably, the method can further comprise a step of fixing reinforcement nets to the structure "S" positioning them in the exoskeleton 4. In other words, the method envisages positioning between the vertical profiles 4a reinforcements consisting of electrowelded nets, hooks for the connection of the nets, pins concreted to the structure "S" and the like. Such reinforcements may preferably be made of steel, but also of other materials, of suitable resistance and with a similar function.

[0035] The antiseismic structure 3 (obtained by the realisation of a reinforced cementitious composite wall and/or made of other materials and external systems to the existing structure "S" and connected thereto appro-

priately with specific connectors) withstands up to 100% of the horizontal actions induced by the earthquake, reducing and/or practically cancelling relative deformations between the superstructure and foundation "F".

[0036] The present invention also relates to an antiseismic system 1, preferably made with the above method.

[0037] The antiseismic system 1 comprises a plurality of panels 5, an exoskeleton 4 fixed or fixable to the structure "S" and structured to enable the fixing of the panels maintaining a gap and a cast of cement which fills the gap.

[0038] The antiseismic system 1 further comprises an separating cut 2 arranged in a base portion of the structure "S".

[0039] In other words, the antiseismic system 1 comprises an separating cut 2 and an antiseismic structure 3.

[0040] Advantageously, the method and antiseismic system 1 described in the foregoing are able to obviate the drawbacks that have emerged in the prior art.

[0041] Advantageously, the synergistic action of the separating cut 2 and of the antiseismic structure 3 (exoskeleton 4, panels 5 and cast of cement) enable capillary rising of dampness to be interrupted and the rigidity of the horizontal actions of the existing structure "S" (e. g. a masonry wall) to be reduced while leaving unvaried its load-bearing capacity towards vertical loads. Advantageously, the separating cut 2 enables the antiseismic structure 3 to absorb all the horizontal seismic action using considerably lower thicknesses with respect to known structures.

[0042] Furthermore, the present invention enables an antiseismic system 1 to be obtained in which the antiseismic structure 3 can have different thicknesses along the entire height of the structure "S".

[0043] Advantageously, the present invention makes available a method for realising an antiseismic system 1 and an antiseismic system 1 which is easy and economical to realise.

Claims

1. A method for realising an antiseismic system (1) for a structure (S) comprising the steps of:

   - realising a separating cut (2) in a base portion of said structure (S);
   - realising an antiseismic structure (3), said step comprising the steps of:
   - fixing an exoskeleton (4) to said structure (S);
   - fixing a plurality of panels (5) to said exoskeleton (4) maintaining a gap;
   - introducing a cast of cement into said gap;

   wherein said step of fixing the plurality of panels (5) and said step of introducing the cast of cement are realised gradually, from the bottom upwards, until the complete coating of the structure (S).

2. The method according to claim 1, wherein said step of realising the separating cut (2) envisages realising a sliding surface between the structure (S) and a foundation (F) of the structure (S).

3. The method according to claim 1 or 2, wherein said step of realising the separating cut (2) is realised by inserting separating resins between the structure (S) and a foundation (F) of the structure (S).

4. The method according to one or more of the preceding claims, wherein said step of realising the antiseismic structure (3) further comprises a step of realising a foundation kerb (6).

5. The method according to one or more of the preceding claims, wherein said step of fixing the exoskeleton (4) is realised by fixing a plurality of vertical profiles (4a) to said structure (S).

6. The method according to one or more of the preceding claims, wherein said step of fixing the plurality of panels (5) is realised in layers or levels (L) wherein each panel (5) is fixed to the exoskeleton (4) by means of horizontal profiles (7), wherein one or more horizontal profiles (7) define a layer or level (L).

7. The method according to claim 6, wherein said step of fixing the panels (5) is realised by arranging horizontal profiles (7), and wherein each panel (5) is fixed to a respective portion of at least one horizontal profile (7).

8. The method according to claim 6, wherein said step of fixing the panels (5) is realised by arranging horizontal profiles (7) having an omega shaped section, delimited by a central, substantially C-shaped portion (7a) and at least one portion with a vertical extension (7b), preferably an upper portion and a lower portion, and wherein each panel (5) is fixed to a respective portion with a vertical extension (7b) through a slot in the panel (5) itself.

9. The method according to one or more of the preceding claims, wherein said step of fixing the panels (5) envisages arranging insulating panels (5) made of sintered expanded polystyrene or another material.

10. The method according to one or more of the preceding claims, wherein said step of fixing the panels is realised by arranging temporary formwork panels (5), preferably made of wood, said method further comprising a step of removing the panels (5), subsequent to the complete coating of the structure (S) with the cast of cement, and subsequent finishing steps.

11. The method according to one or more of the preced-

ing claims, further comprising a step of fixing reinforcement nets to said structure (S) positioning them in said exoskeleton (4).

12. An anti-seismic system (1), preferably realised with a method according to one or more of the preceding claims, comprising:

- a plurality of panels (5);
- an exoskeleton (4) fixed or fixable to said structure (S) and structured to enable the fixing of the panels (5) maintaining a gap;
- a cast of cement which fills the gap;
- an separating cut (2) arranged in a base portion of said structure (S).

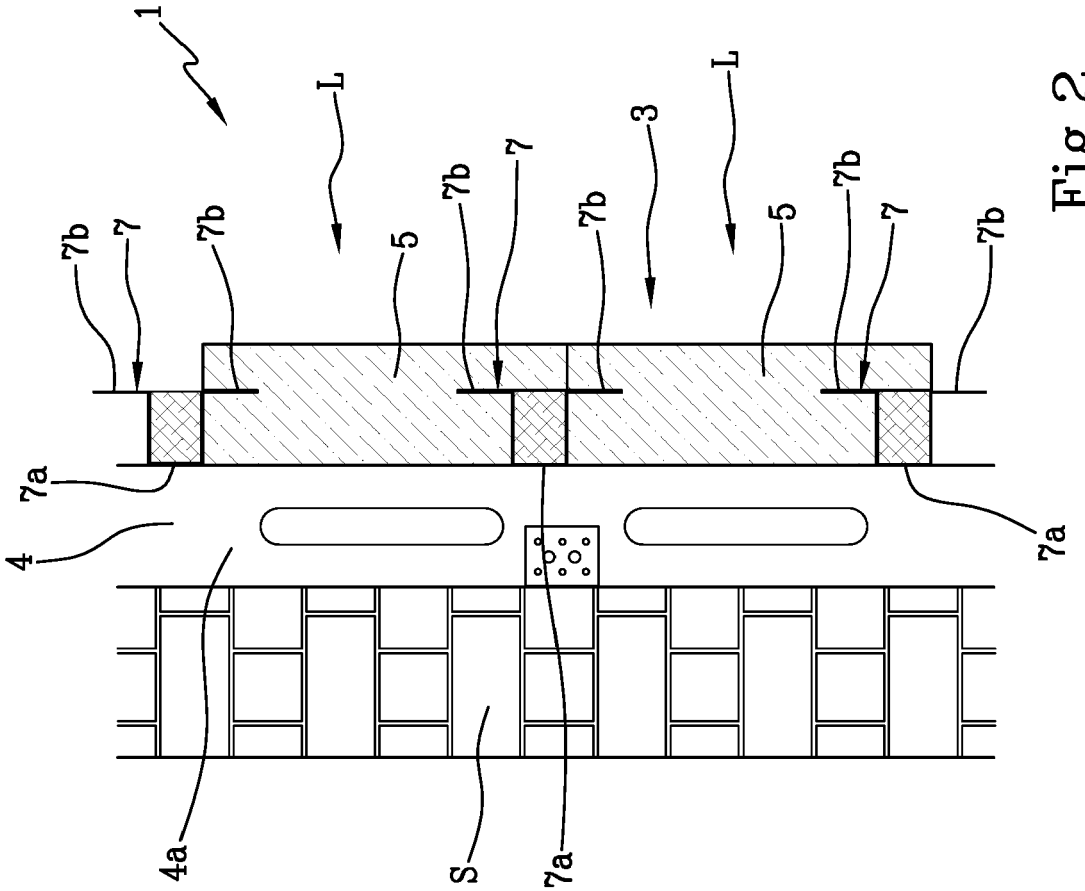

Fig.2

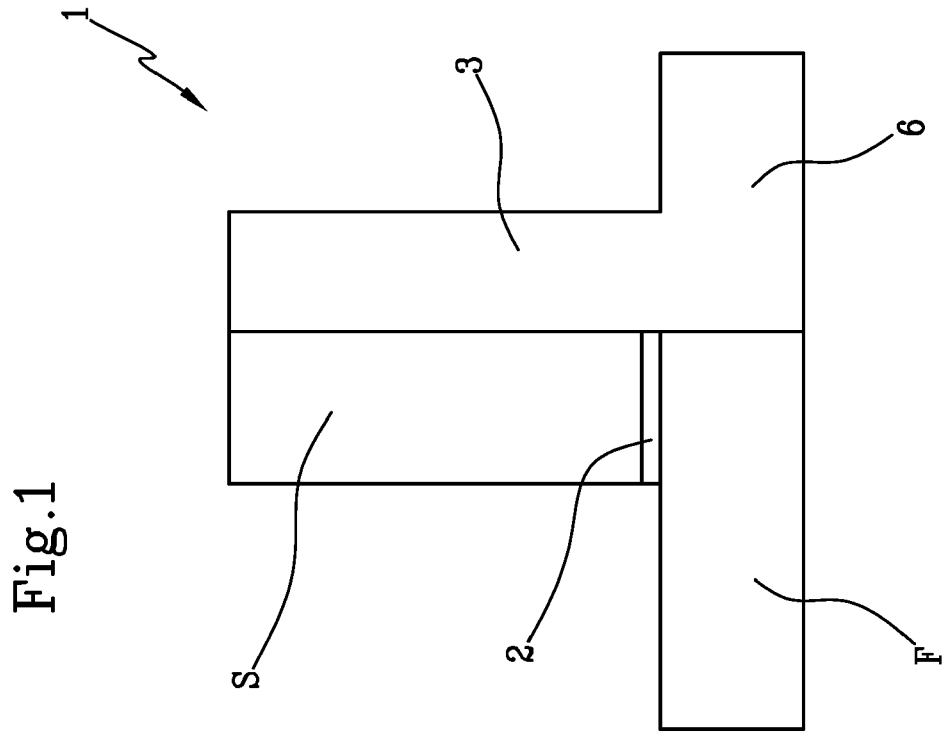

Fig.1

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EUROPEAN SEARCH REPORT

Application Number
EP 21 21 7990

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	KR 101 397 800 B1 (KOREA DISASTER PREVENTION THCHNOLOGY [KR]; DRB HOLDING CO LTD [KR]) 20 May 2014 (2014-05-20) * figures 4a-4g *	1-12	INV. E04H9/02 E04B2/96
A	KR 2010 0119950 A (KRRI [KR]; UNIV KUNSAN IACF [KR]) 12 November 2010 (2010-11-12) * figures 5, 6 *	1-12	
A	KR 2019 0142016 A (BYON DAE KUN [KR]) 26 December 2019 (2019-12-26) * figures 1-8 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04H E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 June 2022	Brucksch, Carola

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 21 7990

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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21-06-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 101397800 B1	20-05-2014	NONE	
KR 20100119950 A	12-11-2010	NONE	
KR 20190142016 A	26-12-2019	NONE	

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