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Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **ANTI - SEISMIC WALL WITH PROFILED CONSTRUCTION ELEMENTS AND BETON STEEL REINFORCEMENTS**

(57) This invention relates to an anti-seismic wall with construction elements such as profiled bricks and beton steel reinforcements intended for industrial or civil constructions, in the category of passive earthquake protection techniques, with structural insulation by energy dissipation.

The anti-seismic wall consists of profiled construction elements **1**, placed on horizontal and vertical rows, in the channels resulting from profiles being mounted beton steel reinforcements **3**, fixed with mortar **2**, fixed to the adjacent construction elements by means of peripheral reinforcements **4**, resulting a reinforcement in the form of a net, with a favourable anti-seismic effect by dissipating the vibrational energy.

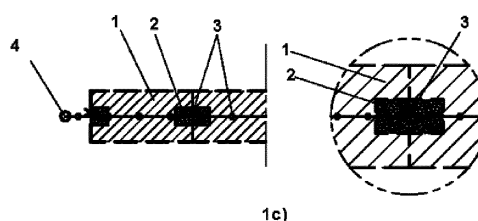
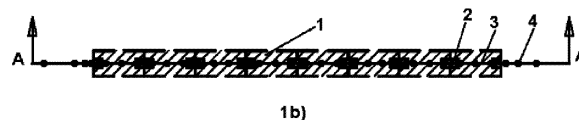
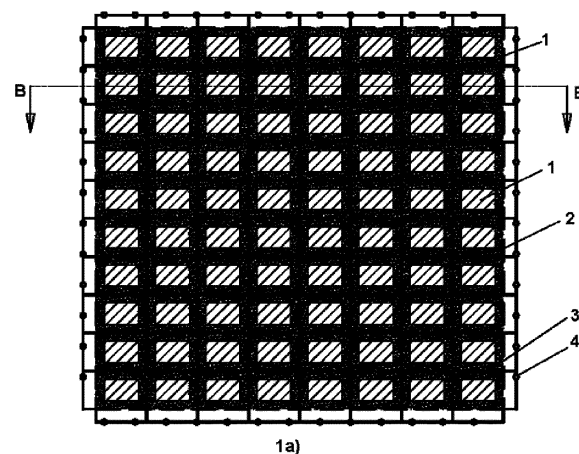


Fig. 1

Description

Technical Field

[0001] This invention relates to an anti-seismic wall with construction elements such as profiled bricks and concrete steel reinforcements intended for industrial or civil constructions, in the category of passive earthquake protection techniques, with structural insulation by energy dissipation

Background Art

[0002] In the present state of the art, two categories of solutions for anti-seismic constructions are known, namely earthquake-resistant constructions and construction elements for earthquake-resistant walls respectively.

[0003] Regarding the state-of-the-art of earthquake-resistant constructions, in patent documents RO119643, RO117271, and IT 201600127242 (WO2018109592), earthquake-resistant structures located inside existing buildings are proposed.

[0004] Technical solution of the patent document RO126217 relates to a modular construction body that is located near the apartment blocks, for housing people in case of an earthquake.

[0005] The disadvantages of these solutions, with structures for housing people inside or outside the buildings, consist in the fact that they ensure the protection of a limited number of people and are made with additional costs compared to the actual cost of the constructions.

[0006] Another category of solutions refers to the use of intermediate elements with elastic properties. Patent document RO129788 discloses an anti-seismic system made using a flexible support formed of two metal plates fastened together by means of a mechanical mounting based on flexible rubber elements, fixed with screws in truncated cone-shaped cavities.

[0007] Patent document TUB20160880 (CA3013170) discloses a seismic isolation device based on a support piece containing an elastic contact element with a rigid support surface, which forms a vibrating system, independent of the seismic wave.

[0008] The disadvantages of this category of solutions involve parts or prefabricated mechanical devices, with additional costs, made by specialized technological processes.

[0009] Regarding the state-of-the-art of construction elements for earthquake-resistant walls, patent document FR1001700 discloses several variants of bricks, with holes of different shapes, interior or profiled on the side faces. The holes allow the mortar to flow on several rows of bricks, increasing the shear strength in the vertical direction.

[0010] Patent document RO112903 develops the idea of the solution in the patent document FR1001700, with

construction elements based on a deformable prismatic structure, with internal stiffening elements, which also have the role of fixing to the adjacent row.

[0011] Patent document RO130257 solves the problem of elastic fixing of bricks without mortar by means of plastic bolt-type fasteners. The bricks are made with holes suitable for the bolts, interior and marginal, for fastening between the rows of bricks and for fastening the wall to the adjacent construction elements (poles, beams, diaphragms).

[0012] Disadvantage of these solutions is that they do not provide earthquake protection unless the construction elements are made of expensive materials or with elastic fastening elements that increase labour costs.

Summary of invention

[0013] Technical problem solved by the invention consists in the realization of an anti-seismic wall with "profiled bricks" type construction elements that allow the creation of channels for the placement of concrete steel reinforcements fixed with a flexible type mortar, ensuring the elasticity of the wall structural system and implicitly diminishing the shear effect.

[0014] The anti-seismic wall is made with specially designed construction elements, of type bricks profiled on 4 faces, which allow installing concrete steel reinforcements, fixed with mortar.

[0015] For the realization of an antiseismic wall according to the invention, parallelepiped shape construction elements of type bricks profiled on 4 faces are used. From the 6 faces of the parallelepiped shape body, 4 faces are provided with rectangular profile channels.

[0016] When the profiled bricks join, empty spaces result forming a matrix of rectangular, horizontal and vertical holes. A wall made of profiled brick elements results, in which there is a net of holes, horizontal and vertical. Concrete steel bars are inserted into these holes, fixed with flexible type mortar.

[0017] In relation to the state of the art presented, the following advantages result:

1. Reduced costs due to the following aspects:

- the anti-seismic solution does not involve additional constructions or parts of constructions;
- the profiled construction elements are made of ordinary materials;
- the relative increase of the cost price, by the necessary amount of concrete steel, is compensated by the advantage of cancelling or significantly diminishing the effects of the seismic phenomenon.

2. Increased safety in reducing the effects of seismic vibrations, due to the mounting solution to the adjacent construction elements.

3. Easy applicability due to the following arguments:

- it can be applied both to load-bearing masonry constructions and to non-structural walls;
- no special qualification of execution staff is required;
- the realization technology is simple, consisting in the realization of the classic masonry with mortar, to which is added the insertion of beton steel reinforcements.

Brief description of drawings

[0018] An example is given below in connection with Figures 1 and 2, representing:

Figure 1 - Sections through the anti-seismic wall:

- 1a) - middle section in a plane parallel to the faces of the wall (A-A);
- 1b) - cross-section with respect to the faces of the wall (B-B);
- 1c) - cross-section details;

Figure 2 - Profiled construction element:

- 2a) - in three-dimensional representation;
- 2b) - section perpendicular to the non-profiled faces (A-A);
- 1c) - section parallel to the non-profiled faces (B-B);

Description of embodiments

[0019] The anti-seismic wall, according to the invention, consists of profiled construction elements **1**, placed in horizontal and vertical rows according to the method of making a masonry wall. After each row of construction elements installed, a horizontal reinforcement **3** is applied in the horizontal channel formed by the joining of the elements **1** and a layer of mortar **2** is applied.

[0020] Every 4 - 5 rows the reinforcement is inserted in the vertical holes formed similarly by joining vertically the construction elements, applying the layer of mortar **2**. The reinforcements mounted vertically on 4 - 5 rows will be fixed to each other by welding or bonding with wire.

[0021] After finishing the execution of the wall, the horizontal and vertical reinforcements will be joined together by welding with a peripheral reinforcement **4**.

[0022] The dimensions of the holes (grooves) can be larger or smaller depending on the wall thickness and the mechanical strength / flexibility ratio correlated with the function of the building, the seismic activity in the area, the geotechnical characteristics of the ground, etc. The beton steel bars are dimensioned so as to get out 10-15 cm of the wall, in order to allow the mounting of the peripheral reinforcement with the role of fixing the wall to the adjacent structural element.

[0023] The fastening of the anti-seismic wall to the adjacent construction element is done by:

- welding the peripheral reinforcements of the anti-seismic wall and the external reinforcements of the adjacent construction element;
- embedding the peripheral reinforcements of the anti-seismic wall in the constituent beton of the adjacent construction element.

[0024] The invention can be applied to both load-bearing and non-load-bearing walls.

[0025] In the case of load-bearing walls, the fixing is made to the adjacent structural element, which may be a foundation beam at the bottom, a reinforced concrete belt at the top, or an adjacent wall. In cases with non-structural walls, the most common in practice, the elements adjacent to the walls are the elements of the resistance structure such as poles, beams, and reinforced beton diaphragms.

[0026] Through the solution of constituting the anti-seismic wall afferent to the invention, inside it results a structure in the form of a mesh, which ensures a convenient resistance/elasticity ratio, with the following positive effects regarding the resistance to vibrations:

- through the elasticity of the structural system, the vibrational energy's dissipation is produced;
- from a physical-constructive point of view, the reinforcement fixed to the adjacent structural element totally excludes the phenomenon of dismantling the wall by shearing.

[0027] The invention applies especially to anti-seismic constructions that have functions of special economic or social importance: secure rooms for banks, buildings for archives of special importance documents, social or military buildings of strategic importance, etc.

[0028] The invention also applies to constructions of buildings with usual functions, located in areas with intense seismic activity or near heavy traffic routes that produces vibrations in the ground, such as crowded boulevards, highways, railways, etc.

Claims

1. Anti-seismic wall, with profiled construction elements and beton steel reinforcements, **characterized in that**, it consists of profiled construction elements **1**, placed on horizontal and vertical rows, in the channels resulting from profiles being mounted beton steel reinforcements **3**, fixed with mortar **2**, fastened to the adjacent construction elements by means of peripheral reinforcements **4**, resulting in a reinforcement in the form of a net, with a favourable anti-seismic effect by dissipating the vibrational energy.
2. Anti-seismic wall, with profiled construction elements and beton steel reinforcements according to

claim 1, **characterized in that**, the profiled construction element **1** is in the form of a parallelepiped shape body with 4 faces on which are provided channels with rectangular section, executed for creating channels to place the reinforcement.

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Amended claims in accordance with Rule 137(2) EPC.

1. Anti-seismic wall, with profiled construction elements and steel reinforcements, **characterized in that**, it consists of a single type of profiled construction elements (**1**), placed on horizontal and vertical rows, in the channels resulting from adjacent profiles being mounted a single type of ordinary steel reinforcements (**3**) for both vertical and horizontal directions, such that the horizontal reinforcement (**3**) is applied for each row of construction elements (1) and the vertical reinforcement (3) is inserted to every 4 - 5 rows of the construction elements (1) and fixed with flexible type of mortar (**2**), fastened to the adjacent construction elements by means of peripheral reinforcements (**4**), resulting a reinforcement structure in the form of a net, having a favourable anti-seismic effect by dissipating the vibration energy in all directions.
2. Anti-seismic wall, with profiled construction elements and steel reinforcements according to claim (1), **characterized in that**, the profiled construction element (**1**) is in the form of a parallelepiped shape body with four of six faces provided with channels of rectangular section, enabling the construction elements (1) placed in a masonry wall to form rectangular holes between the adjacent rows in both horizontal and vertical directions, and thus creating channels to place the reinforcements.

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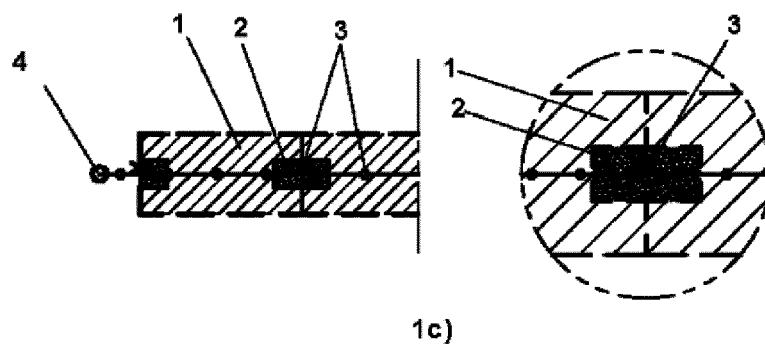
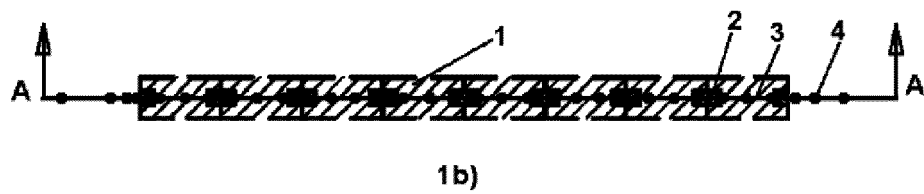
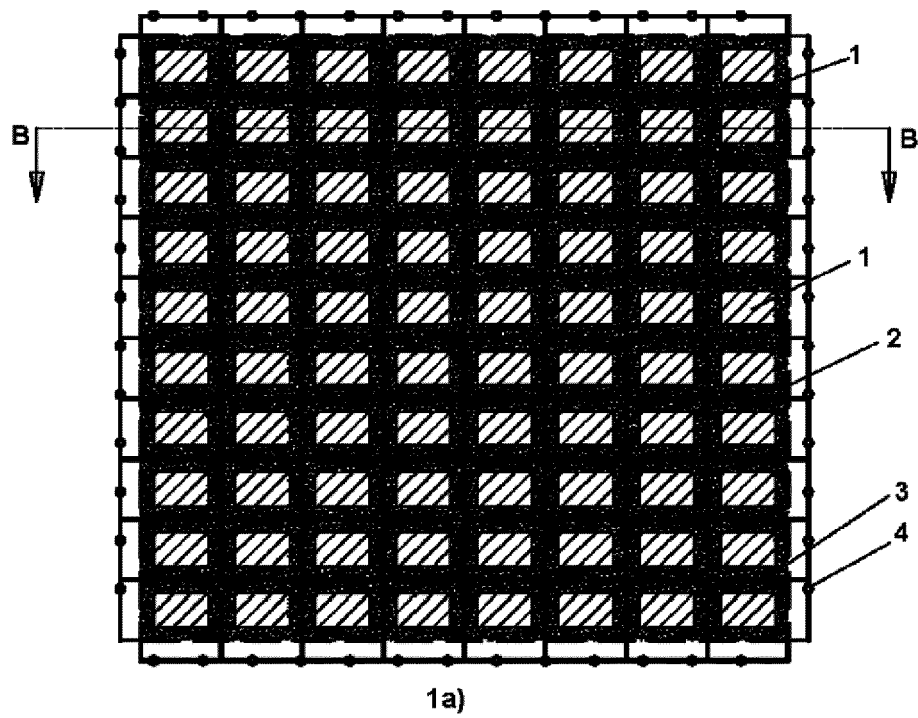


Fig. 1

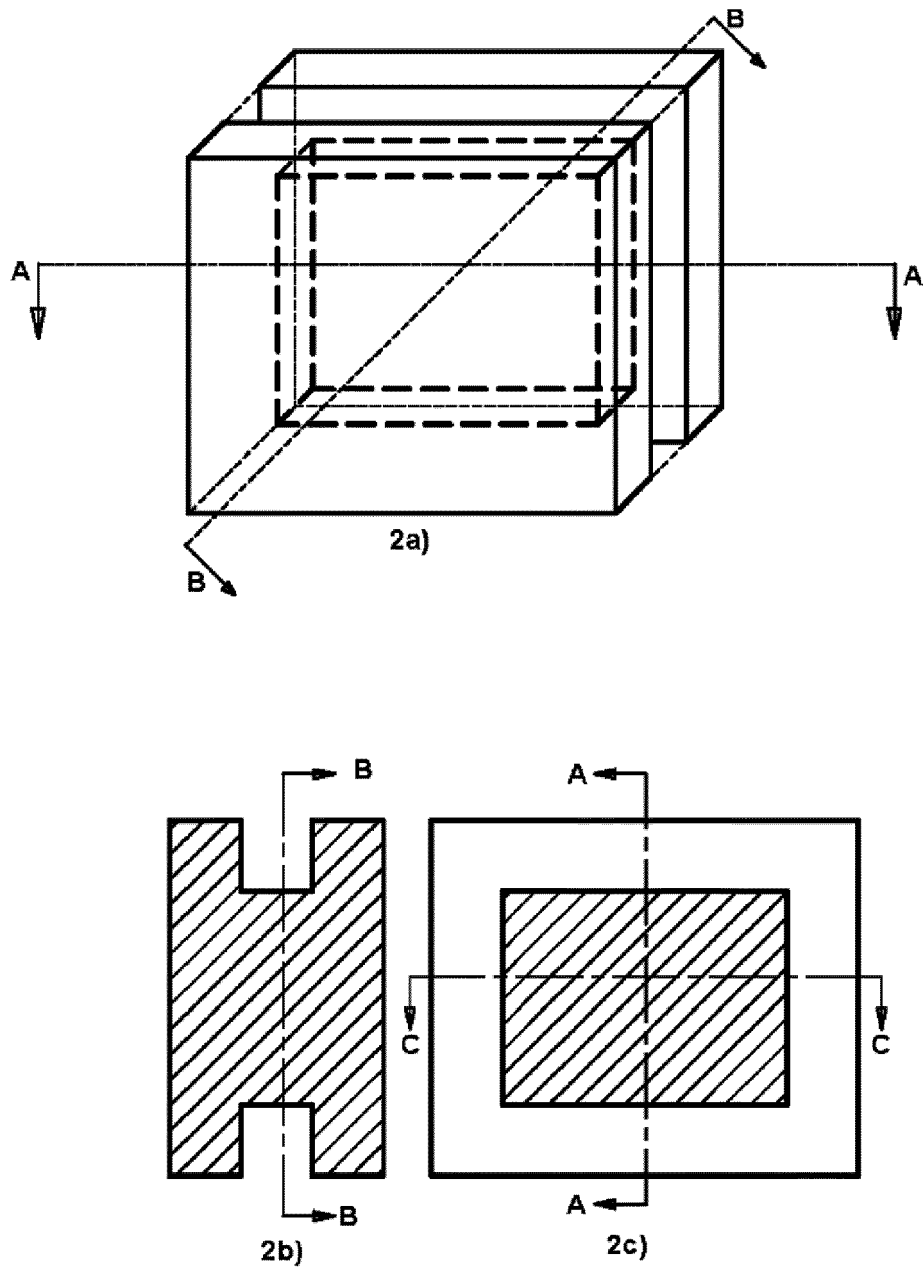


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 02 0272

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X	US 2007/245660 A1 (SCOTT ROBERT E [US] ET AL) 25 October 2007 (2007-10-25) * paragraphs [0001], [0003], [0004], [0011] - [0019]; figures 1-4 *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04H E04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 November 2020	Examiner Decker, Robert
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 02 0272

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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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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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