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(71) Applicant: **Universitat Politècnica de València**
46022 Valencia (ES)

(72) Inventors:
• **PALLARÉS RUBIO, Luis**
46022 Valencia (ES)
• **PALLARÉS RUBIO, Francisco Javier**
46022 Valencia (ES)

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(74) Representative: **Isern Patentes y Marcas S.L.**
Avda. Diagonal, 463 Bis, 2°
08036 Barcelona (ES)

(54) **CORNER SEISMIC ISOLATOR FOR SEISMIC PROTECTION OF BUILDINGS**

(57) A corner seismic isolator for the seismic protection of buildings, both new and already built, comprising at least one resistant element in the form of a frame with a brick partition inside, the isolator consisting of a single monobloc part formed from a material more flexible than the frame and than the bricks in the partition, comprising two arms arranged at a right angle, one to be situated between the frame and the partition in a vertical direction and the other to be situated between the frame and the partition in a horizontal direction, the thickness of which in the direction perpendicular to the plane of the partition

is between 0.5 and 1.5 times the thickness of the bricks in the partition, with the width of the arms being equal to or greater than one third of the height of a single brick in the partition and the length thereof being equal to or greater than three times the width of the arm itself, with the length thereof, in turn, being a portion of the corresponding dimension of the partition, with the vertical arm having a length of between 0.1 and 0.5 times the height of the partition and the horizontal arm a length of between 0.1 and 0.5 times the length of the partition.

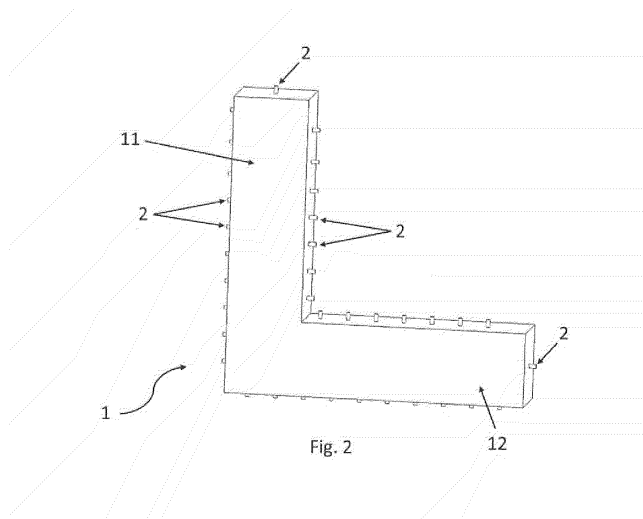


Fig. 2

Description

OBJECT OF THE INVENTION

[0001] The object of the present invention application is the registration of a particularly convenient seismic isolator for conditioning buildings, both new and already built, with brick partitions according to the new seismic regulations.

[0002] More specifically, the invention proposes the development of a seismic isolator, which, due to its particular arrangement, makes it possible to reduce the interaction which is produced between the brick partitions and the resistant structure of buildings due to the seismic activity.

BACKGROUND OF THE INVENTION

[0003] The inner partitions which compartmentalise the spaces of a building have a significant influence on the seismic behaviour of the latter. Due to the fact that the overall structure is stiffened as a whole when building the partitions, the seismic response is different from the one foreseen in the calculations, which are performed without considering the inner partitions. The drift of each floor of the building produces compression connecting rods in the partitions, the ends of which end at the head and base of the pillars that make up each closed frame, being able to lead to unforeseen structural failures.

[0004] Current regulations indicate that masonry partitions which have not been taken into account in the calculations of the seismic response must be seismically isolated from the rest of the structure so that they do not influence the seismic response of the building.

[0005] Elements configured to isolate partitions from the structural frames surrounding them are known in the current state of the art. For example, patent documents CN102268900A and ES2524844A1 mention a seismic isolator element intended for the construction of partitions or enclosures, which is substantially brick-shaped and is made up of a matrix of flexible material and a bar or rods of stiff material embedded in the matrix, some of them passing through from side to side. A plurality of these elements can be placed in the corners of the partition replacing the bricks, using mortar to confer an interlocking with the partition, with the frame and between the parts themselves.

[0006] However, both the mortar placed between the elements and the side-to-side through rods also transfer some of the loads from the structure to the partition, reducing the isolating effect of the flexible parts and forming a flow of forces through the mortar and/or the through rods resulting in the formation of a portion of the initial connecting rod.

[0007] Therefore, there is still a need for a seismic isolator for new and already built buildings which is inexpensive to manufacture and install, the matrix of flexible material of which has continuous contact with the building

structure, preventing the existence of mortar between the elements, and which does not have stiff side-to-side through elements which can transmit forces from the structure to the rest of the brick partition. The present invention contributes to solving the existing deficiency.

DESCRIPTION OF THE INVENTION

[0008] The present invention has been developed in order to provide a seismic isolator which is configured as a novelty within the field of application and which solves the aforementioned drawbacks, particularly convenient for the seismic protection of already built buildings made up of at least one resistant element in the form of a frame with a brick partition inside.

[0009] The seismic isolator object of this invention corresponds to a single monobloc part formed from a material more flexible than the frame and than the bricks in the partition, for example, polymers such as rubber, polyurethane or EVA. The present seismic isolator is characterised in that it comprises two arms arranged at a right angle, one to be situated between the frame and the partition in a vertical direction and the other to be situated between the frame and the partition in a horizontal direction in its condition of use. The thickness of the isolator in the direction perpendicular to the plane of the partition can be between 0.5 to 1.5 times the thickness of the bricks. The width of each arm can be equal to or greater than one third of the height of a single brick. The length of each arm can be equal to or greater than three times the width of the arm itself, being at the same time a portion of the corresponding dimension of the partition, with the vertical arm having a length of between 0.1 and 0.5 times the height of the partition and the horizontal arm a length of between 0.1 and 0.5 times the length of the partition.

[0010] Thanks to this configuration, the seismic isolator of the present invention maintains continuous contact with the structure of the building and thus enables damping throughout the entire element, seismically isolating the corner and sides of the partition in a more suitable manner than in the methods existing in the state of the art. If a seismic isolator is placed in each corner of the partition, the interaction which is produced with the structure of the building is greatly reduced. Each L-shaped part is deformed as a consequence of the displacement of the structure, preventing the brick partition from being loaded. Moreover, as it is an integral part, manufacturing, transportation and installation costs are reduced with respect to brick-shaped isolating elements, especially in already built partitions.

[0011] In order to promote balanced damping throughout the entire element, the width of at least one of the arms can be larger in the area close to the joint with the other arm and be smaller in the area of the end of the arm.

[0012] In order to interlock the part with the structure and with the partition, the present isolator may comprise at least one insert. One of the ends of this insert will be embedded in the part at a length less than or equal to

four fifths of the width of the arm in the same direction as the insert. The other end of the insert will be able to protrude from one of the surfaces of the isolator perpendicular to the plane of the partition at a length less than or equal to the width of the perpend and/or of the bed existing in the partition.

[0013] In this sense, the end of each arm can comprise an insert placed parallel to the longitudinal direction of the corresponding arm. Likewise, each arm can comprise at least one insert perpendicular to the longitudinal direction of the arm itself. Preferably, the isolator comprises one of every two consecutive perpendicular inserts with one end protruding through the surface that is in contact with the frame or structure of the building. Likewise, the inserts alternating with the previous ones comprise one end protruding through the surface that is in contact with the partition. This latter configuration achieves an interlocking of the isolator with the frame and with the partition in a distributed manner.

[0014] The material of the inserts can be any stiff and resistant material in relative terms compared to the base material of the isolator, for example it can be steel or any polymer which satisfies said feature.

[0015] Thanks to this configuration, the present seismic isolator in its condition of use has continuous contact with the structure of the building and does not present elements that transmit large forces in relative terms from the structure to the brick partition, in other words, which inhibit the isolating effect (such as mortar or through rods). The tensions in the partition are reduced by hindering the formation of compression connecting rods, thereby protecting the partition and reducing economic and human losses associated with partition breakage. As an advantage which must also be taken into account, the isolator is inexpensive to install, especially in already built partitions, since it is enough to simply make a groove or recess in the corner of the partition, place the isolator and fill the gaps existing between the isolator and the partition and between the isolator and the structural frame with masonry mortar (which does not generate new loads because it deforms together with the isolator, since it is a continuous part with flexibility). Likewise, the seismic isolator itself is inexpensive to manufacture even with inserts, which can be easily added after the formation of the arms made of flexible material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Figure 1 is a schematic elevation view of the seismic isolator of the present invention in its condition of use. Figure 2 is a perspective view of an exemplary embodiment of the seismic isolator of the present invention. Figure 3 is a schematic view of an exemplary embodiment of the seismic isolator of the present invention.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0017] In light of the aforementioned figures, and in accordance with the adopted numbering, one may observe therein a preferred exemplary embodiment of the invention, comprising the parts and elements indicated and described in detail below.

[0018] As shown in Figure 1, the preferred embodiment of the seismic isolator of the present invention consists of a single monobloc part (1) comprising two arms (11, 12) arranged at a right angle, one to be situated between the frame (F) and the partition (P) in a vertical direction and another to be situated between the frame (F) and the partition (P) in a horizontal direction. In the exemplary embodiment shown in Figure 1, the arms (11, 12) have a width somewhat smaller than the height of the bricks of the partition (P), the horizontal arm has a length ten times the width of the isolator and the vertical arm nine times the width of the isolator. This figure shows the mortar (m) placed around the monobloc part (1), which fills the gaps between it and the frame (F), and between it and the partition (P).

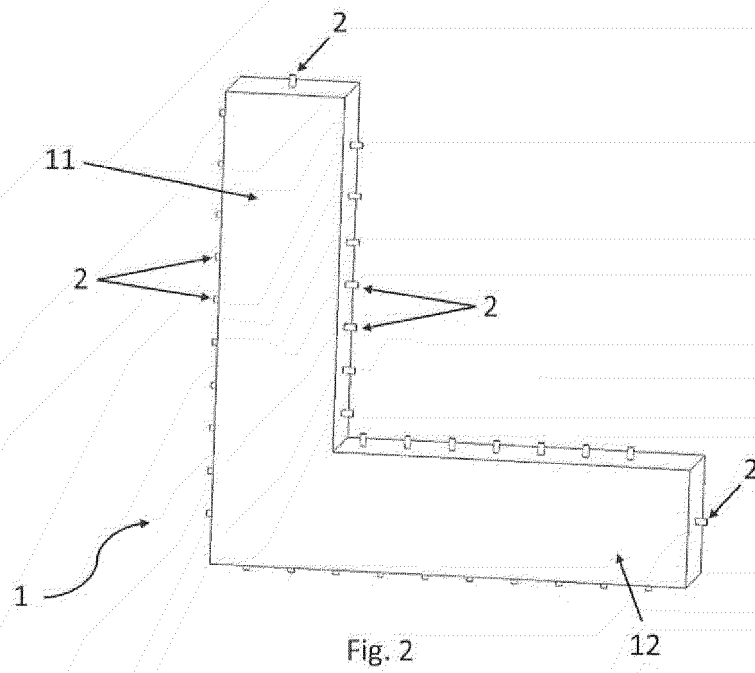
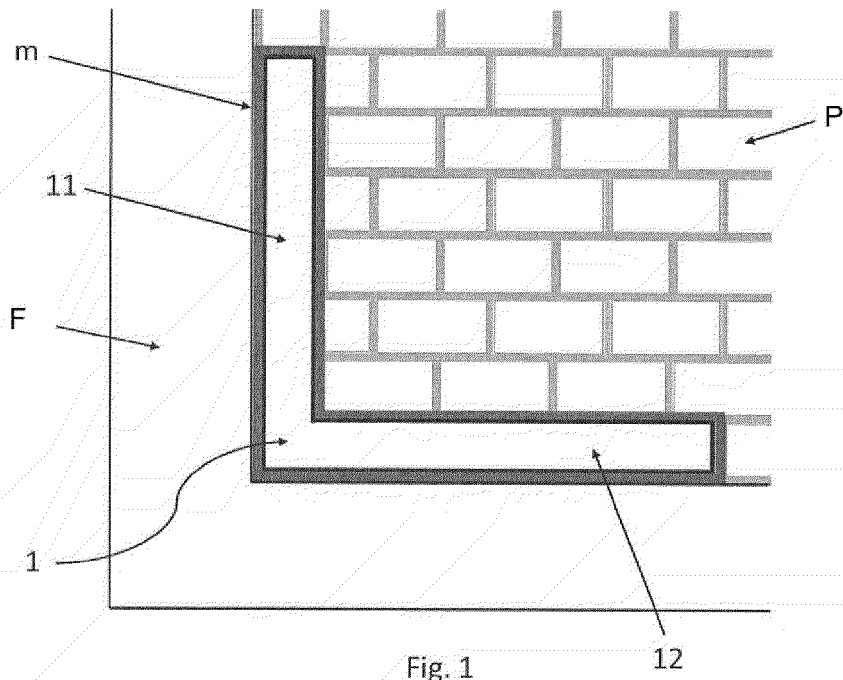
[0019] The exemplary embodiment shown in Figures 2 and 3 comprises an insert (2) placed at the end of each arm (11, 12), parallel to the longitudinal directions thereof. Likewise, it comprises in each arm (11, 12) inserts (2) perpendicular to the longitudinal direction, of which one of every two consecutive inserts (2) comprises an end protruding through the surface that is in contact with the frame (F), while the inserts (2) alternating with the previous ones comprise one end protruding through the surface that is in contact with the partition (P). In this case, the width of the arms (11, 12) is equal to the thickness thereof, and the length thereof is four times the width itself, being able to be comprised between 0.1 and 0.5 times the height of the partition in the case of the vertical arm and between 0.1 and 0.5 times the length of the partition in the case of the horizontal arm. As seen in Figure 3 in dotted lines, the embedded length of the inserts (2) of this exemplary embodiment is two thirds of the width of the arms (11, 12). It can also be seen how the external end of all the inserts (2) protrudes from the part one sixth of the length thereof, being smaller than the width of the mortar perpend and/or bed of the partition wherein it is inserted.

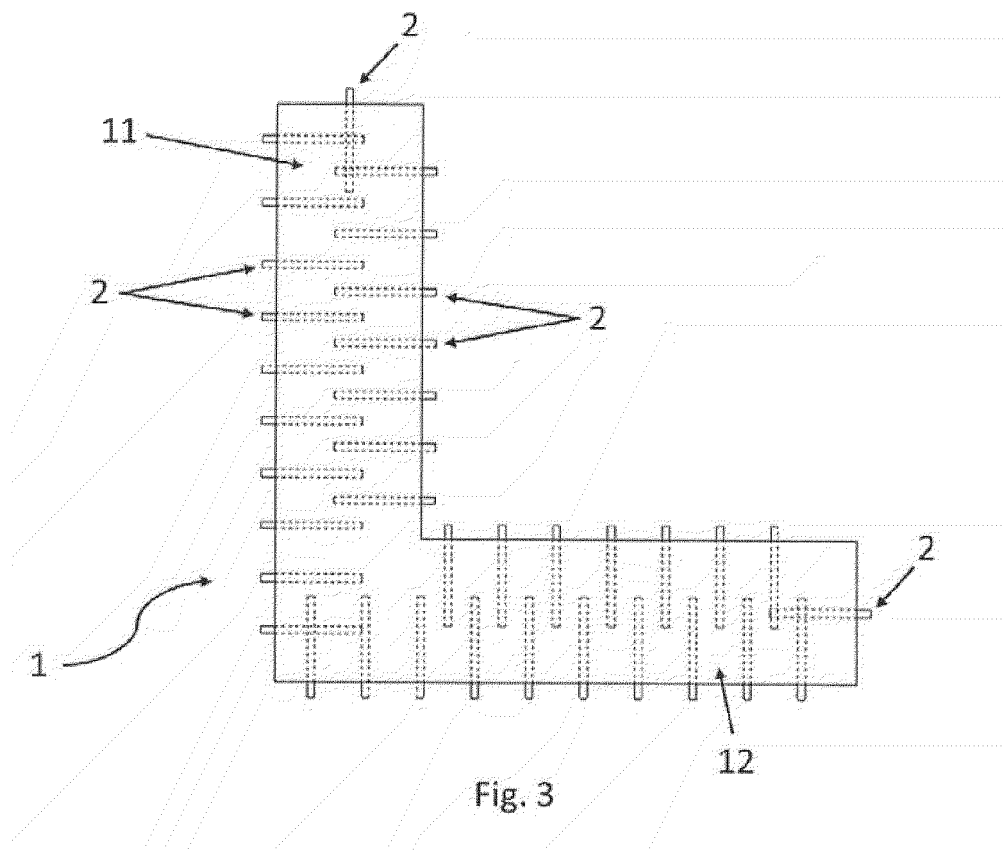
Claims

1. A corner seismic isolator for the seismic protection of buildings, both new and already built, comprising at least one resistant element in the form of a frame (F) with a brick partition (P) inside, the isolator consisting of a single monobloc part (1) formed from a material more flexible than the frame (F) and than the bricks of the partition (P), **characterised in that** two arms (11, 12) arranged at a right angle, one to be situated between the frame (F) and the partition

(P) in a vertical direction and the other to be situated between the frame (F) and the partition (P) in a horizontal direction, the thickness of which in the direction perpendicular to the plane of the partition (P) is between 0.5 to 1.5 times the thickness of the bricks in the partition (P), with the width of the arms (11, 12) being equal to or greater than one third of the height of a single brick in the partition (P) and the length thereof equal to or greater than three times the width of the arm itself (11, 12), with the length thereof, in turn, being a portion than the corresponding dimension of the partition, with the vertical arm having a length of between 0.1 and 0.5 times the height of the partition and the horizontal arm a length of between 0.1 and 0.5 times the length of the partition

2. The isolator according to claim 1, **characterised in that** it comprises at least one insert (2), which has one end embedded in the part (1), this end having a length less than or equal to four fifths of the width of the arm itself (11, 12), and the other end protruding from one of the surfaces of the isolator perpendicular to the plane of the partition (P).
3. The isolator according to claim 2, **characterised in that** the end of each arm (11, 12) comprises an insert (2) placed parallel to the longitudinal direction of the corresponding arm (11, 12).
4. The isolator according to claim 2 or 3, **characterised in that** each arm (11, 12) comprises at least one insert (2) perpendicular to the longitudinal direction of the corresponding arm (11, 12).
5. The isolator according to claim 4, **characterised in that** one of every two consecutive perpendicular inserts (2) comprises one end protruding through the surface that is in contact with the frame (F) and the inserts (2) alternating with the previous ones comprise one end protruding through the surface that is in contact with the partition (P).
6. The isolator according to any of the preceding claims, **characterised in that** the width of at least one of the arms (11, 12) is larger in the area close to the joint with the other arm (11, 12) and is smaller in the area of the end itself.





INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2019/070694

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04B, E04H, E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	AN CN-200710029998-A; page 15, lines 7 - 25; figures 10 - 12.	2 - 4
Y	FR 2690940 A1 (SEYVE DANIEL) 12/11/1993, page 3, line 23 - page 5, line 4; page 6, lines 23 - 32; figures 1, 3.	2 - 4
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	
"E" earlier document but published on or after the international filing date	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search
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Name and mailing address of the ISA/

Authorized officer
S. Fernández de MiguelOFICINA ESPAÑOLA DE PATENTES Y MARCAS
Paseo de la Castellana, 75 - 28071 Madrid (España)
Facsimile No.: 91 349 53 04

Telephone No. 91 3495437

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2019/070694

C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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INTERNATIONAL SEARCH REPORT

International application No.

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CLASSIFICATION OF SUBJECT MATTER

E04B1/98 (2006.01)

E04B2/56 (2006.01)

E04H9/02 (2006.01)

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International application No.

PCT/ES2019/070694

Information on patent family members

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		EP3130715 A4	03.01.2018

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REFERENCES CITED IN THE DESCRIPTION

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