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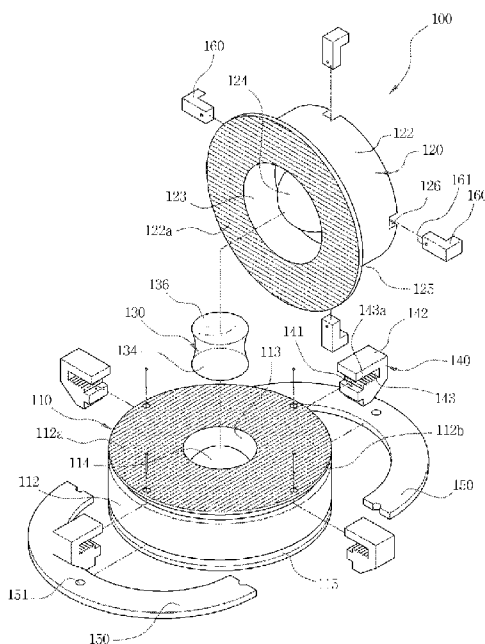
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(54) Title: FOUNDATION STRUCTURE OF CONSTRUCTION

[Fig. 1]



(57) Abstract: There is provided a foundation structure of construction. The foundation structure of construction comprises a lower constructional part, an upper constructional part and an interlocking constructional part having a first anchoring groove and a second anchoring groove formed in the bottom and top of a body that is interlocked between the lower constructional part and the upper constructional part so as to absorb vibrations of constructions, wherein the first dome portion is rotatably anchored to the first anchoring groove and the second dome portion is rotatably anchored to the second anchoring groove. Accordingly, when the foundation structure of construction is installed in lower portions of constructions such as buildings or bridges, it may be useful to prevent the damages or cracking of the constructions since its joint rotates within a certain angle to absorb impacts during the earthquakes or in shaking of the ground foundation, thereby preventing the impacts from being transferred directly to the constructions, and also be useful to uniformly disperse the loads of construction since the interlocking constructional part remains in point contact with the upper/lower constructional parts.

Description

FOUNDATION STRUCTURE OF CONSTRUCTION

Technical Field

- [1] The present invention relates to a foundation structure of construction, and more particularly to a foundation structure of construction having a framework to prevent the collapse of constructions by minimizing the impacts caused when the constructions such as buildings and bridges shake during earthquakes or in various ground works.

Background Art

- [2] As widely known in the art, the Earth has a core molten at the center thereof, a mantle surrounding the nucleus and existing in a semi-molten state, and a crust lying beneath the mantle.
- [3] In particularly, the Earth's crust is moving very slowly and softly while floating on the mantle. Here, the crust is composed of several plates, and the plates collide and recede from each other, thereby causing the earthquakes. In this case, zones where the earthquakes occur frequently (for example, in the boundaries of the plates) are called seismic zones, and one of the representative seismic zones is the Circum-Pacific seismic zone that lies along the east coast of Japan.
- [4] Therefore, building constructions, which is being built in areas located on these seismic zones, may be highly collapsed by very strong earthquakes of six or more degrees intensity, and although the building constructions are designed to endure the very strong earthquakes, they have a problem in that their walls may be cracked because of the very strong earthquakes. As a result, factual residents around the seismic zones may be unfortunately in danger of living under severe mental stresses such the feelings of uneasiness from the collapse of constructions.
- [5] Of course, in order to solve the above-mentioned problems, there is proposed a registered Patent No. 10-0706087 as filed by this applicant. The patent discloses a foundation structure of construction comprising a lower constructional part having a reception part formed a central portion thereof and being opened upwards from the reception part to be fixedly installed into the ground; an upper constructional part fixedly installed in a lower surface of a bottom plate of construction, which corresponds to an upper portion of the lower constructional part, the upper constructional part having a reception part formed in a central portion thereof and being opened downwards from the reception part; a rotatable joint having a lower sphere and an upper sphere formed integrally with each other, the lower sphere being anchored to the reception part of the lower constructional part and the upper sphere being anchored to the reception part of the upper constructional part. Accordingly, when the foundation

structure of construction is installed in lower portions of constructions such as buildings or bridges, it has the effect of preventing the damages or cracking of the constructions since its joint rotates within a certain angle to absorb impacts during the earthquakes or in shaking of the ground foundation, thereby preventing the impacts from being transferred directly to the constructions.

[6] However, the foundation structure of construction disclosed in the registered patent has a problem in that since the reception parts are formed respectively in the upper and lower constructional parts and the upper and lower spheres of the spherical joint are inserted to the reception parts, the joint rotates during an earthquake, but the joint does not smoothly rotate in the reception parts of the upper and lower constructional parts when the joint in the reception parts is not perfectly spherical in shape.

[7] Also, the reception parts of the upper and lower constructional parts are formed with diameters relatively higher than those that of the upper and lower sphere of the joint in order to enable the joint to rotate. Therefore, since a region to which the joint is closely adhered becomes a point contact with the reception parts, the loads of construction converges on the region that is in point contact with the upper and lower spheres of the joint, thereby imposing an increased stress to the upper and lower spheres of the joint, which leads to the deformation or damage of the joint. Also, since the joint does not entirely absorb the loads of the construction, it is unfortunately difficult to apply to larger constructions.

[8] Furthermore, the foundation structure of construction disclosed in the registered patent has a problem in that it is not easy to manufacture joints whose upper and lower spheres are formed integrally with each other.

Disclosure of Invention

Technical Problem

[9] Accordingly, the present invention is designed to solve the problems of the prior art, and therefore it is an object of the present invention to provide a foundation structure of construction that is capable of preventing the damages or cracking of the constructions by uniformly absorbing impacts during earthquakes or in shaking of the ground foundation, thereby preventing the impacts from being transferred directly to the constructions, and that is easy to be manufactured.

[10] Also, it is another object of the present invention to provide a foundation structure of construction capable of stably applying to larger constructions.

Technical Solution

[11] In order to accomplish the above object, the present invention provides a foundation structure of construction including a lower constructional part formed in a first base portion and having a first dome portion extruded upwards therefrom in a dome shape,

an upper constructional part formed in a second base portion supporting the bottom of the construction and having a second dome portion extruded downwards therefrom in a dome shape, and an interlocking constructional part having a first anchoring groove and a second anchoring groove formed respectively in the bottom and top of a body, the first dome portion being rotatably anchored to the first anchoring groove and the second dome portion being rotatably anchored to the second anchoring groove.

Advantageous Effects

[12] When the foundation structure of construction provided in the present invention is installed in lower portions of constructions such as buildings or bridges, it may be useful to prevent the damages or cracking of the constructions since its interlocking constructional part rotates within a certain angle to absorb impacts during the earthquakes or in shaking of the ground foundation shakes, thereby preventing the impacts from being transferred directly to the constructions, and also be useful to uniformly disperse the loads of construction since the interlocking constructional part remains in point contact with the upper/lower constructional parts.

[13] Also, the foundation structure of construction according to the present invention may be useful to secure the stability of constructions in application to the larger constructions since the loads are uniformly dispersed to the constructions.

Brief Description of Drawings

[14] FIG. 1 is a perspective view showing a foundation structure of construction according to one exemplary embodiment of the present invention.

[15] FIG. 2 is a cross-sectional view showing a foundation structure of construction according to one exemplary embodiment of the present invention.

[16] FIG. 3 is a diagram showing a building in which the foundation structure of construction according to one exemplary embodiment of the present invention is installed.

[17] FIG. 4 is a diagram showing a bridge in which the foundation structure of construction according to one exemplary embodiment of the present invention is installed.

[18] FIG. 5 is a diagram showing that the foundation structure of construction according to one exemplary embodiment of the present invention shakes during an earthquake.

Best Mode for Carrying out the Invention

[19] Hereinafter, the foundation structure of construction according to the present invention will be described in detail in exemplary embodiments referring to the accompanying drawings.

[20] Referring to FIGS. 1 to 3, the foundation structure 100 of construction according to one exemplary embodiment of the present invention includes a lower constructional part 110 installed in a constant distance in a ground surface 1, an upper constructional part 120 provided in an upper portion of the lower constructional part 110 and fixed

and installed integrally in a lower portion of a bottom plate 10a of the construction 10, and an interlocking constructional part 130 positioned between the lower constructional part 110 and the upper constructional part 120 and movable at a constant rate.

- [21] The upper constructional part 120, the lower constructional part 110 and the interlocking constructional part 130 are made of iron (Fe) in order to endure the loads of the construction 10, and more preferably is made of special steel whose strength is improved by the thermal treatment.
- [22] Also the construction 10 generally refers to all kinds of building constructions including buildings and bridges, and the foundation structure 100 is then provided in a lower portion of the construction 10 and functions as a foundation.
- [23] More particularly, the lower constructional part 110 has a first dome portion 114 formed in the center of a spherical first base portion 112, the first dome portion 114 being extruded upwards in a dome shape.
- [24] In this case, a first reception part 113 opened upwards therefrom is formed in the center of the first base portion 112, and a first dome portion 114 in a dome shape is formed in the inner center of the first reception part 113.
- [25] As the first reception part 113 is formed in the center of the first base portion 112 and the first dome portion 114 in a dome shape is formed inside the first reception part 113 as described above, a lower portion of an interlocking constructional part 130 as described later rotates into the center of the first dome portion 114, which renders it possible to prevent the breakaway of the interlocking constructional part 130.
- [26] Also, when the lower constructional part 110 is made of the iron, the ground may be sunk by the high load of iron (Fe, specific gravity: 7.86), which is one of representative heavy metals, although the lower constructional part 110 is installed in the hardened ground surface.
- [27] Accordingly, when a base frame 170 is formed in a lower portion of the lower constructional part 110 by curing the concrete, it is possible to prevent the sinking of the ground.
- [28] In this case, a fixing plank 150 is integrally coupled to the lower constructional part 110 in order to prevent the base frame 170 from being separated and broken away from the lower constructional part 110. That is to say, the separation and breakaway of the base frame 170 are prevented and the coupling and fixation of the base frame 170 are secured by forming a press-fit groove 115 in a lower side portion of the lower constructional part 110, inserting the fixing plank 150 into the press-fit groove 115 so that the fixing plank 150 can be protruded in a lateral direction in respect to the body 112 of the lower constructional part 110, and fixing the fixing plank 150 with a coupling pin 151.

- [29] Meanwhile, the upper constructional part 120 has a second dome portion 124 formed in the spherical second base portion 122, the second dome portion 124 being protruded downwards in a dome shape.
- [30] In this case, a second reception part 123 opened upwards therefrom is formed in the center of the second base portion 122, and a second dome portion 124 in a dome shape is formed in the inner center of the second reception part 123.
- [31] As the second reception part 123 is formed in the center of the second base portion 122 and the second dome portion 124 in a dome shape is formed inside the second reception part 123 as described above, an upper portion of an interlocking constructional part 130 as described later rotates into the center of the first dome portion 114, which renders it possible to prevent the breakaway of the interlocking constructional part 130.
- [32] Also, since a bottom plate 10a of the construction 10 of various sizes may be closely adhered to the top of the body 122 of the upper constructional part 120, a fixing groove 126 is formed in an upper circumference of the body 122 of the upper constructional part 120 in order to adjust the size of the bottom plate 10a of the construction 10. Then, an L-shaped fixing bracket 160 of various sizes is selectively closely adhered to the body 122 of the upper constructional part 120, and coupled and fixed with a coupling pin 161, depending on the structure of the lower surface to which the construction 10 is closely adhered.
- [33] The body 122 of the upper constructional part 120 is closely adhered to and fixed through the bottom plate 10a of the construction 10 on the basis of the above-mentioned surface structure using a coupling means (not shown) such bolts and nuts or rivets, or the body 122 of the upper constructional part 120 is fixed integrally in the bottom plate 10a of the construction 10.
- [34] Also, a supporting groove 112b is formed in an outer upper portion of the first base portion 112 of the lower constructional part 110. A breakaway prevention member 140 is fixed in the supporting groove 112b. Here, the breakaway prevention member 140 is formed in the rough shape of a '⊏', and a lower end of the breakaway prevention member 140 is inserted into the supporting groove 112b, and then fixed with the coupling pin 141.
- [35] In this case, the breakaway prevention member 140 is fixed in at least three supporting grooves 112b. Here, a third concavo-convex surface 143a having the same shape as the first concavo-convex surface 112a of the lower constructional part 110 is formed in the breakaway prevention groove 143.
- [36] Also, a breakaway prevention protrusion 125 protruded outwards in a lateral direction is extendedly formed in a lower portion of the second base portion 122 of the upper constructional part 120, and press-fit into the breakaway prevention groove 143.

In this case, since the breakaway prevention protrusion 125 is installed inside the breakaway prevention groove 143 so that it can be spaced apart in a certain distance from the breakaway prevention groove 143, it enables the upper constructional part 120 to move smoothly during an earthquake.

[37] Meanwhile, a first concavo-convex surface 112a is unidirectionally formed in an upper surface of the first base portion 112 of the lower constructional part 110, and a second concavo-convex surface 122a closely adhered crossly to the first concavo-convex surface 112a is formed in a lower surface of the second base portion 122 of the upper constructional part 120. More preferably, when the first concavo-convex surface 112a and the second concavo-convex surface 122a are installed in a rectangular direction to closely adhere the first concavo-convex surface 112a of the lower constructional part 110 to the second concavo-convex surface 122a of the upper constructional part 120, it is desirable to minimize their contact area and support their contact point.

[38] In this case, it is shown that the lower constructional part 110 and the upper constructional part 120 are formed in a spherical shape, but it is understood that they may be manufactured with various shapes such as triangle, rectangle, pentagon, etc.

[39] Meanwhile, the interlocking constructional part 130 has a first anchoring groove 134 and a second anchoring groove 136 formed respectively in the bottom and top of the body 132 that is formed in an approximately cylindrical or drum shape, wherein the first dome portion 114 of the lower constructional part 110 is anchored to the first anchoring groove 134 and the second dome portion 124 of the upper constructional part 120 is anchored to second anchoring groove 136.

[40] In this case, the first anchoring groove 134 and the second anchoring groove 136 are formed with the same size, and the first dome portion 114 of the lower constructional part 110 and the second dome portion 124 of the upper constructional part 120 are also preferably formed with the same size.

[41] In particular, the first anchoring groove 134 and the second anchoring groove 136 of the interlocking constructional part 130 do not completely surround the first dome portion 114 and the second dome portion 124, but preferably surround approximately 20 to 60% of the surface areas of the first dome portion 114 and the second dome portion 124 to allow the interlocking constructional part 130, which is positioned between the upper and lower constructional parts 120 and 110, to rotate smoothly.

[42] Since the first dome portion 114 of the lower constructional part 110 and the second dome portion 124 of the upper constructional part 120 are anchored to the first anchoring groove 134 and the second anchoring groove 136 of the interlocking constructional part 130, respectively, as described above, their anchored regions remains in point contact with the interlocking constructional part 130 to maintain a stable state

of the interlocking constructional part 130, thereby dispersing the loads of the construction 10, which renders it possible to apply to larger constructions as well.

[43] Also, the first dome portion 114 of the lower constructional part 110 and the second dome portion 124 of the upper constructional part 120 may be formed with various shapes such as a gently curved shape, a hemispherical shape and the like, and therefore the first anchoring groove 134 and the second anchoring groove 136 of the interlocking constructional part 130 may be also formed with various shapes.

[44] Meanwhile, although not shown in the accompanying drawings, a plurality of first dome portions 114 are formed in the first reception part 113 of the lower constructional part 110, and a plurality of second dome portions 124 are formed in the second reception part 123 of the upper constructional part 120. In this case, a plurality of interlocking constructional parts 130, which are interlocked with the first and second dome portions 114 and 124, are preferably provided to disperse the loads of the construction 10 in a more effective manner.

[45] The foundation structure 100 having the above-mentioned configuration may be installed in a lower portion of a building, for example the construction 10, as shown in FIG. 3, or be installed to support the bottom plate 10a of a bridge pier for supporting bridges as shown in FIG. 4.

[46] Accordingly, the foundation structure 100 installed in the lower portion of the construction 10 functions to disperse the loads of the construction 10 so that the construction 10 can be in a more stable state as usual without any earthquake. This is carried by closely adhering the first concavo-convex surface 112a of the lower constructional part 110 to the second concavo-convex surface 122a of the upper constructional part 120 and by supporting the interlocking constructional part 130, to which the first dome portion 114 formed in the first reception part 113 of the lower constructional part 110 and the second dome portion 124 formed in the second reception part 123 of the upper constructional part 120 are anchored, while maintaining a surface contact with the first dome portion 114 and the second dome portion 124.

[47] In particular, even when the vertical loads are highly imposed on the construction 10, the first concavo-convex surface 112a of the lower constructional part 110 and the second concavo-convex surface 122a of the upper constructional part 120 is closely adhered to, and supported with each other, thereby minimizing the deformation of the first and second anchoring grooves 134 and 136 of the interlocking constructional part 130 and the lower constructional part 110 anchored between the first and second anchoring grooves 134 and 136. Therefore, the interlocking constructional part 130 may function to steadily absorb impacts even when the construction 10 shakes during earthquakes in the future.

[48] When the ground surface 1 shakes under the above-mentioned conditions during the

earthquake as shown in FIG. 5, the first anchoring groove 134 of the interlocking constructional part 130, to which the first dome portion 114 of the lower constructional part 110 is anchored, rotates unidirectionally on the axis of the first dome portion 114, and the second anchoring groove 136 of the interlocking constructional part 130, to which the second dome portion 124 of the upper constructional part 120 is anchored, rotates in an opposite direction in respect to the first anchoring groove 134, thereby reducing the impacts on the construction 10. Eventually, the damages of the construction 10 may be prevented.

[49] Although the lower constructional part 120 and the upper constructional part 120 move in a relatively horizontal direction by the rotation of the interlocking constructional part 130, the breakaway prevention protrusion 125, which is extruded outwards in a lateral direction from the second base portion 122 of the upper constructional part 120, moves into the breakaway prevention groove 143, which leads to the prevention of the breakaway of the upper constructional part 120.

[50] As described above, the foundation structure of construction according to the present invention has been described in detail with reference to the accompanying drawings. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, and therefore various changes and modifications are made within the scope of the invention.

Industrial Applicability

[51] As described above, the foundation structure of construction according to the present invention may be useful to prevent the damages or cracking of the constructions since it is installed in lower portions of constructions such as buildings or bridges to absorb impacts during the earthquakes or in the shaking of the ground foundation.

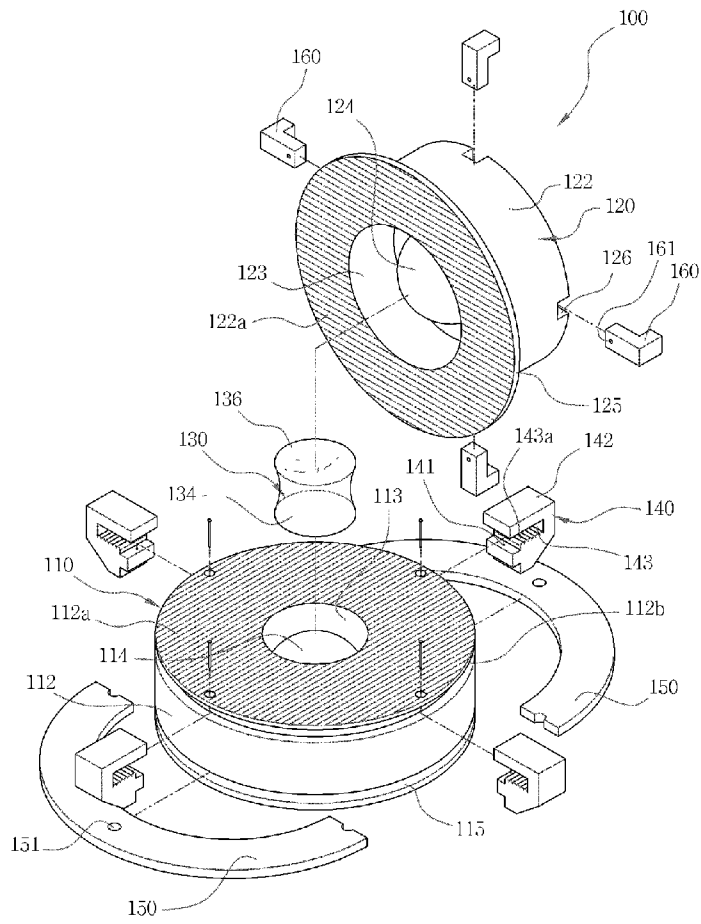
Claims

- [1] A foundation structure of construction, comprising:
a lower constructional part 110 formed in a first base portion 112 and having a first dome portion 114 extruded upwards therefrom in a dome shape;
an upper constructional part 120 formed in a second base portion 122 supporting the bottom of the construction 10 and having a second dome portion 124 extruded downwards therefrom in a dome shape; and
an interlocking constructional part 130 having a first anchoring groove 134 and a second anchoring groove 136 formed respectively in the bottom and top of a body 132, the first dome portion 114 being rotatably anchored to the first anchoring groove 134 and the second dome portion 124 being rotatably anchored to the second anchoring groove 136.
- [2] The foundation structure of construction according to claim 1, wherein a first reception part 113 opened upwards therefrom is formed in the center of the first base portion 112 of the lower constructional part 110 and the first dome portion 114 is formed in an inner part of the first reception part 113; and a second reception part 123 opened upwards therefrom is formed in the center of the second base portion 122 of the upper constructional part 120 and the second dome portion 124 is formed in an inner part of the second reception part 123.
- [3] The foundation structure of construction according to claim 2, wherein a first concavo-convex surface 112a is unidirectionally formed in an upper edge surface of the first base portion 112 of the lower constructional part 110, and a second concavo-convex surface 122a closely adhered crossly to the first concavo-convex surface 112a is formed in a lower edge surface of the second base portion 122 of the upper constructional part 120.
- [4] The foundation structure of construction according to claim 1, wherein a fixing plank 150 extruded outwards therefrom is further provided in a side surface of the body 112 of the lower constructional part 110 in order to prevent the separation and breakaway of a base frame 170 that is made of concrete.
- [5] The foundation structure of construction according to claim 1, wherein a fixing groove 126 is formed in an upper circumference of the body 122 of the upper constructional part 120, and an L-shaped fixing bracket 160 for supporting the bottom of the construction 10 is further fixed in the fixing groove 126.
- [6] The foundation structure of construction according to claim 1, wherein a breakaway prevention protrusion 125 protruded outwards in a lateral direction is extendedly formed in a lower portion of the second base portion 122 of the upper constructional part 120, and a breakaway prevention member 140 in the shape of

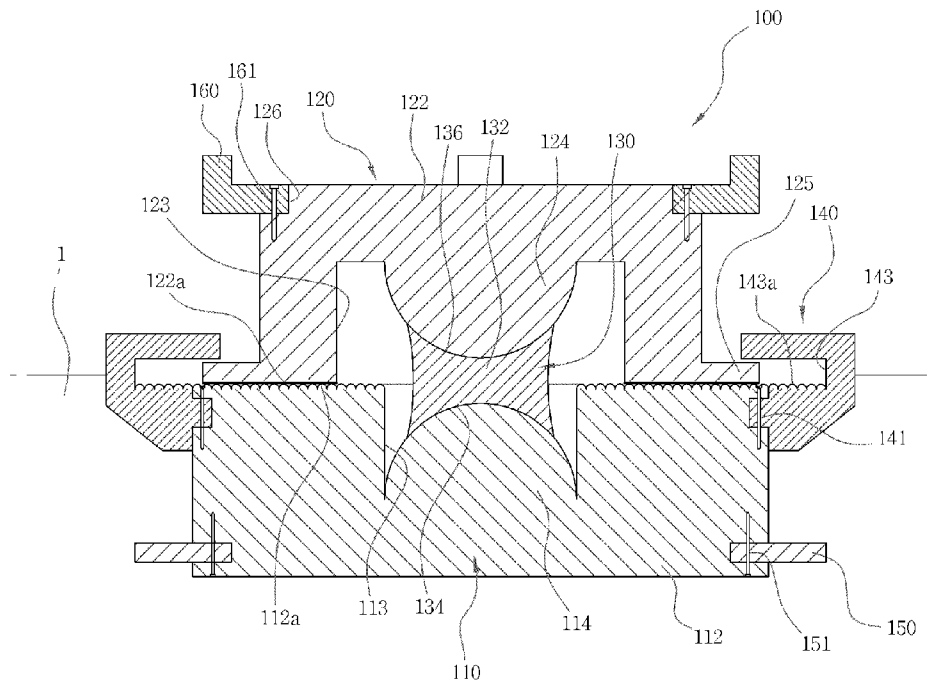
a □ is further fixed in an outer upper portion of the first base portion 112 of the lower constructional part 110, the breakaway prevention member 140 having a breakaway prevention groove 143 formed therein for preventing the breakaway of the breakaway prevention protrusion 125.

[7] The foundation structure of construction according to claim 1, wherein the lower constructional part 110 and the upper constructional part 120 are formed in a spherical shape.

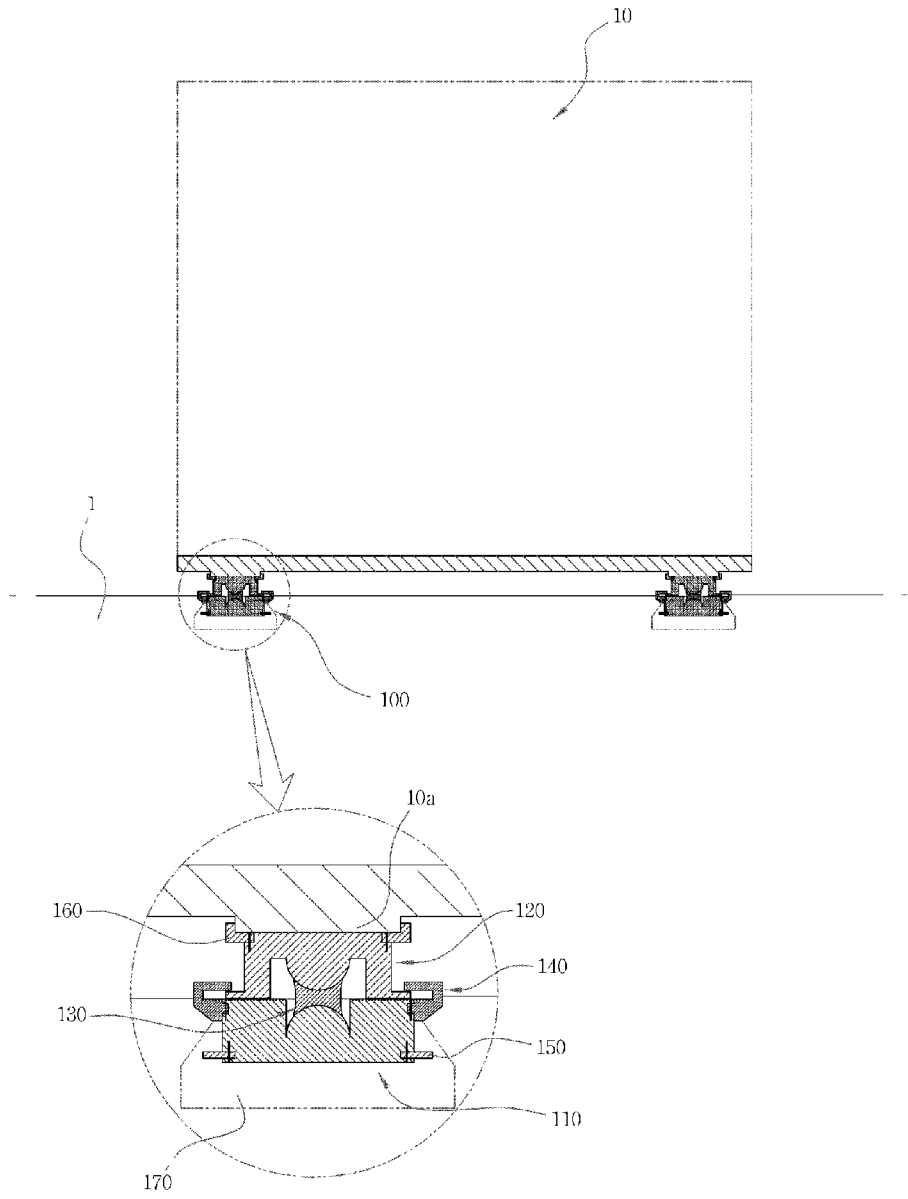
[Fig. 1]



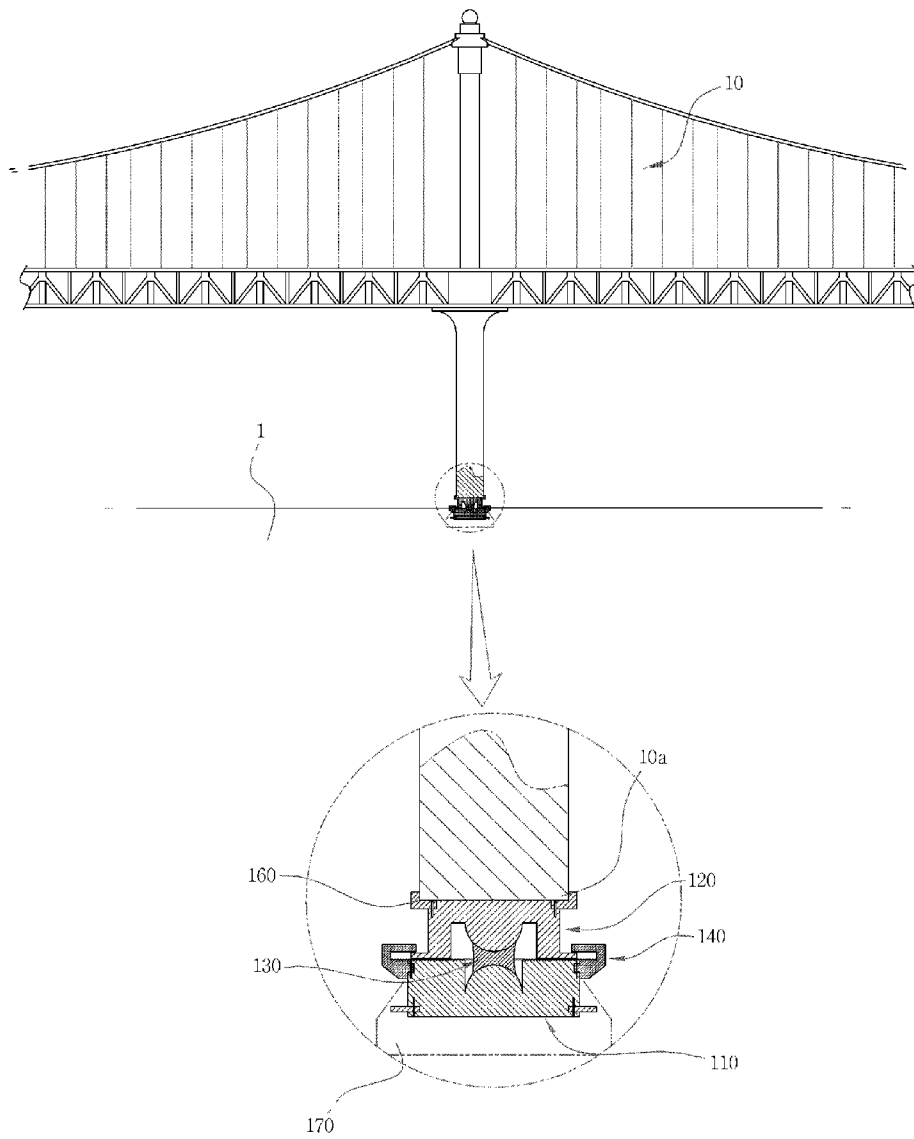
[Fig. 2]



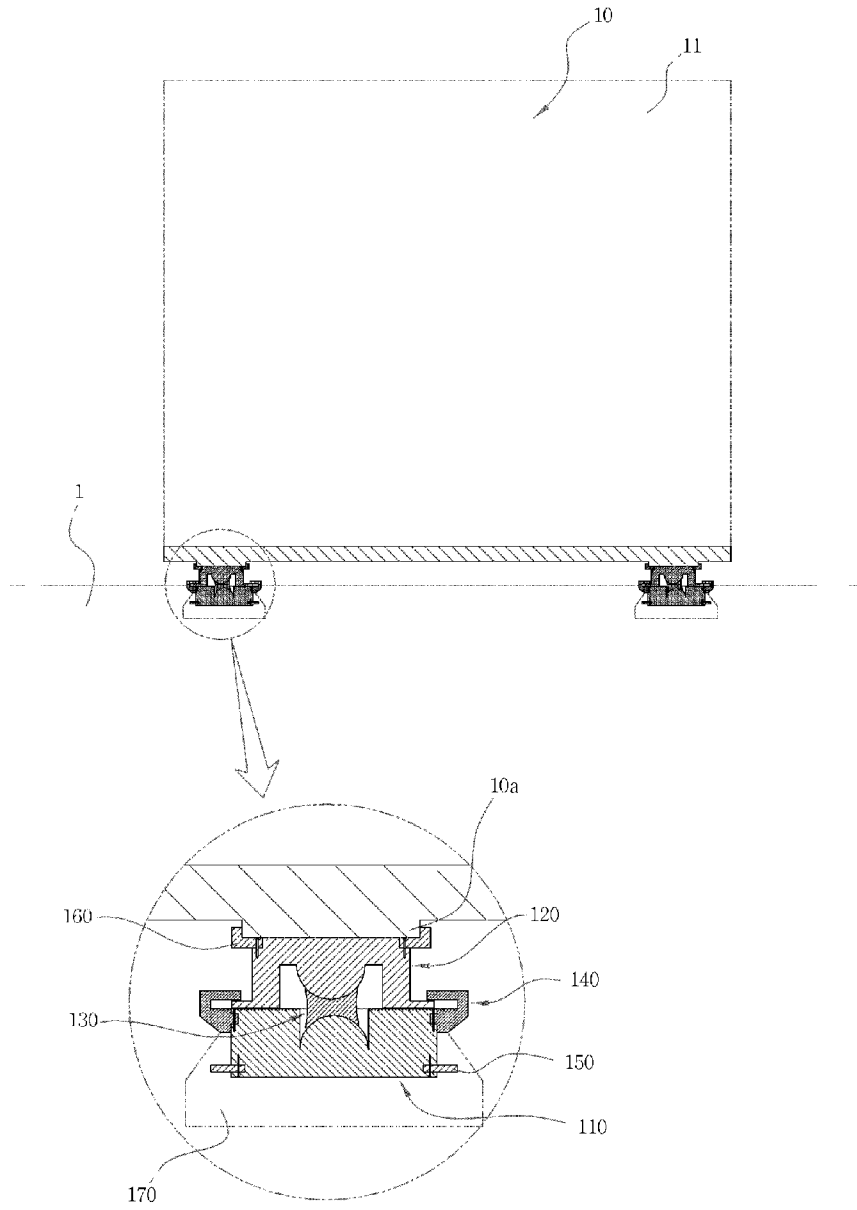
[Fig. 3]



[Fig. 4]



[Fig. 5]



A. CLASSIFICATION OF SUBJECT MATTER*E02D 27/34(2006.01)i*

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)

IPC : E02D 27/34, E01D 19/04, E04H 9/02

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

Korean utility models and applications for utility models since 1975

Japanese utility models and applications for utility models since 1975

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

eKIPASS(KIPO internal) & Keywords : earthquake, seismic, and bearing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2007-315523 A (YOSHISAKA SHIRO; YAMAGEN CO., LTD .) 06 December 2007	1, 7
Y	See paragraphs <20> - <27>, claim 1, and figures 1 - 3.	6
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A	See paragraphs <20> - <36>, claim 1, and figures 1 - 12.	2 - 5
Y	KR 20-0319696 Y1(CHOI, GWANG CHEOL) 01 July 2003	6
	See page 6, lines 42 - 50, claim 1, and figures 1 - 3.	
A	US 5071261 A (GUENTHER STUEVE) 10 December 1991	1 - 7
	See column 2, line 26 - column 3, line 30, claims 1-11, and figures 1 - 4.	
A	US 5689919 A (KENICHI YANO) 25 November 1997	1 - 7
	See column 2, line 41 - column 4, line 26, claims 1 - 4, and figure 1.	

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

16 APRIL 2009 (16.04.2009)

Date of mailing of the international search report

16 APRIL 2009 (16.04.2009)

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Telephone No. 82-42-481-8570



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/004587

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2007-315523 A	06.12.2007	None	
KR 20-0319696 Y1	01.07.2003	None	
US 5071261 A	10.12.1991	None	
US 5689919 A	25.11.1997	None	