SOLAR POWER GENERATION STRUCTURE ON WATER

CROSS REFERENCE TO RELATED APPLICATION

The present application claims priority to Korean Patent Application No. 10-2021-0158417, filed November 17, 2021, the entire contents of which are incorporated herein for all purposes by this reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present disclosure relates generally to a solar power generation structure on water. More particularly, the present disclosure relates to a solar power generation structure on water which provides a coupling structure in which a plurality of unit structures can be securely coupled to each other and impact and stress applied to a coupled portion in vertical and horizontal directions by waves can be respectively relieved and distributed and which can minimize fluid resistance to a buoyancy body in water.

Description of the Related Art

As concerns about the depletion of fossil fuels and environmental pollution are emerging as social problems, a

demand for environmentally friendly clean energy to replace existing energy is increasing. Accordingly, a solar power generation method using sunlight as one of the clean energy is widely used in various fields. In the solar power generation method, various technological developments have been attempted for high efficiency solar power generation at a lower installation cost in consideration of efficiency and installation costs. In consideration of this point, in recent years, a solar power generation device floating on a water surface has been commercialized.

In Korean Patent Application Publication No. 10-2020-0081981 (published on July 8, 2020, and hereinafter, referred to as "Patent Document 1"), a solar power generation structure on water has been proposed. According to Patent Document 1, an elastic connection bracket is provided between unit structures so as to connect the unit structures to each other. Referring to FIG. 1, in Patent Document 1, the elastic connection bracket 1 includes a pair of coupling members 2 provided by being spaced apart from each other, a guide pin 5, a coil spring 3, and a pair of low-friction members 4 such that impact transmitted between the unit structures can be relieved, absorbed and blocked.

However, in the elastic connection bracket 1, the coil spring is corroded due to the exposure thereof to seawater and ultraviolet rays, there resulting in deterioration of

durability. In addition, in order to reduce the surface friction of each of first and second end parts of the coil spring 3, the pair of low-friction members 4 is provided. However, such members are structurally weak parts and thus are frequently damaged and deformed, thereby increasing the number of processes and parts, and increasing manufacturing time and manufacturing cost

In addition, in Korean Patent No. 10-1492838 (registered on Feb 6, 2015, and hereinafter, referred to as "Patent Document 2"), a solar power generation system on sea in which one support frame 8 supports a plurality of solar power generation modules 6 is disclosed. Referring to FIG. 2, the solar power generation system disclosed in Patent Document 2 includes the support frame 8 made of a buoyant material, and a side cushioning material 9 which is provided outside of the support frame 8 and supports a connecting wire 7. One or more fenders 7a are coupled to the outside of the connecting wire 7 for impact prevention and spacing so as to prevent bending or twisting of a connection portion at which neighboring support frames are connected to each other.

However, while a plurality of side cushioning materials 9 provided on the connecting wire 7 is not in close contact with the support frame 8, the side cushioning materials are coupled to each other by the connecting wire 7 made of a flexible material and are tangled with or broken from each other, and

has an excessively large movable range, so impact caused by waves is not effectively dissipated.

Documents of Related Art

(Patent Document 1) Korean Patent Application Publication 10-2020-0081981 (published on July 8, 2020)

(Patent Document 2) Korean Patent No. 10-1492838 (registered on Feb 6, 2015.02.06)

SUMMARY OF THE INVENTION

Accordingly, the present disclosure has been made keeping in mind the above problems occurring in the related art, and the present disclosure is intended to propose a solar power generation structure on water which has an improved structure in which the tight sealed state of a buoyancy body is maintained and fluid resistance to the buoyancy body is minimized such that impact on the buoyancy body and movement thereof due to waves can be minimized.

In addition, the present disclosure is intended to propose a solar power generation structure on water in which deformation of a connecting means and damage thereto caused by stress applied to the connecting means by waves can be prevented.

Furthermore, the present disclosure is intended to propose

a solar power generation structure on water in which by using the connecting means which improves durability against UV rays and corrosion resistance to seawater, impact between a plurality of unit structures is effectively distributed such that stable coupling force can be secured.

In order to achieve the above objective, according to one aspect of the present disclosure, there is provided a solar power generation structure on water formed by coupling unit structures A to each other by a connecting means 400, each of the unit structures being formed by coupling a buoyancy body 300 to a lower part of a frame unit 200 for supporting a solar panel 100, the structure including: the buoyancy body 300 including: a body part 310 having a horizontal cross-section transformed into a streamlined shape gradually downward from an upper side of the body part 310 such that a horizontal cross-section of an upper end part of the body part 310 is a square cross-section having four sides, wherein a length of each of the sides decreases gradually downward such that a horizontal cross-section of a lower end part of the body part 310 is a circular cross-section, and a cover part 320 being configured to have a shape corresponding to the upper end part of the body part 310 and being coupled to the upper end part of the body part 310 so as to form a sealed space part S, and the connecting means 400 including: a pair of brackets 410 coupled to the respective frame units 200 of the unit structures A so

as to couple the unit structures A to each other, an elastic body 420 provided between the pair of brackets 410 and made of an EPDM material with excellent corrosion resistance, and a fastening member 430 passing through the pair of brackets 410 and the elastic body 420 and pressing and fixing opposite ends of the elastic body 420, wherein each of the brackets 410 has a bent surface 412 bent orthogonally to each of opposite end parts of a support surface 411 such that the bracket 410 has a "U" shape and thus an end part of a support of each of the frame units 200 is provided at an open side of the bracket 410, and a flat surface 421 formed on each of the opposite ends of the elastic body 420 is coupled to the support surface 411 to be in contact therewith, and the elastic body 420 has a convex cylindrical structure such that the elastic body 420 has a diameter decreasing gradually from a center of the elastic body 420 toward each of opposite end parts thereof.

In addition, the space part S may be composed of a first space part S1 provided inside the body part 310, and a second space part S2 provided inside the cover part 320 so as to communicate with the first space part S1, wherein the first space part S1 and the second space part S2 may be respectively divided to have grid shapes by a first partition wall member 311 and a second partition wall member 321 and form a plurality of buoyancy chambers.

Furthermore, the first partition wall member 311 may

include a first vertical partition wall 311a dividing the first space part S1 in a vertical direction, and a first horizontal partition wall 311b dividing the first space part S1 in a horizontal direction such that the first space part S1 has a plurality of divided main buoyancy chambers 312, and the second partition wall member 321 may include a second vertical partition wall 321a dividing the second space part S2 in the vertical direction, and a second horizontal partition wall 321b dividing the second space part S2 in the horizontal direction such that the second space part S2 has a plurality of divided buffer buoyancy chambers 322.

Additionally, the first partition wall member 311 and the second partition wall member 321 may be arranged to cross each other.

In addition, at least one of the main buoyancy chambers 312 may be provided with an auxiliary buoyancy body 10 having specific gravity lower than water.

According to the embodiment of the present disclosure, the upper end part of the buoyancy body has a square horizontal cross-section and has the length of each side gradually decreasing downward such that the lower end part of the buoyancy body has a circular horizontal cross-section, thereby minimizing the flow resistance of fluid applied to the buoyancy body in water, and maintaining the tight sealed state of the buoyancy body.

In addition, by using the elastic body of the connecting means which connects the plurality of unit structures to each other, stress applied to a connection portion of the unit structures to each other in horizontal and vertical directions by waves can be distributed and impact transmitted between the unit structures can be distributed so as to prevent the occurrence of cracks in the connection portion due to impact by waves, thereby providing the solar power generation structure on water which has increased durability.

Furthermore, the connecting means which connects the plurality of unit structures to each other has improved corrosion resistance against UV rays and seawater, thereby greatly extending the life of the solar power generation structure on water.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objectives, features, and other advantages of the present disclosure will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of an elastic connection bracket in a solar power generation system on water according to Patent Document 1;

FIG. 2 is a top plan view illustrating the configuration

of a solar power generation system on water according to Patent Document 2;

FIG. 3 is a perspective view illustrating a solar power generation structure on water according to an embodiment of the present disclosure;

FIG. 4 is a perspective view illustrating a buoyancy body of the solar power generation structure on water according to the embodiment of the present disclosure;

FIGS. 5(a) and 5(b) are a bottom view and a top plan view respectively illustrating a cover part and a body part of the buoyancy body of the solar power generation structure on water according to the embodiment of the present disclosure;

FIG. 6 is a perspective view illustrating the coupling state of the body part with the cover part according to the embodiment of the present disclosure;

FIG. 7 is a perspective view illustrating a state in which an auxiliary buoyancy body is provided inside the buoyancy body according to the embodiment of the present disclosure;

FIGS. 8(a) and 8(b) are simulation images showing the fluid resistance test results according to shapes of the buoyancy body of the present disclosure;

FIG. 9 is an exploded perspective view illustrating a connecting means of the solar power generation structure on water according to the embodiment of the present disclosure;

FIG. 10 is a perspective view illustrating the connecting

means of the solar power generation structure on water according to the embodiment of the present disclosure;

FIG. 11 is a top plan view illustrating the coupled state of a fastening member and an elastic body of the connecting means according to the embodiment of the present disclosure;

FIG. 12 illustrates the shape of an A-A section of the fastening member and the elastic body of the connecting means illustrated in FIG. 11;

FIG. 13 is a top plan view illustrating the shape of a frame unit according to the embodiment of the present disclosure;

FIG. 14 illustrates a coupled state of unit structures to each other according to the embodiment of the present disclosure;

FIGS. 15(a) and 15(b), and 15(c) and 15(d) respectively are perspective views illustrating, in detail, the coupled state of the frame unit, and stress analysis simulation images according to the embodiment of the present disclosure;

FIGS. 16(a), 16(b), 16(c), 17(a), 17(b), 18(a), 18(b), and 18(c), which are various comparative examples, are simulation images illustrating stress analysis test results for shapes of the elastic body; and

FIGS. 19(a), 19(b), 19(c), 20, 21(a), 21(b), and 21(c) are simulation images illustrating the stress analysis test results of the elastic body according to the embodiment of the present

disclosure.

DETAILED DESCRIPTION OF THE INVENTION

Hereinafter an exemplary embodiment of the present disclosure will be described in detail with reference to the accompanying drawings.

First, hereinafter, a solar power generation structure on water according to the embodiment of the present disclosure will be described in detail with reference to FIGS. 3, 4, 5(a), 5(b), and 6. As for the solar power generation structure on water according to the embodiment of the present disclosure, a buoyancy body 300 is coupled to the lower part of a frame unit 200 for supporting a solar panel 100 so as to form one unit structure A, and a plurality of unit structures A are coupled to each other by a connecting means 400 so as to form the solar power generation structure on water.

The present disclosure relates to the solar power generation structure on water in which each of the unit structures A is composed of the buoyancy body 300 which floats the solar panel 100 on water, and the frame unit 200 which connects the solar panel 100 with the buoyancy body 300. The buoyancy body 300 includes a body part 310 having a horizontal cross-section transformed into a streamlined shape downward gradually from the upper side of the body part, and a cover

part 320 which has a shape corresponding to the upper end part of the body part 310 and forms a sealed space part S by being coupled to the upper end part of the body part 310.

The space part S is composed of a first space part S1 provided inside the body part 310, and a second space part S2 provided inside the cover part 320 so as to communicate with the first space part S1. The first space part S1 and the second space part S2 are divided to have grid shapes by first and second partition members 311 and 321 and form a plurality of buoyancy chambers.

In addition, the connecting means 400 includes: a pair of brackets 410 coupled to the respective frame units 200 of the unit structures A in opposite ends thereof so as to couple the unit structures A to each other in vertical and horizontal directions; an elastic body 420 provided between the pair of brackets 410; and a fastening member 430 passing through the pair of brackets 410 and the elastic body 420 so as to fix the position of the elastic body 420.

According to the embodiment, the body part 310 has a square horizontal cross-section having four sides in an upper end part thereof, and preferably has a circular horizontal cross-section gradually downward. Accordingly, when coupling the upper end part of the body part 310 to the cover part 320, the square cross-section of the upper end part of the body part 310 has a sufficient surface area so as to realize a sealed

coupling of the body part 310 and the cover part 320 to each other. On the other hand, the lower end part of the body part has a circular cross-section and thus can minimize the flow resistance of fluid applied to the buoyancy body in water.

Furthermore, the body part 310 and the cover part 320 are preferably bonded to each other by thermal fusion between the edges of the upper end part of the body part 310 and the edges of the lower end part of the cover part 320. Accordingly, the buoyancy body of the present disclosure has a fusion point located at an upper portion thereof, and even if weight thereof increases, the fusion point is spaced apart from a water line, so the buoyancy body can have durability and can have an excellent buoyancy performance even in a water environment with high wave heights. Additionally, the buoyancy body is preferably formed of a medium-density polyethylene (MDPE) material.

FIG. 5(a) illustrates the inner side of the cover part 320, and FIG. 5(b) illustrates the inner side of the body part. The first partition wall members 311 and the second partition wall members 321 will be described in detail with reference to FIG. 5(a), 5(b), 6, and 7. Each of the first partition wall members 311 includes a first vertical partition wall 311a dividing the first space part S1 in a vertical direction, and a first horizontal partition wall 311b dividing the first space part S1 in a horizontal direction. The second partition wall

member 321 includes a second vertical partition wall 321a dividing the second space part S2 in a vertical direction, and a second horizontal partition wall 321b dividing the second space part S2 in the horizontal direction.

Accordingly, the first space part S1 is divided horizontally and vertically by the first partition wall member 311 such that a plurality of main buoyancy chambers 312 is formed to have a grid shape, and the second space part S2 is divided horizontally and vertically by the second partition wall member 321 such that a plurality of buffer buoyancy chambers 322 is formed to have a grid shape.

In addition, according to the embodiment, as illustrated in FIG. 7, each of the main buoyancy chambers 312 is provided with an auxiliary buoyancy body 10 with specific gravity lower than water and can secure additional buoyancy through the auxiliary buoyancy body 10 as required. The auxiliary buoyancy body 10 may be made of foamed polypropylene resin or foamed polyethylene resin, etc.

Particularly, the first partition wall member 311 and the second partition wall member 321 are preferably arranged to cross each other. Accordingly, even if external impact is applied to the buoyancy body 300 due to strong waves or the buoyancy body 300 has continuous vibration or shaking, the auxiliary buoyancy body 10 provided in the first space part S1 can prevent movement of the buoyancy body 300. Accordingly, it

is preferable that the number of the second partition wall members 321 is greater than the number of the first partition wall members 311. In addition, the first and second partition wall members 311 and 321 are arranged to cross each other so as to realize additional coupling thereof.

FIGS. 8(a) and 8(b) illustrate results of the fluid resistance simulation test according to shapes of the buoyancy body of the present disclosure. FIG. 8(a) is a test of fluid resistance to the buoyancy body having a streamlined shape, and FIG. 8(b) is a test fluid resistance to the buoyancy body having a square shape. It can be seen that in FIG. 8(a), high fluid resistance does not occur due to the streamlined shape, but in FIG. 8(b), higher fluid resistance occurs due to the square shape.

Hereinafter, the connecting means 400 of the solar power generation structure on water according to the embodiment of the present disclosure will be described with reference to FIGS. 9 to 12. The bracket 410 of the present disclosure is formed to have an "U" shape and is fastened to an end part of the frame unit 200 provided at an open side of the bracket 410 by covering the end part of the frame unit 200, and is composed of a support surface 411, and a bent surface 412 formed by bending orthogonally from each of the opposite end parts of the support surface 411. In addition, the elastic body 420 includes a flat surface 421 formed on each of the opposite ends

of the elastic body 420, and a through hole 422.

Meanwhile, the flat surface 421 formed on each of the opposite ends of the elastic body 420 is coupled to the support surface 411 of the bracket 410 such that the flat surface 421 is in contact with the support surface 411, and thus stress concentrated on the connecting means 400 by waves is evenly distributed through the flat surface 421 of the elastic body to the support surface 411, thereby securing a more stable coupling force and realizing sufficient distributing effect.

Furthermore, the elastic body 420 has a convex cylindrical structure and is formed such that W1 is greater than W2 when a diameter of a center of the elastic body 420 is W1 and a diameter of each of opposite side ends thereof is W2. According to the embodiment, as illustrated in FIG. 9, the elastic body 42 may be arranged to have a pair of elastic bodies. Additionally, in this case, each of the elastic bodies is preferably provided side by side by being spaced at a predetermined interval apart from each other. The elastic body 420 is preferably configured to have a diameter decreasing gradually toward each of opposite end portions of the elastic body 420 from a center portion thereof. Additionally, according to the embodiment, the elastic body 420 is preferably formed of an EPDM-TPV material with excellent corrosion resistance to UV rays and seawater.

A coupled state between the frame unit and the connecting

means will be described in detail with reference to FIGS. 13 and 14. The frame unit 200 includes a horizontal base frame 210 extending in a horizontal direction and having a plurality of supports, and a vertical base frame 220 coupled to the horizontal base frame 210 and having a plurality of supports extending in vertical directions.

The connecting means 400 of the present disclosure may be coupled to an end part of at least one support of the supports of the horizontal base frame 210 so as to be horizontally coupled to another unit structure A, and is coupled to an end part of at least one support of the supports of the vertical base frame 220 so as to be vertically coupled to another adjacent unit structure A.

In addition, the horizontal base frame 210 includes a plurality of first horizontal supports 211, and a plurality of second horizontal supports 212 arranged to intersect with the first horizontal supports 211 and located at positions higher than the first horizontal supports 211, and the vertical base frame 220 includes first vertical supports 221 coupled to the first horizontal supports 211, and second vertical supports 222 supporting the second horizontal supports 212. Additionally, the solar panel 100 is supported by at least one of the second horizontal supports 212 and the second vertical support 222, and the connecting means 400 is coupled to at least one of an end parts of the first horizontal supports 211 and the first

vertical supports 221 so as to connect the plurality of unit structures A to each other.

In addition, according to the embodiment, the solar power generation structure may further include an extension panel 260 provided between the second horizontal supports 212 adjacent to each other, the extension panel 260 extending in a horizontal direction and being coupled to the second horizontal support 212 in vertical opposite ends thereof. The extension panel 260 is a panel having a plurality of through holes formed therethrough in a longitudinal direction thereof, and is intended for a worker to easily perform the connection of the unit structures A to each other and maintenance thereof on water.

FIGS. 15(a) and 15(b), and 15(c) and 15(d) respectively are perspective views illustrating, in detail, the coupled state of the frame unit, and stress analysis simulation images according to the embodiment of the present disclosure. As illustrated in FIGS. 15(a) and 15(b), the frame unit 200 of the present disclosure includes the first and second horizontal supports 211 and 212 extending in horizontal directions, and the first and second vertical supports 221 and 222 extending in vertical directions. The first and second horizontal supports 211 and 212 and the first and second vertical supports 221 and 222 which intersect with each other may be coupled to each other by a connecting plate 250 having the shape of a flat

plate. The connecting plate 250 is provided between the first and second horizontal supports 211 and 212 and the first and second vertical supports 221 and 222, and has an area larger than an intersection area between the first and second horizontal supports 211 and 212 and the first and second vertical supports 221 and 222. Furthermore, for secure connection of the associated parts to each other, a connection means that sequentially passes through each of the parts may be further provided. That is, according to the embodiment, when the connecting plate 250 is provided at an intersection point between the first and second horizontal supports 211 and 212 and the first and second vertical supports 221 and 222, impact and distortion caused by strong waves can be prevented.

In addition, according to the embodiment, at least one guide means may be formed on the upper or lower surface of the connecting plate 250 by protruding therefrom such that the guide means is integrated with the connecting plate by pressing, the guide means being configured to guide the coupling position of the first and second horizontal supports 211 and 212 with the first and second vertical supports 221 and 222.

FIGS. 16(a), 16(b), 16(c), 17(a), 17(b), 18(a), 18(b), and 18(c) are simulation images illustrating stress analysis test results for the shapes of the elastic body according to various comparative examples. As illustrated in FIGS. 16(a), 16(b),

and 16(c), the elastic body of a first comparative example has a quadrangular block shape in which a plurality of concave grooves is formed in the central portion of the elastic body, and in this case, the diameter of the center portion of the elastic body is smaller than the diameter of each of the opposite end parts of the elastic body. According to the comparative example, when a load is applied to the elastic body in a longitudinal direction as illustrated in FIG. 16(a), or when a load is applied to the elastic body in a transverse direction as illustrated in 16(b) and 16 (c), the load is not evenly distributed, and stress is excessively generated on the opposite end parts of the elastic body, so the elastic body may be deformed and damaged. Additionally, when the elastic body is formed in the shape of a quadrangular block, the molding material of the elastic body is consumed relatively excessively, compared to the embodiment illustrated in FIGS. 9 to 12, so manufacturing costs of the elastic body increase.

As illustrated in FIGS. 17(a) and 17(b), the elastic body of a second comparative example has a cylindrical shape and is configured to have a diameter decreasing gradually toward the center portion of the elastic body from the opposite end parts of the elastic body. According to the second comparative example, the manufacturing costs of the elastic body may be reduced, compared to the first comparative example illustrated in FIGS. 16(a), 16(b), and 16(c), but as illustrated in FIG.

17(a), when a load is applied to the elastic body in the longitudinal direction, excessive stress is generated on a predetermined section of the center portion of the elastic body, so the elastic body may be deformed and damaged. Furthermore, as illustrated in FIG. 17(b), when a load is applied to the elastic body in the transverse direction, the concave center portion thereof is compressed, and excessive stress is generated on a predetermined section of the center portion, and further, due to repeated compression, the durability of the elastic body is reduced.

As illustrated in FIGS. 18(a), 18(b), and 18(c), the elastic body of a third comparative example is configured to have a center portion having a spherical shape. In this case, the opposite end parts of the elastic body may be configured to have a cylindrical shape having a diameter smaller than the center portion. According to the third comparative example, the manufacturing of the elastic body may be reduced, compared to the first comparative example illustrated in FIGS. 16(a), 16(b), and 16(c), but as illustrated in FIGS. 18(a) and 18(b), when a load is applied to the elastic body in longitudinal and transverse directions, the opposite end parts of the elastic body are compressed and excessive stress is generated on the opposite end parts, so a connection portion connecting the plurality of unit structures to each other may be deformed and damaged.

The elastic body 420 is not limited to the above description and may be formed into various other shapes, but as described with reference to FIGS. 9 to 12, the elastic body is most preferably configured to have a cylindrical shape such that the center portion of the elastic body has a diameter decreasing gradually toward the opposite end parts of the elastic body.

Hereinafter, with reference to FIGS. 19(a), 19(b), 19(c), 20, 21(a), 21(b), and 21(c), the stress analysis test results of the elastic body according to the embodiment illustrated in FIGS. 9 to 12 will be described by simulation images.

FIGS. 19(a), 19(b), and 19(c) are simulation images of stress analysis test results measured while a load is gradually strongly applied longitudinally to the elastic body 420 of the present disclosure. Referring to FIGS. 19(a), 19(b), and 19(c), the elastic body according to the embodiment illustrated in FIGS. 9 to 12 may evenly distribute a longitudinal load. Furthermore, FIGS. 20, 21(a), 21(b), and 21(c) are simulation images of stress analysis test results measured while a transverse load is applied to the elastic body 420 of the present disclosure. FIG. 21(a) illustrates stress analysis test results measured while a transverse stress is applied to the elastic body in a state in which an angle between a pair of brackets is 15°, FIG. 21(b) illustrates stress analysis test results measured while a transverse stress is applied to the

elastic body in a state in which an angle between a pair of brackets is 20°, and FIG. 21(c) illustrates stress analysis test results measured while a transverse stress is applied to the elastic body in a state in which an angle between a pair of brackets is 25°.

That is, referring to FIGS. 20 and 21(a), 21(b), and 21(c), stress applied to the elastic body in longitudinal and transverse directions is evenly distributed and transmitted to the support surface 411 in contact with the flat surface 421 of the elastic body, so stress generated on the connection portion of the unit structures to each other can be effectively distributed.

It should be understood that the solar power generation structure on water according to the present disclosure described above may be embodied in other specific forms without changing the technical idea or essential characteristics of the present disclosure by those skilled in a technical field to which the present disclosure belongs.

Therefore, it should be understood that the embodiment described above is illustrative in all respects and not restrictive, and the scope of the present disclosure is indicated by the claims to be described later rather than the detailed description described above, and all changes or modifications derived from the meaning and scope of the claims and concepts equivalent thereto should be construed as being

included in the scope of the present disclosure.

WHAT IS CLAIMED IS:

1. A solar power generation structure on water formed by coupling unit structures (A) to each other by a connecting means (400), each of the unit structures being formed by coupling a buoyancy body (300) to a lower part of a frame unit (200) for supporting a solar panel (100), the structure comprising:

the buoyancy body (300) comprising:

a body part (310) having a horizontal cross-section transformed into a streamlined shape gradually downward from an upper side of the body part (310) such that a horizontal cross-section of an upper end part of the body part (310) is a square cross-section having four sides, wherein a length of each of the sides decreases gradually downward such that a horizontal cross-section of a lower end part of the body part (310) is a circular cross-section, and

a cover part (320) being configured to have a shape corresponding to the upper end part of the body part (310) and being coupled to the upper end part of the body part (310) so as to form a sealed space part (S), and

the connecting means (400) comprising:

a pair of brackets (410) coupled to the respective frame units (200) of the unit structures (A) so as to couple the unit structures (A) to each other,

an elastic body (420) provided between the pair of brackets (410) and made of an EPDM material with excellent corrosion resistance, and

a fastening member (430) passing through the pair of brackets (410) and the elastic body (420) and pressing and fixing opposite ends of the elastic body (420),

wherein each of the brackets (410) has a bent surface (412) bent orthogonally to each of opposite end parts of a support surface (411) such that the bracket (410) has a "U" shape and thus an end part of a support of each of the frame units (200) is provided at an open side of the bracket (410), and a flat surface (421) formed on each of the opposite ends of the elastic body (420) is coupled to the support surface (411) to be in contact therewith, and the elastic body (420) has a convex cylindrical structure such that the elastic body (420) has a diameter decreasing gradually from a center of the elastic body (420) toward each of opposite end parts thereof.

2. The structure of claim 1, wherein the space part (S) is composed of a first space part (S1) provided inside the body part (310), and a second space part (S2) provided inside the cover part (320) so as to communicate with the first space part (S1), wherein the first space part (S1) and the second space part (S2) are respectively divided to have grid shapes by a first partition wall member (311) and a second partition wall

member (321) and form a plurality of buoyancy chambers.

3. The structure of claim 2, wherein the first partition wall member (311) comprises a first vertical partition wall (311a) dividing the first space part (S1) in a vertical direction, and a first horizontal partition wall (311b) dividing the first space part (S1) in a horizontal direction such that the first space part (S1) has a plurality of divided main buoyancy chambers (312), and

the second partition wall member (321) comprises a second vertical partition wall (321a) dividing the second space part (S2) in the vertical direction, and a second horizontal partition wall (321b) dividing the second space part (S2) in the horizontal direction such that the second space part (S2) has a plurality of divided buffer buoyancy chambers (322).

4. The structure of claim 3, wherein the first partition wall member (311) and the second partition wall member (321) are arranged to cross each other.

5. The structure of claim 3, wherein at least one of the main buoyancy chambers (312) is provided with an auxiliary buoyancy body (10) having specific gravity lower than water.