

TITLE OF THE INVENTION

FLOATING BASE FOR MOUNTING SOLAR PANELS, CONSTRUCTION FOR MOUNTING SOLAR PANELS, AND METHOD OF PRODUCING FLOATING BASE

TECHNICAL FIELD

[0001]

The invention relates to a floating base for mounting solar panels which is set in a state solar panels are floated on the water surface, a construction for mounting solar panels which has the floating base for mounting solar panels, and a method of producing the floating base for mounting solar panels.

BACKGROUND ART

[0002]

Recently, renewable energy, such as solar, wind, geothermal, biomass energy, which is constantly supplemented with power of nature and is not exhaustively used, is attracting the people in all over the world.

[0003]

Solar power generation, which is one of power generation methods with the renewable energy, have such merits that it has little limitation regarding areas to be mounted in comparison with other power generation methods, and most of maintenance of equipment is unnecessary. From these merits, the solar power generation attracts people's attentions, and large-scale solar power generation systems, so called "mega solar power plants", are built in all parts of the world.

[0004]

Generally, such mega solar power plants are built in dormant areas, such as lands that abandoned cultivation and mountainous areas. But, it is difficult to find vast dormant areas that are sufficient to build the mega solar plant. Besides, land reclamation is necessary when the mega solar power plant is built in the mountainous area, and it takes a longer time and much money for doing so. As a method of solving such problems, a method of mounting the solar panels, floating on a pond, a

lake, the sea or the river is put to practical use, and various kinds of constructions have been proposed as equipment for this purpose, that is, a floating base for mounting solar panels (see patent related document 1 shown below).

[0005]

Fig.11 is a perspective view that shows an instance of a conventional floating base for mounting solar panels. A reference number P denotes a solar panel, and a reference number 200 denotes a casing made of a plastic, that supports the solar panel P, being inclined, and a reference number 300 denotes a connecting element that is installed between the casing 200 and the casing 200. Such a casing 200 is able to construct a float by enclosing air inside, and has an ear section 200a that projects in a horizontal direction at each of four corners thereof, as shown in detail in Fig.12(a), and the ear section 200a has a hole (see Fig.12(b)). Besides, the connecting element 300 also has an ear section 300a projecting in the horizontal direction at each of its four corners, and the ear section 300a has a hole (see Fig.12(b)). It is configured that a plurality of casings 200 and a plurality of connecting elements 300 are mutually connected by respectively inserting fixing pins 400 in the holes of these ear sections 200a and 300a, as shown in Fig.11. In a construction as shown in Fig.11, a passage is formed by continuously locating the connecting elements 300, and operators are able to walk thereon.

PRIOR ART

PATENT-RELATED DOCUMENT

[0006]

[Patent-related document 1]: Japanese Patent Application Publication No.2014-511043

DISCLOSURE OF INVENTION

PROBLEMS TO BE SOLVED BY INVENTION

[0007]

In a spot to mount the floating base for mounting solar panels,

dozens of, hundreds of or thousands of casings 200 are necessary, and many casings 200 are necessary to be transported with a truck or a train. But, the number of the above-mentioned casings 200 that are carried at a time is limited since these have a considerable volume, and there is such a problem that transportation cost is higher for this reason.

[0008]

And, there is an another problem that crack is easy to occur since the respective casings 200 are connected with the fixing pin 400 and power concentrates on the connecting part thereof.

[0009]

An object of the invention is to provide the floating base for mounting solar panels, the construction for mounting solar panels, and the method of producing the floating base for solving the above-mentioned problems.

MEANS FOR SOLVING PROBLEMS

[0010]

As exemplarily shown in Fig.1, a first aspect of the invention is a floating base for mounting solar panels (1) for setting in a state the solar panels (P) float on a water surface or a sea surface (only "the water surface" hereinafter, see a reference number A); comprising:

- a float section (10) that is configured so as to float on the water surface (A);

- an upright supporting section (11) that is configured so as to be attachably and detachably located at an upright position (11A) that is uprightly provided from the float section (10) in the upper hand, and so as to support the solar panels (P), being inclined at a predetermined angle (θ) when being located at the upright position (11A);

- the float section (10) which has an opening (see a reference number 12, "the float opening" hereinafter) that is provided so as to penetrate in an upper/lower direction when it floats on the water surface (A); and

- the upright supporting section (11) configured so as to

take a stored position (11B) that is located inside the float opening (12) and is stored in the float section (10).

[0011]

In a second aspect of the invention, the float section (10) which has a rail section (10d);

the upright supporting section (11) which has an engagement section (11c) that can be slidably inserted into the rail section (10d);

whereby the upright supporting section (11) can be supported by the float section (10) in a state that it takes the upright position (11A) by inserting the engagement section (11c) into the rail section (10d).

[0012]

In a third aspect of the invention, the rail section (10d) is provided, extending in almost horizontal direction if the float section (10) floats on the water surface (A); and

at least one pair of projections (10g, 10h) are formed on an upper surface (10i) of the float section (10) so as to sandwich the upright supporting section (11) being at the upright position (11A).

[0013]

In a forth aspect of the invention as exemplarily shown in Fig.5, a slit (11b) is formed adjacent to an upper end portion of the upright supporting section (11) so as to support the solar panel (P) by inserting a part of the solar panel (P) therein.

[0014]

In a fifth aspect of the invention, a securing engagement section (10c) is formed at an end portion of the floating opening (12) so as to engage a securing long member (18) for engaging the floating base for mounting solar panels (1) on the water surface (A) such that it is possible to prevent the securing long member (18) from freely moving in the floating opening (12).

[0015]

In a sixth aspect of the invention, as exemplarily shown in Fig.3, if a horizontal direction along the water surface (A)

is a x direction and the other horizontal direction perpendicular to the x direction is a y direction, further comprising a scaffold (100) which extends in the x direction till a position that is not covered by the solar panel (P) that is supported by the upright supporting section (11), and which upper surface (100a) is almost flat in at least a part thereof.
[0016]

A seventh aspect of the invention, further comprising a floating material (10a) that is lighter than the water or the sea water in a specific gravity and that causes buoyancy.
[0017]

A eighth aspect of the invention as exemplarily shown in Figs.1 to 3, is a construction for mounting solar panels (D) for setting in a state the solar panels (P) float on a water surface or a sea surface (only "the water surface" hereinafter, see a reference number A), comprising:

- a first floating base (1BR) that is one floating base for mounting the solar panels (1);

- a second floating base (1BL) that is one floating base for mounting the solar panels (1) and is adjacent to the first floating base (1BR) in the x direction;

- a third floating base (1AR) that is one floating base for mounting the solar panels (1) and is located, being spaced from the first floating base (1BR) in the y direction;

- a fourth floating base (1AL) that is one floating base for mounting the solar panels (1) and is located, being spaced from the second floating base (1BL) in the y direction;

- a plate member (14) which end portion (14a) is put on the first floating base (1BR) and/or the second floating base (1BL) and which other end portion (14b) is put on the third floating base (1AR) and /or the fourth floating base (1AL) so that the plate member (14) is bridged between the first floating base (1BR) and/or the second floating base (1BL) and the third floating base (1AR) and/or the fourth floating base (1AL);

- a first band body (13A) full of flexibility that is arranged so as to bind the end portion (14a) of the plate member

(14), the first floating base (1BR) and the second floating base (1BL);

a second band body (13B) full of flexibility that is arranged so as to bind the other end portion (14b) of the plate member (14), the third floating base (1AR) and the fourth floating base (1AL);

wherein the first floating base (1BR) and the second floating base (1BL) are connected with each other by being bound by the first band body (13A), so that relative rotations of both in the x axis direction and in the y axis direction are allowed;

the third floating base (1AR) and the fourth floating base (1AL) are connected with each other by being bound by the second band body (13B), so that relative rotations of both in the x axis direction and in the y axis direction are allowed;

the first floating base (1BR), the second floating base (1BL) and the plate member (14) are connected with each other by being bound by the first band body (13A), so that relative rotations of these in the x axis direction and in the y axis direction are allowed; and

the third floating base (1AR), the fourth floating base (1AL) and the plate member (14) are connected with each other by being bound by the second band body (13B), so that relative rotations of these in the x axis direction and in the y axis direction are allowed.

[0018]

A ninth aspect of the invention is the construction for mounting solar panels (D), wherein a first end (1BR1, 21BR1) that is an end of the first floating base (1BR, 21BR) on a side opposite to the second floating base (1BL, 21BL) and a second end (1BL2, 21BL2) that is an end of the second floating base (1BL, 21BL) on a side opposite to the first floating base (1BR, 21BR) has a corner portion so as to connect both at a point or at a line such that the relative rotation of the first floating base (1BR, 21BR) and the second floating base (1BL, 21BL) can be relatively rotated in the x axis direction and in the y axis direction; and

a third end (1AR1, 21AR1) that is an end of the third floating base (1AR, 21AR) on a side opposite to the fourth floating base (1AL, 21AL) and a fourth end (1AL2, 21AL2) that is an end of the fourth floating base (1AL, 21AL) on a side opposite to the third floating base (1AR, 21AR) has a corner portion so as to connect both at a point or at a line such that the relative rotation of the third floating base (1AR, 21AR) and the fourth floating base (1AL, 21AL) can be relatively rotated in the x axis direction and in the y axis direction.

[0019]

A tenth aspect of the invention is a method of producing integrally molding a floating base for mounting solar panels (1) with a first shaping mold and a second shaping mold, the floating base for mounting solar panels being comprised of a floating section (10) configured so as to float on the water surface or the sea surface (see a reference number A, only "the water surface" hereinafter), to have a float opening (12) located so as to penetrate in the up/down direction when floating on the water surface (A), an upright supporting section (11) configured so as to support the solar panels (P), being inclined at a predetermined angle (θ) when located at an upright position (11A) upright set from the float section (10) on the upper hand, and bridge sections (15A, 15b) that connect the upright supporting section (11) and the float section (10) so as to support the upright supporting section (11) at a stored position (11B) that is a position inside the float opening (12) not the upright position (11A) and the position stored in the float section (10), comprising:

the first shaping mold (17A) having a shape for molding the float section (10) and the upright supporting section (11), and the shape having a gap section (E) along the bridge sections (15A, 15B); and

the second shaping mold (17B) having a shape filling the gap section (E) along the bridge sections (15A, 15B), and the shape for molding the bridge sections (15A and 15B) together with the first shaping mold (17A).

[0020]

A eleventh aspect of the invention is the method of producing the floating base, wherein when molding with the first shaping mold (17A) without the second shaping mold (17B), it is possible to form bigger connection sections (16A, 16B), filling the gap section (E) with an ejection material in comparison with an usage of the second shaping mold (17B).

[0021]

A twelfth aspect of the invention is the method of producing the floating base, further comprising a step of filling the inside of the float section (10) with a floating material (10a) which specific gravity is lighter than the water or the sea water and causes a buoyancy.

[0022]

The number in parentheses shows the corresponding element in the drawings for the sake of convenience, accordingly, the descriptions are not restricted and bound by the descriptions on the drawings.

EFFECTS OF INVENTION

[0023]

According to the invention, if the upright supporting section is located at the stored position, the amount of protrusion of the upright supporting section from the float section is able to be suppressed, that is, the upright supporting section is stored in the float section, in comparison with such a case where the upright supporting section is located at the upright position. Therefore, it is possible to transport the floating base for mounting the solar panels in a good attitude to the site where the floating base for mounting solar panels is located, and to increase the number of the floating bases for mounting solar panels 1 that can be transported at a time and to reduce the transportation cost. Besides, it is possible to pass a cold air from the water surface through the float opening and reach the solar panels, and to cool the panels, thereby suppressing the temperature rise of the panels and the

degradation of the power generating efficiency due to the temperature rise.

[0024]

According to the invention, it is possible to attach the upright supporting section to the float section with a simple operation, and to obtain such an effect that the upright supporting section is hard to be detached from the float section even if the float section swings due to waves and winds for a long term.

[0025]

According to the invention, it is not necessary to locate the brackets or the bolts for fixing the solar panels at the upper end portion of the solar panel and is possible to reduce the number of components (that is, the number of the brackets or the bolts). At the result, it is possible to cut the cost and to make the operation for fixing the solar panels simplified.

[0026]

According to the invention, it is possible to prevent the securing long member from freely move in the float opening and to avoid such a situation that the securing long member damages various kinds of members, such as the solar panels.

[0027]

According to the invention, it is possible to maintain the solar panels and the like, making use of the scaffold.

[0028]

If a buoyancy causes by filling air and thereafter the air comes out, the buoyance may be lost. But, such a situation does not happen since the buoyancy is maintained through the floating material according to the invention.

[0029]

According to the invention, even if the construction for mounting solar panels floating on the water surface is shaken by waves, movement of one floating base is hard to be restricted by movement of the other floating base, and each floating base relatively freely shakes on the waves. For this reason, such a situation that power is concentrated on a specific point can

be reduced or prevented.

[0030]

According to the invention, it is possible to separately produce the constructions which shapes are different, that is, the floating base for mounting solar panels where the upright supporting section can be easily taken off and the floating base for mounting solar panels where the upright supporting section is not be able to be easily taken off with usage or without the usage of the second shaping mold at the time of production. For this reason, it is not necessary to prepare the totally different shaping molds for producing both products, and as the result, it is possible to cut the production cost.

BRIEF DESCRIPTION OF DRAWINGS

[0031]

Fig.1 is a side view that shows an instance of a construction of a floating base for mounting solar panels according to the invention.

Fig.2 is a plan view that shows an instance of usage of the floating base for mounting solar panels according to the invention.

Fig.3 is a perspective view that shows an instance of usage of the floating base for mounting solar panels according to the invention.

Fig.4(a) is a perspective view that shows an instance of such a state that an upright supporting section is connected with a float section through a bigger connection section, and Fig.4(b) is a perspective view that shows an instance of such a state that the upright supporting section is connected with the float section through a narrow bridge section.

Fig.5 is a side view that shows an instance of a construction supporting the solar panel.

Fig.6 is a plan view that shows an instance of the construction for mounting the solar panels according to the invention.

Figs.7(a) and (b) are side views each shows an instance of a contact state between the floating bases.

Fig.8(a) is a sectional view that shows an instance of a way of molding the bridge section with the first shaping mold and a second shaping mold, and Fig.8(b) is an exploded sectional view of Fig.8(a).

Fig.9(a) is a sectional view that shows an instance of a way of molding the connection section with the first shaping mold, and Fig.9(b) is an exploded sectional view of Fig.9(a).

Fig.10 is a sectional view that shows an instance of a construction, connecting the floating base for mounting solar panels and a plate member through a band body.

Fig.11 is a perspective view that shows an instance of a conventional construction of the floating base for mounting solar panels.

Fig.12(a) is a perspective view that shows appearances of a casing and a connecting element, and Fig.12(b) is a view that shows an instance of a construction of the connection portion.

Fig.13(a) is a plan view that shows the float section, Fig.13(b) is a side view of Fig.13(a), and Fig.13(c) is a front view of the upright supporting section and Fig.13(d) is a side view of Fig.13(c).

PREFERRED EMBODIMENT

[0032]

Embodiments of the invention are now explained, referring to appended figures Figs.1 through 10.

[0033]

As exemplarily shown with a reference number 1 in Fig.1, a floating base for mounting solar panels according to the invention is one for mounting solar panels, being floated on a water surface or a sea surface (only "the water surface" hereinafter), and has a float section 10 that is configured so as to float on the water surface A, and an upright supporting section 11 that is configured so as to be attachable to and detachable from an upright position 11A that is uprightly provided from the float section 10 in the upper hand. The float section 10 has an opening (see a reference number 12 of Fig.2

and Fig.3, "the float opening" hereinafter) that is provided so as to penetrate in an upper/lower direction when it floats on the water surface A. The upright supporting section 11 is configured so as to support the solar panels P at a position higher than the water surface A when being located at the upright position 11A. Furthermore, this upright supporting section 11 is configured so as to support the solar panels P, being inclined at a predetermined angle θ (see Fig.1). Besides, the upright supporting section 11 is configured so as to take a stored position 11B that is located inside the float opening 12 and is stored in the float section 10, as exemplarily shown in Fig.4(a), (b).

[0034]

If the upright supporting section 11 is located at the stored position 11B, the amount of protrusion of the upright supporting section 11 from the float section 10 is able to be suppressed in comparison with such a case where the upright supporting section 11 is located at the upright position 11A, that is, the upright supporting section 11 is stored in the float section 10. Therefore, it is possible to transport the floating base for mounting the solar panels 1 in a good attitude to the site where the floating base for mounting solar panels 1 is located, and to increase the number of the floating base for mounting solar panels 1 that can be transported at a time and to reduce the transportation cost. The upright supporting section 11 may be fixed at the stored position 11B with a well-known engagement mechanism, such as the mechanism having a convex part and a concave part at proper positions of the float section 10 where the upright supporting section 11 is engaged with the convex part or the concave part, and a band, a pin and a clip and other engagement mechanism. Alternatively, the floating base for mounting solar panels 1 may be integrally molded such that the upright supporting section 11 is positioned at the stored position 11B (details are mentioned, later).

[0035]

The float section 10 may have buoyancy by filling a sealed

case with air. Preferably, the float section 10 may have a floating material that is lighter than the water or the sea water in the specific gravity and that causes buoyancy, such as styrene forms (see a reference number 10a of Fig.1). Concretely, an outer wall of the float section 10 may be formed with structurally strong resins in the shape of a shell, and the inside of the outer wall may be filled with the floating material 10a. Filling of the floating material 10a and the molding of the outer wall may be simultaneously performed, or the filling of the floating material may be performed after the molding of the outer wall. When such a floating material 10a is used, the buoyancy is hard to be spoiled in comparison with a case where the buoyancy is secured by air, and it is possible to hold the solar panels P on the water surface for a longer time.

[0036]

Various kinds of constructions may be considered as the construction for attachably and detachably locating the upright supporting section 11 at the upright position 11A. For instance, the concave part (not shown) or a hole (not shown) may be formed at a proper position of the float section 10, and the upright supporting section 11 is inserted into the concave part or the hole. Alternatively, the convex part (not shown) may be formed at a proper position of the float section 10, and the upright supporting section 11 may be supported by the convex part. In the most preferable embodiment, a rail section (see a reference number 10d of Fig.13(a) and (b)) may be provided at the float section 10, an engagement section (see a reference number 11c of Fig.13(c) and (d)) that can be slidably inserted into the rail section 10d may be formed at the upright supporting section 11 such that the upright supporting section 11 can be supported by the float section 10 in a state that the upright supporting section 11 takes the upright position 11A by inserting the engagement section 11c into the rail section 10d. In such a case, the rail section 10d may be provided, extending in almost horizontal direction (the x direction) if the float section 10 floats on the water surface A, and if the upright supporting

section 11 is on the upright position 11A and supports the solar panels P, the engagement section 11c of the upright supporting section 11 may be hard to slide by pressing through the rail section 10d, that is, the engagement section 11c is hard to slide on the rail section 10d. By doing so, it is possible to attach the upright supporting section 11 to the float section 10 with a simple operation, and to obtain such an effect that the upright supporting section 11 is hard to be detached from the float section 10 even if the float section 10 swings due to waves and winds for a long term. As shown in reference numbers 10g, 10h of Figs.1, 4 and 5, at least one pair of projections are formed on an upper surface 10i of the float section 10 (that is, the upper surface when the float section 10 floats on the water) so as to sandwich the upright supporting section 11 being at the upright position 11A therebetween. A pair of projections 10g, 10h are formed in a line in a direction of extending the rail section 10d (that is, the x direction). As detailedly shown in Fig.5, the projection 10g located on an upper stream side of the direction where the upright supporting section 11 is inserted into the rail section 10d (that is, the -x direction) has an inclined surface 10g1 smoothly formed, a horizontal surface 10g2 almost horizontally formed and a supporting surface 10g3 that supports the upright supporting section 11, and when the upright supporting section 11 is inserted into the rail section 10d, a part of the lower surface of the upright supporting section 11 is moved to the upright position 11A after sliding on the inclined surface 10g1 and the horizontal surface 10g2. On the other hand, the other projection 10h has the supporting surface 10h3 that supports the upright supporting section 11, and upright supporting section 11 is sandwiched between the supporting surface 10h3 and the supporting surface 10g3 of the projection 10g so as to rigidly support the upright supporting section 11.

[0037]

On the other hand, the upright supporting section 11 located at the upright position 11A supports the solar panels P that

are inclined at a predetermined angle θ , and it is necessary to provide the upright supporting section 11 with a locking section for locking the solar panels P. The most preferable locking section is a slit 11b that supports the solar panel P by inserting a part of the solar panel P (see a reference number Pa of Fig.5) therein, and the slit 11b may be formed adjacent to an upper end portion of the upright supporting section 11. Concretely, a hook section Pa in the shape of almost L character may be formed at an upper end portion of the solar panel P, and the hook section Pa may be inserted into the slit 11b. And, several spacers 19 (each is formed in the shape of a plate having 10 mm width and 2.5mm thickness, for instance) may be located on a lower side of the hook section Pa inserted into the slit 11b so as to restrain looseness of the solar panel P. This spacer 19 may be formed integrally with the float section 10 or the hook section Pa, or may be formed separately from the float section 10 or the hook section Pa. The lower end portion of the solar panel P may be fixed at the float section 10 with a bracket or a bolt that has a proper shape. In such a case, it is sufficient to locate the brackets or the bolts only at the lower end portion of the solar panel P, and is not necessary to locate at the upper end portion of the solar panel P and is possible to reduce the number of components (that is, the number of the brackets or the bolts). At the result, it is possible to cut the cost and to make the operation for fixing the solar panels P simplified.

[0038]

On the other hand, a notch or a hole ("the securing engagement section" hereinafter) 10c may be formed at an end portion of the float opening 12, as exemplarily shown in Fig.2 and Fig.6 so as to engage a long member, such as a fibrous rope having excellent flexibility, a metal wire rope having excellent flexibility and a chain made of resin or metal ("the securing long member 18" hereinafter) with the securing engagement section 10c. And, one end of the securing long member 18 may be fixed at an anchor member (not shown) that may be fixed on

the lakefront or the coast so as to engage the floating base for mounting solar panels 1 at predetermined position on the water surface A with the securing long member 18. In such a case, the securing long member 18 is engaged with the securing engagement section 10c on the side of the floating base for mounting solar panels 1. For this reason, the securing long member 18 is prevented from freely moving in the floating opening 12, and it is possible to avoid such a situation that the securing long member 18 damages various kinds of members, such as the solar panels P. When a worker carries the float section 10, it is easy to carry it if the worker has the securing engagement section 10c, inserting his (or her) body or hands in the floating opening 12. Besides, cavities may be formed at portions shown with reference numbers 10e and 10f of Fig.13(a) such that the securing long member 18 is engaged with the cavities 10e and 10f so as to prevent of the slippage of the securing long member 18. Furthermore, a cavity in the shape of a slit may be formed at a lower portion of the float section 10 so as to insert a claw of a forklift therein. And, the float section 10 may be hold, making use of the cavity in the shape of a slit. In a case where the float section 10 is necessary to be put on a slope, for instance, the float section 10 may be hold, making use of the cavity in the shape of the slit.

[0039]

If the horizontal direction of the position along the water surface A is a x direction and the other horizontal direction perpendicular to the x direction is a y direction as exemplarily shown in Fig.3, the float section 10 may have a scaffold 100, extending in the x direction till the position that is not covered by the solar panels P that are supported by the upright supporting section 11, and which upper surface 100a (that is, the upper surface of the scaffold 100 portion, provided extending in the x direction till the position that is not covered by the solar panels P) is almost flat in almost a part thereof. The float section 10 may be integrally formed with the scaffold 100 and the other portions excluding the scaffold

100 (in an inseparable state), or may be formed in a separable state. Preferably, the scaffold 100 is formed by a material having buoyancy, but the scaffold 100 that is formed by the material having no buoyancy is not excluded. When such a scaffold 100 is provided, it is possible to maintain the solar panels P and the like, making use of the scaffold 100.

[0040]

As exemplarily shown in Fig.6, the width dimension of the floating base for mounting solar panels 1 (that is, the float section 10) in the y direction may be smaller than the width dimension of the solar panels P in the y direction. In such a case, it is possible to reduce the material cost, the production cost or the transportation cost in proportion to the width reduction of the floating base for mounting solar panels 1. But, such a case where the width dimension of the floating base for mounting solar panels 1 (the float section 10) in the y direction is similar to or longer than the width dimension of the solar panels P in the y direction is not excluded in the scope of the invention.

[0041]

On the other hand, the construction for mounting the solar panels according to the invention is one for mounting the solar panels P, being floated on the water surface A, and has at least four floating bases for mounting solar panels 1, that are located in the longitudinal and lateral directions, as exemplarily shown with a reference number D in Figs.2 and 3. When one floating base for mounting solar panels 1BR is "the first floating base", one floating base for mounting solar panels 1BL that is adjacent to the first floating base 1BR in the x direction is "the second floating base", one floating base for mounting solar panels 1AR that is adjacent to the first floating base 1BR in the y direction is "the third floating base", and one floating base for mounting solar panels 1AL that is adjacent to the second floating base 1BL in the y direction is "the fourth floating base", the first floating base 1BR and the third floating base 1AR are located, a predetermined distance

spaced from each other, and the second floating base 1BL and the fourth floating base 1AL are located, a predetermined distance spaced from each other.

[0042]

The construction for mounting solar panels D according to the invention has a plate member 14 bridged between the floating bases spaced in the y direction (concretely, between the first and/or second floating base 1BR, 1BL, and the third and/or fourth floating base 1AR, 1AL). Arrangement modes of the plate member 14 are as follows.

- Arrangement mode where an end portion 14a of the plate member 14 is put on the first floating base 1BR and the other end portion 14b of the plate member 14 is put on the third floating base 1AR so that the plate member 14 is bridged between the first floating base 1BR and the third floating base 1AR
- Arrangement mode where the end portion 14a of the plate member 14 is put on the second floating base 1BL and the other end portion 14b of the plate member 14 is put on the fourth floating base 1AL so that the plate member 14 is bridged between the second floating base 1BL and the fourth floating base 1AL
- Arrangement mode where the end portion 14a of the plate member 14 is put on both the first floating base 1BR and the second floating base 1BL and the other end portion 14b of the plate member 14 is put on both the third floating base 1AR and the fourth floating base 1AL so that the plate member 14 is bridged between the first and second floating bases 1BR, 1BL and the third and fourth floating bases 1AR, 1AL

[0043]

According to such a construction for mounting solar panels D, it is possible to support a plurality of solar panels P on the water surface. Preferably, the above-mentioned plate member 14 may be located, bridged over the scaffolds 100 of the respective floating bases 1AR, ... so as to form a passage successively connecting with the scaffold 100. By doing so, it is possible for the worker to easily move on the passage.

[0044]

On the other hand, as detailedly shown in Fig.2, the construction for mounting solar panels D has a first band body 13A that is arranged so as to bind the end portion 14a of the plate member 14, the first floating base 1BR and the second floating base 1BL, and a second band body 13B that is arranged so as to bind the other end portion 14b of the plate member 14, the third floating base 1AR and the fourth floating base 1AL. Preferably, both first band body 13A and the second band body 13B are formed of the materials full of flexibility or pliability (the long member formed of the flexible member, such as resin, fiber and metal, referred to as "a band" or "a belt"). Preferably, the band bodies 13A, 13B have a loose curved shape or a loose bent shape in either direction in at least one end without lengthening straight. For instance, a resinous band for attaching a sign plate or an electric pole tag to an electric pole (the totally curved band) is commercially available, and such a band may be used as the band bodies 13A, 13B. Preferably, both first and second band bodies 13A, 13B are relatively loosely bound around so that the respective floating bases 1AL, ... and the plate member 14 are able to relatively freely swing. That is, the first floating base 1BR and the second floating base 1BL are connected with each other by being relatively loosely bound through the first band body 13A full of flexibility or pliability thereon, so that relative rotations of both floating bases 1BR and 1BL in the x axis direction and in the y axis direction are allowed. As the result, even if the construction for mounting solar panels D floating on the water surface A is shaken by waves, movement of one floating base 1BR or 1BL is hard to be restricted by movement of the other floating base 1BL or 1BR, and each floating base relatively freely shakes on the waves. For this reason, such a situation that power is concentrated on a specific point can be reduced or prevented. Even if the construction for mounting solar panels D is lifted up to the land for a purpose of the maintenance or the like, each floating base 1BR, 1BL is able to relatively freely displaced (swing) along an inclination of the landform,

and such a situation that power is concentrated on a specific point can be reduced or prevented. Similarly, the third floating base 1AR and the fourth floating base 1AL are connected with each other by being relatively loosely bound through the second band body 13B full of flexibility or pliability thereon, so that relative rotations of both floating bases 1AR and 1AL in the x axis direction and in the y axis direction are allowed. As the result, similar effects can be obtained. Furthermore, as exemplarily shown in Fig.10, the first floating base 1BR, the second floating base 1BL and the plate member 14 are connected with each other by being relatively loosely bound through the first band body 13A full of flexibility or pliability thereon so that relative rotations of both floating bases 1BR, 1BL and the plate member 14 in the x axis direction and in the y axis direction are allowed. As the result, similar effects can be obtained. Besides, the third floating base 1AR, the fourth floating base 1AL and the plate member 14 are connected with each other by being relatively loosely bound through the second band body 13B full of flexibility or pliability thereon so that relative rotations of both floating bases 1AR, 1AL and the plate member 14 in the x axis direction and in the y axis direction are allowed. As the result, similar effects can be obtained.

[0045]

Preferably, as shown in Fig.7(a), (b) in detail, a first end 1BR1, 21BR1 that is an end of the first floating base 1BR, 21BR on a side opposite to the second floating base 1BL, 21BL and a second end 1BL2, 21BL2 that is an end of the second floating base 1BL, 21BL on a side opposite to the first floating base 1BR, 21BR have a corner portion such that the first end 1BR1, 21BR1 connects with the second end 1BL2, 21BL2 at a point or at a line. In such a case, the first floating base 1BR, 21BR and the second floating base 1BL, 21BL are able to smoothly mutually rotate in the y axis direction. As the result, even if the construction for mounting solar panels D floating on the water surface A is shaken by waves, movement of one floating base 1BR, 1BL, 21BR,

21BL is hard to be restricted by movement of the other floating base 1BL ..., and each floating base relatively freely shakes on the waves. For this reason, such a situation that power is concentrated on a specific point can be reduced or prevented. Similarly and preferably, a third end 1AR1, 21AR1 that is an end of the third floating base 1AR, 21AR on a side opposite to the fourth floating base 1AL, 21AL and a fourth end 1AL2, 21AL2 that is an end of the fourth floating base 1AL, 21AL on a side opposite to the third floating base 1AR, 21AR have a corner portion such that the third end 1AR1, 21AR1 connects with the fourth end 1AL2, 21AL2 at a point or at a line. In such a case, effects similar to the above-mentioned can be obtained. On this occasion, the above-mentioned corner may be a round corner as well as a sharp corner.

[0046]

On the other hand, a method of producing the floating base according to the invention is to integrally mold the floating base for mounting solar panels which is comprised of the floating section 10 configured so as to float on the water surface A(exactly, the water surface or the sea surface), having the float opening 12 located so as to penetrate in the up/down direction when floating on the water surface A, the upright supporting section 11 configured so as to support the solar panels P, being inclined at a predetermined angle θ when being located at the upright position 11A upright set on the upper hand from the float section 10, and bridge sections 15A, 15B that connects the upright supporting section 11 and the float section 10 with each other so as to support the upright supporting section 11 at the stored position 11B that is stored in the float section 10, that is, the position 11B inside the float opening 12 (not the upright position 11A). Such a molding has at least two shaping molds, that is, a first shaping mold and a second shaping mold. The first shaping mold of both is the shape for molding the float section 10 and the upright supporting section 11, and is the shape having a gap section E between the bridge sections 15A, 15B (that is, the gap section

E enclosed with a broken line and the gap section E along the bridge sections 15A, 15B), as exemplarily shown with a reference number 17A in Figs.8(a), (b). The other second shaping mold 17B is the shape filling the gap section E along the bridge sections 15A, 15B, and is the shape for molding the bridge sections 15A and 15B together with the first shaping mold 17A (that is, in collaboration with the first shaping mold 17A). The first shaping mold 17A and the second shaping mold 17B are configured so as to be separated from each other. The gap section E may be formed along the bridge sections 15A, 15B. Preferably, the gap section E has a shape enclosing the bridge sections 15A, 15B. Preferably, a die is used for the first shaping mold 17A and the second shaping mold 17B. The first shaping mold 17A as shown in Figs.8(a), (b) is comprised of two molds, but the number of the shaping molds is not restricted to two, but three or more shaping molds are available. The second shaping mold 17B as shown in Figs.8(a), (b) is comprised is one mold, but the number of the shaping mold is not restricted to one, but two or more shaping molds are available.

[0047]

When the first shaping mold 17A and the second shaping mold 17B are used, the float section 10 and the upright supporting section 11 are formed by the first shaping mold 17A, and the bridge sections 15A, 15B are formed in collaboration with the first shaping mold 17A and the second shaping mold 17B, as exemplarily shown in Fig.8(a).

[0048]

When molding with the first shaping mold 17A without the second shaping mold 17B, it is possible to form bigger connection sections 16A and 16B, filling the gap section E with ejection materials in comparison with the bridge sections 15A and 15B that are made with the second shaping mold 17B.

[0049]

With the above-mentioned configuration, it is possible to easily separately produce the floating base for mounting solar panels 1 as exemplarily shown in Fig.4(a) which has the bigger

connection sections 16A, 16B in comparison with the bridge sections 15A, 15B as exemplarily shown in Fig.4(b) and the floating base for mounting solar panels 1 as exemplarily shown in Fig.4(b) where the upright supporting section 11 can be easily taken off the float section 10 by easily cutting the narrow bridge sections 15A, 15B with usage or without the usage of the second shaping mold 17B at the time of production. For this reason, it is not necessary to prepare the totally different shaping molds for producing both products, and as the result, it is possible to cut the production cost. Preferably, in the construction for mounting solar panels D as exemplarily shown in Fig.6, a passage for workers to walk is made, and the construction as exemplarily shown in Fig.4(a) can be used as the member for the passage since the float opening 12 is almost closed by the upright supporting section 11 and the connection sections 16A, 16B if the upright supporting section 11 and the connections sections 16A, 16B are designed so as to sufficiently support the weight of persons. In such a case, the float opening 12 is almost closed by the upright supporting section 11 and the like, and it is not necessary to close the float opening 12 with a new material, such as an acrylic board. In view of this point also, it is possible to cut the cost. In the construction for mounting solar panels D as exemplarily shown in Fig.6, the construction as exemplarily shown in Fig.4(a) is located so as to enclose the solar panels P (that is, located at the circumferential edge of the construction for mounting solar panels D), but the location is not restricted to such one, and may be located so as to pass through the middle of the construction for mounting solar panels D.

[0050]

On the other hand, the method of producing the floating base according to the invention may have a step of filling the inside of the float section with the floating material 10a which specific gravity is lighter than the water or the sea water and causes a buoyancy.

[0051]

Besides, the floating base for mounting solar panels 1 may be produced by molding resin, and a blow molding method may be used for its molding.

EXPLANATION OF REFERENCE NUMBERS

[0052]

1 ... floating base for mounting solar panels
1AL ... fourth floating base
1AL2 ... fourth end portion
1AR ... third floating base
1AR1 ... third end
1BL ... second floating base
1BL2 ... second end
1BR ... first floating base
1BR1 ... first end
10 ... float section
10a ... floating material
10c ... securing engagement section
11 ... upright supporting section
11b ... slit
11A ... upright position
11B ... stored position
12 ... float opening
13A ... first band body
13B ... second band body
14 ... plate member
14a ... end portion
14b ... the other end portion
15A, 15B ... bridge section
16A, 16B ... connection section
17A ... first shaping mold
17B ... second shaping mold
18 ... securing long member
100 ... scaffold
A ... water surface
D ... construction for mounting solar panels

E gap section

Claims

1. A floating base for mounting solar panels (1) for setting in a state the solar panels (P) float on a water surface or a sea surface (only "the water surface" hereinafter, see a reference number A), comprising:

 a float section (10) that is configured so as to float on the water surface (A);

 an upright supporting section (11) that is configured so as to be attachably and detachably located at an upright position (11A) that is uprightly provided from the float section (10) in the upper hand, and so as to support the solar panels (P), being inclined at a predetermined angle (θ) when being located at the upright position (11A);

 the float section (10) which has an opening (see a reference number 12, "the float opening" hereinafter) that is provided so as to penetrate in an upper/lower direction when it floats on the water surface (A); and

 the upright supporting section (11) configured so as to take a stored position (11B) that is located inside the float opening (12) and is stored in the float section (10).

2. The floating base for mounting solar panels (1) according to claim 1, wherein the float section (10) which has a rail section (10d);

 the upright supporting section (11) which has an engagement section (11c) that can be slidably inserted into the rail section (10d);

 whereby the upright supporting section (11) can be supported by the float section (10) in a state that it takes the upright position (11A) by inserting the engagement section (11c) into the rail section (10d).

3. The floating base for mounting solar panels (1) according to claim 2, wherein the rail section (10d) being provided, extending in almost horizontal direction if the float section

(10) floats on the water surface (A); and
at least one pair of projections (10g, 10h) being formed on an upper surface (10i) of the float section (10) so as to sandwich the upright supporting section (11) being at the upright position (11A).

4. The floating base for mounting solar panels (1) according to claim 1, wherein a slit (11b) is formed adjacent to an upper end portion of the upright supporting section (11) so as to support the solar panel (P) by inserting a part of the solar panel (P) therein.
5. The floating base for mounting solar panels (1) according to claim 1, wherein a securing engagement section (10c) is formed at an end portion of the floating opening (12) so as to engage a securing long member (18) for engaging the floating base for mounting solar panels (1) on the water surface (A) such that it is possible to prevent the securing long member (18) from freely moving in the floating opening (12).
6. The floating base for mounting solar panels (1) according to any one of claims 1 through 5, wherein if a horizontal direction along the water surface (A) is a x direction and the other horizontal direction perpendicular to the x direction is a y direction, the floating section (10) has a scaffold (100) which extends in the x direction till a position that is not covered by the solar panel (P) that is supported by the upright supporting section (11), and which upper surface (100a) is almost flat in at least a part thereof.
7. The floating base for mounting solar panels (1) according to claim 1, further comprising a floating material (10a) that is lighter than the water or the sea water in a specific gravity and that causes buoyancy.

8. A construction for mounting solar panels (D) for setting in a state the solar panels (P) float on the water surface or the sea surface (only "the water surface" hereinafter, see a reference number A); comprising:

a first floating base (1BR) that is one floating base for mounting the solar panels (1) according to any one of claims 1 through 7;

a second floating base (1BL) that is one floating base for mounting the solar panels (1) according to any one of claims 1 through 7 and is adjacent to the first floating base (1BR) in the x direction;

a third floating base (1AR) that is one floating base for mounting the solar panels (1) according to any one of claims 1 through 7 and is located, being spaced from the first floating base (1BR) in the y direction;

a fourth floating base (1AL) that is one floating base for mounting the solar panels (1) according to any one of claims 1 through 7 and is located, being spaced from the second floating base (1BL) in the y direction;

a plate member (14) which end portion (14a) is put on the first floating base (1BR) and/or the second floating base (1BL) and which other end portion (14b) is put on the third floating base (1AR) and /or the fourth floating base (1AL) so that the plate member (14) is bridged between the first floating base (1BR) and/or the second floating base (1BL) and the third floating base (1AR) and/or the fourth floating base (1AL);

a first band body (13A) full of flexibility that is arranged so as to bind the end portion (14a) of the plate member (14), the first floating base (1BR) and the second floating base (1BL);

a second band body (13B) full of flexibility that is arranged so as to bind the other end portion (14b) of the plate member (14), the third floating base (1AR) and the fourth floating base (1AL);

wherein the first floating base (1BR) and the second

floating base (1BL) are connected with each other by being bound by the first band body (13A), so that relative rotations of both in the x axis direction and in the y axis direction are allowed;

the third floating base (1AR) and the fourth floating base (1AL) are connected with each other by being bound by the second band body (13B), so that relative rotations of both in the x axis direction and in the y axis direction are allowed;

the first floating base (1BR), the second floating base (1BL) and the plate member (14) are connected with each other by being bound by the first band body (13A), so that relative rotations of these in the x axis direction and in the y axis direction are allowed; and

the third floating base (1AR), the fourth floating base (1AL) and the plate member (14) are connected with each other by being bound by the second band body (13B), so that relative rotations of these in the x axis direction and in the y axis direction are allowed.

9. The construction for mounting solar panels (D) according to claim 8, wherein a first end (1BR1) that is an end of the first floating base (1BR) on a side opposite to the second floating base (1BL) and a second end (1BL2) that is an end of the second floating base (1BL) on a side opposite to the first floating base (1BR) has a corner portion so as to connect both at a point or at a line such that the relative rotation of the first floating base (1BR) and the second floating base (1BL) can be relatively rotated in the x axis direction and in the y axis direction; and

a third end (1AR1) that is an end of the third floating base (1AR) on a side opposite to the fourth floating base (1AL) and a fourth end (1AL2) that is an end of the fourth floating base (1AL) on a side opposite to the third floating base (1AR) has a corner portion so as to connect both at a point or at a line such that the relative rotation of the third floating base (1AR) and the fourth floating base (1AL)

can be relatively rotated in the x axis direction and in the y axis direction.

10. A method of producing integrally molding a floating base for mounting solar panels (1) with a first shaping mold (17A) and a second shaping mold (17B), the floating base for mounting solar panels being comprised of a floating section (10) configured so as to float on the water surface or the sea surface (see a reference number A, only "the water surface" hereinafter), to have a float opening (12) located so as to penetrate in the up/down direction when floating on the water surface (A), an upright supporting section (11) configured so as to support the solar panels (P), being inclined at a predetermined angle (θ) when located at an upright position (11A) upright set from the float section (10) on the upper hand, and bridge sections (15A, 15b) that connect the upright supporting section (11) and the float section (10) so as to support the upright supporting section (11) at a stored position (11B) that is a position inside the float opening (12) and not the upright position (11A) and the position stored in the float section (10), comprising:

the first shaping mold (17A) having a shape for molding the float section (10) and the upright supporting section (11), and the shape having a gap section (E) along the bridge sections (15A, 15B); and

the second shaping mold (17B) having a shape filling the gap section (E) along the bridge sections (15A, 15B), and the shape for molding the bridge sections (15A and 15B) together with the first shaping mold (17A).

11. The method of producing the floating base according to claim 10, wherein when molding with the first shaping mold (17A) without the second shaping mold (17B), it is possible to form bigger connection sections (16A, 16B), filling the gap section (E) with an ejection material in comparison with an usage of the second shaping mold (17B).

12. The method of producing the floating base according to claim 10, further comprising a step of filling the inside of the float section (10) with a floating material (10a) which specific gravity is lighter than the water or the sea water and causes a buoyancy.