

PROTECTIVE COVER FOR VERTICAL PNEUMATIC FENDER, VERTICAL
PNEUMATIC FENDER, AND USAGE FOR VERTICAL PNEUMATIC
FENDER

5 Technical Field

[0001]

The present invention relates to a protective cover for a vertical
pneumatic fender, a vertical pneumatic fender, and a usage for a vertical
pneumatic fender, and more specifically relates to a protective cover for a
10 vertical pneumatic fender capable of suppressing adherence of oil floating on a
water surface and swelling deterioration of the fender, a vertical pneumatic
fender, and a usage for a vertical pneumatic fender.

Background Art

15 [0002]

For the purpose of preventing damage or the like of a hull and a quay
when boats and ships berth, a pneumatic fender installed on a wall surface of
the quay or a broadside has been known. The pneumatic fender is a hollow
body formed from rubber in which a reinforcing material is embedded. Air is
20 enclosed within an interior portion of the hollow, a shock when boats and ships
berth is alleviated by elastic force caused by the enclosed air.

[0003]

Forms of the pneumatic fender can be roughly classified into two types
of a horizontal type and a vertical type. A horizontal pneumatic fender is used
25 in a state that a longitudinal direction is set horizontally while being floated on
water. A vertical pneumatic fender is used in an erected state that a part
thereof is sunk in water and a longitudinal direction is set vertically while being
floated on water by storing a predetermined amount of water in the interior
portion of the hollow.

30 [0004]

Incidentally, when oil drifts to a water area in which the pneumatic
fender is installed and stays, a state where the oil floating on the water surface
adheres to an outer surface of the pneumatic fender is generated. No
consideration has been given to the oil as described above in a conventional
35 pneumatic fender, and thus, if this state lasts for a long time, rubber at a portion
to which the oil adheres swells and deteriorates. As a result, the pneumatic
fender cannot be used, and there is a problem that a service life is shortened.

[0005]

In a horizontal pneumatic fender, which is not a vertical type, a sheet-shaped protective member which covers an outer surface of the fender has been proposed (see Patent Document 1, for example). However, this protective member is made for the purpose of preventing external damage on the fender caused by contact with a hull or the like, and is not intended to cope with swelling deterioration by the oil as described above.

Citation List Patent Literature

10 [0006]
Patent Document 1: JP-A-5-25812

Summary of Invention Technical Problem

15 [0007]
An object of the present invention is to provide a protective cover for a vertical pneumatic fender capable of suppressing adherence of oil floating on a water surface and swelling deterioration of the fender, a vertical pneumatic fender, and a usage for a vertical pneumatic fender.

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Solution to Problem

[0008]
A protective cover for a vertical pneumatic fender according to the present invention to achieve the above object is a protective cover for a vertical pneumatic fender removably mounted on a vertical pneumatic fender including bowl shaped hemispherical portions continuously connected to both upper and lower ends of a cylindrical body portion, the protective cover includes: a tubular protective layer body covering a partial range of an outer surface of the body portion in a vertical direction; and an attachment portion for disposing the protective layer body on a predetermined position of the fender, the protective layer body is capable of separating oil floating on a water surface and the range on the body portion covered by the protective layer body when being disposed on the predetermined position on the fender.

[0009]
35 A vertical pneumatic fender according to the present invention includes, in a vertical pneumatic fender including a cylindrical body portion and bowl shaped hemispherical portions continuously connected to both upper and lower ends of the body portion, a removable tubular protective layer body covering a

partial range of an outer surface of the body portion in the vertical direction, the protective layer body is capable of separating oil floating on a water surface and the range on the body portion covered by the protective layer body.

[0010]

5 Another vertical pneumatic fender according to the present invention includes, in a vertical pneumatic fender including a cylindrical body portion and bowl shaped hemispherical portions continuously connected to both upper and lower ends of the body portion, a tubular protective layer body covering a partial range of an outer surface of the body portion in the vertical direction, the
10 protective layer body is formed from an oil resistance member, and is integrally provided by being vulcanization bonded, the protective layer body is capable of separating oil floating on a water surface and the range on the body portion covered by the protective layer body.

[0011]

15 A usage for a vertical pneumatic fender according to the present invention includes: installing the above vertical pneumatic fender by setting a midway position of the protective layer body in the vertical direction to a water surface position, the protective layer body separates oil and the range on the body portion covered by the protective layer body when the oil is floating on a
20 water area in which the fender is installed.

Advantageous Effects of Invention

[0012]

According to the present invention, the tubular protective layer body
25 covering a part of the outer surface of the body portion in a vertical direction is provided, the protective layer body is capable of separating the oil floating on the water surface and the range on the body portion covered by the protective layer body, and thus it is possible to prevent the range covered by the protective layer body from swelling and deteriorating by the oil floating on the water
30 surface. Additionally, the protective layer body covers only a part of the outer surface of the body portion in the vertical direction, which is advantageous for reducing a material forming the protective layer body.

[0013]

The protective cover according to the present invention can be
35 configured so as to have buoyancy for floating on water by itself with the protective layer body externally put around the body portion with a space from the outer surface of the body portion. According to this configuration, in accordance with vertical motions of the water surface, the protective layer body

independently vertically moves, and thus, by the protective layer body, the outer surface of the body portion is protected from the oil floating on the water surface with ease.

[0014]

5 Alternatively, a configuration in which the protective layer body is externally put around the body portion while abutting on the outer surface of the body portion is also possible. This configuration is advantageous for preventing a failure that the protective layer body accidentally separates from the body portion.

10 [0015]

 The attachment portion is, for example, configured by a cord connecting the protective layer body and the hemispherical portion side continuously connected to the upper end of the body portion. According to this configuration, the protective layer body can be stably attached to the fender

15 with a necessary minimum attachment portion.

[0016]

 The attachment portion can also be configured by a cord connecting the protective layer body and the hemispherical portion side continuously connected to the upper end of the body portion, and a cord connecting the

20 protective layer body and the hemispherical portion side continuously connected to the lower end of the body portion. According to this configuration, the protective layer body can be further stably attached to the fender.

[0017]

25 A configuration in which the protective layer body is formed from an oil resistance member is adopted, which is advantageous for preventing the range covered by the protective layer body from swelling and deteriorating. As the oil resistance member, for example, an elastic member containing acrylonitrile butadiene rubber is used.

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Brief Description of Drawings

[0018]

 FIG. 1 is an explanatory diagram illustrating a protective cover for a vertical pneumatic fender of an embodiment of the present invention as viewed

35 in a side view.

 FIG. 2 is an explanatory diagram illustrating the protective cover for the vertical pneumatic fender in FIG. 1 as viewed in a plan view.

FIG. 3 is an explanatory diagram illustrating a protective cover for a vertical pneumatic fender of another embodiment of the present invention as viewed in a vertical cross-section.

FIG. 4 is an explanatory diagram illustrating the protective cover for the vertical pneumatic fender in FIG. 3 as viewed in a plan view.

FIG. 5 is an explanatory diagram illustrating the protective cover for the vertical pneumatic fender in FIG. 3 when boats and ships berth as viewed in a vertical cross-section.

FIG. 6 is an explanatory diagram illustrating a protective cover for a vertical pneumatic fender of yet another embodiment of the present invention as viewed in a side view.

FIG. 7 is an explanatory diagram illustrating the protective cover for the vertical pneumatic fender in FIG. 6 as viewed in a plan view.

FIG. 8 is an explanatory diagram illustrating the protective cover for the vertical pneumatic fender in FIG. 6 when boats and ships berth as viewed in a side view.

FIG. 9 is an explanatory diagram illustrating a vertical pneumatic fender of an embodiment of the present invention as viewed in a side view.

FIG. 10 is an explanatory diagram illustrating a vertical pneumatic fender as viewed in a vertical cross-section.

Description of Embodiments

[0019]

Hereinafter, a protective cover for a vertical pneumatic fender, a vertical pneumatic fender, and a usage for a vertical pneumatic fender of the present invention will be described with reference to embodiments illustrated in the drawings.

[0020]

A conventional vertical pneumatic fender 1A (hereinafter, referred to as a fender 1A) includes, as illustrated in FIG. 10, a cylindrical body portion 1a, and bowl shaped hemispherical portions 1b continuously connected to both upper and lower ends of the body portion 1a. A fitting 1c is provided on an upper end portion of the hemispherical portion 1b on the upper side, and a fitting 1d is provided on a lower end portion of the hemispherical portion 1b on the lower side. The fender 1A may be provided with only the one fitting 1c.

[0021]

The body portion 1a and the hemispherical portion 1b are configured by a member in which a plurality of reinforcing layers is laminated between an

inner rubber layer and an outer rubber layer. A hollow interior space formed from the body portion 1a and the hemispherical portion 1b is inflated with air A, a predetermined amount of water W is injected therein. In the drawings, a boundary between the body portion 1a and the hemispherical portion 1b is
5 illustrated by a double-dot-dash line.

[0022]

The fitting 1c is provided with an injection port for injecting the air A and the water W, a safety valve for preventing an internal pressure of the fender 1A from being excessive, a pressure sensor for measuring the internal pressure,
10 or the like. A first end portion of each guy chain 5 is connected to each of the fittings 1c and 1d.

[0023]

When the fender 1A is installed on a wall surface of a quay or a broadside, a second end portion of the guy chain 5 connected to the fitting 1c is
15 fixed to the quay or the hull. A weight 6 is connected to a second end portion of the guy chain 5 connected to the fitting 1d. Then, the fender 1A whose hollow interior space stores the air A and the water W is installed in an erected state that a part thereof is sunk in the water such as the sea or the like and a longitudinal direction (a cylinder axial direction of the body portion 1a) is set
20 vertically while being floated on the sea or the like.

[0024]

The fender 1A is installed such that a water surface is positioned at a midway position of the body portion 1a in a vertical direction. Therefore, when oil C drifts to a water area in which the fender 1A is installed and stays,
25 the oil C floating on a water surface always contacts with the body portion 1a. If the fender 1A is continuously used as it is, an outer rubber layer forming the body portion 1a swells by the oil C. A strength deterioration of the body portion 1a or the like is generated by the swell, the fender 1A cannot be used.

[0025]

Therefore, a protective cover 2 for a vertical pneumatic fender (hereinafter, referred to as a protective cover 2) according to the present invention is used as illustrated in FIGS. 1 and 2. The protective cover 2 includes a tubular protective layer body 3 covering a partial range of the outer surface of the body portion 1a in the vertical direction, and an attachment
35 portion 4 for disposing the protective layer body 3 on a predetermined position of the fender 1A.

[0026]

The protective layer body 3 is a sheet obtained by lamellarly thinly forming an elastic member such as rubber or the like, a resin, or the like, a thickness thereof is, for example, from 1 mm to 30 mm, a length in the vertical direction (a cylinder axial direction) is, for example, from 2 m to 5 m, or from 1 m to 3 m depending on an installation water area. The protective layer body 3 has a specification that water does not substantially permeate thereinto. The tubular protective layer body 3 continues in both a circumferential direction and the cylinder axial direction without a rift. The protective layer body 3 is, for example, produced such that a member is integrally formed in a tubular shape. Alternatively, a plurality of members is bonded to produce the tubular protective layer body 3. In this case, a bonded joint of each member is processed so as not to generate a gap so as for the oil C not to pass through. By the tubular protective layer body 3 externally put around the fender 1A, a partial range of the outer surface of the body portion 1a in the vertical direction is covered.

[0027]

The protective layer body 3 can be formed using an oil resistance member, or be formed using non-oil resistance member. Additionally, the protective layer body 3 can be formed using an elastic member, or the protective layer body 3 can be formed using non-elastic member. For example, the protective layer body 3 is formed using an elastic member containing acrylonitrile butadiene rubber having superior oil resistance. As the elastic member having the oil resistance, fluororubber, chloroprene rubber, chlorinated polyethylene rubber, or the like can be cited in addition.

[0028]

An inner surface of the protective layer body 3 and the outer surface of the body portion 1a can be brought into a state with slight gaps therebetween, or can be brought into a state of adhesion bonding with no gaps. When the protective layer body 3 is formed from an elastic member, the tubular protective layer body 3 is expanded in diameter and externally put around the body portion 1a, which makes it possible to adhesion bond the inner surface of the protective layer body 3 and the outer surface of the body portion 1a.

[0029]

As the attachment portion 4, for example, a cord 4b (a cord 4b on an upper side) connecting the protective layer body 3 externally put around the fender 1A and the hemispherical portion 1b side on the upper side, and a cord 4b (a cord 4b on a lower side) connecting the protective layer body 3 and the hemispherical portion 1b side on the lower side are used. The upper side cord

4b directly connects an upper end portion of the protective layer body 3 and a surface of the hemispherical portion 1b on the upper side, or connects the upper end portion of the protective layer body 3 and the fitting 1c provided on the hemispherical portion 1b on the upper side. The lower side cord 4b directly connects a lower end portion of the protective layer body 3 and a surface of the hemispherical portion 1b on the lower side, or connects the lower end portion of the protective layer body 3 and the fitting 1d provided on the hemispherical portion 1b on the lower side. When only the upper side cord 4b can stably fix the protective layer body 3 to the fender 1A, the lower side cord 4b can be omitted.

[0030]

In the present embodiment, a lower end portion of the upper side cord 4b is connected to an upper end opening end portion of the protective layer body 3 via a connecting member 4a. An upper end portion of the upper side cord 4b is connected to the fitting 1c via a fixing member 4c externally fitted to the fitting 1c. An upper end portion of the lower side cord 4b is connected to a lower end opening end portion of the protective layer body 3 via the connecting member 4a. A lower end portion of the lower side cord 4b is connected to the fitting 1d via the fixing member 4c externally fitted to the fitting 1d.

[0031]

As the cord 4b, a rope made of a resin or natural fibers, a metal chain, or the like can be used. A rope made of the resin or the natural fibers is used as the cord 4b, which is advantageous for preventing the surface of the hemispherical portion 1b from being damaged due to the cord 4b.

[0032]

When the protective cover 2 is used, the protective cover 2 is attached to the fender 1A whose hollow interior space stores the air A on the ground or a ship. Thereafter, as illustrated in FIG. 1, the fender 1A is installed on a wall surface of a quay or a broadside. Then, the water W is injected into the interior portion of the fender 1A, and a midway position of the protective cover 2 (the protective layer body 3) in the vertical direction is set to a water surface position.

[0033]

When the oil C drifts to a water area in which the fender 1A is installed and a periphery of the fender 1A is surrounded by the oil C floating on the water surface, a state where the oil C adheres to an outer surface of the protective layer body 3 continues. The body portion 1a is covered by the protective layer body 3, and is therefore separated from the oil C without the oil C adhering

thereto. The oil C fluctuates in accordance with the water surface, the water surface in a port or the like at normal times vertically fluctuates by approximately from 1 to 2 m. Furthermore, the fender 1A vertically moves synchronously with waves (the water surface) in a certain degree, a vertical fluctuation range of the water surface position is therefore within a range of the body portion 1a. Accordingly, a length of the protective layer body 3 in the vertical direction (a cylinder axial direction) and a vertical range covered by the protective layer body 3 may be decided in accordance with the vertical fluctuation range of the water surface position.

10 [0034]

Even if there are slight gaps between the inner surface of the protective layer body 3 and the outer surface of the body portion 1a, unless the water surface position is higher than an upper end position of the protective layer body 3, or the water surface position is lower than a lower end position of the protective layer body 3, the oil C does not enter the gaps therebetween. Accordingly, excluding a case where waves is higher than those at normal times, a range covered by the protective layer body 3 of the fender 1A is separated from the oil C, it is possible to avoid adherence of the oil C to the fender 1A at normal times. When it is not at normal times (when waves are high), the fender 1A may not be used. Consequently, using the protective cover 2 according to the present invention makes it possible to efficiently suppress swelling deterioration of the fender 1A due to the oil C floating on the water surface. Additionally, the protective layer body 3 covers only a part of the outer surface of the body portion 1a in the vertical direction, which is advantageous for reducing a material forming the protective layer body 3.

25 [0035]

Furthermore, since the lamellar thin protective layer body 3 is used, even if the fender 1A is used with the protective cover 2 being attached, compaction and restoring deformation of the fender 1A does not become significantly difficult. Accordingly, the protective cover 2 does not substantially adversely influence a shock absorbing performance or the like of the fender 1A.

[0036]

By forming the protective layer body 3 with a non-oil resistance member, the protective layer body 3 deteriorates by swelling or the like due to the oil C adhering thereto earlier than the case of being formed by the oil resistance member. Therefore, when the deterioration in the protective layer body 3 is found, or after a preset period has elapsed, the deteriorated protective layer body 3 is detached from the fender 1A and replaced with a new protective layer

body 3. Alternatively, replacement with a new protective cover 2 may be performed.

[0037]

5 By forming the protective layer body 3 with an oil resistance member, it is possible to prevent swelling deterioration in a range covered by the protective layer body 3 for a longer period of time than the case of being formed by the non-oil resistance member. Consequently, replacement with a new protective layer body 3 (protective cover 2) is not necessary. Alternatively, it is possible to reduce replacement frequency to a new protective layer body 3 (protective cover 2).

10 [0038]

A configuration in which the protective layer body 3 is externally put around the body portion 1a while abutting on the outer surface of the body portion 1a is used, which is advantageous for preventing a malfunction that the protective layer body 3 accidentally separates from the body portion 1a. When the inner surface of the protective layer body 3 and the outer surface of the body portion 1a make an adhesion bond, there is an advantage that the protective layer body 3 does not easily shift with respect to the fender 1A, and thus it is also possible to set a strength of the attachment portion 4 low. When the inner surface of the protective layer body 3 and the outer surface of the body portion 1a are brought into an adhesion bond, the protective layer body 3 may be formed by an elastic member capable of deforming in accordance with compaction and restoring deformation of the fender 1A.

20 [0039]

25 By gaps being provided between the inner surface of the protective layer body 3 and the outer surface of the body portion 1a, there is an advantage that compaction and restoring deformation of the fender 1A is not easily affected by the protective layer body 3. Additionally, elasticity or the like required to deform in accordance with the compaction and the restoring deformation of the fender 1A becomes low, a selection range of members which can be employed as the protective layer body 3 is therefore widen.

30 [0040]

In the present embodiment, the attachment portion 4 is configured by the cord 4b connecting the protective layer body 3 and the hemispherical portion 1b side continuously connected to the upper end of the body portion 1a, and the cord 4b connecting the protective layer body 3 and the hemispherical portion 1b side continuously connected to the lower end of the body portion 1a, and thus it is possible to further stably attach the protective layer body 3 to the fender 1A

than a case where the cord 4b connecting the protective layer body 3 and the hemispherical portion 1b side continuously connected to the lower end of the body portion 1a is not provided.

[0041]

5 Furthermore, it is also possible to configure the attachment portion 4 by a cord 4b connecting the protective layer body 3 and the hemispherical portion 1b side continuously connected to the upper end of the body portion 1a. According to this configuration, the protective layer body 3 can be stably attached to the fender 1A with a necessary minimum attachment portion 4.

10 [0042]

 In another embodiment of the protective cover 2 illustrated in FIGS. 3 to 5, the protective layer body 3 is configured so as to have buoyancy for floating on water by itself. In the protective cover 2, the protective layer body 3 is configured by a tubular cell structure member having elasticity for being
15 externally put around the body portion 1a. For example, a resin, rubber, or the like having a closed cell structure can be used as the protective layer body 3. Alternatively, a buoyancy portion made of the resin, the rubber, or the like having the closed cell structure is added to the protective layer body 3 of the embodiment illustrated in FIGS. 1 and 2, which makes it possible to serve as the
20 protective layer body 3 of the present embodiment.

[0043]

 The protective layer body 3 is externally put around the body portion 1a with a space from the outer surface of the body portion 1a as illustrated in FIG. 3, and independently vertically moves in accordance with vertical motions of
25 the water surface.

[0044]

 Although the protective layer body 3 is sandwiched between the fender 1A and a quay S, and between the fender 1A and a hull B when boats and ships berth as illustrated in FIG. 5, since the protective layer body 3 is lamellar and
30 thin, compaction and restoring deformation of the fender 1A does not become significantly difficult. Accordingly, the protective cover 2 does not substantially adversely influence a shock absorbing performance or the like of the fender 1A.

[0045]

35 According to the present embodiment, in accordance with vertical motions of the water surface, the protective layer body 3 independently vertically moves, and thus, by the protective layer body 3, the outer surface of the body portion 1a is protected from the oil C floating on the water surface

with ease. The protective layer body 3 has sufficient buoyancy, and it is therefore possible to make the attachment portion 4 for fixing to the fender 1A unnecessary. However, in the present embodiment, in order to prevent the protective layer body 3 from being detached from the fender 1A when the fender 1A is installed and when the fender 1A is withdrawn from the installation place, the protective layer body 3 is attached to the fender 1A using the cord 4b having an extra length on the upper side.

[0046]

FIGS. 6 to 8 illustrate another embodiment of the protective cover 2 including the protective layer body 3 having buoyancy for floating on water by itself.

[0047]

In the protective cover 2, a part of the protective layer body 3 externally put around the body portion 1a is configured by a buoyancy portion 3a having buoyancy. As the protective layer body 3, the protective layer body 3 of the embodiment illustrated in FIGS. 1 to 2 can be used. For example, a resin, rubber, or the like having a closed cell structure can be used as the buoyancy portion 3a. The buoyancy portions 3a are preferably provided at positions, which are not pressed by the hull B and the quay S when boats and ships berth, so as to oppose each other. The protective layer body 3 is externally put around the body portion 1a with a space from the outer surface of the body portion 1a as illustrated in FIG. 7, and independently vertically moves in accordance with vertical motions of the water surface.

[0048]

In the present embodiment, a first end portion of the cord shaped attachment portion 4 is connected to a position corresponding to each of the buoyancy portions 3a of the protective layer body 3, and a second end portion is connected to the quay S. The protective layer body 3 is connected to the quay S in this manner, which makes it possible to prevent a rotation around a cylinder center line of the protective layer body 3.

[0049]

Although the protective layer body 3 is sandwiched between the fender 1A and a quay S, and between the fender 1A and a hull B when boats and ships berth as illustrated in FIG. 8, since the protective layer body 3 is lamellar and thin, compaction and restoring deformation of the fender 1A does not become significantly difficult. Accordingly, the protective cover 2 does not substantially adversely influence a shock absorbing performance or the like of the fender 1A. The buoyancy portion 3a can be continuously provided on an

entire circumference in a circumferential direction, or can be intermittently provided in the circumferential direction. As in the present embodiment, the buoyancy portion 3a is not excessively compacted by disposing on a position, which is not pressed by the hull B and the quay S, in the circumferential direction, which is advantageous for preventing a damage.

[0050]

Furthermore, a vertical pneumatic fender 1 according to the present invention (hereinafter, referred to as a fender 1) removably includes the above-described various protective layer bodies 3 with respect to the conventional fender 1A.

[0051]

FIG. 9 illustrates another embodiment of the fender 1.

[0052]

The fender 1 includes a tubular protective layer body 3 covering a partial range of the outer surface of the body portion 1a in a vertical direction, the protective layer body 3 is integrated with the fender 1 by being vulcanization-bonded. In other words, the inner surface of the protective layer body 3 makes an adhesion bond and is fixed with an opposite surface without a gap. The protective layer body 3 can be additionally vulcanization-bonded to the outer surface of the conventional fender 1A, or the protective layer body 3 can be substituted for the outer rubber layer of the conventional fender 1A and be vulcanization-bonded.

[0053]

As the protective layer body 3, the above-described various specifications can be used. However, the specification is not such that only the protective layer body 3 can be removed or attached, the protective layer body 3 cannot therefore be replaced. Accordingly, the protective layer body 3 is formed by an oil resistance member. Additionally, the protective layer body 3 needs to deform in accordance with compaction and restoring deformation, and therefore is preferably formed from an elastic member such as rubber or the like.

[0054]

A usage for the fender 1 is the same as that in the above-described embodiment. According to the fender 1, a range covered by the protective layer body 3 of the fender 1 is separated from the oil C floating on the water surface, it is possible to substantially avoid adherence of the oil C to the fender 1. Consequently, swelling deterioration of the fender 1 due to the oil C floating on the water surface can be efficiently suppressed.

[0055]

The fender 1 has an advantage that the attachment portion 4 is unnecessary as described above, and an advantage that the protective layer body 3 does not shift.

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Reference Signs List

[0056]

- 1 Vertical pneumatic fender of present invention
- 1A Conventional vertical pneumatic fender
- 10 1a Body portion
- 1b Hemispherical portion
- 1c Fitting (upper side)
- 1d Fitting (lower side)
- 2 Protective cover
- 15 3 Protective layer body
- 3a Buoyancy portion
- 4 Attachment portion
- 4a Connecting member
- 4b Cord
- 20 4c Fixing member
- 5 Guy chain
- 6 Weight

Claims

[Claim 1]

A protective cover for a vertical pneumatic fender removably mounted on a vertical pneumatic fender including bowl shaped hemispherical portions continuously connected to both upper and lower ends of a cylindrical body portion, the protective cover for the vertical pneumatic fender comprising:

a tubular protective layer body covering a partial range of an outer surface of the body portion in a vertical direction; and

an attachment portion for disposing the protective layer body on a predetermined position of the fender,

the protective layer body being capable of separating oil floating on a water surface and the range on the body portion covered by the protective cover when being disposed on the predetermined position on the fender.

[Claim 2]

The protective cover for the vertical pneumatic fender according to claim 1, wherein

the protective layer body is externally put around the body portion with a space from the outer surface of the body portion, and has buoyancy for floating on water by itself.

[Claim 3]

The protective cover for the vertical pneumatic fender according to claim 1, wherein

the protective layer body is externally put around the body portion while abutting on the outer surface of the body portion.

[Claim 4]

The protective cover for the vertical pneumatic fender according to any one of claims 1 to 3, wherein

the attachment portion is configured by a cord connecting the protective layer body and the hemispherical portion side continuously connected to the upper end of the body portion.

[Claim 5]

The protective cover for the vertical pneumatic fender according to any one of claims 1 to 3, wherein

the attachment portion is configured by a cord connecting the protective layer body and the hemispherical portion side continuously connected to the upper end of the body portion, and a cord connecting the protective layer body and the hemispherical portion side continuously connected to the lower end of the body portion.

[Claim 6]

The protective cover for the vertical pneumatic fender according to any one of claims 1 to 5, wherein

the protective layer body is formed from an oil resistance member.

[Claim 7]

The protective cover for the vertical pneumatic fender according to claim 6, wherein

the oil resistance member is an elastic member containing acrylonitrile butadiene rubber.

[Claim 8]

A vertical pneumatic fender including a cylindrical body portion and a bowl shaped hemispherical portion continuously connected to both upper and lower ends of the body portion, the vertical pneumatic fender comprising:

a removable tubular protective layer body covering a partial range of an outer surface of the body portion in a vertical direction,

the protective layer body being capable of separating oil floating on a water surface and the range on the body portion covered by the protective layer body.

[Claim 9]

A vertical pneumatic fender including a cylindrical body portion and a bowl shaped hemispherical portion continuously connected to both upper and lower ends of the body portion, the vertical pneumatic fender comprising:

a tubular protective layer body covering a partial range of an outer surface of the body portion in a vertical direction,

the protective layer body being formed from an oil resistance member, and integrally provided by being vulcanization-bonded, the protective layer body being capable of separating oil floating on a water surface and the range on the body portion covered by the protective layer body.

[Claim 10]

The vertical pneumatic fender according to claim 8, wherein the protective layer body is formed from an oil resistance member.

[Claim 11]

The vertical pneumatic fender according to claim 9 or 10, wherein the oil resistance member is an elastic member containing acrylonitrile butadiene rubber.

[Claim 12]

A usage for a vertical pneumatic fender comprising:
installing the vertical pneumatic fender according to any one of claims 8 to 11 by setting a midway position of the protective layer body in the vertical direction to a water surface position,
the protective layer body separating oil and the range on the body portion covered by the protective layer body when the oil is floating on a water area in which the fender is installed.