

DESCRIPTION

[TITLE OF THE INVENTION] CABLE BODY ANCHORING FITTING

[Technical Field]

[0001]

This invention relates to a cable body anchoring fitting for anchoring a cable body such as a wire rope.

[Background Art]

[0002]

A fitting using a wedge is used as a fitting for anchoring a cable body such as a wire rope. Patent Document 1 discloses a technique related to such a fitting using a wedge (wedge clamp).

[Prior Art Publication]

[Patent Document]

[0003]

[Patent Document 1]

Japan Patent No. 6009611

[Summary of the Invention]

[Problems to be Solved by the Invention]

[0004]

As described in Patent Document 1, the wedge clamp (cable body anchoring fitting) disclosed therein exhibits excellent fastening force due to its configuration, which prevents slippage between the cable body and the wedge member when tension is applied to the cable body, and in which the cable body and the wedge member, as an integral unit, enter a restraining member (cylindrical member) to achieve a higher fastening force.

Cable body anchoring fittings utilizing the principle of the wedge clamp disclosed in Patent Document 1 offer excellent workability and, as

mentioned above, achieve high anchoring efficiency, leading to their increased use in a wide range of applications.

With this diversification of applications, there is a growing demand for cable body anchoring fittings that are even more user-friendly.

[0005]

In view of the above, the present invention relates to a wedge-type fitting (cable body anchoring fitting) for securing cable bodies such as wire ropes, and aims to provide a cable body anchoring fitting that is easier to use.

[Means for Solving the Problem]

[0006]

(Configuration 1)

A cable body anchoring fitting including:

a fitting member including a cylindrical member through which a cable body is inserted; and

a driving member including a wedge member inserted into the cylindrical member and abutting the cable body in the cylindrical member, and

on a surface of the driving member in contact with the cable body, includes:

a V-shaped groove configured to contact the cable body at two faces; and

a weak fastening portion where fastening force exerted on the cable body is reduced compared to that of the V-shaped groove.

[0007]

(Configuration 2)

The cable body anchoring fitting described in Configuration 1, in which the weak fastening portion

is formed on an anterior side of the V-shaped groove relative to the driving direction of the driving member.

[0008]

(Configuration 3)

The cable body anchoring fitting described in Configuration 1 or 2, in which the weak fastening portion has a concave shape in a cross-section perpendicular to a driving direction of the driving member.

[0009]

(Configuration 4)

The cable body anchoring fitting described in any one of Configurations 1 to 3, in which the ratio of formation range of the weak fastening portion to the formation ranges of the V-shaped groove and the weak fastening portion in the driving direction of the driving member is 40% or more.

[Effect of the Invention]

[0010]

The present invention can provide a wedge-type fitting (cable body anchoring fitting) for anchoring cable bodies such as wire ropes, and aims to provide a cable body anchoring fitting that is easier to use.

[Brief Description of the Drawings]

[0011]

[Fig. 1] Fig. 1 is a perspective view showing a cable body anchoring fitting of an embodiment of the present invention.

[Fig. 2] Fig. 2 shows the fitting member of the cable body anchoring fitting of the embodiment.

[Fig. 3] Fig. 3 shows the driving member of the cable

body anchoring fitting of the embodiment.

[Fig. 4] Fig. 4 is a schematic diagram showing the cable body (wire rope) inserted through the cable body anchoring fitting of the embodiment.

[Embodiment for Carrying Out the Invention]

[0012]

The detailed description of the embodiment of the present invention is given below with reference to the drawings. It should be noted that the following embodiment is merely one example of how the present invention may be implemented and does not limit the scope of the invention.

[0013]

Fig. 1 is a perspective view showing a cable body anchoring fitting (with a driving member detached from a fitting member) of an embodiment of the present invention. Fig. 4 is a schematic diagram showing the state in which a cable body (wire rope WR) is inserted through the cable body anchoring fitting of this embodiment. Fig. 4(a) is a schematic cross-sectional view along the longitudinal direction (conceptual diagram showing the positional relationship of each component in a state where the driving member has not been driven (i.e., no fastening force is being generated); Fig. 4(b) is a conceptual cross-sectional view at a position where a weak fastening portion is located when the driving member is driven; and Fig. 4(c) is a conceptual cross-sectional view at a position where a V-shaped groove is located when the driving member is driven.

As shown in Fig. 4, the cable body anchoring fitting 1 of this embodiment is for eye-splicing the

end portion of a cable body to anchor the end of a cable body such as a wire rope WR.

The cable body anchoring fitting 1 of this embodiment includes:

- a fitting member 11 including a cylindrical member through which a cable body is inserted,

- a driving member 12 including a wedge member inserted into the cylindrical member of the fitting member 11 and abutting the cable body within the cylindrical member, and

- on a surface of the driving member 12 in contact with the cable body, includes:

- a V-shaped groove 121 configured to contact the cable body at two faces; and

- a weak fastening portion 122 where the fastening force exerted on the cable body is reduced more than that of the V-shaped groove 121.

The cable body anchoring fitting 1 includes a wedge member of the driving member 12 and a cable body that are inserted into the cylindrical member of the fitting member 11 (state shown in Fig. 4(a)), and in the state shown in Fig. 4(a), when the driving member 12 is driven, the cable body is restrained by the pressure generated based on the wedge shape of the driving member. Since the basic function and the configuration therefor are the same as those of the wedge clamp disclosed in Patent Document 1, the explanation thereof will be hereafter omitted or simplified.

[0014]

Fig. 2 shows the fitting member 11, with Fig. 2(a) being a top view, Fig. 2(b) a front view, Fig.

2(c) a side view, Fig. 2(d) a rear view, and Fig. 2(e) a bottom view.

For the sake of clarity, the forward side along a driving direction of the driving member 12 (the left side in Fig. 2(c)) is referred to as "front surface" while the opposite side (the right side in Fig. 2(c), where driving member 12 is inserted) is referred to as "rear surface". The side of the driving member 12 that contacts the fitting member (the bottom side in Fig. 2(c)) is referred to as "bottom surface" and the opposite side (the top side in Fig. 2(c)) is referred to as "top surface".

The fitting member 11 includes a tapered cylindrical member and serves to restrain the driving member 12 and the cable body such as a wire rope. As the driving member 12 and the cable body enter the tapered internal space of the cylindrical member of the fitting member 11, strong frictional force is generated between the respective members, thereby restraining the cable body.

In this function, to obtain effective restraint to the cable body, a V-shaped groove (cylindrical member side V-shaped groove) 111 is formed on the inner surface of the top surface of the cylindrical member of the fitting member 11, configured to contact the cable body at two faces. Since the V-shaped groove 111 itself is similar to the wedge clamp disclosed in Patent Document 1, an explanation of the V-shaped groove itself is omitted.

The inner portion of the opening on the front side of the cylindrical member is formed with a chamfered portion 112 that is chamfered (tapered),

which prevents localized high loads from being applied to the cable body due to contact at the corners (thereby reducing the risk of cable body breakage, etc.).

A through hole 113 is formed in the lower rear portion of both side surfaces of the cylindrical member, allowing a pin member to be inserted through the through hole 113 while the driving member 12 is driven into place (positioning the pin member to engage with the engaging portion 123 of the driving member 12 (Fig. 3(c)). This configuration ensures that the driving member 12 is driven into place in a predetermined position and prevents the driving member 12 from retracting (loosening of the fastening).

[0015]

Fig. 3 is a diagram showing the driving member 12, Fig. 3(a) showing a top view, Fig. 3(b) showing a front view, Fig. 3(c) showing a side view, Fig. 3(d) showing a rear view, and Fig. 3(e) showing a bottom view.

When viewed from the side, the driving member 12 has a wedge between the bottom surface portion and the upper portion (V-shaped groove 121 in which a V-shaped groove (driving member side V-shaped groove) is formed). When the wedge member is driven into the interior of the cylindrical member of fitting member 11 together with the cable body, the resulting pressure generates frictional force between fitting member 11, driving member 12, and the cable body, thereby fastened to the cable body.

Since the V-shaped groove 121 itself provided on the driving member 12 is similar to the wedge clamp

disclosed in Patent Document 1, explanation of the V-shaped groove 121 itself is omitted.

[0016]

The driving member 12 has a weak fastening portion 122 formed on the front side of the V-shaped groove 121. In this embodiment, the weak fastening portion 122 has a concave shape in cross-section perpendicular to the driving direction of the driving member. The weak fastening portion 122, which is a channel-shaped groove, is formed such that its groove width (the distance between both sides of the channel-shaped groove) is equal to or greater than the diameter of the cable body, and both sides of the channel-shaped groove do not basically generate a fastening force against the cable body. The bottom surface of the groove is formed continuously with (on the same plane as) the bottom surface of the V-shaped groove 121.

The weak fastening portion 122 is formed such that the ratio of the range of the weak fastening portion 122 to the combined range of the V-shaped groove 121 and the weak fastening portion 122, in the driving direction of the driving member, is 40% or more.

[0017]

The weak fastening portion 122 is not a V-shaped groove that contacts the cable body at two faces as described in Patent Document 1, but basically contacts the cable body at its bottom surface portion (although the side faces of the groove may also contact the cable body, such contact does not generate a substantial fastening force). Therefore, the force

fastening the cable body at the weak fastening portion 122 is smaller than the fastening force at the V-shaped groove 121.

[0018]

For example, cable body anchoring fittings designed to fasten relatively thick wire ropes (cable bodies) with a diameter of 18 mm or more naturally become larger as the cable body diameter increases. Thick cable bodies are used in applications where high tensile forces are applied, and consequently, the cable body anchoring fittings used therefor should also provide a fastening force according thereto.

As a result, conventional cable body anchoring fittings, in which a V-shaped groove was formed along nearly the entire length of the driving member, required significant driving force, making manual driving using a hammer, etc. difficult. In conventional cable body anchoring fittings, in which a V-shaped groove is formed along nearly the entire length of the driving member, the cable body is clamped with a high fastening force even at the forward end (the side where the cable body is eye-spliced). Therefore, when fastening a relatively thick cable body with high fastening force, the amount of deformation in the cable body also increases, and consequently, the load on the cable body at the border (the base of the eye) becomes significant, creating a risk that the cable body could fracture at this location.

While it is possible to reduce the driving force of the driving member by shortening the driving member (reducing the length of the V-shaped groove in the

driving direction), if the driving member is shortened (the length of the V-shaped groove in the driving direction is reduced), the driving distance should be increased to obtain the same fastening force. In other words, the fastening force per unit length should be increased, which requires greater driving. Consequently, the amount of deformation in the cable body at the fastening point also increases. This leads to the problem that the load on the cable body at the boundary of the fastening section as mentioned above becomes even greater (increasing the risk of fracture, etc.).

In contrast, according to the cable body anchoring fitting 1 of this embodiment, including the weak fastening portion 122 (shortening the V-shaped groove) facilitates the driving operation compared to conventional cable body anchoring fittings in which a V-shaped groove is formed along the entire length. By having the weak fastening portion 122 on the front side (the side where the cable body is eye-spliced), it is possible to reduce the increased load on the cable body at the base of the eye, thereby reducing the risk of cable body fracture at this location.

[0019]

As described above, according to the cable body anchoring fitting 1 of this embodiment, a more user-friendly fitting using a wedge (cable body anchoring fitting) for anchoring cable bodies such as wire ropes, can be obtained.

[0020]

In this embodiment, the weak fastening portion is illustrated as having a concave cross-section

perpendicular to the driving direction of the driving member. However, the present invention is not limited thereto, and the weak fastening portion may have any configuration provided that the fastening force exerted on the cable body is smaller than that of the V-shaped groove. For example, the weak fastening portion may be formed as a second V-shaped groove in which the relative angle between the two faces of the V-shaped groove that generates the primary fastening force is an angle smaller than 42° , while the relative angle between the two faces of the weak fastening portion is an angle greater than 42° . The weak fastening portion may be formed as a simple flat portion that does not have side faces (i.e., is not concave).

In this embodiment, the bottom surface of the groove in the weak fastening portion is formed to be continuous with (and in the same plane as) the bottom surface of the V-shaped groove. However, the present invention is not limited thereto, and the bottom surface of the groove in the weak fastening portion may not be in the same plane as the bottom surface of the V-shaped groove. For example, the bottom surface of the groove in the weak fastening portion may have a step relative to the bottom surface of the V-shaped groove, or the bottom surface of the groove in the weak fastening portion may be provided with an inclination (an inclined surface such that the inner diameter of the cylindrical member increases as it approaches the opening at the end of the cylindrical member, i.e., a tapered shape that increases the inner diameter toward the opening).

[0021]

In this embodiment, the weak fastening portion 122 is illustrated as being formed on the front side of the V-shaped groove 121 (one V-shaped groove 121 and one weak fastening portion 122). However, the present invention is not limited thereto, and may be provided with one or both of the weak fastening portions and the V-shaped groove in two or more locations (for example, multiple weak fastening portions and the V-shaped grooves are formed alternately).

As can be understood from the above explanation, while it is preferable for the weak fastening portion to be provided at the front end of the driving member that is eye-spliced, the weak fastening portion may also be provided at the rear end of the driving member to reduce the load on the cable body near the outlet at the rear end.

[0022]

This embodiment gives an example where V-shaped groove 121 transitions to the weak fastening portion 122 in a stepwise manner (switches from the V-shaped groove 121 to the weak fastening portion 122 at a predetermined position). However, the present invention is not limited thereto. For example, the shape may gradually change from the V-shaped groove to the weak fastening portion, for example, by having a tapered shape.

[0023]

In this embodiment, an example is given in which a V-shaped groove that contacts the cable body at two sides is provided inside the cylindrical member as

well, allowing two folded cable bodies to be inserted to perform eye-splicing (Fig. 4). However, the present invention is not limited thereto, and for example, the concept of the present invention can also be applied to configurations without a V-shaped groove inside the cylindrical member (where a single cable body is inserted and fastened) as described in Example 1, etc. of Reference 1.

[0024]

Regarding the V-shaped groove in the cable body anchoring fitting 1 of the embodiment which contacts the cable body at two faces, slippage between the cable body being prevented by setting the angle between those two faces to a predetermined angle, is as described in Patent Document 1, and while this is highly preferable, it is not essential for the application of the present invention.

[0025]

Furthermore, although an example is given in the embodiment in which the driving member consists generally only of a wedge member, and the fitting member consists generally only of a cylindrical member, the present invention is not limited thereto. The present invention only needs to include a driving member having a wedge member and a fitting member that engages with the driving member to restrain the cable body by means of pressure generated based on the wedge shape of the driving member (each member may additionally have other functions or structural portions).

[Explanation of Reference Numerals]

[0026]

1...cable body anchoring fitting

11...fitting member

12...driving member

121...V-shaped groove

122...weak fastening portion

CLAIMS

[Claim 1]

A cable body anchoring fitting comprising:
a fitting member including a cylindrical member through which a cable body is inserted; and
a driving member including a wedge member inserted into the cylindrical member and abutting the cable body in the cylindrical member, and
on a surface of the driving member in contact with the cable body, comprises:
a V-shaped groove configured to contact the cable body at two faces; and
a weak fastening portion where fastening force exerted on the cable body is reduced compared to that of the V-shaped groove.

[Claim 2]

The cable body anchoring fitting described in claim 1, in which the weak fastening portion is formed on an anterior side of the V-shaped groove relative to the driving direction of the driving member.

[Claim 3]

The cable body anchoring fitting described in claim 1, wherein the weak fastening portion has a concave shape in a cross-section perpendicular to a driving direction of the driving member.

[Claim 4]

The cable body anchoring fitting described in any one of claims 1 to 3, wherein the ratio of formation range of the weak fastening portion to the formation ranges of the V-shaped groove and the weak fastening portion in a driving direction of the driving member is 40% or more.