Title: SELF-STANDING CABLE TRAY FACILITY EQUIPPED WITH CABLE ESCAPE PREVENTION UNIT

Technical Field

The present invention relates to a self-standing cable tray facility, and in particular to a self-standing cable tray facility which makes the main frame combined with the cradling member and the support frame to cradle the power cable in a shape corresponding to the inner shape of the underground tunnel, and then the self-standing cable tray is installed in close contact with the inside of the underground tunnel, while shortening the construction period by shortening the installation period of the cable tray, and preventing the reinforced concrete wall from cracking caused by the perforation on the wall, which will lead to achieve the durability and stability of the underground tunnel.

In addition, the present invention relates to a self-standing cable tray facility equipped with cable escape prevention unit which is intended to secure the stability of the tunnel structure by preventing perforation of wire mesh, rebar, and others mounted on the exterior wall, and leakage of the underground water during the perforation works to fix the existing C-channel main support to the tunnel wall, and to reduce the construction cost, operation and maintenance cost necessary for the various devices by improving the working environment

producing massive machine drilling noise and dust accompanied due to the perforation works of C-channel to the inside of the tunnel.

Furthermore, the present invention relates to a self-standing cable tray facility equipped with cable escape prevention unit which is intended to prevent the power cable from escaping by installing escape prevention unit including pivoting shaft installed in the longitudinal direction, cover member covering upper portion, and a plurality of coil springs, which will lead to secure the cable stability and the installation space.

Background Art

Generally, underground cable is divided into overhead line on the ground and the underground line under the ground, and the use of the underground line is getting enlarged due to the advantage of clean city view and easy maintenance while being installed under the ground.

Generally, the above mentioned underground line is installed in the underground cable tunnel. The underground tunnel, as shown in Figure 1, is composed of and including mounting member 20 installed on the underground tunnel 10 and inside of the underground tunnel 10, formed in hollow cylindrical shape, and installed by cradling power cable 40 on the upper part of the mounting member 20.

The conventional underground power tunnel has a problem of potential break or leakage due to the crack of the underground tunnel 10 formed of concrete since the mounting member 20 is installed inside the underground tunnel 10 by bolts 30.

Furthermore, there was a problem of construction period increase because it is difficult to install mounting member 20 in the narrow space of the underground tunnel 10 and the working time is delayed.

Accordingly, there is still a necessity for a self-standing cable tray with new structure mounted with cable escape prevention unit which ensures simple and convenient installation method of mounting member and shortening working time inside of the narrow underground tunnel.

Disclosure of Invention

Accordingly, it is an object of the present invention to provide self-standing cable tray facility equipped with cable escape prevention unit, which will shorten the construction period by saving underground power tunnel installation time and will prevent occurrence of cracking on the underground tunnel, by making and installing the main frame combined with the cradling member and the support frame in a shape corresponding to the inner shape of the underground tunnel, being fitted and installed into the inside of the

underground tunnel.

In addition, the escape prevention unit comprises a pivoting shaft installed at one side of the cradling member in the longitudinal direction, a cover member installed by connecting to the pivoting shaft, thereby covering the upper portion of the cradling member by pivoting, a plurality of coil springs installed to cover the pivoting shaft and providing a resilient force for the cover member to cover the upper portion of the cradling member by both end sides being positioned at the side of the cradling member and the cover member.

In addition, the upper portion of the cradling member and the lower portion of the cover member formed in a concave shape corresponding to the curvature of a power cable, thereby the power cable mounted between the cradling member and the cover member.

In addition, the self-standing cable tray facility further comprises a plurality of rollers installed to be rotatable on the upper portion of the cradling member in which the power cable is mounted, the rollers being spaced apart from each other in the longitudinal direction of the cradling member.

In addition, the main frame, the support frame, the cradling member and the escape prevention units are composed of a set of group, inside the underground tunnel, in separated with each other.

~~In addition,~~ According to another embodiment of the present invention,

the self-standing cable tray facility further comprises a plurality of connecting frames connecting the main frames with each other.

Since the description of the present invention is just an exemplary embodiment so as to describe a structure or a function, the scope of the right of the present invention should not be interpreted to be limited by the exemplary embodiments disclosed in the descriptions of the present invention. More specifically, since the exemplary embodiments of the present invention may be modified into various forms and may have various forms, the scope of the right of the present invention should be interpreted to include equivalents which may implement technical concepts. In addition, since the objects and effects of the present invention don't mean that a specific exemplary embodiment should include all the above objects or effects or should include only the effects, the scope of the right of the present invention should be understood to be limited by such things.

Meanwhile, the meaning of the terms used in the present invention should be interpreted as follows. The terms "a first", "a second", etc. are used so as to distinguish one component from other components, so the scope of the right should be limited by such terms. For example, a first component element may be named as a second component element, and in a similar way, the second component element may be named as the first component element.

When describing that a predetermined component element "is connected" to other component elements, it may mean that the predetermined component element may be directly connected to the other component elements, but it should be understood as being connected thereto through other component element disposed between the predetermined component element and the other component element. Meanwhile, when such connection is described like a predetermined component element "is directly connected" to other component elements, it should be understood that there is not any other component element between them. Meanwhile, other expressions describing any relationship between component elements, namely, the terms such as "between ~" and "just between ~" or "neighboring with ~" and "directly neighboring with~" should be interpreted in the same way.

It should be interpreted that the expression in a singular form means including a plurality of expressions unless it is expressed in a clear form in a corresponding context, and the terms such as "include", "have", etc. are used to express the presences of an implemented feature, a number, a step, an operation, a component element, a partial component, etc. or a combination thereof, and it should be interpreted not to previously exclude any presence or an adding possibility of one or more other features, numbers, steps, operations, component elements, partial components , etc. or a combination thereof.

Advantageous effects

Thereby, there is an effect of shortening the construction period by shortening the underground power cable tunnel installation time and preventing the break of the underground tunnel by preventing the occurrence of crack on the underground tunnel, through the installation of the main frame into the inner portion of the underground tunnel in a shape of corresponding to the inner shape of the underground tunnel in the form of combination with cradling member and support frame for the power cable.

In addition, the present invention can achieve the effect of securing the stability of the tunnel structure by preventing perforation of wire mesh, rebar, and others mounted on the exterior wall and leakage of the underground water during the perforation works to fix the existing C-channel main support to the tunnel wall, and reducing the construction cost, operation and maintenance cost necessary for the various devices by improving the working environment producing massive machine drilling noise and dust accompanied due to the perforation works of C-channel to the inside of the tunnel.

Furthermore, the present invention can achieve the effect of securing the cable stability and the space for cable cradling, for the purpose of preventing an escape of the power cable, by installing escape prevention unit including pivoting shaft installed in the longitudinal direction, cover member

covering upper portion, and a plurality of coil springs.

Brief Description of Drawings

Figure 1 is a view for prior art.

Figure 2 is a perspective view for describing a self-standing cable tray facility equipped with cable escape prevention unit according to an exemplary embodiment of the present invention.

Figure 3 is a front view for describing a self-standing cable tray facility equipped with cable escape prevention unit according to an exemplary embodiment of the present invention.

Figure 4 is a partial front view for describing a self-standing cable tray facility equipped with cable escape prevention unit according to an exemplary embodiment of the present invention.

Figure 5 is a partial perspective view for describing a self-standing cable tray facility equipped with cable escape prevention unit according to an exemplary embodiment of the present invention.

Figure 6 is a partial front view for describing a self-standing cable tray facility equipped with cable escape prevention unit according to another exemplary embodiment of the present invention.

Figure 7 is a partial perspective view for describing a self-standing cable

tray facility equipped with cable escape prevention unit according to an exemplary embodiment of the present invention.

<Legend of major components in the drawings>

10 : underground tunnel	20 : mounting member
30 : bolt	40 : power cable
100 : underground tunnel	200 : main frame
210 : connecting frame	300 : support frame
310 : cradling member	320 : roller
400 : escape prevention unit	410 : pivoting shaft
420 : cover member	430 : coil spring
500 : grating	510 : support frame
600 : power cable	

Best modes for carrying out the invention

According to the exemplary embodiment of the present invention, a self-standing cable tray facility equipped with cable escape prevention unit comprises an underground tunnel buried underground; a main frame formed in a shape corresponding to the inside shape of the underground tunnel, the main frame being fitted and installed to the inside of the underground tunnel; a plurality of support frames formed to extend horizontally on the inner surface of

the main frame; a plurality of cradling members installed on the upper portion of respective support frames to cradle a power cable; a plurality of escape prevention units for preventing the power cable from escaping by pressurizing the power cable at the upper portion of respective cradling members; and a grating formed horizontally along the longitudinal direction of the underground tunnel near the inner lower portion of the underground tunnel.

Modes for carrying out the invention

The present invention will be described in detail with reference to the attached Figures.

The attached Figures illustrate an exemplary embodiment of the present invention, which is provided merely to illustrate the invention in more detail, whereby it is not limited to the technical scope of the invention.

A self-standing cable tray facility equipped with cable escape prevention unit according to the present invention, referring to Figure 2 to 7, comprises an underground tunnel 100 buried underground, a main frame 200 formed in a shape corresponding to the inside shape of the underground tunnel 100, the main frame being fitted and installed to the inside of the underground tunnel 100, a plurality of support frames 300 formed to extend horizontally on the inner surface of the main frame 200, a plurality of cradling members 310 installed on

the upper portion of respective support frames 300 to cradle a power cable 600, a plurality of escape prevention units 400 for preventing the power cable 600 from escaping by pressurizing the power cable 600 at the upper portion of respective cradling members 310, and a grating 500 formed horizontally along the longitudinal direction of the underground tunnel 100 near the inner lower portion of the underground tunnel 100.

~~First,~~ To begin with, the underground tunnel 100 is a concrete tunnel formed in a hollow cylindrical shape and is embedded under the ground. The underground tunnel 100 is embedded under the ground in the form of interconnected multiple open-circuit unit which is composed of predetermined parts with certain length. Although the underground tunnel 100 is explained in a hollow cylindrical shape according to the embodiment of the present invention, it is not limited to this but may be formed in rectangular or triangular shape.

In the meantime, the main frame 200, formed in a shape corresponding to the inside shape of the underground tunnel 100, is of a metallic material with a hollow cylindrical shape, that is, ring shape. Since the main frame 200 formed as above is to be fitted and installed to the inside of the underground tunnel 100, it can prevent the cracking of the underground tunnel 100 and shorten the construction period than the installation through perforation. Also referring to the attached drawings, although the main frame 200 is installed in the integral form

inside of the underground tunnel 100, it is not necessarily to be limited to the above embodiment which is just a reference for explaining the present invention. That is, the main frame 200 is installed in the integral form inside of the underground tunnel 100 or may be able to be formed in a shape that the middle portion is separated, considering spot and ground conditions. Also, the main frame 200 can comprise insulators between adjacent main frames 200. Furthermore it does not exclude the use of the other shape within the range for achieving the purpose and functions of the present invention.

And the support frame 300, member in a beam-like shape with predetermined thickness, is formed to extend horizontally along the inner direction of the main frame 200 of the inner side of the main frame 200. The support frame 300 may be formed integrally with the main frame 200 or may be separately manufactured and combined afterward. The above support frame 300 is formed on the inner surface of the main frame 200 in the state of separated space from each other with multiple preparations.

Meanwhile, according to another embodiment example of the present invention, sensors or alarm devices 330 can be installed at the free end of support frame 300 so as to provide warning function to vehicle or person accessing inadvertently to a predetermined position.

In addition, the cradling member 310, member of a rectangular box-like

shape with a predetermined thickness, is installed on the upper portion of respective support frames 300. In this case, the cradling member 310 is combined to the upper portion of each ~~cradling member 310~~ support frames 300 in the state of regular interval space separated from each other with multiple preparations. The upper surface of the cradling member 310 is formed to be recessed into the depression on which the power cable 600 is to be mounted.

In the meantime, the escape prevention unit 400 is composed of pivoting shaft 410, the cover member 420, and the coil spring 430.

The pivoting shaft 410, having the cylindrical rod shape with a predetermined diameter, is installed at one side of the cradling member 310 in the longitudinal direction.

And the cover member 420, as a rectangular box-shaped member corresponding to a shape of the cradling member 310, is rotating via the pivoting shaft 410 with connected to each pivoting shaft 410. The above cover member 420 is to cover or open the upper portion of the cradling member 310 by rotation. At this time, the lower surface of the cover member 420 which is touching the upper surface of the cradling member 310 is formed to be recessed to press the upper portion of the power cable 600, when covering the upper portion of the cradling member 310, to prevent the power cable 600 from escaping from the cradling member 310.

Also, the coil spring 430 having a general shape of coil springs, is mounted to install the pivoting shaft 410 with its middle portion, and both end sides of the coil spring are positioned at the side of the cradling member 310 and the cover member 420. The resilient force of the mounted coil spring 430 makes the cover member 420 keep covering the upper portion of the cradling member 310. That is, without any outside force on the cover member 420, the cover member 420 keeps covering the upper portion of the cradling member 310. Since, as described above, the cover member 420 always covers the cradling member 310, the power cable 600 does not escape from the cradling member 310. In case of installing the power cable 600 to the cradling member 310, if the operator rotates to open the cover member 420 by force and removes the force after installing the power cable 600, the cover member 420 is automatically to press to fix the power cable 600.

Meanwhile, the above cradling member 310 and escape prevention unit 400, referring to Figure 4, may be installed at each power cable 600 respectively, but, referring to Figure 6, may be fixing a plurality of power cables 600 in one installation by making the width of the cradling member 310' and the cover member 420' bigger than its original width. Also referring to the attached drawings, although the power cables 600 are arranged on the upper portion of the cradling member 310' in a row, it is not necessarily to be limited to the above

embodiment which is just a reference for explaining the present invention. That is, it does not exclude the use of the other shape within the range for achieving the purpose and functions of the present invention. For example, the power cables 600 are arranged in a row or may be able to be formed in a shape of multiple layers where the power cables 600 stacked on each other, considering spot and ground conditions.

A plurality of rollers 320 can be formed on the upper surface of the cradling member 310. The roller 320, a member having cylindrical shape with a predetermined diameter, is installed to be rotatable in such direction as the power cable 600 is installed. The installation time of the power cable 600 can be reduced because the power cable 600 can be more easily moved due to the roller as installed above.

The main frame 200, the support frame 300, the cradling member 310 and escape prevention unit 400 that are formed as described above, are composed of a set of group, and each set is arranged in multiple numbers and can be arranged in regular distance apart from each other inside the underground tunnel 100. In this case, each of the main frames 200 is connected to each other by a plurality of connecting frames 210 to maintain its shape.

Meantime, the grating 500 is formed on the lower side of the underground tunnel 100 horizontally along the length of the underground tunnel.

In this case, a plurality of support frames 510 is installed to support the grating 500 at the lower portion of the grating 500. The grating 500 is to provide a space for operators to install the power cable 600 and operators are to conduct the power cable 600 installation works on the top of the grating 500. In the meantime, according to another embodiment of the present invention, the grating 500 can further comprise an insulator between adjacent gratings 500.

The self-standing cable tray facility equipped with cable escape prevention unit, that is formed as described above, has a remarkable effect to reduce the construction period by reducing the installation time of the underground power cable tunnel and to prevent the damage to the underground tunnel 100 by preventing the underground tunnel 100 from cracking, by making the shape of the main frame 200, combined with the cradling member 310 and the support frame 300 for installing the power cable 600, corresponding to the inner shape of the underground tunnel 100, and being fitted and installed to the inner portion of the underground tunnel 100.

Industrial Applicability

As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described examples are not limited by any of the

details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the meets and bounds of the claims, or equivalences of such meets and bounds are therefore intended to be embraced by the appended claims.

Claims:

1. Self-standing cable tray facility equipped with cable escape prevention unit, comprising:

an underground tunnel buried underground;

a main frame formed in a shape corresponding to the inside shape of the underground tunnel, the main frame being fitted and installed to the inside of the underground tunnel;

a plurality of support frames formed to extend horizontally on the inner surface of the main frame;

a plurality of cradling members installed on the upper portion of respective support frames to cradle a power cable;

a plurality of escape prevention units for preventing the power cable from escaping by pressurizing the power cable at the upper portion of respective cradling members; and

a grating formed horizontally along the longitudinal direction of the underground tunnel near the inner lower portion of the underground tunnel;

wherein further comprises a plurality of rollers installed to be rotatable on the upper portion of the cradling member in which the power cable is mounted, the rollers being spaced apart from each other in the longitudinal direction of the cradling member.

2. The self-standing cable tray facility of claim 1, wherein the escape prevention unit comprises:

a pivoting shaft installed at one side of the cradling member in the longitudinal direction;

a cover member installed by connecting to the pivoting shaft, thereby covering the upper portion of the cradling member by pivoting; and

a plurality of coil springs installed to cover the pivoting shaft and providing a resilient force for the cover member to cover the upper portion of the cradling member by both end sides being positioned at the side of the cradling member and the cover member.

3. The self-standing cable tray facility of claim 2, wherein the upper portion of the cradling member and the lower portion of the cover member formed in a concave shape corresponding to the curvature of a power cable, thereby the power cable mounted between the cradling member and the cover member.

~~4. The self-standing cable tray facility of claim 1, wherein further comprises a plurality of rollers installed to be rotatable on the upper portion of the cradling member in which the power cable is mounted, the rollers being spaced apart from each other in the longitudinal direction of the cradling~~

~~member.~~

~~5.~~4. The self-standing cable tray facility of claim 1, wherein the main frame, the support frame, the cradling member and the escape prevention unit are composed of a set of group, inside the underground tunnel, in separated with each other.

~~6.~~5. The self-standing cable tray facility of claim ~~5~~ 4, wherein further comprise a plurality of connecting frames connecting the main frames with each other.

~~7.~~6. The self-standing cable tray facility of one among claims 1 to ~~6~~ 5, wherein sensors or alarm devices installed at the free end of support frame.