equipment at the user end through branch cable connections. It is possible to solve the problems of difficult operation, high cost and inconsistent construction quality when implementing a waterproofing treatment to the cable for a mid-span branch connection by using an elastic contracting sleeve, and to develop and manufacture a novel and advanced cable splice box with easier operation, much lower cost, more consistent construction quality and sufficient utilization of the radial contracting force of the elastic contracting sleeve to continuously maintain the tightness of the first waterproof structure in the cable splice box. Accordingly, the construction quality of the fiber-optic cable network of the related vendors will be significantly improved.

[0012] Therefore, based on the drawbacks of the prior art, "the cable splice box" of the present invention is disclosed after dedicated development and research. The brief description of the present invention is as follows.

SUMMARY OF THE INVENTION

[0013] To overcome the shortages of the prior art, the purpose of the present invention is to provide a cable splice box. The cable splice box includes an end surface passing therethrough a cable having two cable segments respectively passing in and out of the cable splice box; a first waterproof structure, including a pillar including a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate one of the two cable segments; a longitudinal surface having at least two longitudinal slits, each of which has a width Y larger than or equal to X, corresponds to one of the at least two longitudinal grooves, and forms an opening thereon; and at least two elastic pieces, each of which forms one edge of one of the at least two longitudinal slits; and a hollow cylindrical tube

disposed on the end surface, having an outer surface and providing a mid-span branch connection; and a second waterproof structure including an elastic contracting sleeve disposed on the outer surface and enveloping the first waterproof structure. In addition, the outer surfaces of the at least two longitudinal elastic pieces jointly (integrally, or combined) and partly define the longitudinal surface. In addition, the pillar is an elastic body. In addition, the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves. In addition, in the cable splice box, each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits; the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions. In addition, the cable splice box further includes a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and one of the two cable segments passing therethrough. In addition, the first waterproof structure has a cross-section being one of a circle-like or ellipse-like shape.

[0014] The present invention also discloses a pillar used for a cable splice box to form therein a waterproof structure. The pillar includes a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate a cable segment; a longitudinal surface having at least two longitudinal slits, each of which has a width Y larger than or equal to X, corresponds to one of the two longitudinal grooves, and forms an opening thereon; and two longitudinal elastic pieces, each of which is disposed on one of the at least two longitudinal slits to keep the cable segment in the respective

longitudinal groove. In addition, the outer surfaces of the at least two longitudinal elastic pieces jointly (integrally, or combined) and partly define the longitudinal surface. In addition, the pillar is an elastic body. In addition, the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves. In addition, in the pillar, each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits; the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions. In addition, the pillar coordinates with an elastic contracting sleeve to form a waterproof splice box unit. In addition, the pillar further includes a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and the cable segment passing therethrough. In addition, the first waterproof structure has a cross-section being one of a circle-like or ellipse-like shape.

[0015] The cable splice box of the present invention includes a pillar, by which the cable for the mid-span branch connection and the pillar form the first waterproof structure in a cylindrical shape having no dent or gap between the cable and the pillar. And the first waterproof structure has a cross-section in a circle-like or ellipse-like shape. Accordingly, the waterproofing treatment between the cable inlet and outlet, which is disposed on the hollow cylindrical tube on the end surface for a cable passing through the cable splice box, and the cables by using the cable splice box with the elastic contracting sleeve is novel and advanced over the prior technique. So the operation is much easier, the cost is much lower, and the construction quality is more consistent. Moreover, in the

cable splice box, the radial contracting force of the elastic contracting sleeve continuously maintains the tightness of the first waterproof structure. The contraction quality of the fiber-optic cable network built by the related suppliers will substantially improve.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Fig. 1(A) is a diagram showing a cable splice box according to the first Embodiment of the present invention;

[0017] Fig. 1(B) is a diagram showing an end surface for a cable passing therethrough and a hollow cylindrical tube in the cable splice box according to the first Embodiment of the present invention;

[0018] Fig. 1(C) is a diagram showing a cable for a mid-span branch connection, which passes through a hollow cylindrical tube and so passes in and out of the cable splice box according to the first Embodiment of the present invention;

[0019] Fig. 2(A) is a diagram showing a pillar in the cable splice box according to the first Embodiment of the present invention;

[0020] Fig. 2(B) is a diagram showing a cross-section of a cylindrical portion of the pillar in the cable splice box according to the first Embodiment of the present invention;

[0021] Fig. 2(C) is a diagram showing a cross-section of a cylindrical portion of the pillar according to the first Embodiment of the present invention, wherein a longitudinal slit having a width Y is larger than a bore diameter X of the longitudinal groove;

[0022] Fig. 3(A) is a diagram showing an elastic contracting sleeve in the cable splice box according to the first Embodiment of the present invention;

[0023] Fig. 3(B) is a diagram showing a waterproof glue having adhesiveness and plasticity in the cable splice box according to the first Embodiment of the present invention;

[0024] Fig. 3(C) is a diagram showing a waterproof band having adhesiveness and plasticity in the cable splice box according to the first Embodiment of the present invention;

[0025] Fig. 4(A) is a diagram showing a pillar in the cable splice box according to the first Embodiment of the present invention;

[0026] Fig. 4(B) is a diagram showing the position that two cable segments for a mid-span branch connection are wound by the waterproof band having adhesiveness and plasticity before the elastic contracting sleeve is used for a waterproofing treatment in the cable splice box according to the first Embodiment of the present invention;

[0027] Fig. 4(C) is a diagram showing a first waterproof structure formed by the pillar and the cables having two cable segments for a mid-span branch connection in the cable splice box according to the first Embodiment of the present invention;

[0028] Fig. 4(D) is a diagram showing a cross-section of a cylindrical portion of the first waterproof structure in the cable splice box according to the first Embodiment of the present invention;

[0029] Fig. 5(A) is a diagram showing the cable splice box according to the first Embodiment of the present invention, wherein the elastic contracting sleeve is going to contract to envelop an outer surface of the hollow cylindrical tube and an outer surface of the first waterproof structure;

[0030] Fig. 5(B) is a diagram showing the cable splice box according to the first Embodiment of the present invention, wherein the elastic contracting

sleeve is going to contract to envelop an outer surface of the hollow cylindrical tube and an outer surface of the first waterproof structure, to form the second waterproof structure;

[0031] Fig. 5(C) is a diagram showing the cable splice box according to the first Embodiment of the present invention, wherein the elastic contracting sleeve is going to contract to envelop an outer surface of the hollow cylindrical tube and an outer surface of the first waterproof structure, and form the second waterproof structure;

[0032] Fig. 5(D) is a diagram showing the cable splice box according to the first Embodiment of the present invention, wherein the cable splice box is implemented with the waterproofing treatment by using the elastic contracting sleeve for a mid-span branch connection;

[0033] Fig. 6(A) is a diagram showing a cross-section of a pillar in a cable splice box according to the second Embodiment of the present invention, wherein the original slit width W_2 of the two grooves of the pillar equals 0, representing that the two edges of the longitudinal elastic pieces contact each other;

[0034] Fig. 6(B) is a diagram showing a cross-section of a pillar in a cable splice box according to the second Embodiment of the present invention, wherein a longitudinal slit has a slit width Y after operation being larger than the bore size X of the longitudinal groove of the pillar;

[0035] Fig. 6(C) is a diagram showing a cross-section of a pillar of the first waterproof structure in a cable splice box according to the second Embodiment of the present invention;

[0036] Fig. 7(A) is a diagram showing a cross-section of a pillar in a cable splice box according to the third Embodiment of the present invention, wherein

the original slit width W_3 of the two grooves of the pillar is unable to be measured as a result of the two overlapping extensions, and W2 equals 0, representing that the two edges of the longitudinal elastic pieces are in contact with each other;

[0037] Fig. 7(B) is a diagram showing a cross-section of a pillar in a cable splice box according to the third Embodiment of the present invention, wherein a longitudinal slit has a slit width Y after the operation being larger than the bore size X of the longitudinal groove of the pillar;

[0038] Fig. 7(C) is a diagram showing a cross-section of a pillar of the first waterproof structure in a cable splice box according to the third Embodiment of the present invention;

[0039] Description of the reference numerals

1 cable splice box

2 end surface

3 hollow cylindrical tube

4 cable for mid-span branch connection

401 two cable segments of the cable for the mid-span branch connection

402 portion of the cable for the mid-span branch connection

5 pillar

6 pillar body

7 longitudinal groove

8 longitudinal surface

9 longitudinal slit

10 opening

11 elastic piece

12 first waterproof structure

13 elastic contracting sleeve

14 outer surface of the hollow cylindrical tube

15 outer surface of the first waterproof structure

16 second waterproof structure

17 adhesive glue having adhesiveness and plasticity

X bore size of the longitudinal groove

Y slit width after the operation

W_1 original slit width of the longitudinal groove of the pillar of the first Embodiment

W_2 original slit width of the longitudinal groove of the pillar of second Embodiment

W_3 original slit width of the longitudinal groove of the pillar of third Embodiment

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0040] The cable splice box disclosed in the present invention will now be described for more concrete understanding with reference to the following embodiments, so it can be implemented by the person skilled in the art. However, the implementation of the present invention is not restricted to the following embodiments. The person skilled in the art can predict other embodiments according to the technical spirit of the embodiments disclosed in the present invention. Those predicted embodiments still belong to the scope of the present invention.

[0041] The first Embodiment

[0042] Please refer to Figs. 1(A)-5(D), each of which shows a cable splice box 1 according to the First Embodiment of the present invention. The cable

splice box 1 includes an end surface 2 passing therethrough a cable 4 having two cable segments 401 respectively passing in and out the cable splice box 1; a first waterproof structure 12 including a pillar 5 (please refer to Fig. 2(A)) including a pillar body 6 having at least two longitudinal grooves 7, each of which has a bore diameter X configured to accommodate one of the two cable segments 401; a longitudinal surface 8 having at least two longitudinal slits 9, each of which has a width Y not less than X, corresponds to one of the at least two longitudinal grooves 7, and forms an opening 10 thereon; and at least two elastic pieces 11, each of which forms on one edge of one of the at least two longitudinal slits 9; and a hollow cylindrical tube 3 disposed on the end surface 2, having an outer surface 14 and providing a mid-span branch connection; and a second waterproof structure 16 including an elastic contracting sleeve 13 disposed on the outer surface 15 and enveloping the first waterproof structure 12 (please refer to Figs. 5(A) to 5(D)). In addition, according to the cable splice box 1 of the first Embodiment of the present invention, the outer surfaces of the at least two longitudinal elastic pieces 11 jointly (integrally, or combined) and partly define the longitudinal surface 8 (please refer to Figs. 2(A) to 2(C)). In addition, according to the cable splice box 1 of the first Embodiment of the present invention, the pillar 5 is an elastic body 6. In addition, according to the cable splice box 1 of the first Embodiment of the present invention, the bore diameter X is the maximum bore diameters of each of the at least two longitudinal grooves 7. In addition, according to the cable splice box 1 of the first Embodiment of the present invention, each of the at least two longitudinal elastic pieces 11 has two extensions defining two edges of each of the at least two longitudinal slits 9; the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width

W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions. In addition, according to the cable splice box 1 of the first Embodiment of the present invention, the cable splice box 1 further includes a waterproof glue having adhesiveness and plasticity (please refer to Figs. 3(B) to 3(C)) and disposed between one of the at least two longitudinal grooves 7 and one of the two cable segments 401 passing therethrough (please refer to Figs. 4(A) to 4(D)). In addition, the first waterproof structure 12 has a cross-section being one of a circle-like and ellipse-like shape (please refer to Fig. 4(D)). A cable splice box 1 used in the first Embodiment of the present invention includes an end surface 2 for a cable 4 passing in and out of the cable splice box 1. The end surface 2 is disposed thereon with a hollow cylindrical tube 3 for the cable 4 for the mid-span branch connection to pass in and out of the cable splice box 1. A hard plastic skin of a portion 402 on the cable 4 for the mid-span branch connection should be unskinned, and then the cable 4 is bent into a U shape. The unskinned portion of the U-shaped cable and the other skinned portion of the two cables segments 401 pass through the hollow cylindrical tube 3 and pass into the cable splice box 1 in a dual-cable manner. The waterproofing treatment between the two cable segments 401 and the hollow cylindrical tube 3 is implemented by using an elastic contracting sleeve 13 (please refer to Fig. 1(C)). Due to the fact that the cross-sections of the two cable segments 401 are circle-like and have different circle centers, if an elastic contracting sleeve 13 is merely used to envelop them and the cylindrical tube 3 by contracting the elastic contracting sleeve 13, there will be a gap between the two cable segments 401 when aligned in parallel and it is not possible to form an effective waterproof structure. Furthermore, the outer diameter of the cable 4 is less than the bore diameter X of the longitudinal

of the first waterproof structure 12 being cylindrical can be wound with one more round or an adequate amount of the adhesive band 17 having adhesiveness and plasticity to more perfectly secure the waterproof effect. After the operation of the first waterproof structure 12, the portions 402 for the mid-span branch connection are passed through, or inserted into, the elastic contracting sleeve 13 and the portions of the two cable segments 401, which excludes a portion of the first waterproof structure to be wound with the elastic contracting sleeve 13, are passed into the hollow cylindrical tube 3, so that a portion of the first waterproof structure 12 to be enveloped and contracted by the elastic contracting sleeve 13 connects to each other at a position outside of the hollow cylindrical tube 3. And then the two cable segments 401 passing through the hollow cylindrical tube and passing into the cable splice box 1 are fixed in the cable splice box 1. The elastic contracting tube 13 contracts to envelop the outer surface 14 of the hollow cylindrical tube 3 and connects to the outer surface 15 of the waterproof structure at a position outside of the hollow cylindrical tube 3. Accordingly, the second waterproof structure 16 is formed between the hollow cylindrical tube 3 and the first waterproof structure 12. The cable splice box 1 used in the first Embodiment of the present invention can form a first waterproof structure having a cross-section in a circle-like shape between the pillar 5 and the two cable segments 401 via a simple operation. It will be very convenient to use an elastic contracting sleeve 13 to implement the waterproofing treatment between the cable 4 for a mid-span branch connection and the hollow cylindrical tube 3, by which the problems of the difficult operation, high cost and inconsistent construction quality in the prior art can be overcome. Moreover, each of the elastic pieces 11 of the longitudinal groove 7 matches the gap between the pillar 5 and the two cable segments 401 to form the first waterproof structure 12, and

the elastic contracting sleeve 13 contracts to the first waterproof structure. Therefore, the radial contracting force exerted by the elastic contracting sleeve 13 is sufficient and long-lasting and used to maintain the tightness between the pillar 5 and the two cable segments 401. It is clear to see that the cable splice box in the first Embodiment of the present invention can certainly overcome the shortages of the prior art.

[0043] The second Embodiment

[0044] Please refer to Figs. 6(A) to 6(C) and Figs. 1(A) to 5(D). Fig. 6(A) is a diagram showing a cross-section of a pillar included in a cable splice box 1 according to the second Embodiment of the present invention. The difference between the pillar 5 of the second Embodiment and that of the first Embodiment is that the original slit width W_2 of the two grooves 7 of the pillar 5 used in the second Embodiment equals 0 (please refer to Figs. 6(A) to 6(C)), representing that the two edges of the openings 10 on the longitudinal groove 7 contact each other.

[0045] The third Embodiment

[0046] Please refer to Figs. 7(A) to7(C) and Figs. 1(A) to 5(D). Fig. 6(A) is a diagram showing a cross-section of a pillar included in a cable splice box 1 according to the third Embodiment of the present invention. The difference between the pillar 5 of the third Embodiment and that of the first Embodiment is that the original slit width W_3 of the two grooves 7 of the pillar 5 is unable to be measured as a result of the two overlapping extensions (please refer to Fig. 7(A) to 7(C)), indicating that the two edges of the openings 10 of the two grooves 7 surpass each other.

[0047] Based on the descriptions of the above first, second and third Embodiments, the cable splice box of the present invention overcomes the

WHAT IS CLAIMED IS :

1. A cable splice box, comprising:

an end surface passing therethrough a cable having two cable segments respectively passing in and out the cable splice box;

a first waterproof structure, including:

a pillar including:

a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate one of the two cable segments;

a longitudinal surface having at least two longitudinal slits, each of which has a width Y not less than X, corresponds to one of the at least two longitudinal grooves, and forms an opening thereon; and

at least two elastic pieces, each of which forms on one edge of one of the at least two longitudinal slits; and

a hollow cylindrical tube disposed on the end surface, having an outer surface and providing a mid-span branch connection; and

a second waterproof structure including an elastic contracting sleeve disposed on the outer surface and enveloping the first waterproof structure, wherein the second waterproof structure exerts a radial contracting force on the first waterproof structure, and the at least two longitudinal elastic pieces are in place both before and after formation of the first and second waterproof structures.

2. The cable splice box according to Claim 1, wherein outer surfaces of

the at least two longitudinal elastic pieces jointly and partly define the longitudinal surface.

3. The cable splice box according to Claim 1, wherein the pillar is an elastic body.
4. The cable splice box according to Claim 1, wherein the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves.
5. The cable splice box according to Claim 1, wherein:

   each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits;

   the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions.
6. The cable splice box according to Claim 1, further comprising a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and one of the two cable segments passing therethrough.
7. The cable splice box according to Claim 1, wherein the first waterproof structure has a cross-section being one of a circle-like and ellipse-like shape.
8. A pillar used for a cable splice box to form therein a waterproof structure, comprising:

   a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate a cable segment;

   a longitudinal surface having at least two longitudinal slits, each

of which has a width Y not less than X, corresponds to one of the two longitudinal grooves, and forms an opening thereon; and

two longitudinal elastic pieces, each of which is disposed on one of the at least two longitudinal slits; and

the longitudinal elastic pieces are in place both before and after formation of the first and second waterproof structures, and a radial contracting force maintains the respective longitudinal groove tightly around the cable segments.

9. The pillar according to Claim 8, wherein outer surfaces of the at least two longitudinal elastic pieces jointly and partly define the longitudinal surface.

10. The pillar according to Claim 8, wherein the pillar is an elastic body.

11. The pillar according to claim 8, wherein the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves.

12. The pillar according to Claim 8, wherein:

each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits;

the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions.

13. The pillar according to Claim 8, wherein the pillar coordinates with an elastic contracting sleeve to form a waterproof splice box unit.

14. The pillar according to Claim 8, further comprising a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and the cable segment passing

~~therethrough.~~

15. The pillar according to Claim 8, wherein the first waterproof structure has a cross-section being one of a circle-like and ellipse-like shape.

equipment at the user end through branch cable connections. It is possible to solve the problems of difficult operation, high cost and inconsistent construction quality when implementing a waterproofing treatment to the cable for a mid-span branch connection by using an elastic contracting sleeve, and to develop and manufacture a novel and advanced cable splice box with easier operation, much lower cost, more consistent construction quality and sufficient utilization of the radial contracting force of the elastic contracting sleeve to continuously maintain the tightness of the first waterproof structure in the cable splice box. Accordingly, the construction quality of the fiber-optic cable network of the related vendors will be significantly improved.

[0012] Therefore, based on the drawbacks of the prior art, "the cable splice box" of the present invention is disclosed after dedicated development and research. The brief description of the present invention is as follows.

SUMMARY OF THE INVENTION

[0012a] The invention is defined in the independent claims. Some optional features of the invention are defined in the dependent claims.

[0013] In one example, there is a cable splice box which includes an end surface passing therethrough a cable having two cable segments respectively passing in and out of the cable splice box; a first waterproof structure, including a pillar including a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate one of the two cable segments; a longitudinal surface having at least two longitudinal slits, each of which has a width Y larger than or equal to X, corresponds to one of the at least two longitudinal grooves, and forms an opening thereon; and at least two elastic pieces, each of which forms one edge of one of the at least two longitudinal slits; and a hollow cylindrical tube

disposed on the end surface, having an outer surface and providing a mid-span branch connection; and a second waterproof structure including an elastic contracting sleeve disposed on the outer surface and enveloping the first waterproof structure. In addition, the outer surfaces of the at least two longitudinal elastic pieces jointly (integrally, or combined) and partly define the longitudinal surface. In addition, the pillar is an elastic body. In addition, the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves. In addition, in the cable splice box, each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits; the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions. In addition, the cable splice box further includes a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and one of the two cable segments passing therethrough. In addition, the first waterproof structure has a cross-section being one of a circle-like or ellipse-like shape.

[0014] There is also disclosed herein a pillar used for a cable splice box to form therein a waterproof structure. The pillar includes a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate a cable segment; a longitudinal surface having at least two longitudinal slits, each of which has a width Y larger than or equal to X, corresponds to one of the two longitudinal grooves, and forms an opening thereon; and two longitudinal elastic pieces, each of which is disposed on one of the at least two longitudinal slits to keep the cable segment in the respective

longitudinal groove. In addition, the outer surfaces of the at least two longitudinal elastic pieces jointly (integrally, or combined) and partly define the longitudinal surface. In addition, the pillar is an elastic body. In addition, the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves. In addition, in the pillar, each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits; the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions. In addition, the pillar coordinates with an elastic contracting sleeve to form a waterproof splice box unit. In addition, the pillar further includes a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and the cable segment passing therethrough. In addition, the first waterproof structure has a cross-section being one of a circle-like or ellipse-like shape.

[0015] The cable splice box may include a pillar, by which the cable for the mid-span branch connection and the pillar form the first waterproof structure in a cylindrical shape having no dent or gap between the cable and the pillar. And the first waterproof structure has a cross-section in a circle-like or ellipse-like shape. Accordingly, the waterproofing treatment between the cable inlet and outlet, which is disposed on the hollow cylindrical tube on the end surface for a cable passing through the cable splice box, and the cables by using the cable splice box with the elastic contracting sleeve is novel and advanced over the prior technique. So the operation is much easier, the cost is much lower, and the construction quality is more consistent. Moreover, in the

cable splice box, the radial contracting force of the elastic contracting sleeve continuously maintains the tightness of the first waterproof structure. The contraction quality of the fiber-optic cable network built by the related suppliers will substantially improve.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Fig. 1(A) is a diagram showing a cable splice box according to a first example;

[0017] Fig. 1(B) is a diagram showing an end surface for a cable passing therethrough and a hollow cylindrical tube in the cable splice box according to the first example;

[0018] Fig. 1(C) is a diagram showing a cable for a mid-span branch connection, which passes through a hollow cylindrical tube and so passes in and out of the cable splice box according to the first example;

[0019] Fig. 2(A) is a diagram showing a pillar in the cable splice box according to the first example;

[0020] Fig. 2(B) is a diagram showing a cross-section of a cylindrical portion of the pillar in the cable splice box according to the first example;

[0021] Fig. 2(C) is a diagram showing a cross-section of a cylindrical portion of the pillar according to the first example, wherein a longitudinal slit having a width Y is larger than a bore diameter X of the longitudinal groove;

[0022] Fig. 3(A) is a diagram showing an elastic contracting sleeve in the cable splice box according to the first example;

[0023] Fig. 3(B) is a diagram showing a waterproof glue having adhesiveness and plasticity in the cable splice box according to the first example;

[0024] Fig. 3(C) is a diagram showing a waterproof band having adhesiveness and plasticity in the cable splice box according to the first example;

[0025] Fig. 4(A) is a diagram showing a pillar in the cable splice box according to the first example;

[0026] Fig. 4(B) is a diagram showing the position that two cable segments for a mid-span branch connection are wound by the waterproof band having adhesiveness and plasticity before the elastic contracting sleeve is used for a waterproofing treatment in the cable splice box according to the first example;

[0027] Fig. 4(C) is a diagram showing a first waterproof structure formed by the pillar and the cables having two cable segments for a mid-span branch connection in the cable splice box according to the first example;

[0028] Fig. 4(D) is a diagram showing a cross-section of a cylindrical portion of the first waterproof structure in the cable splice box according to the first example;

[0029] Fig. 5(A) is a diagram showing the cable splice box according to the first example, wherein the elastic contracting sleeve is going to contract to envelop an outer surface of the hollow cylindrical tube and an outer surface of the first waterproof structure;

[0030] Fig. 5(B) is a diagram showing the cable splice box according to the first example, wherein the elastic contracting

sleeve is going to contract to envelop an outer surface of the hollow cylindrical tube and an outer surface of the first waterproof structure, to form the second waterproof structure;

[0031] Fig. 5(C) is a diagram showing the cable splice box according to the first example, wherein the elastic contracting sleeve is going to contract to envelop an outer surface of the hollow cylindrical tube and an outer surface of the first waterproof structure, and form the second waterproof structure;

[0032] Fig. 5(D) is a diagram showing the cable splice box according to the first example wherein the cable splice box is implemented with the waterproofing treatment by using the elastic contracting sleeve for a mid-span branch connection;

[0033] Fig. 6(A) is a diagram showing a cross-section of a pillar in a cable splice box according to a second example, wherein the original slit width W_2 of the two grooves of the pillar equals 0, representing that the two edges of the longitudinal elastic pieces contact each other;

[0034] Fig. 6(B) is a diagram showing a cross-section of a pillar in a cable splice box according to the second example, wherein a longitudinal slit has a slit width Y after operation being larger than the bore size X of the longitudinal groove of the pillar;

[0035] Fig. 6(C) is a diagram showing a cross-section of a pillar of the first waterproof structure in a cable splice box according to the second example;

[0036] Fig. 7(A) is a diagram showing a cross-section of a pillar in a cable splice box according to a third example, wherein

the original slit width W_3 of the two grooves of the pillar is unable to be measured as a result of the two overlapping extensions, and W2 equals 0, representing that the two edges of the longitudinal elastic pieces are in contact with each other;

[0037] Fig. 7(B) is a diagram showing a cross-section of a pillar in a cable splice box according to the third example, wherein a longitudinal slit has a slit width Y after the operation being larger than the bore size X of the longitudinal groove of the pillar;

[0038] Fig. 7(C) is a diagram showing a cross-section of a pillar of the first waterproof structure in a cable splice box according to the third example;

[0039] Description of the reference numerals

1 cable splice box

2 end surface

3 hollow cylindrical tube

4 cable for mid-span branch connection

401 two cable segments of the cable for the mid-span branch connection

402 portion of the cable for the mid-span branch connection

5 pillar

6 pillar body

7 longitudinal groove

8 longitudinal surface

9 longitudinal slit

10 opening

11 elastic piece

12 first waterproof structure

13 elastic contracting sleeve

14 outer surface of the hollow cylindrical tube

15 outer surface of the first waterproof structure

16 second waterproof structure

17 adhesive glue having adhesiveness and plasticity

X bore size of the longitudinal groove

Y slit width after the operation

W_1 original slit width of the longitudinal groove of the pillar of the first Embodiment

W_2 original slit width of the longitudinal groove of the pillar of second Embodiment

W_3 original slit width of the longitudinal groove of the pillar of third Embodiment

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0040] The cable splice box will now be described for more concrete understanding with reference to the following embodiments, so it can be implemented by the person skilled in the art. However, the implementation of the present invention is not restricted to the following embodiments. The person skilled in the art can predict other embodiments according to the technical spirit of the embodiments disclosed in the present invention. Those predicted embodiments still belong to the scope of the present invention.

[0041] The first Example

[0042] Please refer to Figs. 1(A)-5(D), each of which shows a cable splice box 1 according to the First example. The cable

splice box 1 includes an end surface 2 passing therethrough a cable 4 having two cable segments 401 respectively passing in and out the cable splice box 1; a first waterproof structure 12 including a pillar 5 (please refer to Fig. 2(A)) including a pillar body 6 having at least two longitudinal grooves 7, each of which has a bore diameter X configured to accommodate one of the two cable segments 401; a longitudinal surface 8 having at least two longitudinal slits 9, each of which has a width Y not less than X, corresponds to one of the at least two longitudinal grooves 7, and forms an opening 10 thereon; and at least two elastic pieces 11, each of which forms on one edge of one of the at least two longitudinal slits 9; and a hollow cylindrical tube 3 disposed on the end surface 2, having an outer surface 14 and providing a mid-span branch connection; and a second waterproof structure 16 including an elastic contracting sleeve 13 disposed on the outer surface 15 and enveloping the first waterproof structure 12 (please refer to Figs. 5(A) to 5(D)). In addition, according to the cable splice box 1 of the first example, the outer surfaces of the at least two longitudinal elastic pieces 11 jointly (integrally, or combined) and partly define the longitudinal surface 8 (please refer to Figs. 2(A) to 2(C)). In addition, according to the cable splice box 1 of the first example, the pillar 5 is an elastic body 6. In addition, according to the cable splice box 1 of the first example, the bore diameter X is the maximum bore diameters of each of the at least two longitudinal grooves 7. In addition, according to the cable splice box 1 of the first example, each of the at least two longitudinal elastic pieces 11 has two extensions defining two edges of each of the at least two longitudinal slits 9; the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width

W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions. In addition, according to the cable splice box 1 of the first example the cable splice box 1 further includes a waterproof glue having adhesiveness and plasticity (please refer to Figs. 3(B) to 3(C)) and disposed between one of the at least two longitudinal grooves 7 and one of the two cable segments 401 passing therethrough (please refer to Figs. 4(A) to 4(D)). In addition, the first waterproof structure 12 has a cross-section being one of a circle-like and ellipse-like shape (please refer to Fig. 4(D)). A cable splice box 1 used in the first example includes an end surface 2 for a cable 4 passing in and out of the cable splice box 1. The end surface 2 is disposed thereon with a hollow cylindrical tube 3 for the cable 4 for the mid-span branch connection to pass in and out of the cable splice box 1. A hard plastic skin of a portion 402 on the cable 4 for the mid-span branch connection should be unskinned, and then the cable 4 is bent into a U shape. The unskinned portion of the U-shaped cable and the other skinned portion of the two cables segments 401 pass through the hollow cylindrical tube 3 and pass into the cable splice box 1 in a dual-cable manner. The waterproofing treatment between the two cable segments 401 and the hollow cylindrical tube 3 is implemented by using an elastic contracting sleeve 13 (please refer to Fig. 1(C)). Due to the fact that the cross-sections of the two cable segments 401 are circle-like and have different circle centers, if an elastic contracting sleeve 13 is merely used to envelop them and the cylindrical tube 3 by contracting the elastic contracting sleeve 13, there will be a gap between the two cable segments 401 when aligned in parallel and it is not possible to form an effective waterproof structure. Furthermore, the outer diameter of the cable 4 is less than the bore diameter X of the longitudinal

of the first waterproof structure 12 being cylindrical can be wound with one more round or an adequate amount of the adhesive band 17 having adhesiveness and plasticity to more perfectly secure the waterproof effect. After the operation of the first waterproof structure 12, the portions 402 for the mid-span branch connection are passed through, or inserted into, the elastic contracting sleeve 13 and the portions of the two cable segments 401, which excludes a portion of the first waterproof structure to be wound with the elastic contracting sleeve 13, are passed into the hollow cylindrical tube 3, so that a portion of the first waterproof structure 12 to be enveloped and contracted by the elastic contracting sleeve 13 connects to each other at a position outside of the hollow cylindrical tube 3. And then the two cable segments 401 passing through the hollow cylindrical tube and passing into the cable splice box 1 are fixed in the cable splice box 1. The elastic contracting tube 13 contracts to envelop the outer surface 14 of the hollow cylindrical tube 3 and connects to the outer surface 15 of the waterproof structure at a position outside of the hollow cylindrical tube 3. Accordingly, the second waterproof structure 16 is formed between the hollow cylindrical tube 3 and the first waterproof structure 12. The cable splice box 1 used in the first example can form a first waterproof structure having a cross-section in a circle-like shape between the pillar 5 and the two cable segments 401 via a simple operation. It will be very convenient to use an elastic contracting sleeve 13 to implement the waterproofing treatment between the cable 4 for a mid-span branch connection and the hollow cylindrical tube 3, by which the problems of the difficult operation, high cost and inconsistent construction quality in the prior art can be overcome. Moreover, each of the elastic pieces 11 of the longitudinal groove 7 matches the gap between the pillar 5 and the two cable segments 401 to form the first waterproof structure 12, and

the elastic contracting sleeve 13 contracts to the first waterproof structure. Therefore, the radial contracting force exerted by the elastic contracting sleeve 13 is sufficient and long-lasting and used to maintain the tightness between the pillar 5 and the two cable segments 401. It is clear to see that the cable splice box in the first example may overcome the shortages of the prior art.

[0043] The second Example

[0044] Please refer to Figs. 6(A) to 6(C) and Figs. 1(A) to 5(D). Fig. 6(A) is a diagram showing a cross-section of a pillar included in a cable splice box 1 according to the second example. The difference between the pillar 5 of the second example and that of the first example is that the original slit width W_2 of the two grooves 7 of the pillar 5 used in the second Embodiment equals 0 (please refer to Figs. 6(A) to 6(C)), representing that the two edges of the openings 10 on the longitudinal groove 7 contact each other.

[0045] The third Example

[0046] Please refer to Figs. 7(A) to7(C) and Figs. 1(A) to 5(D). Fig. 6(A) is a diagram showing a cross-section of a pillar included in a cable splice box 1 according to the third example. The difference between the pillar 5 of the third example and that of the first example is that the original slit width W_3 of the two grooves 7 of the pillar 5 is unable to be measured as a result of the two overlapping extensions (please refer to Fig. 7(A) to 7(C)), indicating that the two edges of the openings 10 of the two grooves 7 surpass each other.

[0047] Based on the descriptions of the above first, second and third examples, the cable splice box may overcome the

WHAT IS CLAIMED IS :

1. A cable splice box, comprising:

an end surface for a cable passing therethrough, the cable having two cable segments respectively for passing in and out the cable splice box;

a first waterproof structure, including:

a pillar including:

a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate one of the two cable segments;

a longitudinal surface having at least two longitudinal slits, each of which has a width Y not less than X, corresponds to one of the at least two longitudinal grooves, and forms an opening thereon; and

at least two elastic pieces, each of which forms on one edge of one of the at least two longitudinal slits; and

a hollow cylindrical tube disposed on the end surface, having an outer surface and providing a mid-span branch connection; and

a second waterproof structure including an elastic contracting sleeve disposed on the outer surface and enveloping the first waterproof structure, wherein the second waterproof structure exerts a radial contracting force on the first waterproof structure, and the at least two longitudinal elastic pieces are in place both before and after formation of the first and second waterproof structures.

2. The cable splice box according to Claim 1, wherein outer surfaces of the at least two longitudinal elastic pieces jointly and partly define the longitudinal surface.

3. The cable splice box according to Claim 1, wherein the pillar is an elastic body.

4. The cable splice box according to Claim 1, wherein the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves.

5. The cable splice box according to Claim 1, wherein:

each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits;

the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions.

6. The cable splice box according to Claim 1, further comprising a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and one of the two cable segments passing therethrough.

7. The cable splice box according to Claim 1, wherein the first waterproof structure has a cross-section being one of a circle-like and ellipse-like shape.

8. A cable splice box, comprising:

an end surface configured for a cable to pass therethrough, the cable having two cable segments respectively for passing in and out the cable splice box and having an average cable diameter Z and a minimum cable diameter;

a first waterproof structure, including:

a pillar, including:

a pillar body having two longitudinal grooves, each of

which has a first bore diameter X being barely larger than Z and a second bore diameter X_1 being barely larger than the minimum cable diameter and is configured to accommodate one of the two cable segments;

a longitudinal surface having at least two longitudinal slits, each of which has a width Y not less than X, corresponds to one of the two longitudinal grooves, and forms an opening thereon; and

at least two elastic pieces, each of which is disposed on one of the at least two longitudinal slits; and

a hollow cylindrical tube disposed on the end surface, having an outer surface and providing a mid-span branch connection; and

a second waterproof structure including an elastic contracting sleeve disposed on the outer surface and enveloping the first waterproof structure, wherein the second waterproof structure exerts a radial contracting force on the first waterproof structure, and the at least two longitudinal elastic pieces are in place both before and after formation of the first and second waterproof structures.

9. The cable splice box according to Claim 8, wherein outer surfaces of the at least two longitudinal elastic pieces jointly and partly define the longitudinal surface, the pillar is an elastic body, and the first waterproof structure has a cross-section being one of a circle-like and ellipse-like shape.

10. The cable splice box according to Claim 8, wherein the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves.

11. The cable splice box according to Claim 8, wherein:

each of the at least two longitudinal elastic pieces has two extensions

defining two edges of each of the at least two longitudinal slits;

the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions.

12. The cable splice box according to Claim 8, further comprising a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and one of the two cable segments passing therethrough.

13. A pillar used for a cable splice box to form therein a waterproof structure, comprising:

a pillar body having at least two longitudinal grooves, each of which has a bore diameter X configured to accommodate a cable segment;

a longitudinal surface having at least two longitudinal slits, each of which has a width Y not less than X, corresponds to one of the two longitudinal grooves, and forms an opening thereon; and

two longitudinal elastic pieces, each of which is disposed on one of the at least two longitudinal slits to keep the cable segment in the respective longitudinal groove.

14. The pillar according to Claim 13, wherein outer surfaces of the at least two longitudinal elastic pieces jointly and partly define the longitudinal surface, and the pillar is an elastic body.

15. The pillar according to Claim 13, wherein the longitudinal elastic pieces are in place both before and after formation of the first and second waterproof structures, and arranged for a radial contracting force to maintain tightly around the cable segments.

16. The pillar according to Claim 13, wherein the bore diameter X is one of the minimum and maximum bore diameters of each of the at least two longitudinal grooves.

17. The pillar according to Claim 13, wherein:

each of the at least two longitudinal elastic pieces has two extensions defining two edges of each of the at least two longitudinal slits;

the slit width Y is selected from the group consisting of an original slit width W_1 less than X and greater than zero, an original slit width W_2 equal to zero, and an original slit width W_3 which is unmeasurable as a result of the two overlapping extensions.

18. The pillar according to Claim 13, wherein the pillar coordinates with an elastic contracting sleeve to form a waterproof splice box unit.

19. The pillar according to Claim 13, further comprising a waterproof glue having adhesiveness and plasticity and disposed between one of the at least two longitudinal grooves and the cable segment passing therethrough.

20. The pillar according to Claim 13, wherein the first waterproof structure has a cross-section being one of a circle-like and ellipse-like shape.