



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.01.2014 Bulletin 2014/04

(51) Int Cl.:
A41D 1/00 (2006.01) A41D 13/005 (2006.01)

(21) Application number: **13162376.1**

(22) Date of filing: **04.04.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(30) Priority: **18.07.2012 TW 101125837**

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(54) **Retractable electrical connector assembly and electric-heating garment including the same**

(57) A retractable electrical connector assembly (40) is attached to a piece of clothing (110), is electrically connected to an electric-powered article (20), and includes an electrical connector (31), a stationary unit (41) and a movable unit (42). The electrical connector (31) is disposed at the clothing (110) and electrically connected between a power supply (36) and the electric-powered article (20). The stationary unit (41) is attached to the clothing (110). The movable unit (42) is connected to the electrical connector (31), and is movable relative to the stationary unit (41) to move the electrical connector (31) between an inner position, where the electrical connector (31) is received in the clothing (110), and an outer position, where the electrical connector (31) is exposed partially from the clothing (110).

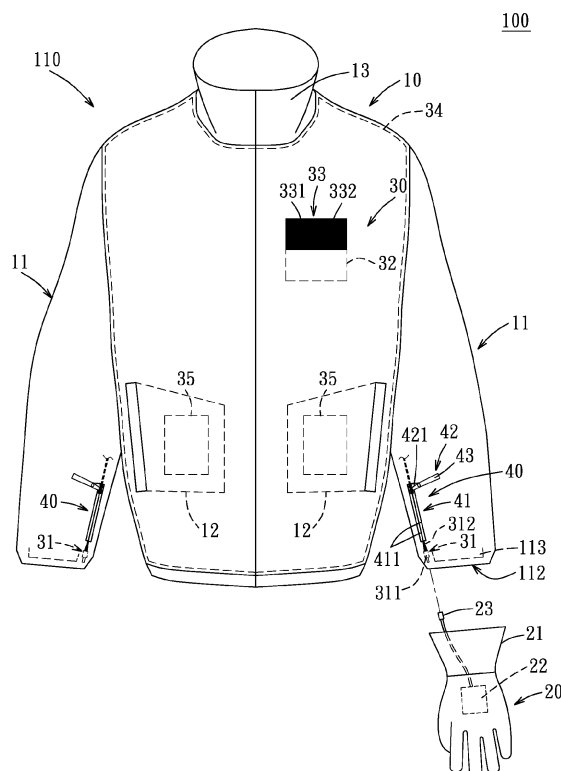


FIG. 2

Description

[0001] The present invention relates to a retractable electrical connector assembly and an electric-heating garment including the same.

[0002] Referring to Figure 1, Taiwanese Utility Model No. M431583 discloses a conventional electric-heating garment 9, which includes an upper body garment 91, a glove 92 and a remote controller 93. The upper body garment 91 includes a first electric-heating component 94 in a form of a soft slice, a controller 98 capable of providing electricity, and a first electric cable 95 electrically connected between the first electric-heating component 94 and the controller 98 for transmitting electricity from the controller 98 to the first electric-heating component 94, so that the first electric-heating component 94 is operable to warm up the upper body garment 91. The upper body garment 91 further includes an extension cord 96 electrically connected to the controller 98, and an output terminal 961 electrically connected to the extension cord 96 and exposed from a sleeve of the upper body garment 91. The glove 92 includes a second electric-heating component 94' disposed therein, an input terminal 951 configured to be electrically connected to the output terminal 961, and a second electric cable 95' electrically connected between the input terminal 951 and the second electric-heating component 94' for transmitting electricity to the second electric-heating component 94'. When the input terminal 951 is electrically connected to the output terminal 961, electricity is transmitted from the controller 98 to the second electric-heating component 94' for warming up the glove 92.

[0003] In addition, the conventional electric-heating garment 9 is typically formed with a slit 971 on an outer cloth layer at a position close to a cuff of the sleeve of the upper body garment 91, and the electric-heating garment 9 further includes a pouch 97 that is disposed between the outer cloth layer and a lining layer of the sleeve, that corresponds to the slit 971, and that has an accommodating space in spatial communication with the slit 971 for receiving the extension cord 96 and the output terminal 961 therein. Moreover, the electric-heating garment 9 may further include a zipper (not shown) sewn on the sleeve at the slit 971 for opening and closing the slit 971. In such configuration, the extension cord 96 is able to be partially exposed from the pouch 97 via the slit 971 and the output terminal 961 is able to be electrically connected to the input terminal 951 of the glove 92.

[0004] However, it is difficult and inconvenient for a user to look for the extension cord 96 and the output terminal 961 disposed in the pouch 97 with one hand when the user is wearing the electric-heating garment 9. Further, it is also inconvenient to put the extension cord 96 and the output terminal 961 into the pouch 97 with one hand.

[0005] Therefore, an object of the present invention is to provide a retractable electrical connector assembly that is able to alleviate the above drawbacks of the prior

art.

[0006] Accordingly, a retractable electrical connector assembly of the present invention is adapted to be attached to a piece of clothing and is adapted to be electrically connected to an electric-powered article for transmitting electricity from a power supply to the electric-powered article. The piece of clothing includes a clothing main body and a pair of limb parts extending from the clothing main body, and at least one of the limb parts is formed with a slit.

[0007] The retractable electrical connector assembly comprises an electrical connector, a stationary unit and a movable unit. The electrical connector is adapted to be disposed at the piece of clothing and is adapted to be electrically connected between the power supply and the electric-powered article for transmitting the electricity from the power supply to the electric-powered article. The stationary unit is adapted to be attached to one of the limb parts that is formed with the slit. The movable unit is connected to the electrical connector, is adapted to be exposed from one of the limb parts through the slit, and is movable relative to the stationary unit to move the electrical connector between an inner position, where the electrical connector is adapted to be received in said one of the limb parts, and an outer position, where the electrical connector is adapted to be exposed partially from said one of the limb parts.

[0008] Another object of the present invention is to provide an electric-heating garment provided with the aforesaid retractable electrical connector assembly.

[0009] According to another aspect, an electric-heating garment of the present invention comprises a piece of clothing, an electric-powered article, an electric-heating device and a retractable electrical connector assembly. The clothing includes a clothing main body and a pair of limb parts extending from the clothing main body, and at least one of the limb parts is formed with a slit. The retractable electrical connector assembly is disposed on the piece of clothing and includes an electrical connector, a stationary unit and a movable unit. The electrical connector is disposed at the piece of clothing and is electrically connected between the power supply and the electric-powered article for transmitting the electricity from the power supply to the electric-powered article. The stationary unit is attached to one of the limb parts formed with the slit. The movable unit is connected to the electrical connector, is exposed from said one of the limb parts through the slit, and is movable relative to the stationary unit to move the electrical connector between an inner position, where the electrical connector is received in said one of the limb parts, and an outer position, where the electrical connector is exposed partially from said one of the limb parts.

[0010] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a schematic view of a conventional electric-heating garment;

Figure 2 is a schematic view of an example of an electric-heating garment provided with a retractable electrical connector assembly according to a first preferred embodiment of the present invention;

Figure 3 is a schematic block diagram of an electric-heating device of the electric-heating garment according to the present invention;

Figure 4 is a fragmentary enlarged view for illustrating the retractable electrical connector assembly of the first preferred embodiment according to the present invention;

Figures 5 and 6 are fragmentary enlarged sectional views for illustrating the retractable electrical connector assembly of the first preferred embodiment according to the present invention;

Figure 7 is a fragmentary enlarged sectional view for illustrating a modification of the retractable electrical connector assembly of the first preferred embodiment according to the present invention;

Figures 8 and 9 are fragmentary enlarged sectional views for illustrating a retractable electrical connector assembly of a second preferred embodiment according to the present invention;

Figures 10 and 11 are fragmentary enlarged sectional views for illustrating a retractable electrical connector assembly of a third preferred embodiment according to the present invention; and

Figure 12 is a schematic view of another example of an electric-heating garment provided with the retractable electrical connector assembly according to the preferred embodiments of the present invention.

[0011] Before the present invention is described in greater detail, it should be noted that like elements are denoted by the same reference numerals throughout the disclosure.

[0012] Referring to Figure 2, an example of an electric-heating garment 100 according to a first preferred embodiment of the present invention includes a piece of clothing 110, a pair of electric-powered articles 20 (only one is shown in Figure 2), an electric-heating device 30, and a pair of retractable electrical connector assemblies 40 disposed at the piece of clothing 110. The piece of clothing 110 has a clothing main body 10, a pair of pockets 12 disposed on the clothing main body 10, and a pair of limb parts 11 extending from the clothing main body 10. Each of the retractable electrical connector assemblies 40 is configured to be electrically connected between a power supply 36 (see Figure 3) and a respective one of the electric-powered articles 20 for transmitting electricity from the power supply 36 to the respective one of the electric-powered articles 20. In this embodiment, the piece of clothing 110 is an upper body garment, the limb part 11 is a sleeve, and the electric-powered article 20 is a glove.

[0013] Referring to Figures 2, 4 and 5, each of the limb

parts 11 is formed with an end opening 112 (i.e., a cuff of the sleeve) away from the clothing main body 10, and includes an outer cloth layer 115 formed with a slit 116 near the end opening 112, a lining layer 113, and a pouch layer 114 disposed between the outer cloth layer 115 and the lining layer 113. The pouch layer 114 corresponds to the slit 116, cooperates with the outer cloth layer 115 to define an accommodating space 120 in spatial communication with the slit 116, and is formed a pair of apertures 117 in spatial communication with the accommodating space 120 and adjacent to opposite ends of the slit 116.

[0014] Each of the retractable electrical connector assemblies 40 includes an electrical connector 31, a stationary unit 41, and a movable unit 42. The electrical connector 31 is disposed at the piece of clothing 110 and is electrically connected between the power supply 36 and a corresponding one of the electric-powered articles 20 for transmitting the electricity from the power supply 36 to the corresponding one of the electric-powered articles 20. The stationary unit 41 is attached to the corresponding one of the limb parts 11. The movable unit 42 is connected to the electrical connector 31, is exposed from the corresponding one of the limb parts 11 through the slit 116, and is movable relative to the stationary unit 41 to move the electrical connector 31 between an inner position, where the electrical connector 31 is received in the limb part 11 (see Figure 5), and an outer position, where the electrical connector 31 is exposed partially from the limb part 11 (see Figure 6).

[0015] Referring to Figures 2 and 3, the electric-heating device 30 includes a first electric-heating component 34 disposed in the clothing main body 10, a pair of second electric-heating components 35 disposed respectively in the pockets 12, and a controller 32 and a user-operable unit 33 disposed at the clothing main body 10. The controller 32 is electrically connected to the user-operable unit 33, the first and second electric-heating components 34, 35, and the electrical connector 31 of the retractable electrical connector assembly 40, and is configured to be electrically connected to the power supply 36 and to control the electricity transmitted from the power supply 36 to the first and second electric-heating components 34, 35 and the electrical connector 31. In addition, the controller 32 may be configured to control and provide the electricity from the power supply 36 to the second electric-heating components 35 only when the electrical connector 31 is not electrically connected to the electric-powered article 20. The user-operable unit 33 includes an on-off button 331 for activating the controller 32 to output the electricity from the power supply 36, and a power-switching button 332 for activating the controller 32 to adjust electric power of the electricity provided to the first and second electric-heating components 34, 35 and the first electrical connector 31. The on-off button 331 and the power-switching button 332 may be, but is not limited to, push buttons, turning knobs, etc..

[0016] The electrical connector 31 includes an output terminal 311 configured to be electrically connected to

the electric-powered article 20 for outputting the electricity thereto, and an electric cable 312 electrically connecting the output terminal 311 to the controller 32 for transmitting the electricity to the output terminal 311. The electric cable 312 extends through the apertures 117 of the pouch layer 114. The output terminal 311 is disposed out of the pouch layer 114, and is formed to be bigger than the apertures 117, preventing the output terminal 311 from passing through the pouch layer 114.

[0017] In this preferred embodiment, the controller 32 is a control chip, and is configured to adjust the electric power of the electricity transmitted from the power supply 36 before providing the electricity to the first and the second electric-heating components 34, 35. Specifically, the power-switching button 332 is user-operable to activate the controller 32 to adjust the electric power of the electricity transmitted from the power supply 36 to the first electric-heating component 34, so that the first electric-heating component 34 is operable to warm up the piece of clothing 110 with various levels of heating power. Similarly, the second electric-heating components 35 are operable to warm up the respective pockets 12 with various levels of heating power. For example, the controller 32 may adjust and output 100%, 75%, 50% or 25% of the electric power of the electricity transmitted from the power supply 36 so as to warm up the piece of clothing 110 with a desired level of heating power. In this embodiment, a user can repeatedly press the user-operable unit 33 to select a certain one of 25%, 50%, 75% and 100% of the electric power outputted from the power supply 36 in a cycling manner. It should be understood that the percentages of the electric power of the electricity are not limited to the disclosure of this preferred embodiment.

[0018] The electric-powered article 20 (i.e., the glove in this embodiment) includes an article main body 21, a third electric-heating component 22 disposed at the article main body 21, and an input terminal 23 electrically connected to the third electric-heating component 22. The input terminal 23 is configured to be electrically connected to the output terminal 311 of the electrical connector 31 of the retractable electrical connector assembly 40 for transmitting the electricity from the electrical connector 31 to the third electric-heating component 22. Thus, when the input terminal 23 is electrically connected to the output terminal 311 of the electrical connector 31, the user can operate the power-switching button 332 to activate the controller 32 to adjust the electric power of the electricity transmitted to the third electric-heating component 22, so that the third electric-heating component 22 is operable to warm up the electric-powered article 20 with various levels of heating power.

[0019] Referring to Figures 2, 4 and 5, in this embodiment, the stationary unit 41 includes a pair of tooth members 411 sewn on the limb part 11 of the piece of clothing 110 at the slit 116. The movable unit 42 is connected to the stationary unit 41, and includes two sliding members 421 adjacent closely to each other, a connecting member 422, and a pull rope 43 interconnecting the sliding mem-

bers 421. The sliding members 421 are connected between the tooth members 411, are slidable with respect to the tooth members 411, and cooperate with the tooth members 411 as a zipper. When the pull rope 43 is pulled, the sliding members 421 are moved together at the same time to ensure the slit 116 being always closed for preventing entry of water into the accommodating space 120 and for preventing exposure of the electric cable 312 through the slit 116. The connecting member 422 connects one of the sliding members 421 to the electrical connector 31 for driving the electrical connector 31 to move between the inner position (see Figure 5) and the outer position (see Figure 6) by pulling the pull rope 43 to move the sliding members 421. Specifically, the connecting member 422 of the movable unit 42 is fixedly connected to the electric cable 312. Alternatively, in a modification of the retractable electrical connector assembly 40 as shown in Figure 7, the connecting member 422 may be fixedly connected to the output terminal 311. In other embodiments, the movable unit 42 may only include one sliding member 421 and the pull rope 43 may be omitted.

[0020] Referring to Figures 2 to 6, when the user wears the electric-heating garment 100, the user is able to turn on/off the electric-heating device 30 by pressing the on-off button 331 of the user-operable unit 33 of the electric-heating device 30. When the user wants to wear the electric-powered article 20 and to heat the electric-powered article 20 for warming up the user's hand, the user may pull the movable unit 42 of the retractable electrical connector assembly 40 toward the end opening 112 of the limb part 11 to move the electrical connector 31 from the inner position to the outer position. As a result, the output terminal 311 is exposed from the limb part 11 through the end opening 112, and can be electrically connected to the input terminal 23 of the electric-powered article 20 for transmitting the electricity to the third electric-heating component 22.

[0021] When the user wears the electric-heating garment 100, he or she is able to control the desired heating degree within the clothing 110 by simply pressing the power-switching button 332 on the user-operable unit 33 of the electric-heating device 30. For example, with correspondence to the number of times the user presses the power-switching button 332, the controller 32 may adjust and sequentially output 25%, 50%, 75%, 100%, 25%, 50%, 75%, and 100% of electric power of the electricity transmitted from the power supply 36 to achieve desired heating degree within the clothing 110.

[0022] Referring to Figures 8 and 9, the second preferred embodiment of the retractable electrical connector assembly 40 of the present invention is shown. In this embodiment, the stationary unit 41 of the retractable electrical connector assembly 40 includes a pair of stationary members 44 that are fixedly connected to an inner surface 119 of the outer cloth layer 115 of the limb part 11, that are disposed adjacent respectively to opposite ends of the slit 116, and that are formed with respective

through holes 441. The movable unit 42 includes a movable cord 424 movable with respect to the stationary members 44, a pull rope 43 fixedly connected to the movable cord 424 and adapted to be pulled for moving the movable cord 424 with respect to the stationary members 44, and a connecting member 422 fixedly connecting the movable cord 424 to the electrical connector 31 for driving the electrical connector 31 to move between the inner position (see Figure 8) and the outer position (see Figure 9).

[0023] In this preferred embodiment, the movable cord 424 is in a ring shape. The pull rope 43 of the movable unit 42 is fixedly connected to the movable cord 424 between the stationary members 44. The connecting member 422 of the movable unit 42 is fixedly connected to the movable cord 424 at a position opposite to the pull rope 43. Accordingly, when the user pulls the pull rope 43 away from the end opening 112 of the limb part 11, the movable cord 424 is driven to move cyclically. Meanwhile, the connecting member 422 moves toward the end opening 112 of the limb part 11 so as to drive the electrical connector 31 to move opposite to the pull rope 43 from the inner position (as shown in Figure 8) to the outer position (as shown in Figure 9). As a result, the output terminal 311 is exposed from the limb part 11 through the end opening 112.

[0024] Referring to Figures 10 and 11, the third preferred embodiment of the retractable electrical connector assembly 40 of the present invention is shown. In this embodiment, the pouch layer 114 serves as the stationary unit 41. The pull rope 43 of the movable unit 42 is directly and fixedly connected to the connecting member 422. When the user pulls the pull rope 43 toward the end opening 112 of the limb part 11, the electrical connector 31 moves from the inner position (as shown in Figure 10) to the outer position (as shown in Figure 11). As a result, the output terminal 311 is exposed from the limb part 11 through the end opening 112.

[0025] It should be appreciated that, although the retractable electrical connector assembly 40 is disposed at the limb part (i.e., sleeve) of the piece of clothing 110 and the electric-powered article 20 is a glove in the foregoing embodiments, the retractable electrical connector assembly 40 may be disposed at a collar 13 (see Figure 2) of the piece of clothing 110 and the electric-powered article 20 may be a scarf, an earmuff, or any other head-gears in other embodiments.

[0026] Referring to Figure 12, another example of the electric-heating garment 100 is shown. In this example, the piece of clothing 110 is a pair of pants including a clothing main body 50 and a pair of limb parts 51 (i.e., pant legs) extending from the clothing main body 50. In this case, the electric-powered article 20 is a sock. Each of the limb parts 51 is formed with the slit 116 at a bottom part thereof, and each of the retractable electrical connector assemblies 40 is disposed at the bottom part in connection with the slit 116.

[0027] To sum up, the retractable electrical connector

assembly 40 according to the present invention facilitates the user to pull out or in the output terminal 311 of the electrical connector 31 using one hand. Moreover, by virtue of the pull rope 43 and the sliding members 421 of the movable unit 42, the slit 116 is always closed for preventing entry of water into the accommodating space 120 and for preventing exposure of the electric cable 312 through the slit 116. Further, the controller 32 is configured to control and provide the electricity from the power supply 36 to the second electric-heating components 35, which are disposed in the pockets 12, only when the electrical connector 31 is not electrically connected to the electric-powered article 20.

Claims

1. A retractable electrical connector assembly (40) adapted to be attached to a piece of clothing (110) and adapted to be electrically connected to an electric-powered article (20) for transmitting electricity from a power supply (36) to the electric-powered article (20), the piece of clothing (110) including a clothing main body (100) and a pair of limb parts (11) extending from the clothing main body (100), at least one of the limb parts (11) being formed with a slit (116), said retractable electrical connector assembly (40) being **characterized by:**

an electrical connector (31) adapted to be disposed at the piece of clothing (110) and to be electrically connected between the power supply (36) and the electric-powered article (20) for transmitting the electricity from the power supply (36) to the electric-powered article (20);
a stationary unit (41) adapted to be attached to said one of the limb parts (11) that is formed with the slit (116); and
a movable unit (42) connected to said electrical connector (31), adapted to be exposed from said one of the limb parts (11) through the slit (116), and movable relative to said stationary unit (41) to move said electrical connector (31) between an inner position, where said electrical connector (31) is adapted to be received in said one of the limb parts (11), and an outer position, where said electrical connector (31) is adapted to be exposed partially from said one of the limb parts (11).

2. The retractable electrical connector assembly (40) as claimed in Claim 1, **characterized in that:**

said stationary unit (41) includes a pair of tooth members (411) that are adapted to be sewn on said one of the limb parts (11) of the piece of clothing (110) at the slit (116); and
said movable unit (42) is connected to said sta-

tionary unit (41) and includes

at least one sliding member (421) that is connected between said tooth members (411), that is slidable with respect to said tooth members (411), and that cooperates with said tooth members (411) as a zipper, and

a connecting member (422) connecting said sliding member (421) to said electrical connector (31) for driving said electrical connector (31) to move between the inner position and the outer position.

3. The retractable electrical connector assembly (40) as claimed in Claim 2, **characterized in that** said electrical connector (31) includes an output terminal (311) adapted to be electrically connected to the electric-powered article (20) for outputting the electricity to the electric-powered article (20), and an electric cable (312) electrically connected to said output terminal (311) for transmitting the electricity to said output terminal (311), said connecting member (422) of said movable unit (42) is fixedly connected to one of said output terminal (311) and said electric cable (312).

4. The retractable electrical connector assembly (40) as claimed in any one of Claims 2 and 3, **characterized in that** said movable unit (42) includes two of said sliding members (421) adjacent closely to each other, and further includes a pull rope (43) interconnecting said sliding members (421), said connecting member (422) is connected to one of said sliding members (421).

5. The retractable electrical connector assembly (40) as claimed in Claim 1, said one of the limb parts (11) including an outer cloth layer (115) that has an inner surface (119), **characterized in that:**

said stationary unit includes a pair of stationary members (41) that are adapted to be connected fixedly to the inner surface (119) of the outer cloth layer (115) of said one of the limb parts (11), that are disposed adjacent respectively to opposite ends of the slit (116), and that are formed with respective through holes (441); and said movable unit (42) includes

a movable cord (424) extending through said through holes (441) and movable with respect to said stationary members (41), a pull rope (43) connected fixedly to said movable cord (424) and adapted to be pulled for moving said movable cord (424) with respect to said stationary members (41), and

a connecting member (422) fixedly connecting said movable cord (424) to said electrical connector (31) for driving said electrical connector (31) to move between the inner position and the outer position.

6. The retractable electrical connector assembly (40) as claimed in Claim 5, **characterized in that** said movable cord (424) is in a ring shape, said pull rope (43) of said movable unit (42) is connected fixedly to said movable cord (424) between said stationary members (41), and said connecting member (422) of said movable unit (42) is fixedly connected to said movable cord (424) at a position opposite to said pull rope (43).

7. An electric-heating garment (100), being **characterized by:**

a piece of clothing (110) including a clothing main body (10) and a pair of limb parts (11) extending from said clothing main body (10), at least one of said limb parts (11) being formed with a slit (116); and

a retractable electrical connector assembly (40) attached to said piece of clothing (110), and adapted to be electrically connected to an electric-powered article (20) for transmitting electricity from a power supply (36) to the electric-powered article (20), said retractable electrical connector assembly (40) including

an electrical connector (31) disposed at said piece of clothing (110) and adapted to be electrically connected between the power supply (36) and the electric-powered article (20) for transmitting the electricity from the power supply (36) to the electric-powered article (20),

a stationary unit (41) attached to said one of the limb parts (11) that is formed with said slit (116), and

a movable unit (42) connected to said electrical connector (31), exposed from said one of said limb parts (11) through said slit (116), and movable relative to said stationary unit (41) to move said electrical connector (31) between an inner position, where said electrical connector (31) is received in said one of said limb parts (11), and an outer position, where said electrical connector (31) is exposed partially from said one of said limb parts (11).

8. The electric-heating garment (100) as claimed in Claim 7, **characterized in that:**

said stationary unit 41 includes a pair of tooth

members (411) that are sewn on said one of said limb parts (11) of said piece of clothing (110) at said slit (116); and
said movable unit (42) is connected to said stationary unit (41) and includes

at least one sliding member (421) that is connected between said tooth members (411), that is slidable with respect to said tooth members (411), and that cooperates with said tooth members (411) as a zipper, and
a connecting member (422) connecting said sliding member (421) to said electrical connector (31) for driving said electrical connector (31) to move between the inner position and the outer position.

9. The electric-heating garment (100) as claimed in Claim 8, **characterized in that** said electrical connector (31) includes an output terminal (311) adapted to be electrically connected to the electric-powered article (20) for outputting the electricity to the electric-powered article (20), and an electric cable (312) electrically connected to said output terminal (311) for transmitting the electricity to said output terminal (311), said connecting member (422) of said movable unit (42) is fixedly connected to one of said output terminal (311) and said electric cable (312).
10. The electric-heating garment (100) as claimed in any one of Claims 8 and 9, **characterized in that** said movable unit (42) includes two of said sliding members (421) adjacent closely to each other, and further includes a pull rope (43) interconnecting said sliding members (421), said connecting member (422) is fixedly connected to one of said sliding members (421).
11. The electric-heating garment 100 as claimed in Claim 7, **characterized in that:**

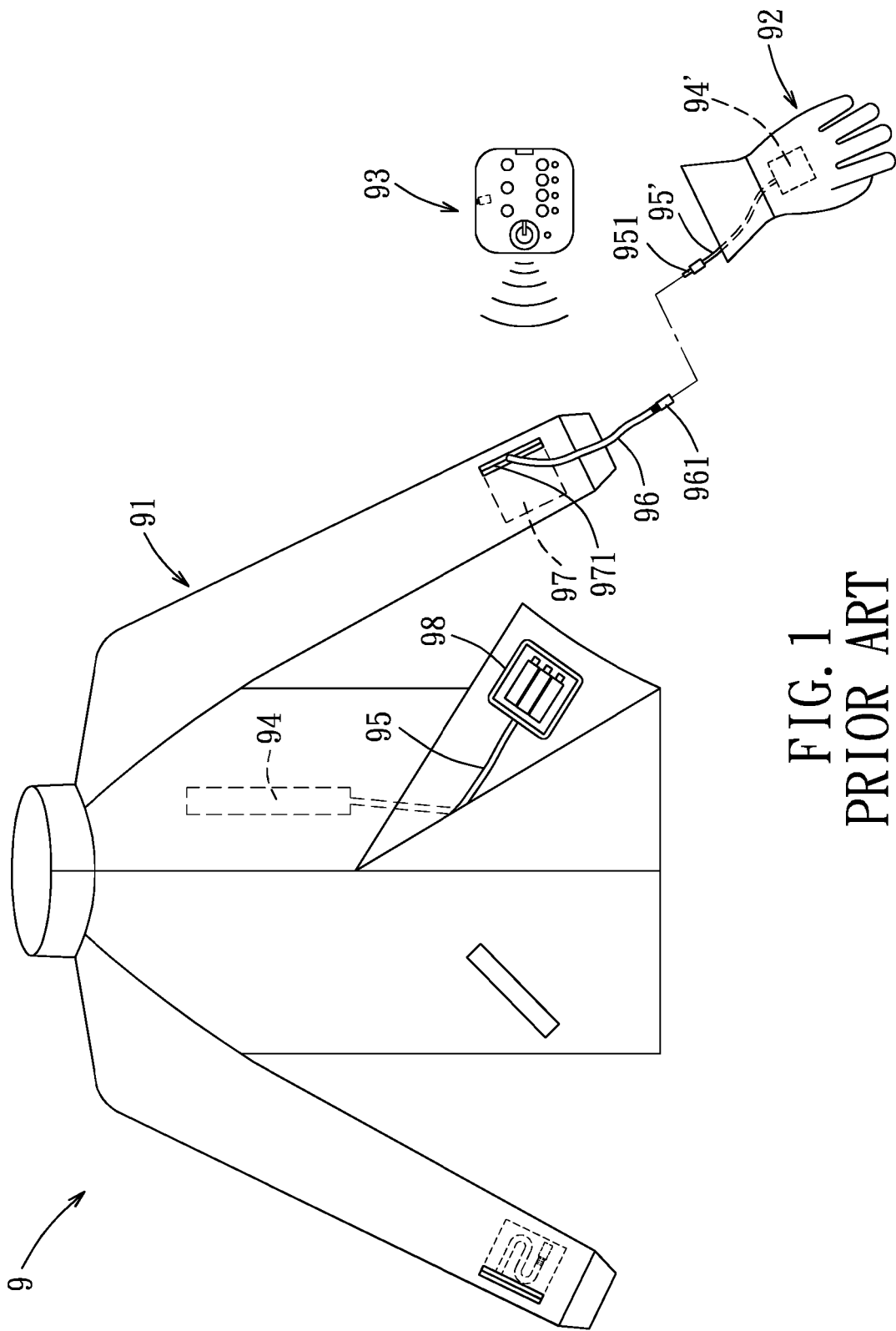
said one of said limb parts (11) has an inner surface 119;
said stationary unit (41) includes a pair of stationary members (44) that are connected fixedly to said inner surface (119) of said one of said limb parts (11), that are disposed adjacent respectively to opposite ends of said slit (116), and that are formed with respective through holes (441); and
said movable unit (42) includes

a movable cord (424) extending through said through holes (441) and movable with respect to said stationary members (41),
a pull rope (43) connected fixedly to said movable cord (424) and adapted to be

pulled for moving said movable cord (424) with respect to said stationary members (41), and
a connecting member (422) fixedly connecting said movable cord (424) to said electrical connector (31) for driving said electrical connector (31) to move between the inner position and the outer position.

12. The electric-heating garment (100) as claimed in Claim 11, **characterized in that** said movable cord (424) is in a ring shape, said pull rope (43) of said movable unit (42) is connected fixedly to said movable cord (424) between said stationary members (44), and said connecting member (422) of said movable unit (42) is fixedly connected to said movable cord (424) at a position opposite to said pull rope (43).
13. The electric-heating garment (100) as claimed in any one of Claims 7 to 12, **characterized in that** said one of said limb parts (11) is further formed with an end opening (112) away from said clothing main body (10), and includes an outer cloth layer (115) formed with said slit (116) near said end opening (112), a lining layer (113), and a pouch layer (114) that is disposed between said outer cloth layer (115) and said lining layer (113), that corresponds to said slit (116), that cooperates with said outer cloth layer (115) to define an accommodating space in spatial communication with said slit (116), and that is formed a pair of apertures (117) in spatial communication with said accommodating space and adjacent to opposite ends of said slit (116), said electrical connector (31) includes an output terminal (311) adapted to be electrically connected to the electric-powered article (20) for outputting the electricity to the electric-powered article (20), and an electric cable (312) extending through said apertures (117) and being electrically connected to said output terminal (311) for transmitting the electricity to said output terminal (311), said electrical connector (31) is exposed partially from said one of said limb parts (11) through said end opening (112) when said electrical connector (31) is at the outer position.
14. The electric-heating garment (100) as claimed in any one of Claims 7 to 13, further **characterized by** an electric-heating device (30) that includes a first electric-heating component (34), and a controller (32) electrically connected to said first electric-heating component (34) and said electrical connector (31) of said retractable electrical connector assembly (40), said controller (32) being adapted to be electrically connected to the power supply (36) and being configured to control the electricity transmitted from the power supply (36) to said first electric-heating component (34) and said electrical connector (31).

15. The electric-heating garment (100) as claimed in Claim 14, **characterized in that** said piece of clothing (110) further includes a pair of pockets (12) disposed at said clothing main body (10), and said electric-heating device (30) further includes two second electric-heating components (35) respectively disposed in said pockets (12) and electrically connected to said controller (32), said controller (32) is further configured to control and provide the electricity from the power supply (36) to said second electric-heating components (35) when said electrical connector (31) is not electrically connected to the electric-powered article (20).
16. The electric-heating garment (100) as claimed in any one of Claims 14 and 15, **characterized in that** said electric-heating device (30) further includes a user-operable unit (33) that is disposed at said clothing main body (10) of said piece of clothing (110), that is electrically connected to said controller (32), and that includes an on-off button (331) for activating said controller (32) to output the electricity from the power supply (36), and a power-switching button (332) for activating said controller (32) to adjust electric power of the electricity provided to said first electric-heating component (34) and said electrical connector (31).
17. An electric-heating garment (100), being **characterized by**:
- a piece of clothing (110) including a clothing main body (10) and a pair of limb parts (11) extending from the clothing main body (10), at least one of said limb parts (11) being formed with a slit (116);
- an electric-powered article (20); and
- a retractable electrical connector assembly (40) attached to said piece of clothing (110) and electrically connected to said electric-powered article (20) for transmitting electricity from a power supply (36) to said electric-powered article (20), said retractable electrical connector assembly (40) including
- an electrical connector (31) disposed at said piece of clothing (110) and adapted to be electrically connected between the power supply (36) and said electric-powered article (20) for transmitting the electricity from the power supply (36) to said electric-powered article (20),
- a stationary unit (41) attached to said one of the limb parts (11) that is formed with said slit (116), and
- a movable unit (42) connected to said electrical connector (31), exposed from said one of said limb parts (11) through said slit (116), and movable relative to said stationary unit (41) to move said electrical connector (31) between an inner position, where said electrical connector (31) is received in said one of said limb parts (11), and an outer position, where said electrical connector (31) is exposed partially from said one of said limb parts (11).
18. The electric-heating garment (100) as claimed in Claim 17, **characterized in that** said electric-powered article (20) includes an electric-heating component (22), and an input terminal (23) electrically connected to said electric-heating component (22) and said electrical connector (31) of said retractable electrical connector assembly (40) for transmitting the electricity from said electrical connector (31) to said electric-heating component (22).
19. The electric-heating garment (100) as claimed in any one of Claims 17 and 18, **characterized in that** said piece of clothing (110) is an upper body garment, said limb parts (11) are sleeves, and said electric-powered article (20) is a glove.
20. The electric-heating garment (100) as claimed in any one of Claims 17 and 18, **characterized in that** said piece of clothing (110) is pants, said limb parts (11) are pant legs, and said electric-powered article (20) is a sock.



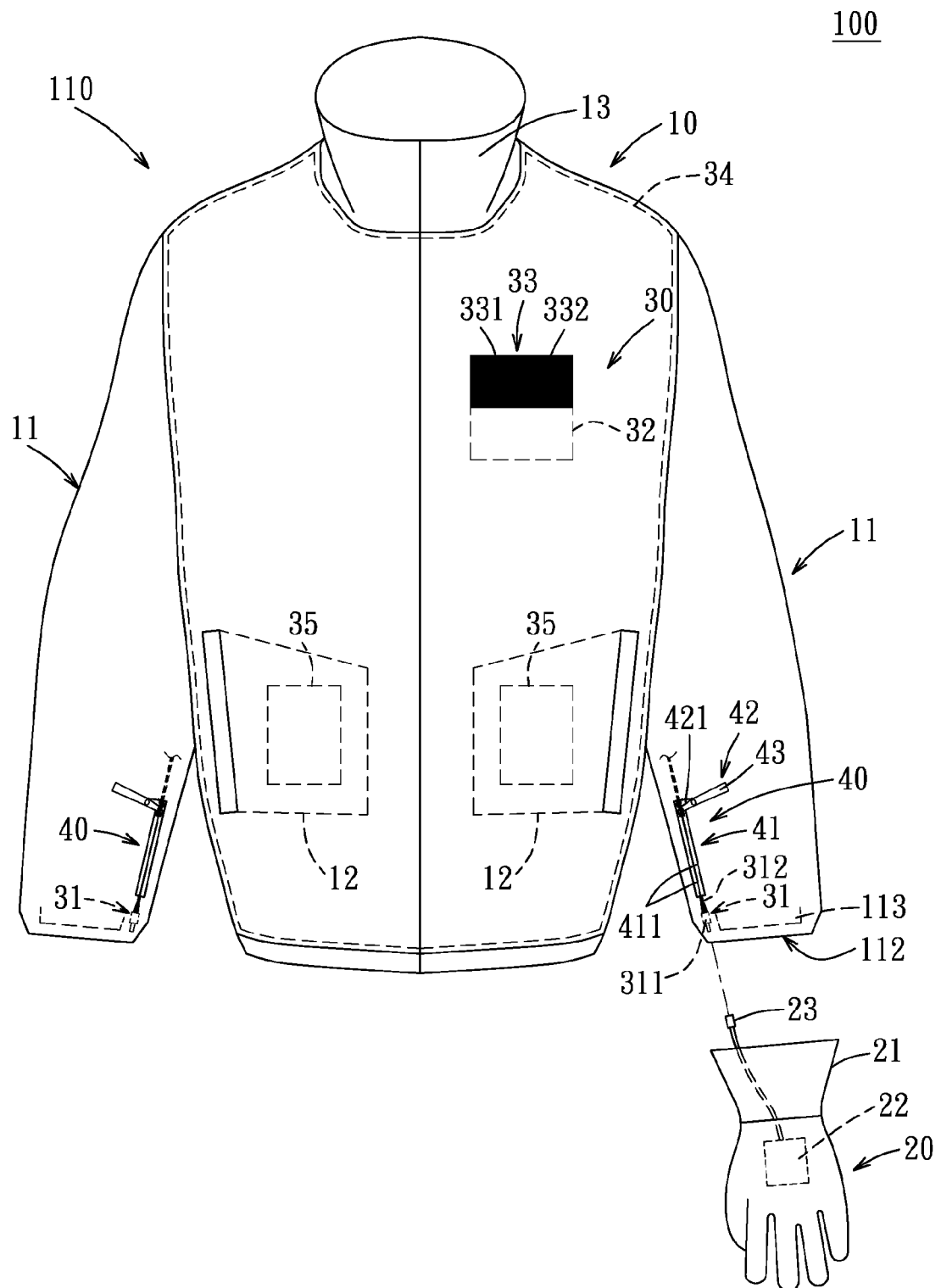


FIG. 2

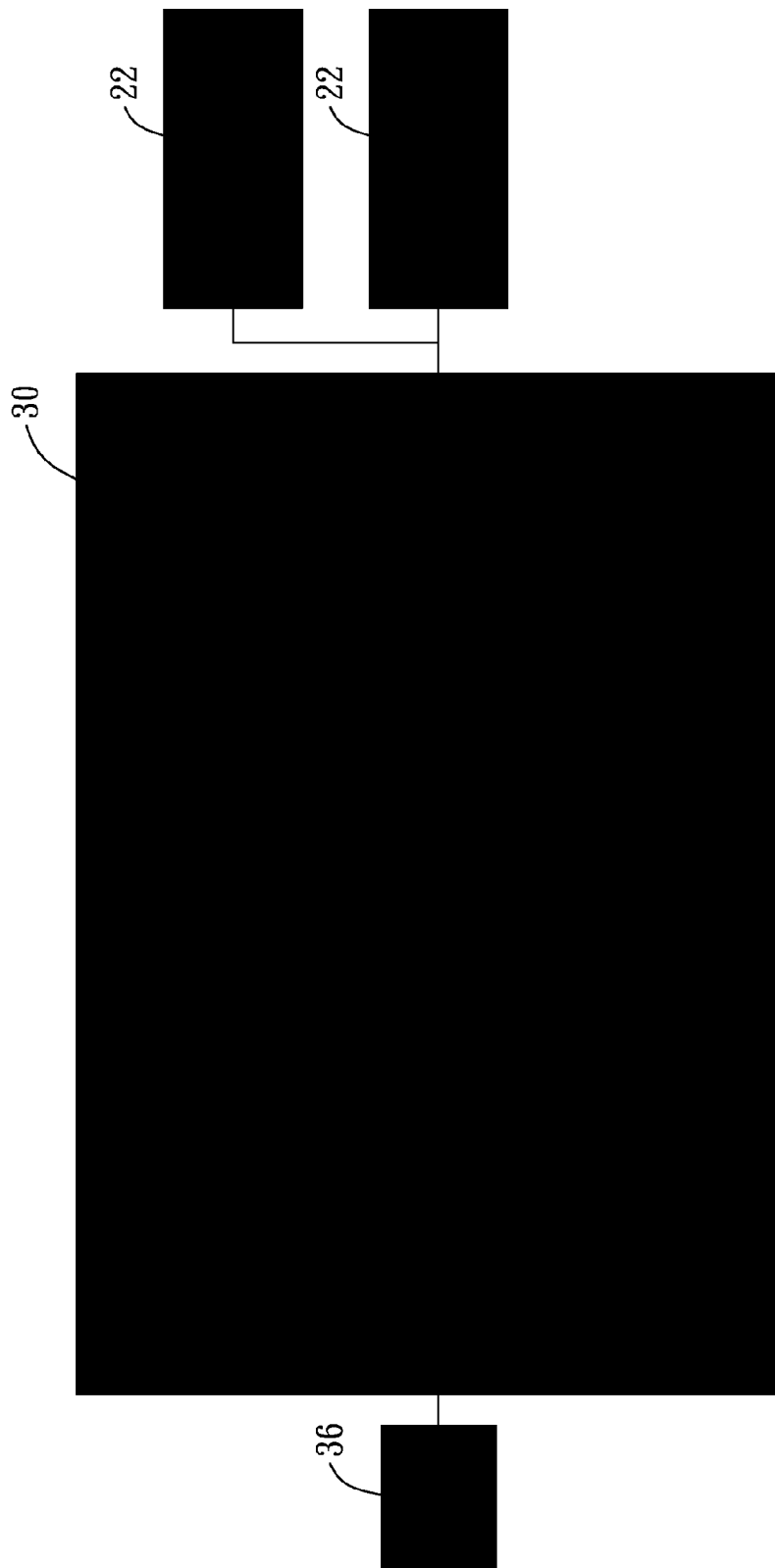


FIG. 3

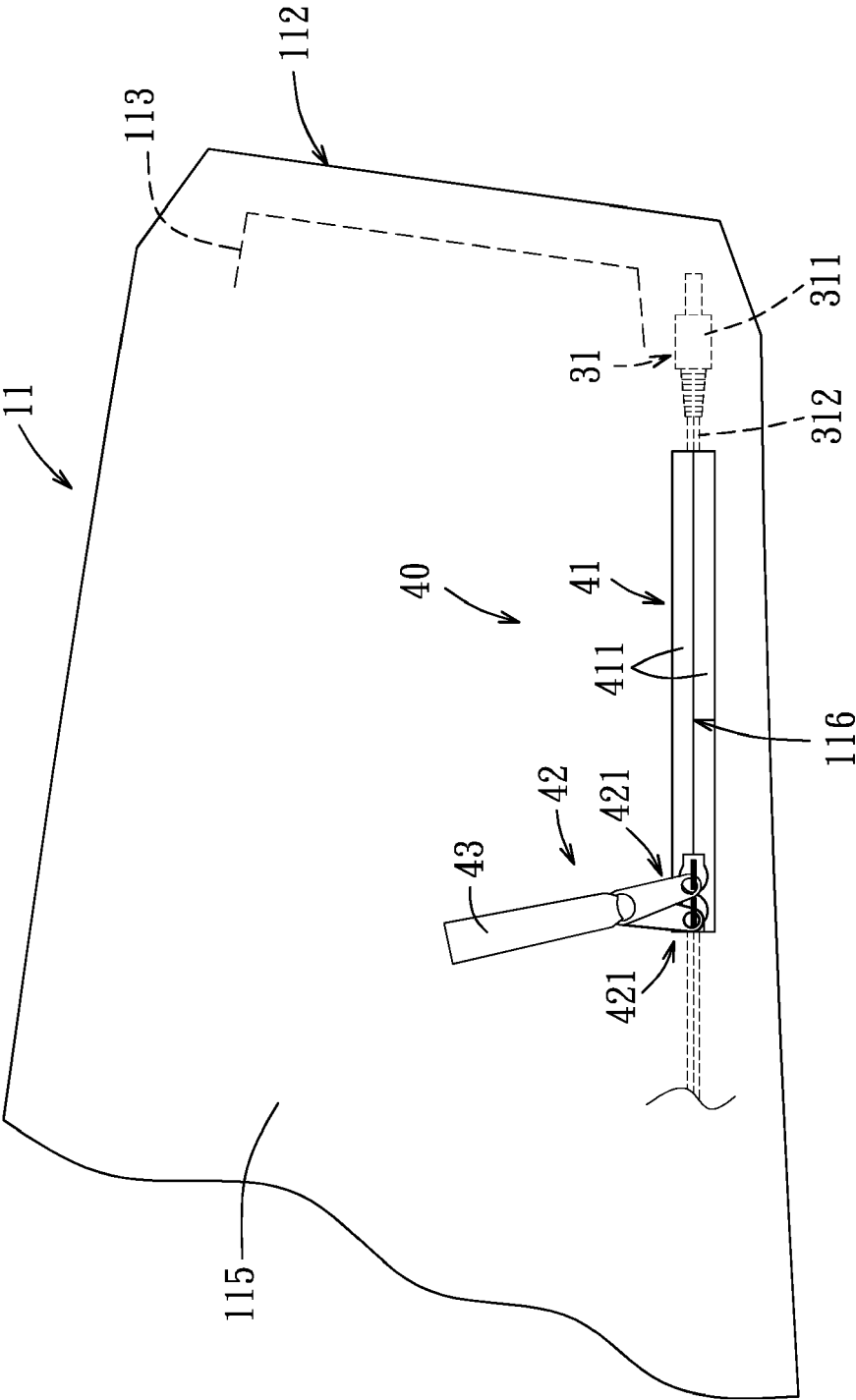


FIG. 4

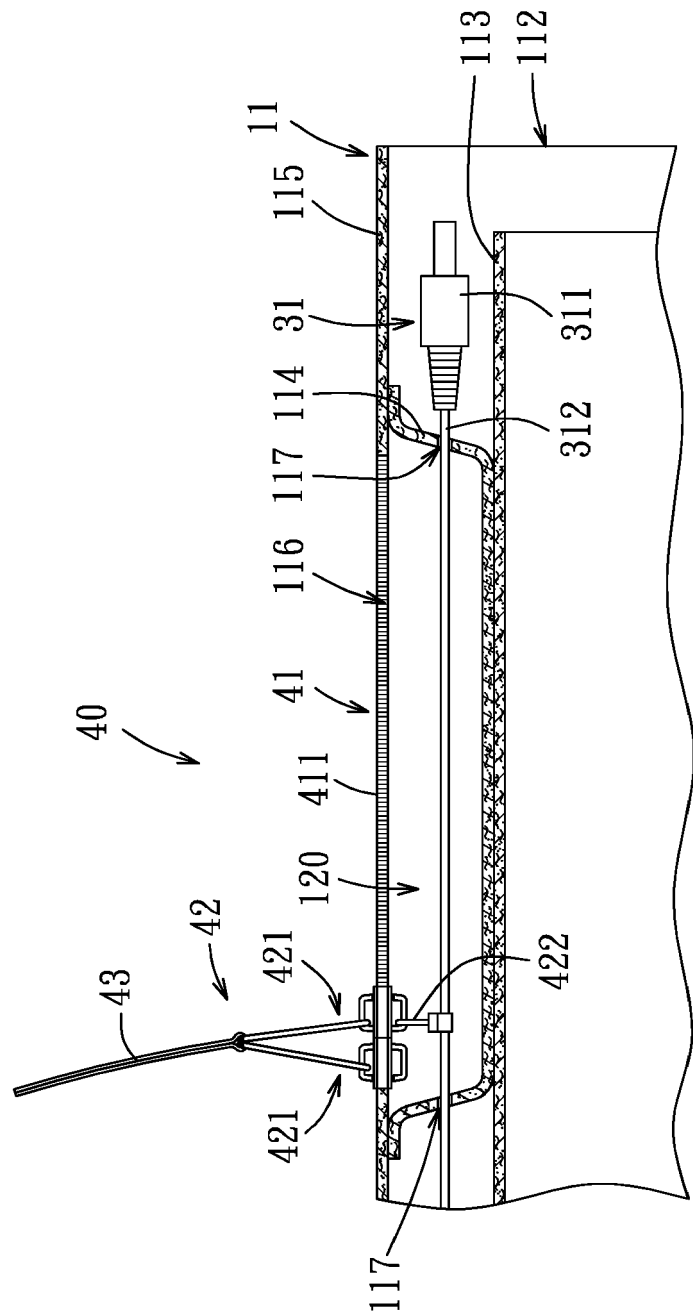


FIG. 5

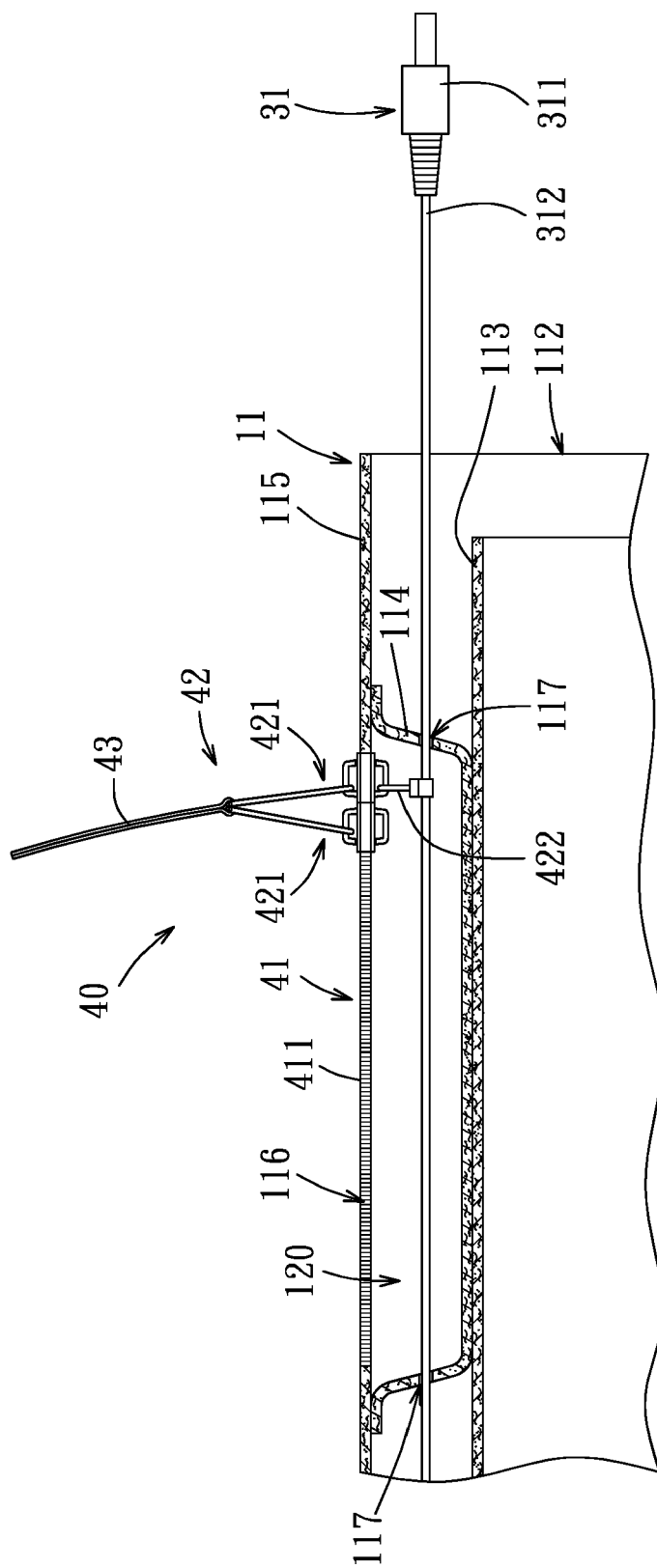


FIG. 6

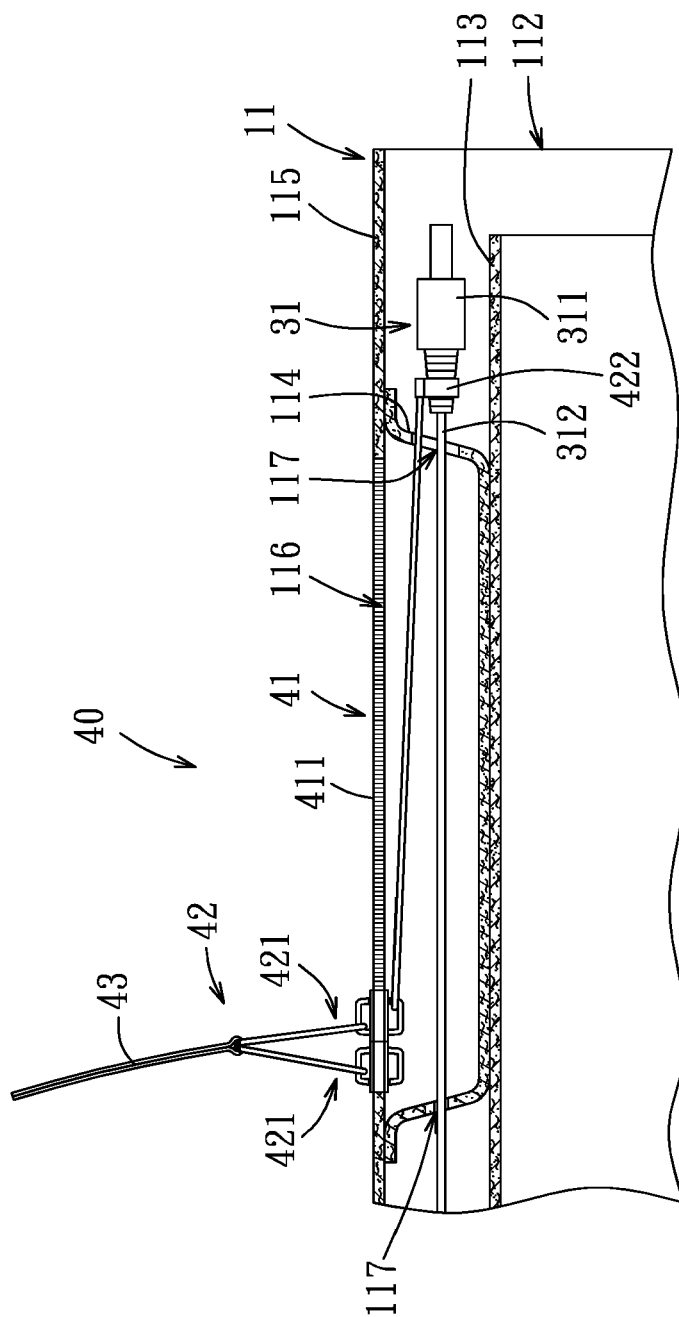


FIG. 7

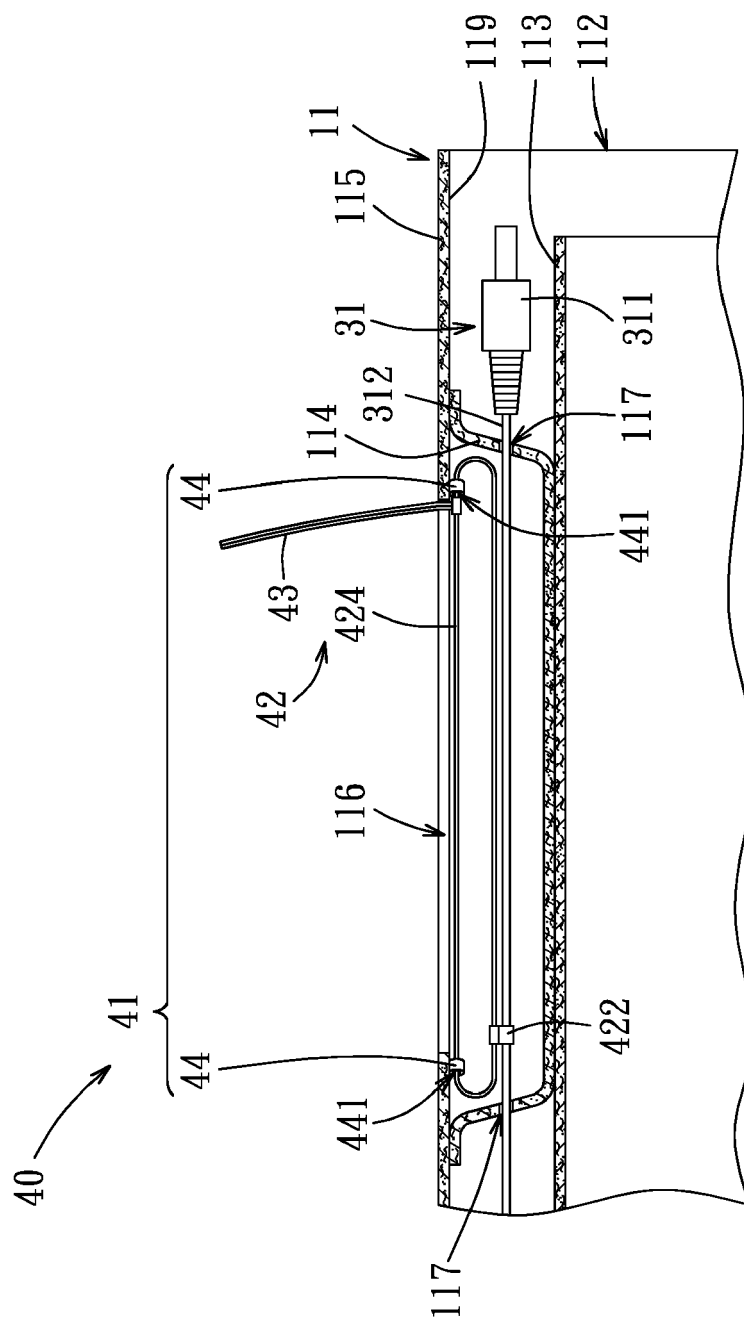


FIG. 8

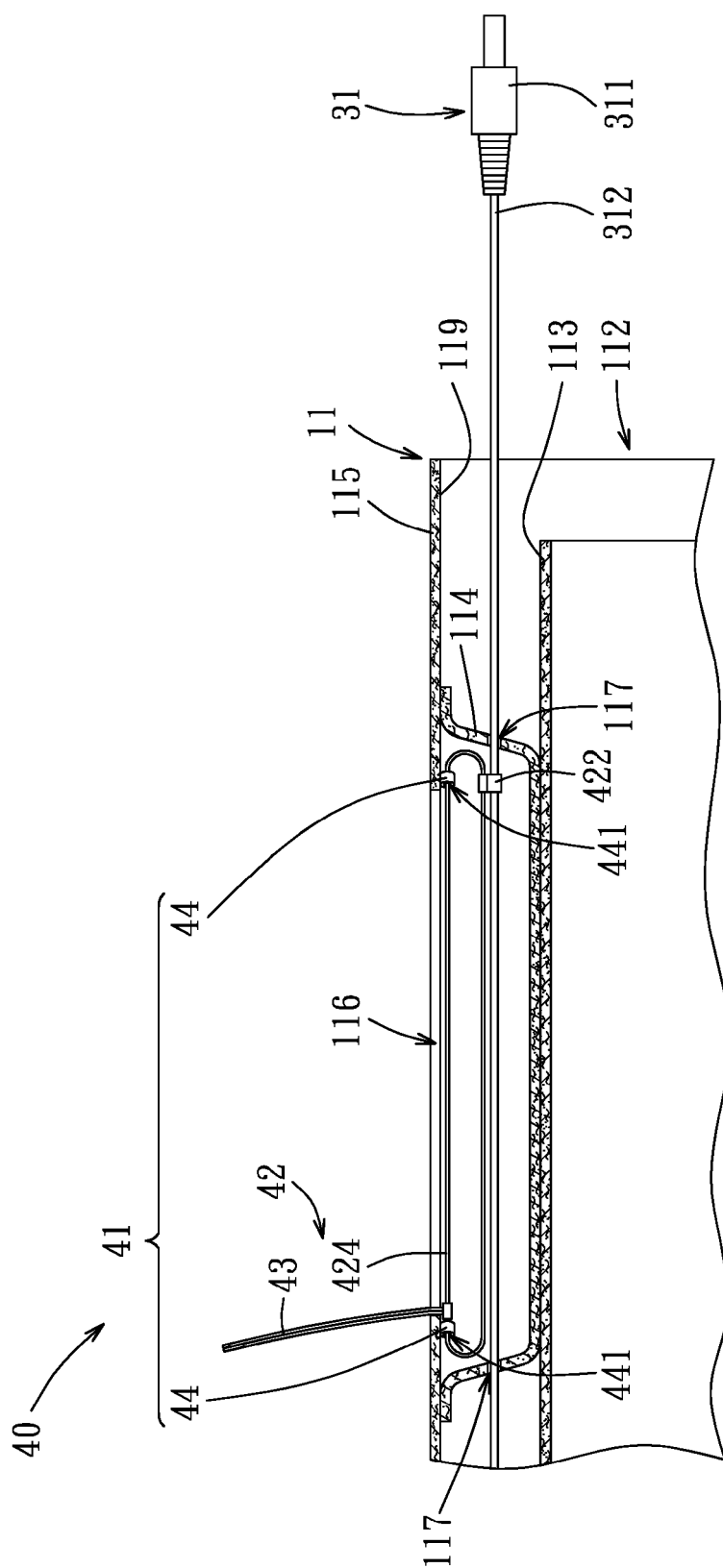


FIG. 9

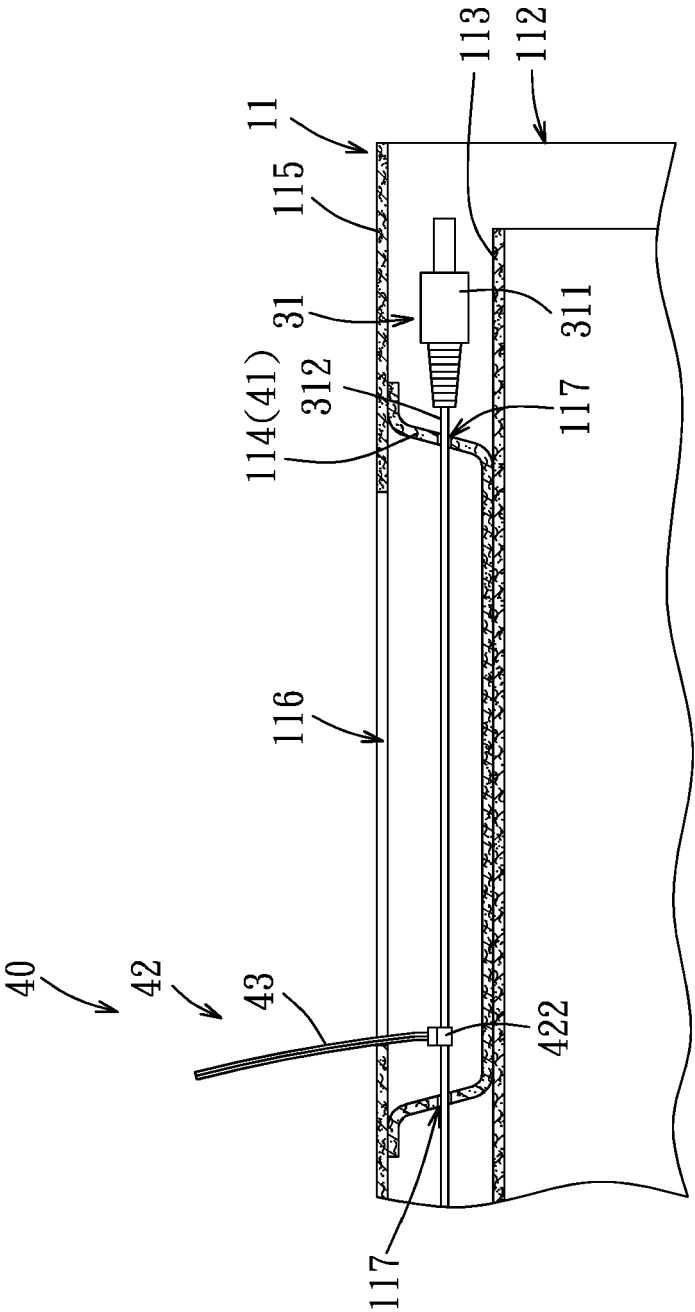


FIG. 10

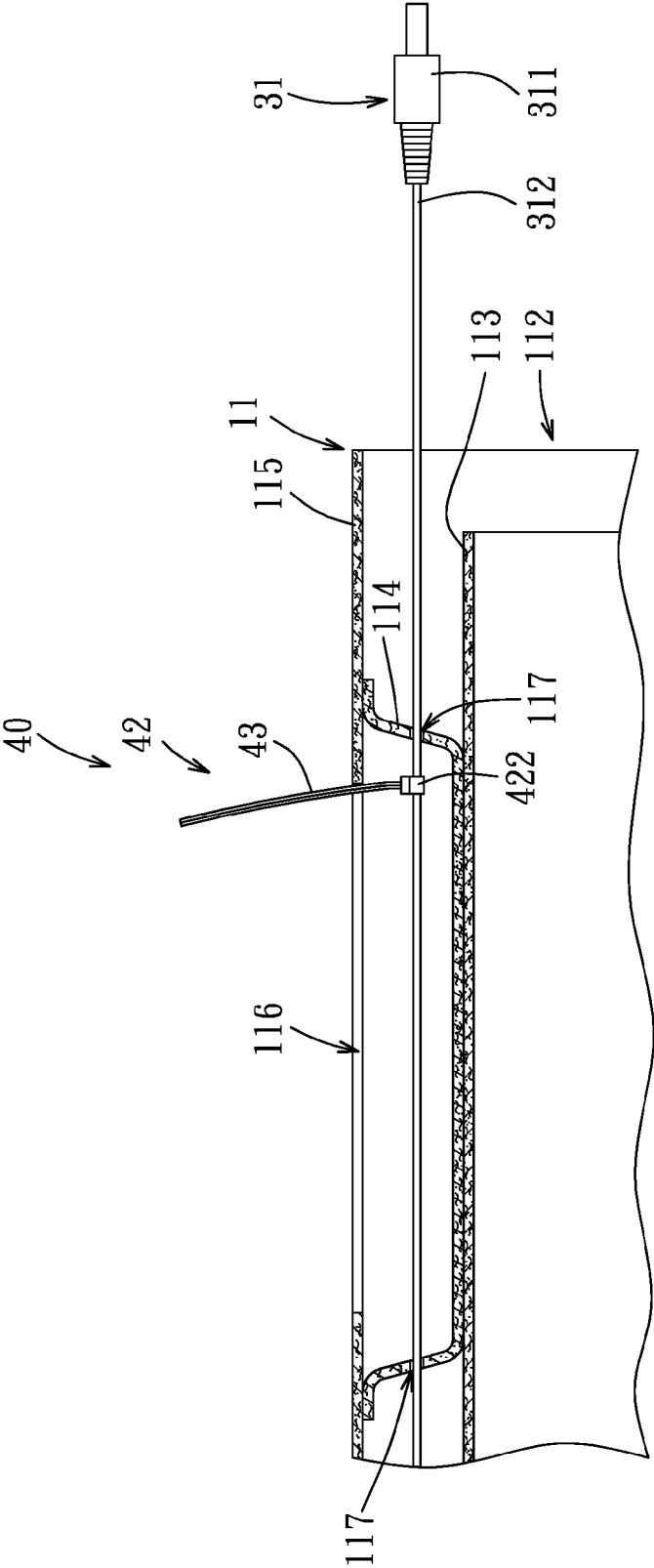


FIG. 11

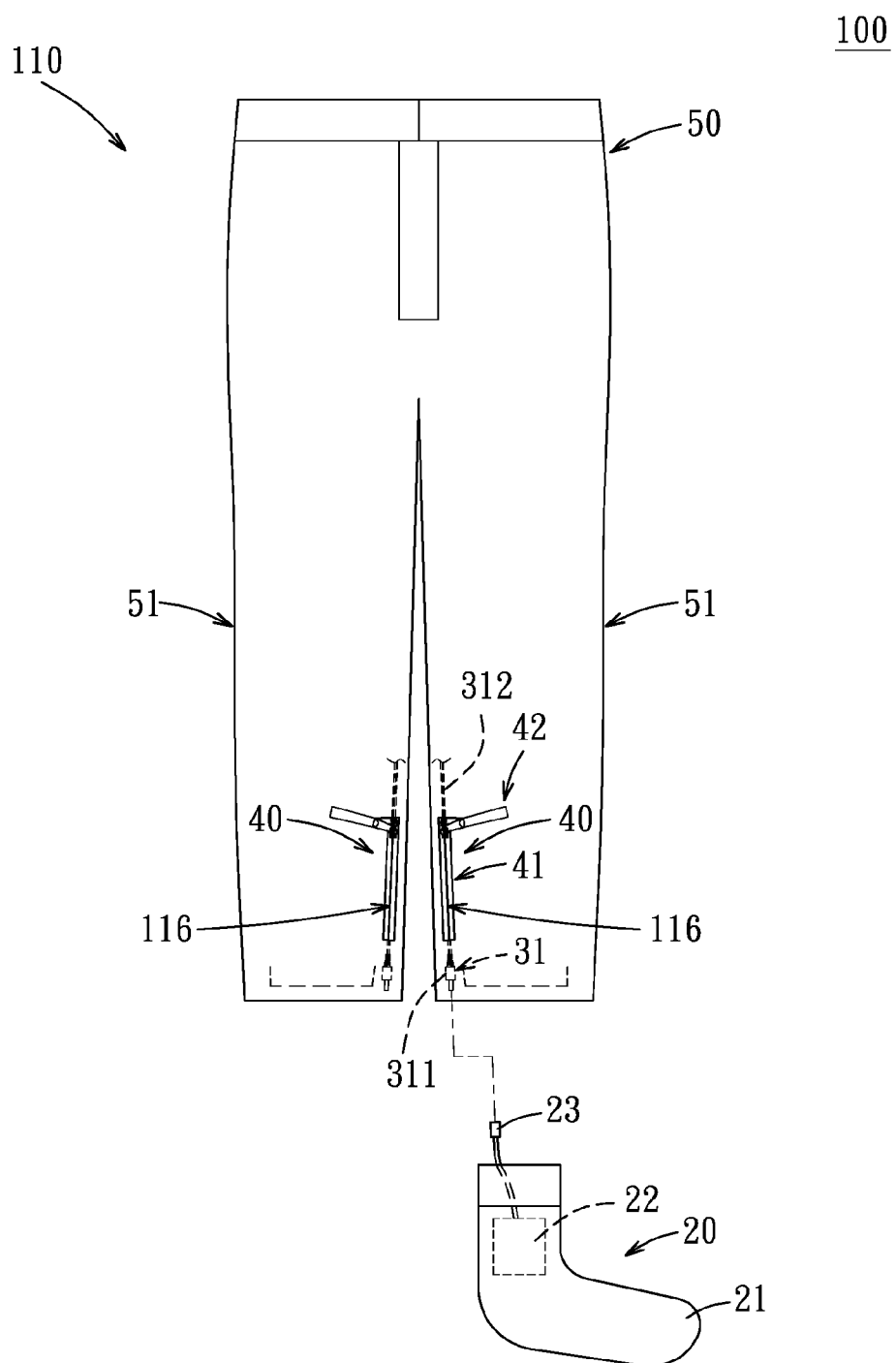


FIG. 12



EUROPEAN SEARCH REPORT

Application Number
EP 13 16 2376

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			A41D A44B H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 29 October 2013	Examiner Simpson, Estelle
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			

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29-10-2013

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