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(71) Applicant: **Jess-Link Products Co., Ltd**
Taipei County
Chung Ho City (TW)

(72) Inventors:
- **Chang, Hsu-Cheng**
  220, Banciao City (TW)
- **Lin, Po-Fu**
  104, Taipei City (TW)

(74) Representative: **Viering, Jentschura & Partner**
Postfach 22 14 43
80504 München (DE)

(54) Power cable structure for car

(57) A power cable structure for a car includes a power cable, a first connector, a cigar-lighter plug and an RF cable. The power cable includes a core portion, an insulating layer wrapped around the core portion and an external cover layer wrapped around the insulating layer. The first connector is located at one end of the power cable, and the cigar-lighter plug is located at the second end of the power cable. One end of the RF cable is connected with the power cable. The RF cable includes a signal wire and an external cover layer wrapped around the signal wire. Thereby, the power cable is combined with a RF cable so that an electronic device can transmit the FM signal via the RF cable.

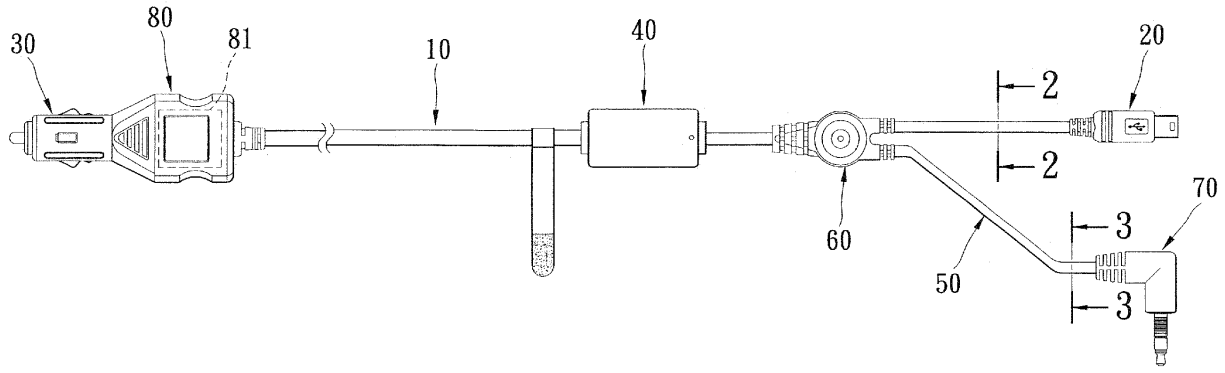

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a power cable structure for a car. In particular, this invention relates to a power cable structure for a car that has a FM signal transmission function.

2. Description of the Related Art

[0002] Cars are the dominant means of locomotion for people. In order to use an electronic device, such as a cell phone, a GPS, etc. in a car, the electronic device is connected with the electric power outlet of the car via a power cable for a car to obtain the required power. The two ends of the power cable for a car of the prior art respectively have a cigar-lighter plug and a connector. The cigar-lighter plug is plugged into the cigar-lighter socket in the car, and the connector is connected with the electronic device. Thereby, electric power of the car is supplied to the electronic device. Furthermore, the electronic device can be connected with an antenna device to transmit the FM signal or other wireless signals.

[0003] However, the power cable for a car has only the function to supply power, and this is inadequate. When the power cable for a car has both the power supply function to supply the power to the electronic device and a FM transmission function, the user does not need to install an antenna device. The power cable for a car will become multi-functional.

SUMMARY OF THE INVENTION

[0004] One particular aspect of the present invention is to provide a power cable structure for a car. The power cable is combined with a RF cable so that an electronic device can transmit the FM signal via the RF cable.

[0005] The power cable structure for a car includes a power cable having a core portion, an insulating layer wrapped around the core portion and an external cover layer wrapped around the insulating layer, a first connector located at one end of the power cable, a cigar-lighter plug located at the second end of the power cable, and at least one RF cable. One end of the RF cable is connected with the power cable. The RF cable includes a signal wire wrapped by an external cover layer.

[0006] The present invention has the following characteristics. When an electronic device is connected to the power of the car, the RF cable connected with the power cable can be used as an antenna to transmit the FM signals. Thereby, the user can receives FM radio without install an antenna on the electronic device.

[0007] For further understanding of the invention, reference is made to the following detailed description illustrating the embodiments and examples of the invention. The description is only for illustrating the invention and is not intended to limit of the scope of the claim.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The drawings included herein provide a further understanding of the invention. A brief introduction of the drawings is as follows:

FIG. 1 is a schematic diagram of the first embodiment of the present invention;
FIG. 2 is a cross-sectional view of the cross-section 2-2 in FIG. 1;
FIG. 3 is a cross-sectional view of the cross-section 3-3 in FIG. 1;
FIG. 4 is a schematic diagram of the second embodiment of the present invention;
FIG. 5 is a cross-sectional view of the cross-section 5-5 in FIG. 4;
FIG. 6 is a cross-sectional view of another core portion of the present invention;
FIG. 7 is a cross-sectional view of the interior of the power cable and the RF cable of the present invention having a shielding layer;
FIG. 8 is a cross-sectional view of the interior of the power cable and the RF cable of the present invention having two shielding layers;
FIG. 9 is a schematic diagram of the third embodiment of the present invention;
FIG. 10 is a schematic diagram of the fourth embodiment of the present invention;
FIG. 11 is a schematic diagram of the fifth embodiment of the present invention;
FIG. 12 is a schematic diagram of the sixth embodiment of the present invention;
FIG. 13 is a cross-sectional view of the cross-section 13-13 in FIG. 12; and
FIG. 14 is a cross-sectional view of the interior of the power cable of the present invention having a plurality of conducting wires.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] Reference is made to FIG. 1, which shows the power cable structure for a car of the first embodiment of the present invention. The power cable structure for a car includes a power cable 10, a first connector 20, a cigar-lighter plug 30, an anti-interference unit 40, a RF cable 50, a stress buffer portion 60, a second connector 70, and a receiving device 80.

[0010] The power cable 10 includes a core portion 11, an insulating layer 12, and an external cover layer 13 (referring to FIG. 2). In this embodiment, the core portion 11 includes two conducting wires 111, but not limited to above. The two conducting wires 111 are respectively used as the positive pole and the negative pole of the power cable 10. Each of the conducting wires 111 in-

cludes a conducting body 1111 and an insulating body 1112 wrapped around the conducting body 1111.

[0011] The insulating layer 12 of the power cable 10 is a tissue paper that has a moisture-proof, fireproof and insulating function. The insulating layer 12 is wrapped around the core portion 11.

[0012] The external cover layer 13 of the power cable 10 is made of PVC or PU and has an excellent insulating effect. The external cover layer 13 is wrapped around the insulating layer 12.

[0013] In this embodiment, the first connector 20 is a MINI-USB connector, but not limited to above. The first connector 20 can be other connectors and has a female type or a male type. The interior of the first connector 20 has a plurality of pins (not shown in the figure). The first connector 20 is located at the rear end of the power cable 10, and the pins of the first connector 20 is electrically connected with the conducting wires 111 of the power cable 10.

[0014] The cigar-lighter plug 30 is located at the front end of the power cable 10. The cigar-lighter plug 30 can be plugged into the cigar-lighter socket on the car to obtain the power from the car. Then, power is delivered to an electronic device (such as cell phones, MP3 players, GPSs, or PDAs, etc) connected with the first connector 20 via the power cable 10.

[0015] The anti-interference unit 40 is made of insulating materials. The interior of the anti-interference unit 40 has an iron powder core (not shown in the figure). The iron powder core is sleeved on the power cable 10 for avoiding the interference from the power signal. In this embodiment, the anti-interference unit 40 is located at the middle portion of the power cable 10, but not limited to above.

[0016] In this embodiment, the RF cable 50 is shorter than the power cable 10. The RF cable 50 includes a signal wire 51 and an external cover layer 52 (referring to FIG. 3). The signal wire 51 includes a conducting body 511 and an insulating body 512 wrapped around the conducting body 511. The external cover layer 52 also is made of PVC or PU and has an excellent insulating effect. The external cover layer 52 is wrapped around the signal wire 51. The front end of the RF cable 50 is connected to the rear side of the anti-interference unit 40 located at the middle portion of the power cable 10 to form a wire-divided status.

[0017] The stress buffer portion 60 is located at the connection portion of the RF cable 50 and the power cable 10. The stress buffer portion 60 is made of insulating materials and has a proper elasticity. Therefore, the appearance of the present invention is beautiful, the present invention has a scratch-proof function, and the usage life of the power cable 10 is lengthened.

[0018] In this embodiment, the second connector 70 is a phone jack, but not limited to above. The second connector 70 can be other connectors. The second connector 70 is located at the rear end of the RF cable 50, and is electrically connected with the signal wire 51 of the RF cable 50.

[0019] The interior of the receiving device 80 has a FM receiver 81 so that the electronic device can receive the FM signals. By using the speaker of the electronic device or the audio device of the car, the user can receive the FM radio. The receiving device 80 is located between the cigar-lighter plug 30 and the power cable 10. However, the location of the receiving device 80 is not limited to above, and the receiving device 80 also can be located at the middle portion of the power cable 10. The interior of the receiving device 80 further has a battery (not shown in the figure) so that the FM receiver 81 can directly obtain power from the battery before the power cable structure for a car of the present invention is connected with the cigar-lighter socket.

[0020] Reference is made to FIG. 4, which shows the power cable structure for a car of the second embodiment of the present invention. The difference between the second embodiment and the first embodiment is:

> The RF cable 50 and the power cable 10 are not located in parallel. The side edge of the external cover layer 52 of the RF cable 50 is connected with the side edge of the external cover layer 13 of the power cable 10 to form a wire-merging status (referring to FIG. 5). The rear ends of the RF cable 50 and the power cable 10 is commonly connected with the first connector 20. The two conducting wires 111 of the power cable 10 are electrically connected with the two pins of the first connector 20. The signal wire 51 of the RF cable 50 is electrically connected with one of the two pins of the first connector 20.

[0021] Reference is made to FIG. 6, which shows the core portion 11 of another power cable 10. The core portion 11 includes a conducting wire 111 and a twisted wire 112. The twisted wire 112 is wrapped around the conducting wire 111 for insulating and shielding the noise generated by the power line. The conducting wire 111 and the twisted wire 112 respectively are used as the positive pole and the negative pole of the power cable 10. The conducting wire 111 and the twisted wire 112 respectively are electrically connected with the two pins of the first connector 20.

[0022] Reference is made to FIG. 7. A first shielding layer 14 is located between the insulating layer 12 and the external cover layer 13. The first shielding layer 14 is a metal foil (such as an aluminum foil) or a shield screen for insulating and shielding the noise generated by the power line. A first shielding layer 53 also is located between the signal wire 51 and the external cover layer 52 of the RF cable 50. The first shielding layer 53 is a metal foil or a shield screen for insulating and shielding the noise generated by the power line.

[0023] Of course, it does not need to have both the first shielding layer 14 of the power cable 10 and the first shielding layer 53 of the RF cable 50. The first shielding layer 14 is merely located in the power cable 10 or the

first shielding layer 53 is merely located in the RF cable 50.

[0024] Reference is made to FIG. 8. A second shielding layer 15 is further located between the first shielding layer 14 and the external cover layer 13. For example, when the first shielding layer 14 is a metal foil, a shield screen is used as the second shielding layer 15 and is located between the metal foil and the external cover layer 13 to form a multi-layer shielding protection to enhance the insulating and shielding effects for the noise generated by the power line. Similarly, a second shielding layer 54 (such as a shield screen) is located between the first shielding layer 53 and the external cover layer 52 of the RF cable 50 for enhancing the insulating and shielding effects for the noise generated by the power line. Therefore, this embodiment also can be applied to the first embodiment to enhance the shielding effect of the power cable 10 and the RF cable 50 in a wire-divided status.

[0025] Moreover, the interior of the first connector 20 is installed with an anti-interference element (such as an inductor) by using the welding method to avoid the interference of the noise, or lock a fixed frequency period to filter the noise of the other frequency period to make the receiving effect on the fixed frequency period be more better. For example, when the first connector 20 has five pins, and the first pin and the fifth pin respectively are connected with the positive pole and the negative pole of the power cable 10, the inductor is electrically connected between the fourth pin and the fifth pin by using the welding method to achieve the above effect.

[0026] Reference is made to FIG. 9, which shows the third embodiment of the present invention. The difference between the third embodiment and the second embodiment is:

> The first connector 20 includes an insulating casing 21, a first terminal 22 and a second terminal 23. The first terminal 22 and the second terminal 23 are located in parallel and extend outside of the insulating casing 21. The core portion 11 of the power cable 10, the signal wire 51 of the RF cable 50 are respectively electrically connected with the first terminal 22 and the second terminal 23. Thereby, the power cable 10 and the RF cable 50 are respectively connected with the first terminal 22 and the second terminal 23 to avoid the interference between signals. Furthermore, when the present invention is linked with an electronic device, the first terminal 22 and the second terminal 23 are plugged into the connectors of the electronic device at one time. It is convenient.

[0027] Reference is made to FIG. 10, which shows the fourth embodiment of the present invention. The difference between the fourth embodiment and the second embodiment is:

> The present invention further has an adapter 90 that can connect the first connector 20. The adapter 90 has a first terminal 91 and a second terminal 92 that are located in parallel. Therefore, the user can determine to directly connect the first connector 20 with the electronic device, or to connect the first connector 20 with the adapter 90, as shown in the third embodiment, and then connect the electronic device.

[0028] Reference is made to FIG. 11, which shows the fifth embodiment of the present invention. The difference between the fifth embodiment and the second embodiment is:

> The length of the RF cable 50 is the same as the length of the power cable 10 so that both the RF cable 50 and the power cable 10 are fully merged.

[0029] Reference is made to FIGs. 12 and 13, which shows the sixth embodiment of the present invention. The difference between the sixth embodiment and the fifth embodiment is:

> Both sides of the power cable 10 have a RF cable 50. The two RF cables and the power cable are merged. Therefore, the quantity of the RF cables is not limited to above. A plurality of RF cables are located around the power cable 10 to form a circular arrangement.

[0030] Reference is made to FIG. 14. The quantity of the conducting wires 111 of the core portion 11 of the power cable 10 is even and is more than two. Half of the conducting wires 111 are used as the positive pole, and the other conducting wires 111 are used as the negative pole. The diameter of the conducting wires 111 is smaller and the cost of the conducting wires 111 is low. Therefore, the diameter of the power cable 10 is reduced, and its cost is also reduced.

[0031] Furthermore, the external cover layer 13 of the power cable 10 can be made of a transparent material, and at least one light-guiding element (such as light-guiding wire, a lighting wire, or an optical fiber) is located in the power cable 10. The core portion 11 of the power cable 10 is electrically connected with a lighting element (such as an LED). The lighting element is located at one end of the light-guiding element. When the cigar-lighter plug 30 is plugged into the cigar-lighter socket of the car, the lighting element emits light, and the light is guided by the light-guiding element so that the light can be emitted via the transparent external cover layer 13 of the power cable 10 to inform the user about the usage status of the present invention.

[0032] Similarly, the external cover layer 52 of the RF cable 50 is also made of a transparent material, and a light-guiding element (such as light-guiding wire, a lighting wire, or an optical fiber) is located in the RF cable 50. The lighting element (an LED) is located at one end of the light-guiding element and is electrically connected

with the core portion 11 of the power cable 10. Thereby, the lighting RF cable can be used to inform the usage status of the present invention to the user.

[0033] The present invention has the following characteristics:

1. When the present invention uses the power cable 10 to supply the power to an electronic device, it also uses the RF cable 50 to provide the FM signal transmission function to the electronic device. An additional antenna is not required.
2. Because the receiving device 80 has a FM receiver 81, the electronic device can receive the FM signals without being installed with a FM receiver. The user can receive the FM radio via the speaker on the electronic device or the audio player on the car.
3. The receiving device 80 also can have a battery so that the present invention is not supplied power from the car. The battery also provides power to the FM receiver 81 to receive the FM radio.
4. The first connector 20 can be welded with an anti-interference element, such as an inductor, to lock a fixed frequency period and filter the noise of the other frequency period. The signal-receiving effect is enhanced.
5. The external cover layer 13 of the power cable 10 or the external cover layer 52 of the RF cable 50 can be made of a transparent material and cooperates with the lighting element (such as an LED) and the light-guiding element (such as a light-guiding wire, a lighting wire, or an optical fiber) so that the power cable 10 or the RF cable 50 emits light to inform the status to the user.

[0034] The description above only illustrates specific embodiments and examples of the invention. The invention should therefore cover various modifications and variations made to the herein-described structure and operations of the invention, provided they fall within the scope of the invention as defined in the following appended claims.

Claims

1. A power cable structure for a car, comprising:

a power cable having a core portion, an insulating layer wrapped around the core portion and an external cover layer wrapped around the insulating layer;
a first connector located at one end of the power cable;
a cigar-lighter plug located at a second end of the power cable; and
at least one RF cable, wherein one end of the RF cable is connected with the power cable, and the RF cable includes a signal wire wrapped by an external cover layer.

2. The power cable structure for a car as claimed in claim 1, wherein at least one shielding layer is located between the insulating layer and the external cover layer of the power cable.

3. The power cable structure for a car as claimed in claim 1, wherein the core portion of the power cable includes conducting wires, the quantity of the conducting wires is even and is at least two, and the conducting wires of the power cable are electrically connected with the first connector.

4. The power cable structure for a car as claimed in claim 1, wherein the core portion of the power cable includes a conducting wire and a twisted wire, the twisted wire is wrapped around the conducting wire, and the conducting wire and the twisted wire of the power cable are electrically connected with the first connector.

5. The power cable structure for a car as claimed in claim 1, wherein there is an anti-interference unit located at a middle portion of the power cable.

6. The power cable structure for a car as claimed in claim 5, wherein the anti-interference unit has an iron powder core.

7. The power cable structure for a car as claimed in claim 1, wherein the external cover layer of the power cable is made of a transparent material, the power cable has a light-guiding element, the core portion of the power cable is electrically connected with a lighting element, and the lighting element is located at one end of the light-guiding element.

8. The power cable structure for a car as claimed in claim 7, wherein the lighting element is an LED.

9. The power cable structure for a car as claimed in claim 1, wherein the first connector has an anti-interference element.

10. The power cable structure for a car as claimed in claim 9, wherein the anti-interference element is an inductor.

11. The power cable structure for a car as claimed in claim 1, wherein the first connector is connected to an adapter, and the adapter has two terminals that are disposed in parallel.

12. The power cable structure for a car as claimed in claim 1, wherein the first connector is an MINI-USB connector.

13. The power cable structure for a car as claimed in claim 1, wherein at least one shielding layer is located between the signal wire and the external cover layer of the RF cable.

14. The power cable structure for a car as claimed in claim 1, wherein one end of the RF cable has a second connector, and the signal wire of the RF cable is electrically connected with the second connector.

15. The power cable structure for a car as claimed in claim 14, wherein the second connector is a phone jack.

16. The power cable structure for a car as claimed in claim 1, wherein the RF cable and the power cable are disposed in parallel, and the side edge of the external cover layer of the RF cable is connected with the side edge of the external cover layer of the power cable to form a merged status.

17. The power cable structure for a car as claimed in claim 16, wherein one end of the RF cable is connected with the first connector, and the signal wire of the RF cable is electrically connected with the first connector.

18. The power cable structure for a car as claimed in claim 16, wherein the first connector includes an insulating casing, a first terminal and a second terminal, the first terminal and the second terminal are disposed in parallel and extend outside the insulating casing, and the core portion of the power cable and the signal wire of the RF cable are respectively connected with the first terminal and the second terminal.

19. The power cable structure for a car as claimed in claim 1, wherein the external cover layer of the RF cable is made of a transparent material, the RF cable has a light-guiding element, the core portion of the power cable is electrically connected with a lighting element, and the lighting element is located at one end of the light-guiding element.

20. The power cable structure for a car as claimed in claim 19, wherein the lighting element is an LED.

21. The power cable structure for a car as claimed in claim 1, further comprising a receiving device, wherein the receiving device is located at the power cable, the receiving device has a FM receiver for receiving FM signals.

22. The power cable structure for a car as claimed in claim 21, wherein the receiving device is located between the cigar-lighter plug and the power cable.

23. The power cable structure for a car as claimed in claim 21, wherein the receiving device is located at a middle portion of the power cable.

24. The power cable structure for a car as claimed in claim 21, wherein the receiving device further comprises a battery for providing power to the FM receiver.

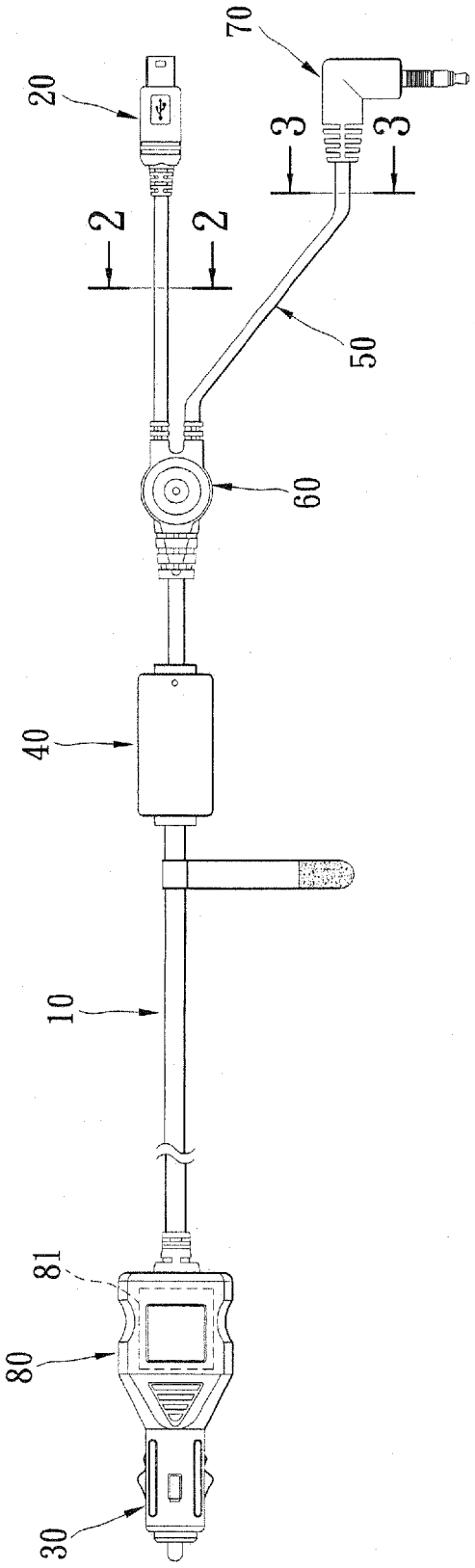

FIG. 1

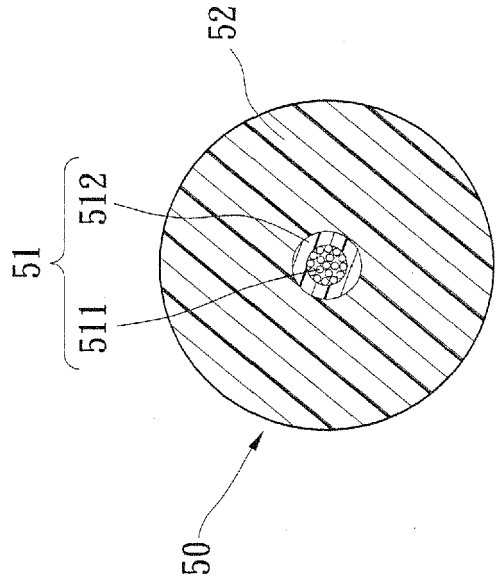

FIG. 3

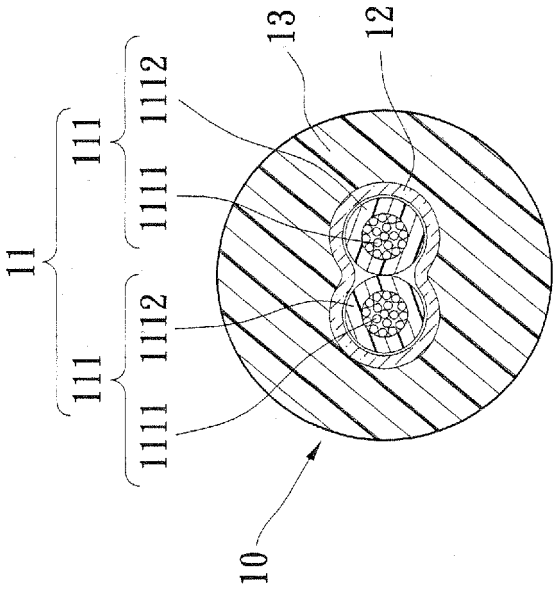

FIG. 2

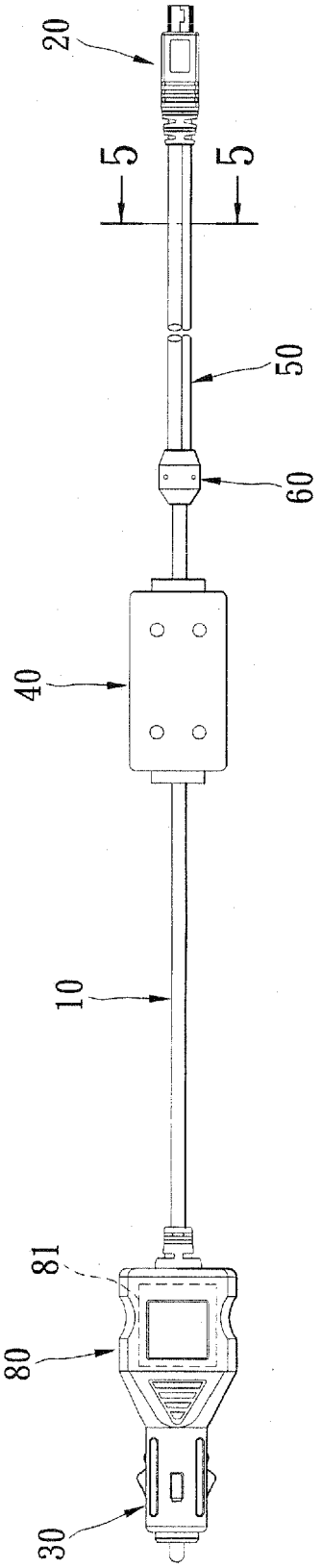

FIG. 4

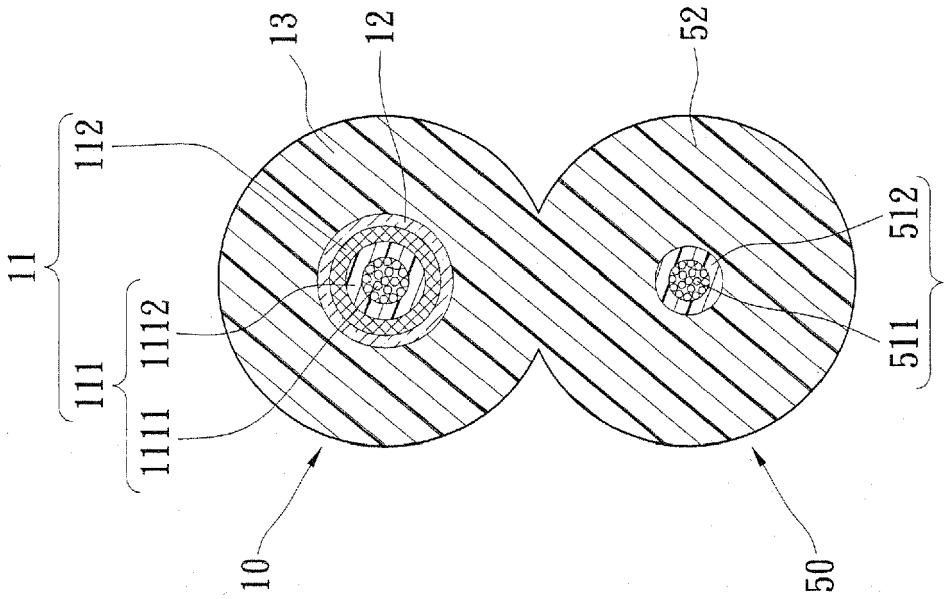
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FIG. 6

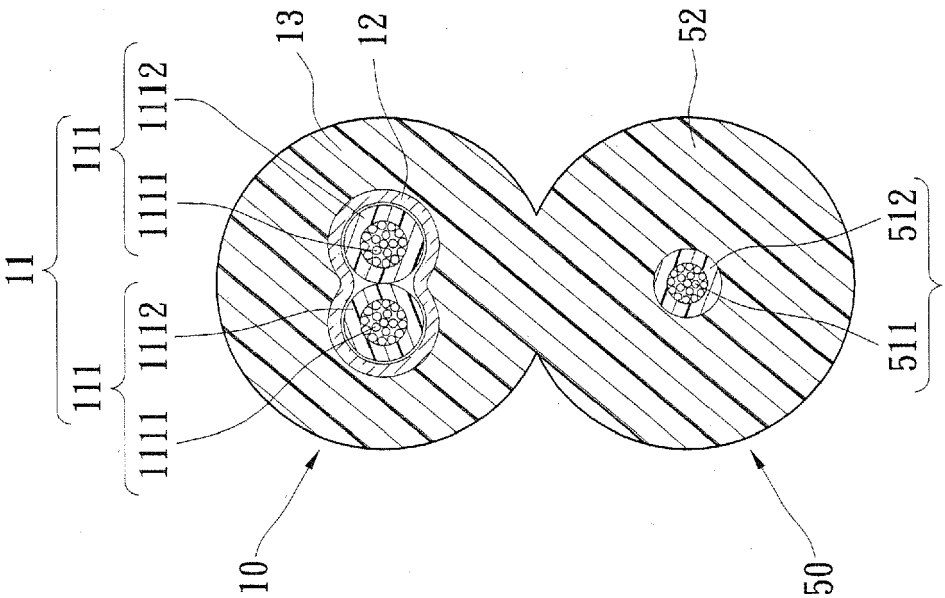
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FIG. 5

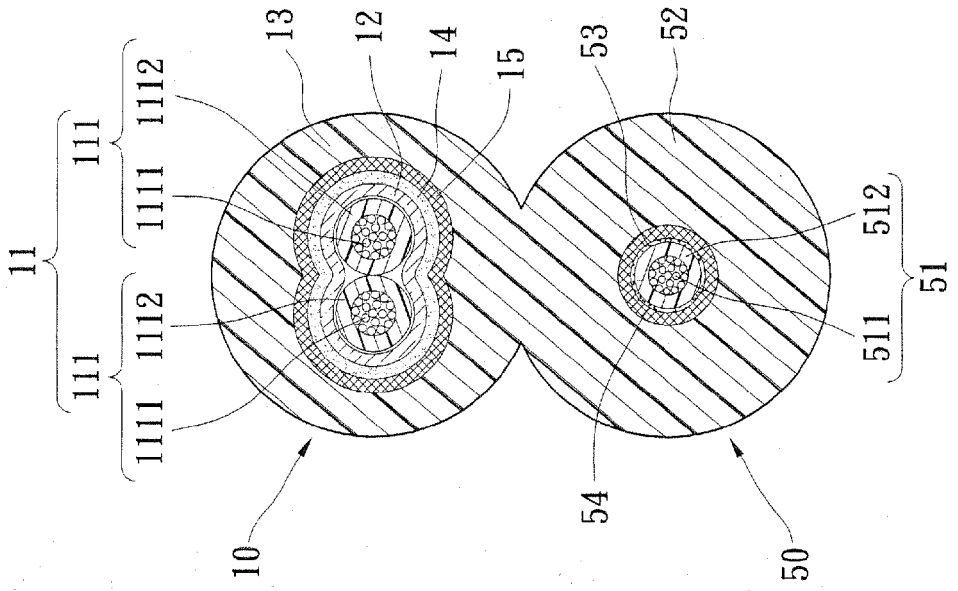
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FIG. 8

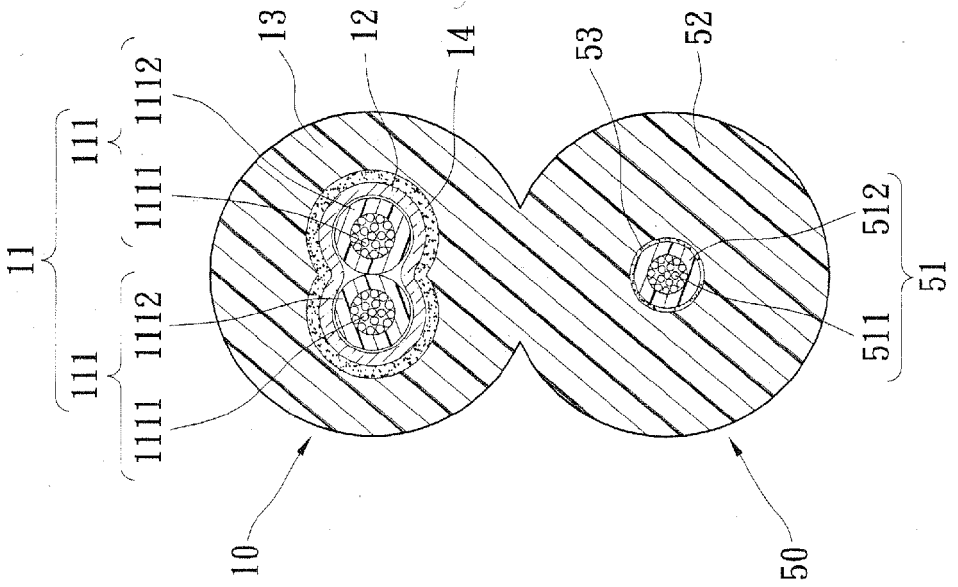
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FIG. 7

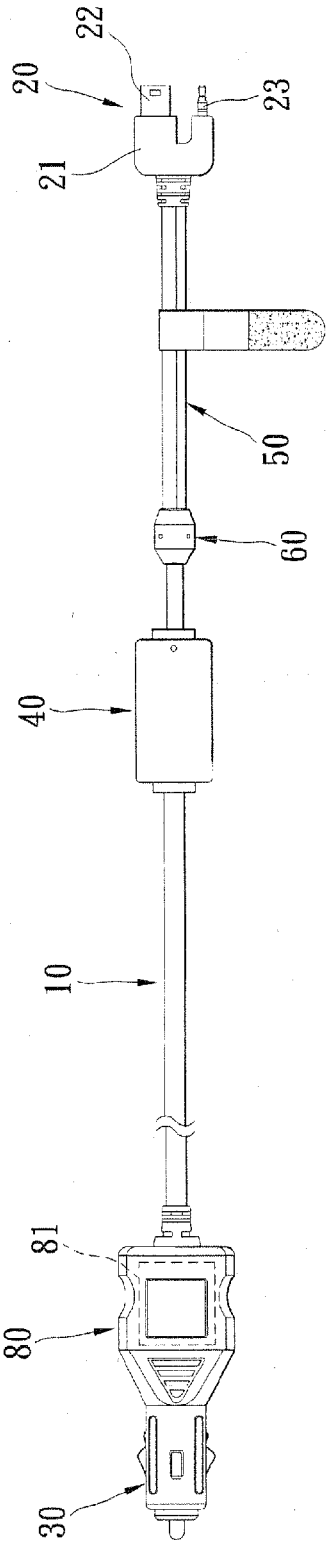

FIG. 9

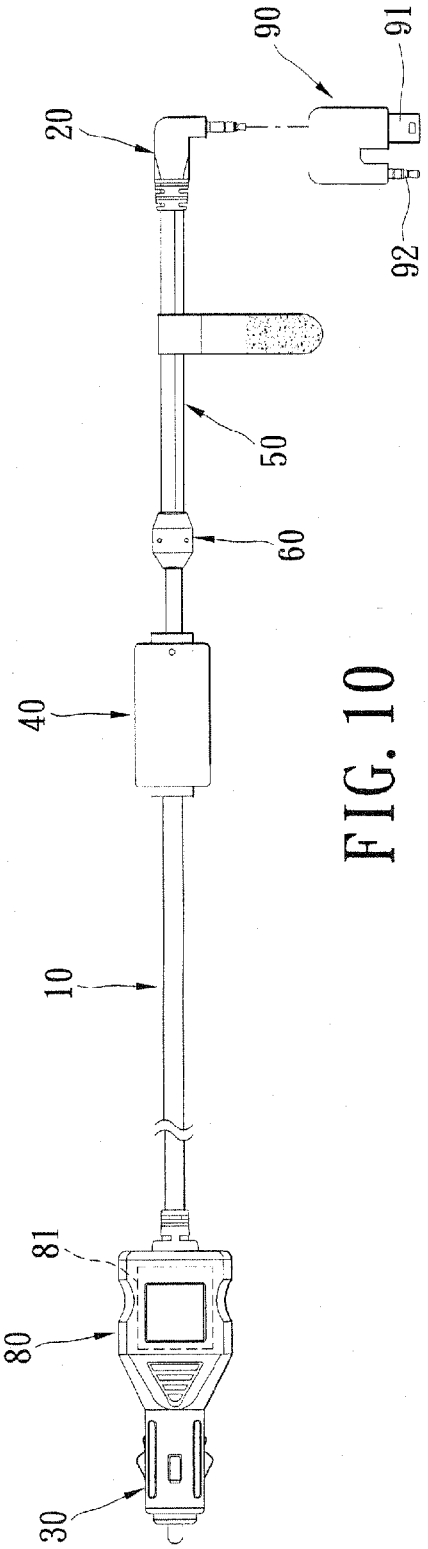

FIG. 10

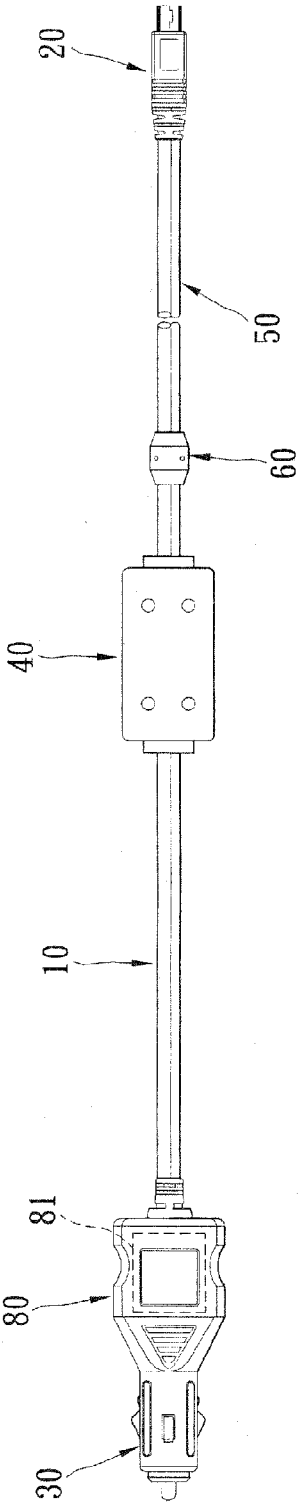

FIG. 11

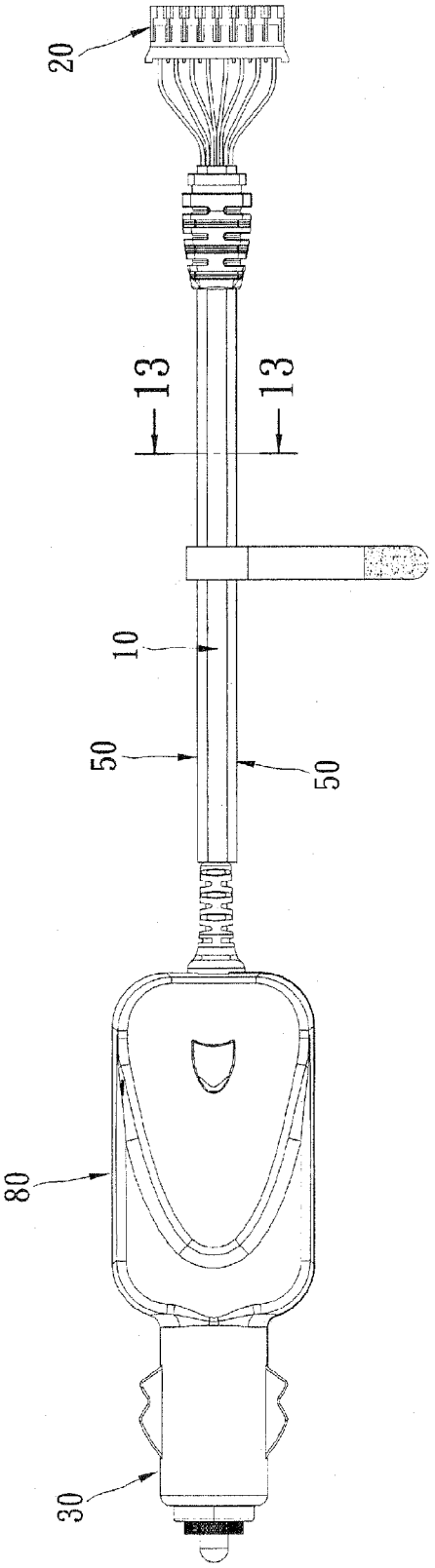

FIG. 12

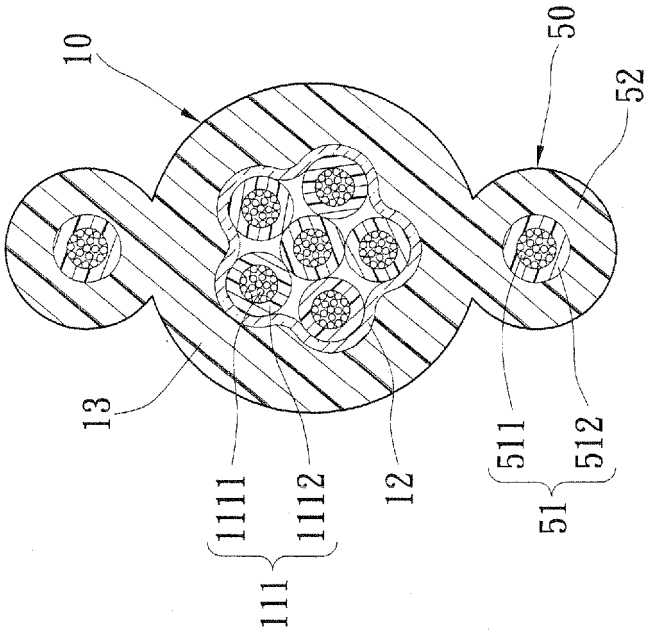
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FIG. 14

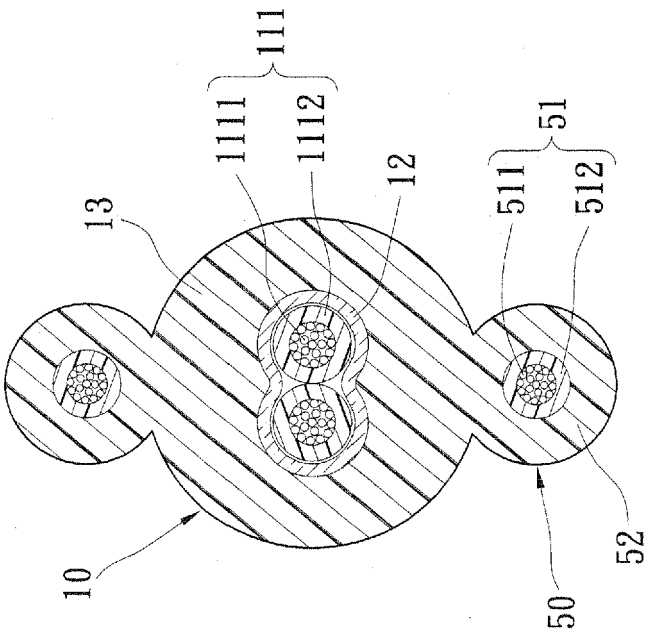
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FIG. 13

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 15 0896

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2004/026114 A1 (HSIEH ANGUS [TW]) 12 February 2004 (2004-02-12) * paragraph [0019] - paragraph [0021]; figures 5,6 *	1-20 21-24	INV. H01B9/00 ADD. H01R31/06
Y A	US 2007/178877 A1 (PEMBLE CLIFTON A [US] ET AL) 2 August 2007 (2007-08-02) * paragraphs [0010] - [0012], [0041], [0046], [0057]; figures 4,5,7 *	21-24 1	
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Place of search	Date of completion of the search	Examiner
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