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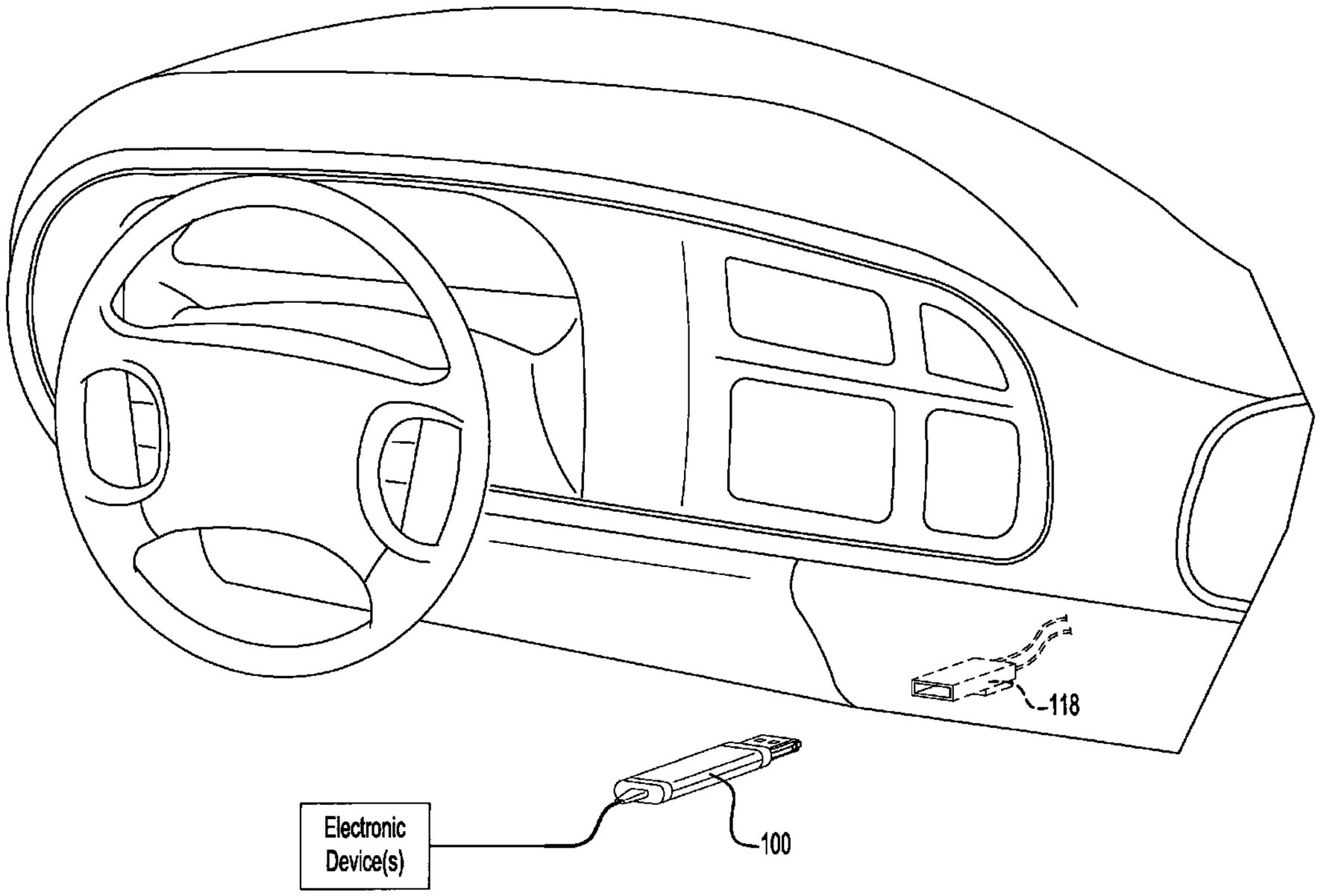
(54) **Titre : USB POUR UNE APPLICATION POUR VEHICULE**
(54) **Title: USB FOR VEHICLE APPLICATION**



(57) **Abrégé/Abstract:**
A power data connection for a vehicle and one or more electronic devices is provided. The power data connection comprises a data communication connector and a terminal. The data communication connector includes a case ground and is adapted to enable data communication to and from the vehicle. The terminal is supported by the case ground and operable to supply electrical power from the vehicle to the electronic devices simultaneously with the data communication connector enabling data communication to and from the vehicle.

USB for Vehicle Application

Abstract

A power data connection for a vehicle and one or more electronic devices is provided. The power data connection comprises a data communication connector and a terminal. The data communication connector includes a case ground and is adapted to enable data communication to and from the vehicle. The terminal is supported by the case ground and operable to supply electrical power from the vehicle to the electronic devices simultaneously with the data communication connector enabling data communication to and from the vehicle.

USB FOR VEHICLE APPLICATION

BACKGROUND

1. Technical Field

The embodiments of the present invention generally relate to a power and data communication connection in a vehicle.

2. Background Art

A number of vehicles produced today include a power point connection for providing power to any number of electrical devices brought into a vehicle by a user. Such devices may include a cell phone, portable DVD player, personal laptops, compact disc players, etc. The power point connection comprises a power point plug and receptacle positioned in the instrument panel of the vehicle or other interior portion of the vehicle. The power point connection is coupled to a power supply in the vehicle. In the past, these power point connections were used to heat cigarette lighters when automakers provided such lighters in vehicles. Conventional power point connections are large and consume a large amount of surface area on the instrument panel or other portion in the interior of the vehicle. For example, the power point connection may consume 30 mm to 40 mm of space on the dash panel or on other interior trim pieces to allow for customer usage. Conventional power point connections are limited to providing power for charging and powering up the electrical devices brought into the vehicle by the user.

With the advent of data communication protocols and the use of such communication with any number of electrical devices, automakers today may be compelled to provide an architecture that supports a data communication protocol while continuing to provide an ample amount of power needed to charge and operate the electronic devices. Universal Serial Bus (USB) protocols have become prevalent on a number of consumer electronic devices. Such devices may include laptops, personal digital assistants (PDAs), digital cameras, MP3 players, mouses, keyboards, cell phones, printers, fax machines, etc. While the use of USB

has become prevalent, the USB protocol is limited in the amount of power that can be provided to any one or more electronic devices via a USB connector. Due to such limitations, the USB connector cannot be used to power and/or charge a number of the electronic devices generally coupled to a vehicle through the power point connection.

Accordingly, it would be desirable to provide a combined power data connection for supporting data communication between electronic devices coupled to a vehicle and for providing higher power requirements in order to charge and power the electronic devices. It would also be desirable to reduce the size of the power point connection to preserve space on the instrument panel and/or other trim pieces which support power point connections used in vehicles today.

SUMMARY

In one non-limiting embodiment, a power data connection for a vehicle and one or more electronic devices is provided. The power data connection comprises a data communication connector and a terminal. The data communication connector includes a case ground and is adapted to enable data communication to and from the vehicle. The terminal is supported by the case ground and operable to supply electrical power from the vehicle to the electronic devices simultaneously with the data communication connector enabling data communication to and from the vehicle.

In another non-limiting embodiment, a power data connection for allowing the transfer of electrical power from a power supply and data between one or more electronic devices is provided. The power data connection comprises a data communication connector, a terminal and a circuit breaker. The data communication connector includes a case ground and is adapted to enable data communication to and from the electrical devices. The terminal is supported by the case ground and is operable to supply electrical power from the power supply to the electronic devices simultaneously with the data communication connector enabling data communication between the electronic devices. The circuit breaker is operable to disconnect the electrical power from the terminal to the electrical devices while continuing

to allow the data communication connector to enable data communication between the electrical devices.

In another non-limiting embodiment, a power data connection for a vehicle and one or more electrical devices is provided. The power data connection comprises a Universal Serial Bus (USB) connector. The USB connector includes a case ground and is adapted to enable data communication to and from the vehicle and the case ground includes interior and exterior portions. The terminal is supported by the exterior portion of the case ground and is operable to supply electrical power from the vehicle to the electronic devices simultaneously with the USB connector enabling data communication to and from the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a data communication connector in accordance with one embodiment of the present invention;

FIG. **2** illustrates a top view of the data communication connector;

FIG. **3** illustrates a power data connection in accordance with one embodiment of the present invention positioned in an instrument panel;

FIG. **4** illustrates a socket in accordance with one embodiment of the present invention;

FIG. **5** illustrates a power data connection in accordance with one embodiment of the present invention;

FIG. **6** illustrates the power data connection with a circuit breaker positioned in the socket; and

FIG. **7** illustrates the data connection connector with a circuit breaker.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring to FIG. **1**, a diagram of a data communication connector **100** is shown in accordance to one embodiment of the present invention. The data communication connector **100** includes a terminal **102** and a case ground **104**. The case ground **104** includes interior and exterior portions. The terminal **102** is supported by the exterior portion of the case

ground **104** and is generally flexible. Baseline circuitry (not shown) is positioned in the interior portion of the case ground **104** and is configured to provide baseline electrical power to electronic devices and transfer digital data to and from electronic devices. The terminal **102** and the case ground **104** act together to provide an additional power level for one or more electronic devices coupled to the data communication connector **100** while allowing the baseline circuitry of the data communication connector to continue to allow for data communication between the electronic devices. In one non-limiting example, if a dedicated ground is needed in addition to the case ground **104**, the dedicated ground can be added to the other side of the exterior portion of the case ground **104** opposite to the terminal **102**.

A spacer **106** is positioned between the terminal **102** and the case ground **104** for insulating the terminal **102** from the case ground **104**. The spacer **106** may be made of any non-conductive material. In one non-limiting example, the spacer **106** may be made of plastic or rubber. The type of material used to construct the spacer **106** may be varied to meet the design criteria of a particular implementation. The spacer **106** may be coupled to the exterior portion of the case ground **104** by adhesive or glue. In general, the spacer **106** may be coupled to the case ground **104** a number of different ways. The particular attachment method used to couple the spacer **106** to the case ground **104** may be varied to meet the design criteria of a particular implementation. The spacer **106** includes a locking arrangement **108** for coupling the terminal **102** to the spacer **106**.

FIG. **2** generally illustrates a top view of the data communication connector **100**. The locking arrangement **108** includes a retaining rib **110** and a channel **112**. The channel **112** is positioned below the retaining rib **110**. An end of the terminal **102** is disposed in the channel **112** of the spacer **106**. To couple the terminal **102** to the spacer **106**, an end of the terminal **102** maybe positioned in the channel **112** of the spacer **106** and underneath the retaining rib **110**. The particular position of the retaining rib **110** and the channel **112** on the spacer **106** may be varied to meet the design criteria of a particular implementation. In one non-limiting example, the locking arrangement **108** may be an adhesive that is applied to a portion of the terminal in order to couple the terminal **102** to the spacer **106**. In general, the locking arrangement **108** is configured to ensure that the terminal **102** stays in a particular orientation

while the data communication connector **100** is being mated.

Referring to FIG. **3**, a diagram of a power data connection is shown in accordance to one embodiment of the present invention. The power data connection includes a socket **118** and the data communication connector **100**. While FIG. **3** generally illustrates the power data connection positioned in the instrument panel of the vehicle, the power data connection may be positioned in any location in the vehicle. In one non-limiting example, the power data connection may be disposed in a center console (not shown) of the vehicle. In another non-limiting example, the power data connection may be positioned in the interior trim located on the front driver and passenger doors. The particular location of the power data connection in the vehicle may be varied to meet the design criteria of a particular implementation. The data communication connector **100** and the socket **118** may include any number of indexing arrangements to ensure that the data communication connector **100** is mated with the socket **118** in the desired orientation. Such indexing arrangements may ensure that the terminal **102** does not come into contact with the ground terminal **124** when the data communication connector **100** is mated to the socket **118**.

Referring to FIG. **4**, a diagram of the socket **118** is shown in accordance to one embodiment of the present invention. As noted in connection with FIG. **3**, the socket **118** may be positioned in any number of areas in the vehicle. The socket **118** includes a power terminal **122** and a ground terminal **124**. The power terminal **122** of the socket **118** is configured to slideably engage the terminal **102** and the ground terminal **124** of the socket **118** is configured to slideably engage the case ground **104**. The ground terminal **124** may be coupled to any number of grounds located throughout the vehicle. The power terminal **122** may be coupled to a high current positive source such as a battery feed. The battery feed may be a 12 volt power feed. The power terminal **122** may pass the 12V feed to the terminal **102**. The terminal **102** enables the data communication connector **100** to provide for an increased power level when compared to the base line power provided by the base line circuitry of the data communication connector **100**. In one non-limiting example, the terminal **102** may be configured to provide up to 10A of current to any one or more electronic devices coupled to the data communication connector **100**. The baseline circuitry of the data communication

connector **100** may be limited to providing up to 3A of current.

In one non-limiting example, the data communication connector **100** may be implemented as a Universal Serial Bus (USB) connector. The USB connector generally includes a two level pin interface and is configured to provide baseline power of 2.5 Watts. The terminal **102** is configured to add up to 120 Watts of power in addition to the 2.5 Watts of power provided by the data communication connector **100**. The power terminal **102** may have a current rating of up to 10 Amps.

Referring to FIG. **5**, a power data connection in accordance to one embodiment of the present invention is shown. As noted in connection with FIG. **4**, the ground terminal **124** slideably engages the case ground **104** for establishing ground and the power terminal **122** slideably engages the terminal **102**. The ground terminal **124** includes a curved portion **130**. The curved portion **130** is configured to flex toward the power terminal **122**. As a user inserts the data communication connector **100** into the socket **118**, the curved portion **130** is positioned along the ground terminal **124** such that contact is made between the curved portion **130** and the case ground **104** prior to contact being made between the terminal **102** and the power terminal **122**. Such a configuration isolates the terminal **102** from the ground and eliminates the potential of shorting the terminal **102** to ground. The curved portion **130** also reduces the occurrence of an electrostatic discharge (ESD) from taking place when any one or more of the electronic devices are coupled to the vehicle via the power data connection.

While the terminal **102** is coupled to the spacer **106** via the locking arrangement **106**, a portion of the terminal **102** flexes outward from the spacer **106** in a manner such that the flexed portion of the terminal **102** applies a force against the power terminal **122** to ensure contact with the power terminal **122** when the data communication connector **100** is mated to the socket **118**.

Referring to FIG. **6**, a diagram illustrating the power data connection having a circuit breaker in accordance to one embodiment of the present invention is shown. A circuit breaker **150** is placed in series with the power terminal **122**. The circuit breaker **150**

disconnects the battery power supply from the power terminal **122** in the event too much current is being drawn. The data communication connector **100** may continue to provide baseline power and enable data communication between one or more electronic devices and the vehicle when the circuit breaker **150** disconnects the battery power supply from the power terminal **122**.

Referring to FIG. **7**, a diagram illustrating the power data connection having a circuit breaker in accordance to another embodiment of the present invention is shown. The circuit breaker **150** may be positioned about the data communication connector **100** and placed in series with the terminal **102**. The circuit breaker **150** disconnects the battery power supply from the terminal **102** in the event too much current is being drawn. The data communication connector **100** may continue to provide baseline power and enable data communication between one or more electronic devices and the vehicle when the circuit breaker **150** disconnects the battery power supply from the terminal **102**.

In one non-limiting example, the circuit breaker **150** may be implemented as a resettable fuse-based circuit breaker. In another non-limiting example, the circuit breaker **150** may be implemented as a resettable positive thermal coefficient (PTC) circuit breaker. The PTC circuit breaker may be positioned about the terminal **102** or the power terminal **122** in such a manner such that the PTC detects the amount of current that is passed between the terminal **102** or the power terminal **122** as electrical power is being transmitted from the power source to any one or more of the electronic devices. In the event the PTC circuit breaker detects that too much current is being passed through the terminal **102** or the power terminal **122**, the PTC circuit breaker includes a polymer matrix that expands as more heat is conducted due to the increased current consumption taking place between the terminal **102** and the power terminal **122**. The resistance of the PTC circuit breaker increases as the amount of heat detected increases. In response to such increased current consumption, the PTC circuit breaker attains a high resistance level and prevents further current draw.

While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

Claims

What is claimed is:

1. A power data connection for a vehicle and one or more electronic devices, the connection comprising:

a data communication connector having a case ground and configured to enable data communication to and from the vehicle;

a terminal supported on the case ground and operable to supply electrical power from the vehicle to the electronic devices simultaneously with the data communication connector enabling data communication to and from the vehicle; and

a spacer positioned on the exterior portion of the case ground and configured to receive the terminal and to prevent the terminal from contacting the case ground;

wherein the case ground includes interior and exterior portions and the power terminal is supported on the external portion of the case ground.

2. The power data connection of claim 1, wherein the interior portion of the case ground surrounds baseline circuitry to provide baseline power associated with the data communication to enable the data communication between the one or more electronic devices and the vehicle.

3. The power data connection of claim 2, further comprising a locking arrangement positioned on the spacer to couple the terminal to the spacer.

4. The power data connection of claim 1, further comprising a socket having socket power and ground terminals disposed in the interior of the vehicle and the socket power terminal is adapted to slideably engage the power terminal and the ground terminal is adapted to slideably engage the case ground.

5. The power data connection of claim 4, wherein the ground terminal includes a curved portion that is flexed inward in such a manner to allow contact to be made between the ground terminal and the case ground first, before contact is made between the power terminal and the socket power terminal when the ground terminal engages the case ground and the power terminal engages the power terminal.

6. The power data connection of claim 5, wherein the terminal is flexible and a portion of the power terminal is flexed outward in such a manner to allow the power terminal to apply a locking force against the socket power terminal while mating the data communication connector with the socket.

7. The power data connection of claim 1, further comprising a circuit breaker disposed about the power terminal and operable to disconnect electrical power from the power terminal to the one or more electronic devices while continuing to allow the data communication connector to enable data communication to and from the vehicle.

8. The power data connection of claim 4, further comprising a circuit breaker disposed about the socket and operable to disconnect electrical power from the power terminal to the electrical devices while continuing to allow the data communication connector to enable data communication to and from the vehicle.

9. The power data connection of claim 1, wherein the data communication connector includes a Universal Serial Bus (USB) connector.

10. A power data connection for allowing the transfer of electrical power from a power supply and data between one or more electronic devices, the power data connection comprising:

a data communication connector having a case ground and configured to enable data communication to and from the electronic devices;

a terminal supported on the case ground and operable to supply electrical power from the power supply for powering the electronic devices simultaneously with the

data communication connector enabling data communication between the electronic devices; and

a circuit breaker operable to disconnect the electrical power from the terminal to the electronic devices while continuing to allow the data communication connector to enable data communication between the electronic devices.

11. The power data connection of claim 10, wherein the case ground includes interior and exterior portions and the power terminal is supported on the external portion of the case ground.

12. The power data connection of claim 11, wherein the interior portion of the case ground surrounds baseline circuitry to provide baseline power associated with the data communication and to enable data communication between the electronic devices.

13. The power data connection of claim 11, further comprising a spacer positioned on the exterior portion of the case ground and configured to receive the power terminal and to prevent the power terminal from contacting the case ground.

14. The power data connection of claim 10, further comprising a socket having power and ground terminals disposed in the interior of the vehicle and the socket power terminal is adapted to slideably engage the power terminal and the ground terminal is adapted to slideably engage the case ground.

15. The power data connection of claim 14, wherein the ground terminal includes a curved portion that is flexed inward in such a manner to allow contact to be made between the ground terminal and the case ground prior to contact being made between the power terminal and the socket power terminal.

16. The power data connection of claim 15, wherein the power terminal is flexible and a portion of the power terminal is flexed outward in such a manner to allow the power terminal

to apply a locking force against the socket power terminal while mating the data communication connector and the socket.

17. A power data connection for a vehicle and one or more electrical devices, the connection comprising:

a Universal Serial Bus (USB) connector having a case ground and configured to enable data communication to and from the vehicle and the case ground having interior and exterior portions;

a terminal physically supported on the exterior portion of the case ground and operable to supply electrical power from the vehicle for powering the electronic devices simultaneously with the USB connector enabling data communication to and from the vehicle; and

a spacer positioned on the exterior portion of the case ground and configured to retain the terminal and to prevent the power terminal from contacting the case ground.

18. The power data connection of claim 17, wherein the interior portion of the case ground supports baseline circuitry to provide baseline power associated with the data communication to enable the data communication between the one or more electronic devices and the vehicle.

19. A power data connection for a vehicle and one or more electronic devices, the connection comprising:

a data communication connector having a case ground and configured to enable data communication to and from the vehicle;

a terminal supported on the case ground and operable to supply electrical power from the vehicle to the electronic devices simultaneously with the data communication connector enabling data communication to and from the vehicle; and

a socket having power and ground terminals disposed in the vehicle interior and the power terminal is adapted to slideably engage the terminal and the ground

terminal is adapted to slideably engage the case ground, said ground terminal including a curved portion that is flexed inward in such a manner to allow contact to be made between the ground terminal and the case ground first before contact is made between the terminal and the power terminal when the ground terminal engages the case ground and the power terminal engages the terminal.

20. The power data connection of claim 19, wherein the case ground includes interior and exterior portions and the terminal is supported on the external portion of the case ground.

21. The power data connection of claim 20, wherein the interior portion of the case ground surrounds baseline circuitry to provide baseline power associated with the data communication and to enable data communication between the electrical devices and the vehicle.

22. The power data connection of claim 20, further comprising a spacer positioned on the exterior portion of the case ground and configured to receive the terminal and to prevent the terminal from contacting the case ground.

23. The power data connection of claim 22, further comprising a locking arrangement positioned on the spacer to couple the terminal to the spacer.

24. The power data connection of claim 19, wherein the terminal is flexible and a portion of the terminal is flexed outward in such a manner to allow the terminal to apply a locking force against the power terminal while mating the data communication connector with the socket.

25. The power data connection of claim 19, further comprising a circuit breaker disposed about the terminal and operable to disconnect electrical power from the terminal to the electrical devices while continuing to allow the data communication connector to enable data communication to and from the vehicle.

26. The power data connection of claim 19, further comprising a circuit breaker disposed about the socket and operable to disconnect electrical power from the terminal to the electrical devices while continuing to allow the data communication connector to enable data communication to and from the vehicle.

27. The power data connection of claim 19, wherein the data communication connector includes a Universal Serial Bus (USB) connector.

28. The power data connection of claim 19, further comprising:

a Universal Serial Bus (USB) connector having a case ground and adapted configured to enable data communication to and from the vehicle and the case ground having interior and exterior portions; and

a terminal physically supported on the exterior portion of the case ground and operable to supply electrical power from the vehicle for powering the electronic devices simultaneously with the USB connector enabling data communication to and from the vehicle.

29. The power data connection of claim 28, further comprising a spacer positioned on the exterior portion of the case ground and configured to retain the terminal and to prevent the terminal from contacting the case ground.

30. A power data connection for allowing the transfer of electrical power from a power supply and data between one or more electronic devices, the power data connection comprising:

a data communication connector having a case ground and adapted configured to enable data communication to and from the electrical devices;

a terminal supported on the case ground and operable to supply electrical power from the power supply for powering the electronic devices simultaneously with the data communication connector enabling data communication between the electronic devices;

a circuit breaker operable to disconnect the electrical power from the terminal to the electrical devices while continuing to allow the data communication connector to enable data communication between the electrical devices and a socket having power and ground terminals disposed in the interior of the vehicle and the power terminal is adapted to slideably engage the terminal and the ground terminal is adapted to slideably engage the case ground, said ground terminal includes a curved portion that is flexed inward in such a manner to allow contact to be made between the ground terminal and the case ground prior to contact being made between the terminal and the power terminal.

31. The power data connection of claim 30, wherein the case ground includes interior and exterior portions and the terminal is supported on the external portion of the case ground.

32. The power data connection of claim 31, wherein the interior portion of the case ground surrounds baseline circuitry to provide baseline power associated with the data communication and to enable data communication between the electrical devices.

33. The power data connection of claim 31, further comprising a spacer positioned on the exterior portion of the case ground and configured to receive the terminal and to prevent the terminal from contacting the case ground.

34. The power data connection of claim 30, wherein the terminal is flexible and a portion of the terminal is flexed outward in such a manner to allow the terminal to apply a locking force against the power terminal while mating the data communication connector and the socket.

35. A power data connection for a vehicle and at least one electronic device, the connection comprising:

a data communication connector comprising a Universal Serial Bus (USB) connector having a case ground and configured to enable data communication to and from the vehicle; and

a power terminal supported on the case ground and operable to supply electrical power from the vehicle to the at least one electronic device simultaneously with the data communication connector enabling data communication to and from the vehicle wherein the case ground includes interior and exterior portions and the power terminal is supported on an exterior side portion of the case ground,

the interior portion of the case ground surrounding baseline circuitry to provide baseline power associated with the data communication to enable the data communication between the at least one electronic device and the vehicle,

an insulating spacer positioned on the exterior portion of the case ground and configured to receive the power terminal and to prevent the power terminal from contacting the case ground; and

the terminal is flexible and a portion of the terminal is flexed outward in such a manner to allow the power terminal to apply a locking force against a mating socket power terminal while mating the data communication connector with the socket.

36. The power data connection of claim 35, further comprising a locking arrangement positioned on the spacer to couple the power terminal to the spacer.

37. The power data connection of claim 35, further comprising a socket having socket power and ground terminals disposed in the interior of the vehicle and the socket power terminal is adapted to slideably engage the power terminal and the ground terminal is adapted to slideably engage the case ground.

38. The power data connection of claim 37, wherein the ground terminal includes a curved portion that is flexed inward in such a manner to allow contact to be made between the ground terminal and the case ground first before contact is made between the power terminal and the socket power terminal when the ground terminal engages the case ground and the power terminal engages the power terminal.

39. The power data connection of claim 37, further comprising a circuit breaker disposed about the socket and operable to disconnect electrical power from the power terminal to the at least one electrical device while continuing to allow the data communication connector to enable data communication to and from the vehicle.

40. The power data connection of claim 35, further comprising a circuit breaker disposed about the power terminal and operable to disconnect electrical power from the power terminal to the at least one electrical device while continuing to allow the data communication connector to enable data communication to and from the vehicle.

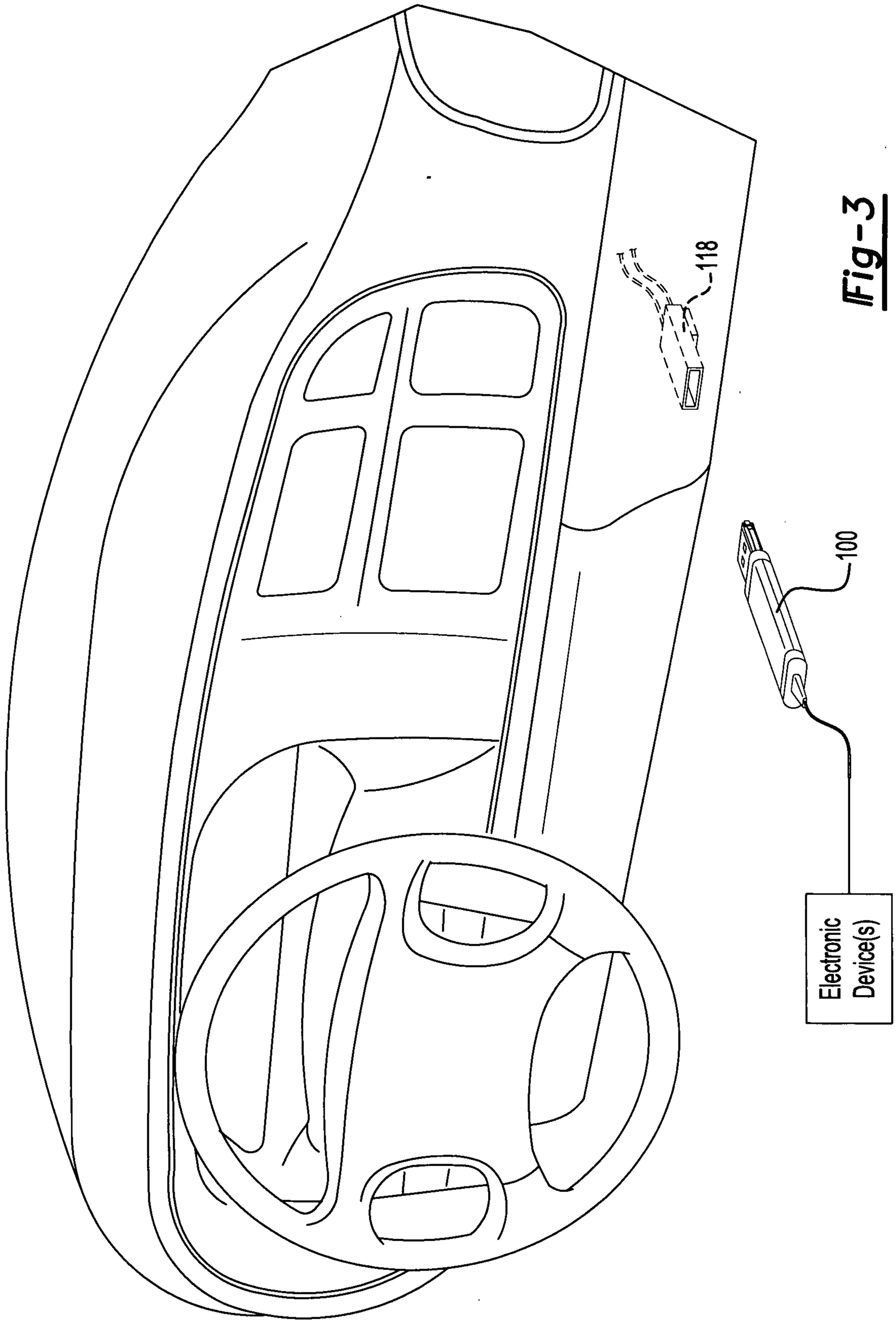


Fig-3

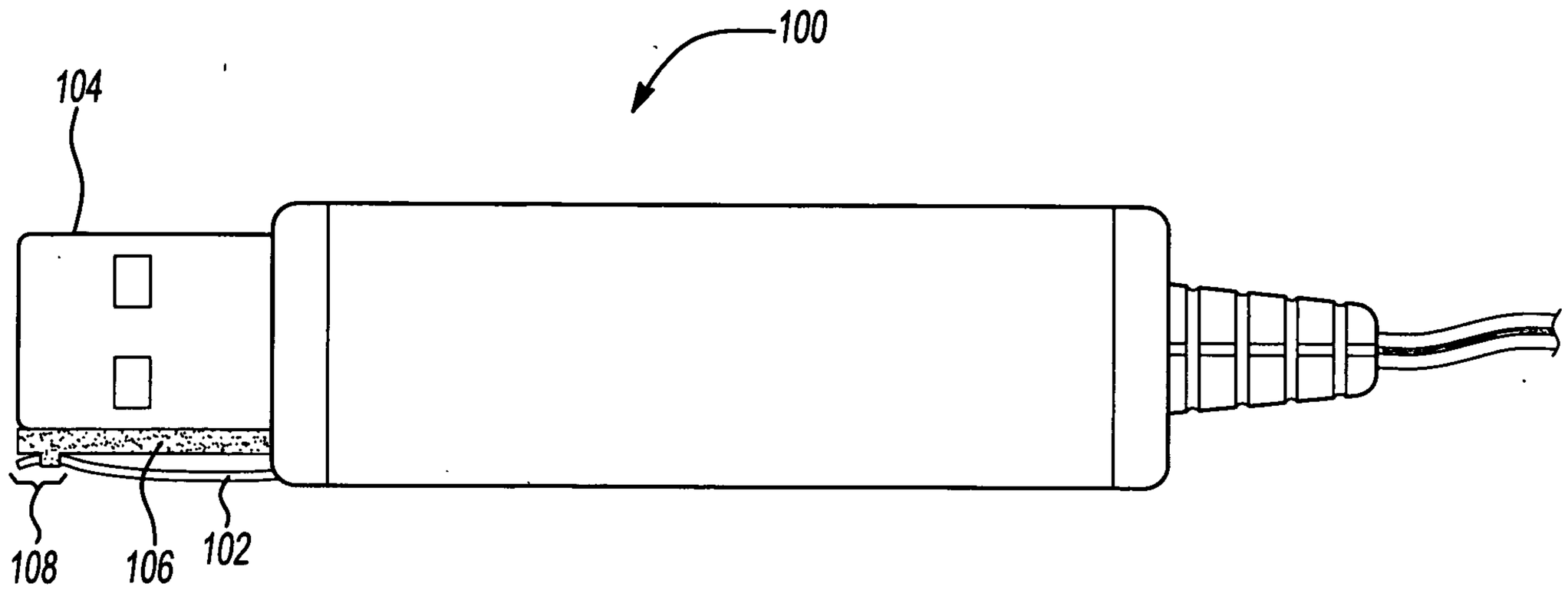


Fig-1

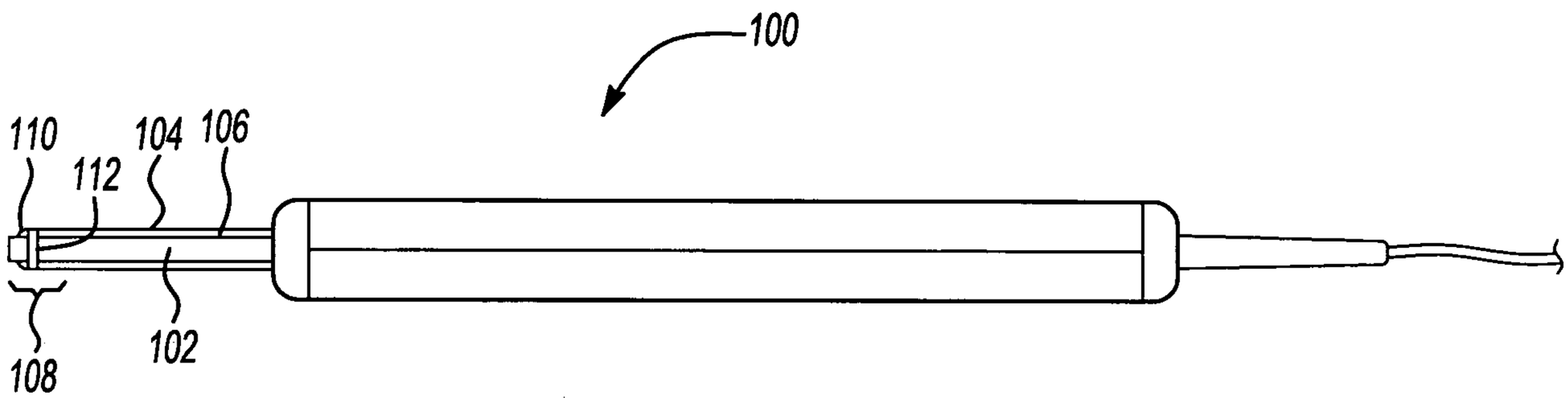


Fig-2

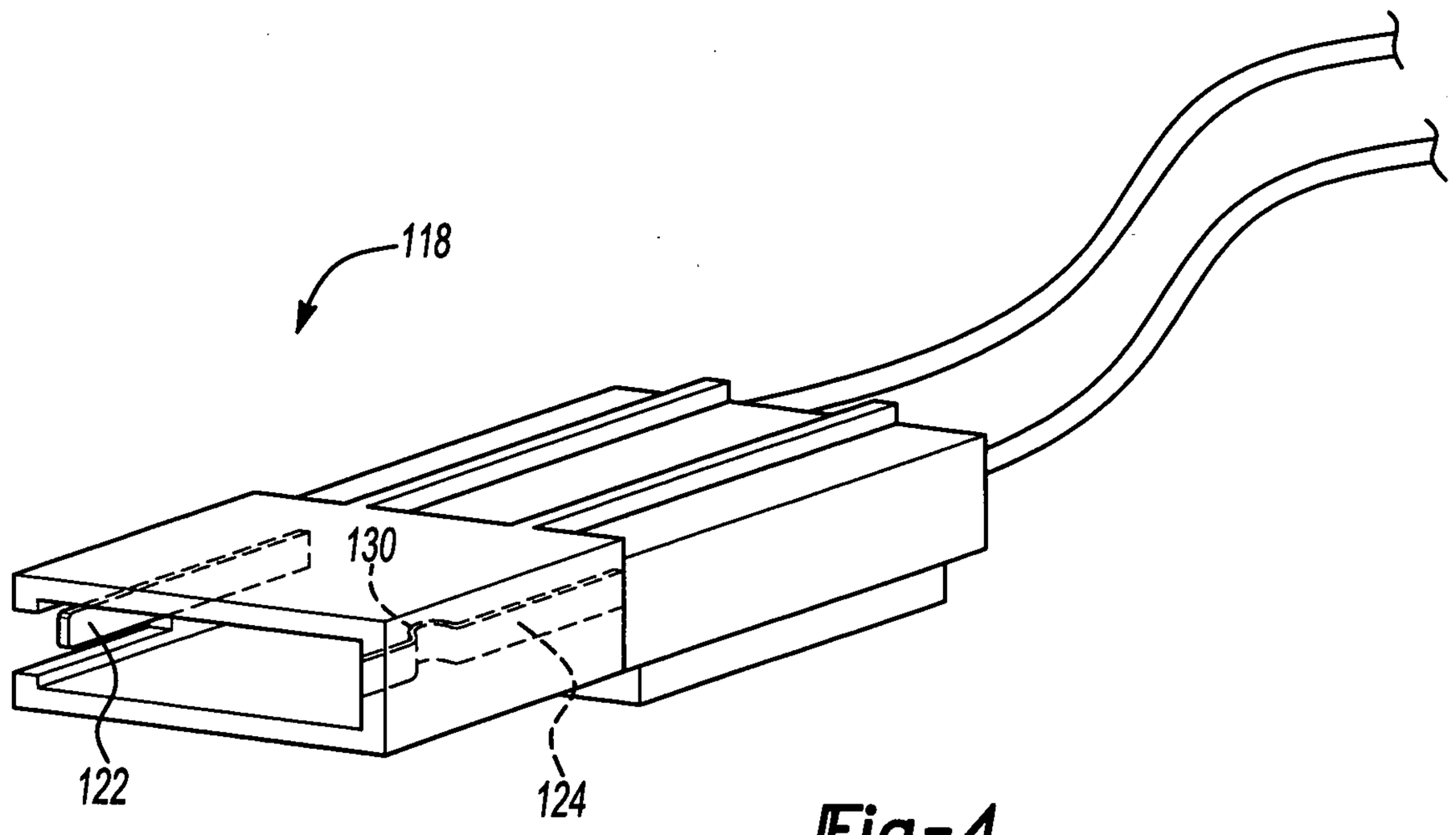


Fig-4

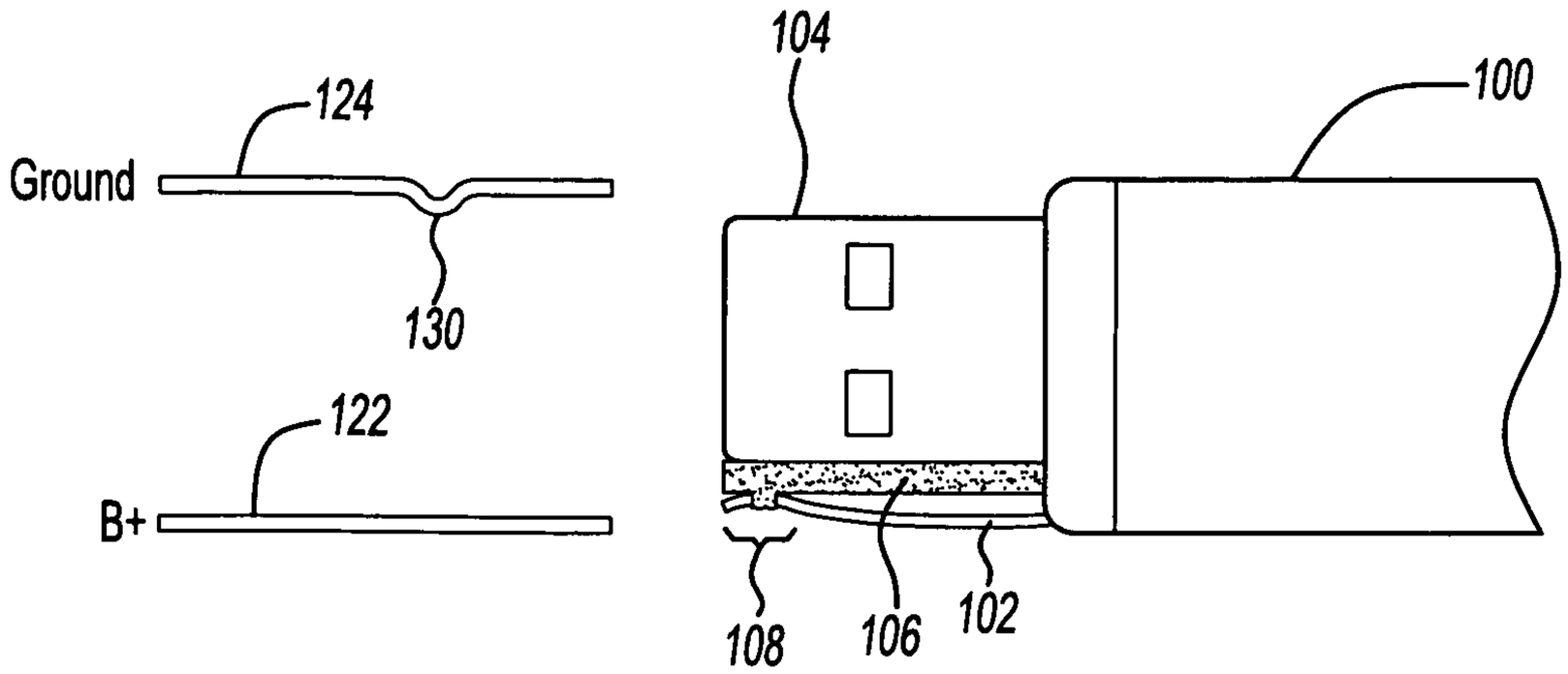


Fig-5

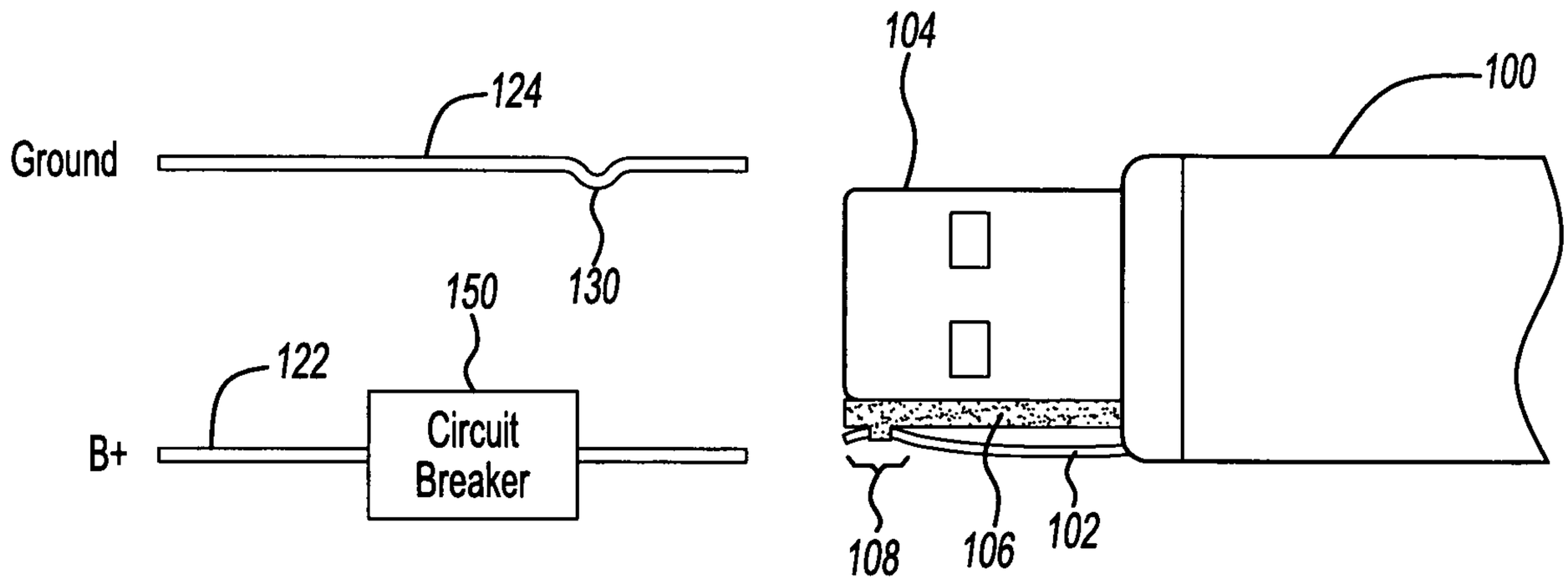


Fig-6

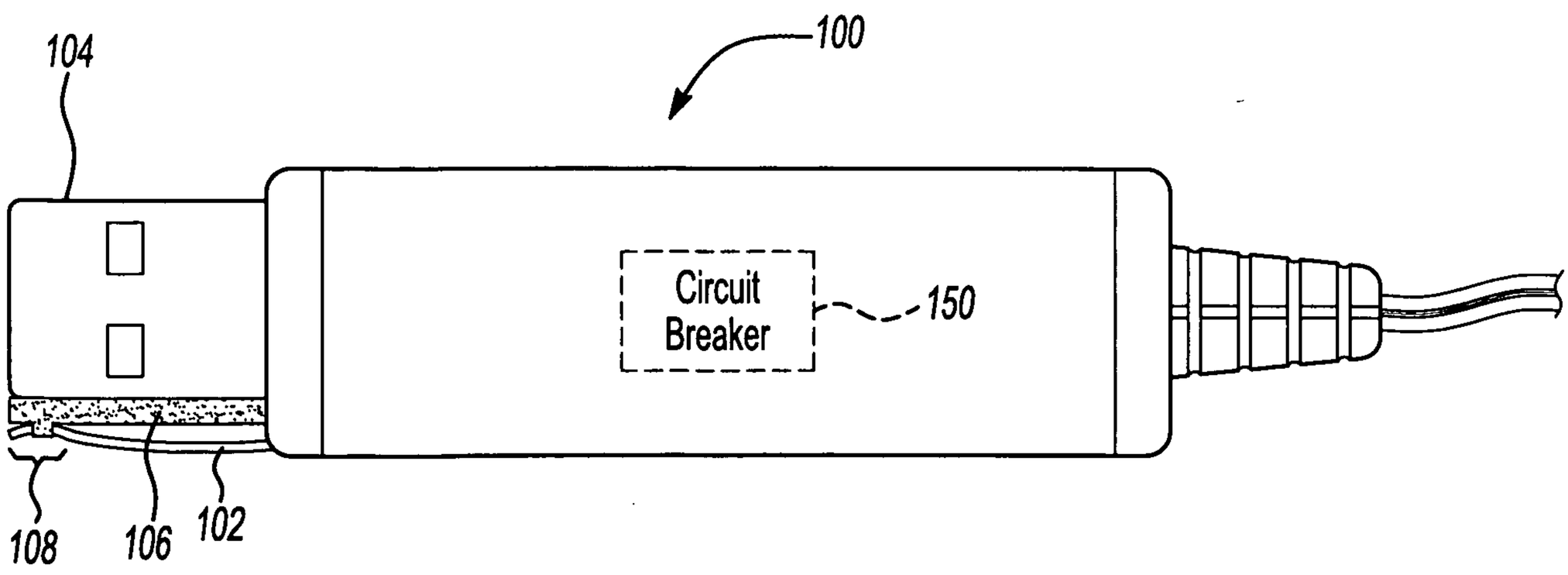
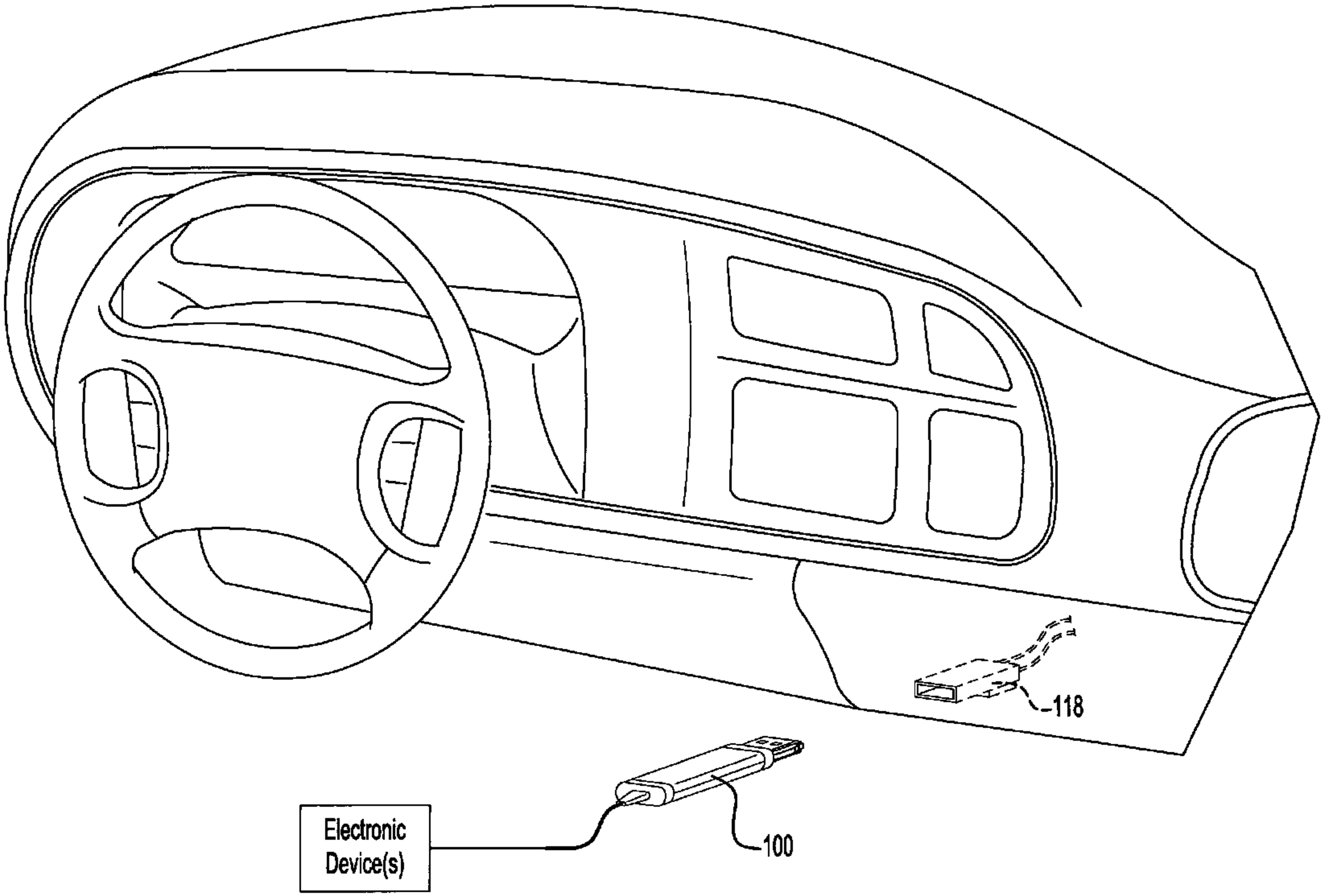


Fig-7


118
Electronic Device(s)
100