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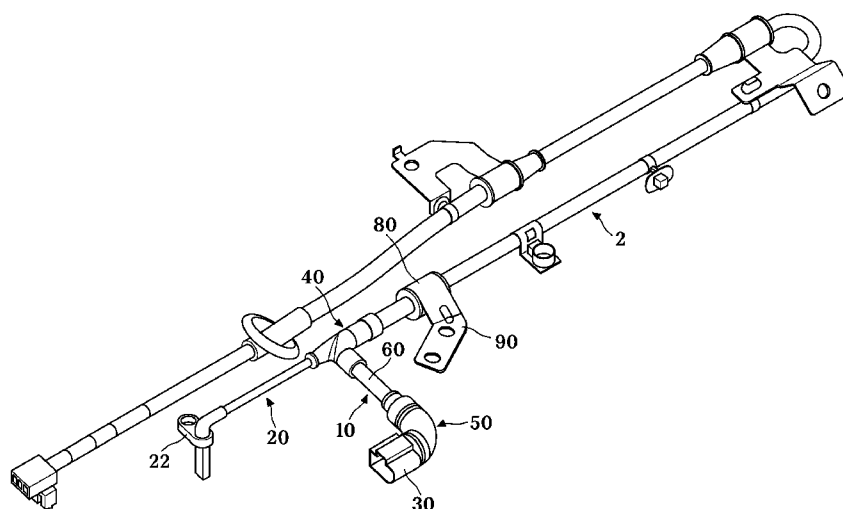
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(54) **Title:** SEAL MOLD DIVIDED STRUCTURE FOR COMBINATION CABLE AND METHOD FOR MANUFACTURING THE SAME



(57) **Abstract:** The present invention relates to a seal mold divided structure for combination cable. A seal mold divided structure for combination cable disclosed by the present invention is characterized in that it comprises the following structures: a first cable and a second cable separated from the combination cable; a connector provided at the end of the first cable; a division molding portion that molds the division part between the first cable and the second cable and keeps the first cable and the second cable separated from each other; a connector molding portion that molds the connection part between the connector and the first cable; and a protect tube, with its ends respectively fixed to the division molding portion and the connector molding portion to protect the first cable and prevent inflow of a molding compound.



Description

Title of Invention: SEAL MOLD DIVIDED STRUCTURE FOR COMBINATION CABLE AND METHOD FOR MANUFACTURING THE SAME

Technical Field

- [1] The present invention relates to a seal mold divided structure for combination cable and method for manufacturing the same, more specifically to a seal mold divided structure for combination cable and method for manufacturing the same, wherein cables respectively connected to a wheel speed sensor and electronic parking brake are fixed integrally in a separate state and the inner surface of the protect tube is formed into an ellipse to prevent inflow of a molding compound.

Background Art

- [2] Generally, the electronic parking brake (EPB) of a vehicle is a braking device that automatically locks the braking when the vehicle is stopped and automatically unlocks the braking once the acceleration pedal is stepped on at startup. As it can brake without the need of stepping on the brake, the EPB has been used in more and more vehicles.
- [3] By motor driving, the EPB grips or relaxes a disc, thus locking or unlocking the brake. An EPB cable, by using a connector, is connected to the motor to supply electric power. In addition, in order to sense the rotation speeds of wheels after an ABS is enabled, a wheel speed sensor (WSS) is equipped around the EPB. The WSS also transmits or receives sensing signals by using a cable.
- [4] However, in the past, an EPB cable and a WSS cable in a vehicle were equipped separately and connected to the motor and the WSS respectively. As the cables were set separately, it was difficult to sort out the cables clearly; consequently, the vehicle quality was affected.
- [5] In addition, in order to resolve the above-mentioned problem, an EPB cable and a WSS cable were bound and connected with each other. However, no suitable structure has been provided regarding the division point between a motor and a WSS to separate the cables.
- [6] Therefore, it is necessary to improve the aforesaid problem.
- [7] The background art of the present invention is what is described in Korean registered patent No. 10-0589195 (title of invention: An Electrodynamical Automatic Braking Device for Vehicles, dated 12 June 2006).

Disclosure of Invention

Technical Problem

- [8] Due to the aforesaid necessity, the present invention is proposed. Its purpose is to provide a seal mold divided structure for combination cable and method for manufacturing the same, wherein cables respectively connected to a wheel speed sensor and electronic parking brake are fixed integrally in a separate state and the inner surface of the protect tube is formed into an ellipse to prevent inflow of a molding compound.

Solution to Problem

- [9] In order to achieve the aforesaid purpose, the seal mold divided structure for combination cable disclosed by the present invention is characterized in that the structure comprises the following structures: a first cable and a second cable separated from the combination cable; a connector provided at the end of said first cable; a division molding portion that molds the division part between said first cable and second cable and keeps said first cable and second cable separated from each other; a connector molding portion that molds the connection part between said connector and said first cable; and a protect tube, with its ends respectively fixed to said division molding portion and said connector molding portion to protect said first cable and prevent inflow of a molding compound.
- [10] In addition, the present invention is characterized in that said connector can be used as the connector of an EPB and connect the WSS or the WSS extension cable connector to said second cable.
- [11] In addition, the present invention is characterized in that said division molding portion comprises the following structures: an integral portion, which wraps the outer surface of said combination cable and fixes it; a first division portion, which is formed by bending towards the side of the first cable exposed to said integral portion; a second division portion, which is formed by straightening towards the side of the second cable exposed to said integral portion.
- [12] In addition, the present invention is characterized in that, in order that a right angle is formed between said connector and said first cable, said connector molding portion bends to take a "┐" shape.
- [13] In addition, the present invention is characterized in that the outer surface of said protect tube is circular.
- [14] In addition, the present invention is characterized in that the inner surface of said protect tube is elliptical and that the protect tube closely fits the outer surface of said first cable, which comprises two winding displacements, thus preventing the inflow of a molding compound.
- [15] In addition, the present invention is characterized in that, in order to install a mounting bracket, a cord grommet portion is formed and integrated on the outer surface of said division molding portion.

- [16] In addition, the present invention is characterized in that said cord grommet portion is located on the integral portion of said division molding portion.
- [17] In order to achieve the aforesaid purpose, the method for manufacturing the seal mold divided structure for combination cable disclosed by the present invention is characterized in that it comprises the following steps of: removing the sheathing of the combination cable to expose the first cable and the second cable and separating them; providing a protect tube on the outer surface of the separated first cable; providing an EPB connector at the end of said first cable; providing a WSS at the end of said second cable; wrapping and molding the division portion between said first cable and second cable and one end of said protect tube to form a seal molded portion; and wrapping and molding the division portion between said connector and said first cable and the other end of said protect tube to separate it from said seal molded portion, thus forming a connector molded portion.
- [18] In addition, the present invention is characterized in that the inner surface of said protect tube is elliptical and that the protect tube closely fits the outer surface of said first cable, which comprises two winding displacements, thus preventing the inflow of a molding compound.

Advantageous Effects of Invention

- [19] With a seal mold divided structure for combination cable and method for manufacturing the same disclosed by the present invention, the first cable and the second cable respectively connected to an electronic parking brake and a wheel speed sensor are fixed integrally in a separate state.
- [20] In addition, on the outer surface of the first cable of an EPB disclosed by the present invention, a protect tube is provided to protect the first cable against damages.
- [21] In addition, in the present invention, the inner surface of the protect tube is elliptical and the protect tube closely fits the outer surface of the first cable; thus, inflow of a molding compound into the protect tube can be prevented; in addition, by maintaining injection pressure, the molding performance can be improved.
- [22] In addition, in the present invention, a division molding portion is formed; it is formed by simultaneously wrapping and molding the second cable of the WSS and the first cable of the EPB, capable of keeping the first cable and the second cable in a stable state of division.
- [23] In addition, in the present invention, a cord grommet portion is formed on the division molding portion integrating the first cable and the second cable, capable of supporting the cables conveniently.

Brief Description of Drawings

- [24] Figure 1 shows an oblique view of the complete structure of a combination cable

described in an embodiment of the present invention.

[25] Figure 2 shows an enlarged oblique view of the seal mold divided structure of a combination cable described in an embodiment of the present invention.

[26] Figure 3 shows the state in which the first cable and second cable are exposed after the sheathing of the combination cable is removed in an embodiment of the present invention.

[27] Figure 4 shows the state in which a protect tube is provided on the first cable in an embodiment of the present invention.

[28] Figure 5 shows a sectional view of the state in which the protect tube is provided on the first cable in an embodiment of the present invention.

[29] Figure 6 shows the state in which a cord grommet portion is formed on the division molding portion in a seal mold divided structure for combination cable according to the present invention.

[30] Figure 7 shows a flow chart of the procedure of manufacturing a seal mold divided structure of a combination cable described in an embodiment of the present invention.

Mode for the Invention

[31] By referring to the drawings, the following describes in detail the method for manufacturing a seal mold divided structure for combination cable according to the present invention.

[32] For ease and clarity of description, representations of the line thickness or sizes of structure elements shown in the drawings may be exaggerated. In addition, the terms used in the following description are the terms defined according to the functions in the present invention and vary with the intentions of users and operators or usual practice. Therefore, these terms should be defined on the basis of the entire contents of this specification.

[33] Figure 1 shows an oblique view of the complete structure of a combination cable described in an embodiment of the present invention. Figure 2 shows an enlarged oblique view of the seal molding divided structure of a combination cable described in an embodiment of the present invention. Figure 3 shows the state in which the first cable and second cable are exposed after the sheathing of the combination cable is removed in an embodiment of the present invention.

[34] Figure 4 shows the state in which a protect tube is provided on the first cable in an embodiment of the present invention. Figure 5 shows a sectional view of the state in which the protect tube is provided on the first cable in an embodiment of the present invention. Figure 6 shows the state in which a cord grommet portion is formed on the division molding portion in the seal mold divided structure for combination cable according to the present invention.

- [35] Figure 7 shows a flow chart of the procedure of manufacturing a seal mold divided structure of a combination cable described in an embodiment of the present invention.
- [36] As shown in Figure 1 to Figure 6, a seal mold divided structure of a combination cable described in an embodiment of the present invention comprises the first cable (10), the second cable (20), the connector (30), the division molding portion (40), the connector molding portion (50), and the protect tube (60).
- [37] As shown in Figure 1 and Figure 2, after the first cable (10) is separated from the combination cable (2), an electrical parking brake (EPB) is connected to its end. The first cable (10) is exposed outside by removing the sheathing (4) of the combination cable (2). The first cable (10) comprises two winding displacements, which can be configured with one below the other.
- [38] After the second cable (20) is separated from the combination cable (2), the wheel speed sensor (WSS) (22) or the WSS extension cable connector (24) is connected to its end. As shown in Figure 3, the second cable (20) is exposed outside by removing the outer sheathing (4) of the combination cable (2). In this case, the second cable (20) may additionally have the inner sheathing (6) on the inner side of the outer sheathing (4); thus, the two winding displacements of the second cable (20) cannot be exposed until the inner sheathing (6) is removed. The WSS (22) is connected to the two winding displacements of the second cable (20) and operates. In addition, as shown in Figure 6, the WSS extension cable connector (24) can further be connected to the end of the second cable (20).
- [39] The connector (30) is provided at the end of the first cable (10), allowing the EPB to work. After the connector (30) is connected to the end of the first cable (10), the connector molding portion (50) described below fixes it.
- [40] The division molding portion (40) is a molding structure that is molded in the divided part between the first cable (10) and the second cable (20) and keeps the first cable (10) and the second cable (20) in a divided state. By means of molding, the division molding portion (40) integrally fixes the combination cable (2), the second cable (20), which is formed by connecting to it in a straight line, and the first cable (10) division portion that bends into an $\sqcap$ shape, so that the combination cable (2) keeps the first cable (10) and the second cable (20) in a divided state.
- [41] The division molding portion (40) comprises the following structures: the integral portion (42), which wraps and fixes the outer surface of the outer sheathing (4) of the combination cable (2); the first division portion (44), which is formed by bending towards the side of the first cable (10) exposed to the integral portion (42); the second division portion (46), which is formed by straightening towards the side of the second cable (20) exposed to the integral portion (42). In this case, the diameter of the first division portion (44) almost remains the same from one end to the other end. This

ensures that the first division portion (44) secures one end of the protect tube (60) and keeps the first cable (10) bent. In addition, the diameter of the second division portion (46) gradually increases from one end to the other end. The diameter of the second cable (20) is smaller than the diameter of the protect tube (60) that wraps the first cable (10). Therefore, a diameter the same as that of the protect tube (60) that wraps the first division portion (44) is maintained. In order to improve the flexibility of the second cable (20), its diameter is made to gradually decrease towards its end. The division molding portion (40) wraps the separated first cable (10) and second cable (20) and the combination cable (2) not separated, thus preventing intrusion of any foreign matters, such as moisture.

[42] The connector molding portion (50) is a structure that molds the connection portion between the connector (30) and the first cable (10). The connector molding portion (50) can mold concurrently with, before, or after the division molding portion (40). The connector molding portion (50) bends to be $\sqcap$ -shaped; thus, when the connector (30) is set, the first cable (10) can be bent to reach a preset degree and direction. The connector molding portion (50) is roughly right-angled. The connector molding portion (50) wraps the separated first cable (10) and part of the connector (30), capable of preventing intrusion of foreign matters, such as moisture.

[43] As shown in Figure 4 and Figure 5, the protect tube (60) is a structure that protects the first cable (10), with its ends respectively fixed to the division molding portion (40) and the connector molding portion (50). The outer surface of the protect tube (60) is circular. The protect tube (60) can be made of Thermoplastic Poly Urethane (TPU) rubber. The protect tube (60) can also be made of one of other various types of rubber or soft synthetic resin. As shown in Figure 5, the inner surface (62) of the protect tube (60) can be elliptic and the protect tube closely fits the outer surface of said first cable (10), which comprises two winding displacements, thus preventing the inflow of a molding compound. Therefore, when the division molding portion (40) and the connector molding portion (50) are molded respectively on either side of the protect tube (60), a molding compound can be prevented from flowing into the inner side of the protect tube (60) through the open spaces on both sides of the protect tube (60). In this case, the inner surface of the protect tube (60) is an ellipse (62). Due to rubbing action, it may be difficult to insert the first cable (10), which comprises two winding displacements. However, the protect tube (60) alone can block the inflow of a molding compound, without the need of any additional blocking component (not shown in the figure). Thus, the number of components can be reduced.

[44] As shown in Figure 6, in order to install the mounting bracket (90), the cord grommet portion (80) is formed and integrated on the outer surface of the division molding portion (40). As shown in Figure 1, when the cord grommet portion (80) is set on the

division molding portion (40) and in any other position on the combination cable (2), the number of components may increase. In contrast, as shown in Figure 6, when the cord grommet portion (80) is integrated with the division molding portion (40), the number of components and manufacture costs can be reduced. In this case, if the cord grommet portion (80) is provided on the integral portion (42) of the division molding portion (40), it is convenient to install the mounting bracket (90).

- [45] By referring to Figure 7, the following describes in detail the specific procedure of the method for manufacturing a seal mold divided structure for combination cable according to the present invention.
- [46] First, the method for manufacturing a seal mold divided structure for combination cable according to the present invention comprises the steps of: exposing and dividing (S10), sheathing setting (S20), connector setting (S30), WSS setting (S40), forming the division molding portion (S50), and forming the connector molding portion (S60).
- [47] The step of exposing and dividing (S10) is the step of removing the outer sheathing (4) of the combination cable (2) to expose and separate partial sections of the first cable (10) and the second cable (20). In this case, part of the inner sheathing (6) possibly remains on the second cable (20).
- [48] The step of sheathing setting (S20) is the step of setting the sheathing (60) on the outer surface of the separated first cable (10). The outer surface of the sheathing (60) is circular, and the sheathing's inner surface (62) is elliptical. Therefore, the side face of the sheathing (60) fits the first cable (10) as closely as possible. When the division molding portion (40) and the connector molding portion (50) are molded, a molding compound can be prevented from flowing into the inner side of the protect tube (60).
- [49] The connector setting step (S30) is the step of setting the EPB connector (30) at the end of the first cable (10).
- [50] The step of WSS setting (S40) is the step of setting the WSS (22) at the end of the second cable (20).
- [51] The step of forming the division molding portion (S50) is the step of wrapping the division portion between the first cable (10) and the second cable (20) and one end of the protect tube (60) to form the division molding portion (40). The division molding portion (40) concurrently wraps the division portion between the first cable (10) and the second cable (20) and part of the combination cable (2), thus preventing intrusion of any foreign matters, such as moisture.
- [52] The step of forming (S60) the connector molding portion (40) is the step of wrapping the connection portion between the connector (30) and the first cable (10) and the other end of the protect tube (60) to form the connector molding portion (50). The connector molding portion (50) bends to take the shape of "┐". The connector molding portion (50) wraps the first cable (10) and part of the connector (30), capable of preventing

intrusion of foreign matters, such as moisture.

[53] While the present invention has been particularly described above with reference to preferred embodiments shown in the drawings, it should be understood that said embodiments are only exemplary and that those of ordinary skill in the art can make various modifications and equivalent substitutions therefrom.

[54] Therefore, the technical protection scope of the present invention should be defined by the following Claims.

[55]

[56] **[Description of Symbols]**

[57] 2: Combination cable 10: First cable

[58] 20: Second cable 22: WSS

[59] 30: Connector 40: Division molding portion

[60] 42: Integral portion 44: First division portion

[61] 46: Second division portion 50: Connector molding portion

[62] 60: Protect tube 62: Inner surface

[63] 80: Cord grommet portion 80: Mounting bracket

[64] S10 ~ S60: Steps of the manufacture method according to the present invention.

Claims

- [Claim 1] Seal mold divided structure for combination cable, characterized in that said structure comprises the following structures:
a first cable and a second cable separated from the combination cable;
a connector provided at the end of said first cable;
a division molding portion that molds the division part between said first cable and second cable and keeps said first cable and second cable separated from each other;
a connector molding portion that molds the connection part between said connector and said first cable; and
a protect tube, with its ends respectively fixed to said division molding portion and said connector molding portion to protect said first cable and prevent inflow of a molding compound.
- [Claim 2] Seal mold divided structure for combination cable according to Claim 1, characterized in that
said connector can be used as the connector of an electronic parking brake (EPB); and
a wheel speed sensor (WSS) or a WSS extension cable connector is connected to said second cable.
- [Claim 3] Seal mold divided structure for combination cable according to Claim 1, characterized in that
said division molding portion comprises the following structures:
an integral portion, which wraps the outer surface of said combination cable and fixes it;
a first division portion, which is formed by bending towards the side of the first cable exposed to said integral portion; and
a second division portion, which is formed by straightening towards the side of the second cable exposed to said integral portion.
- [Claim 4] Seal mold divided structure for combination cable according to Claim 1, characterized in that, in order that a right angle is formed between said connector and said first cable, said connector molding portion bends to take an "┐" shape.
- [Claim 5] Seal mold divided structure for combination cable according to Claim 1, characterized in that the outer surface of said protect tube is circular.
- [Claim 6] Seal mold divided structure for combination cable according to Claim 1 or Claim 5, characterized in that
the inner surface of said protect tube is elliptical, and the protect tube

closely fits the outer surface of said first cable, which comprises two winding displacements, thus preventing the inflow of a molding compound.

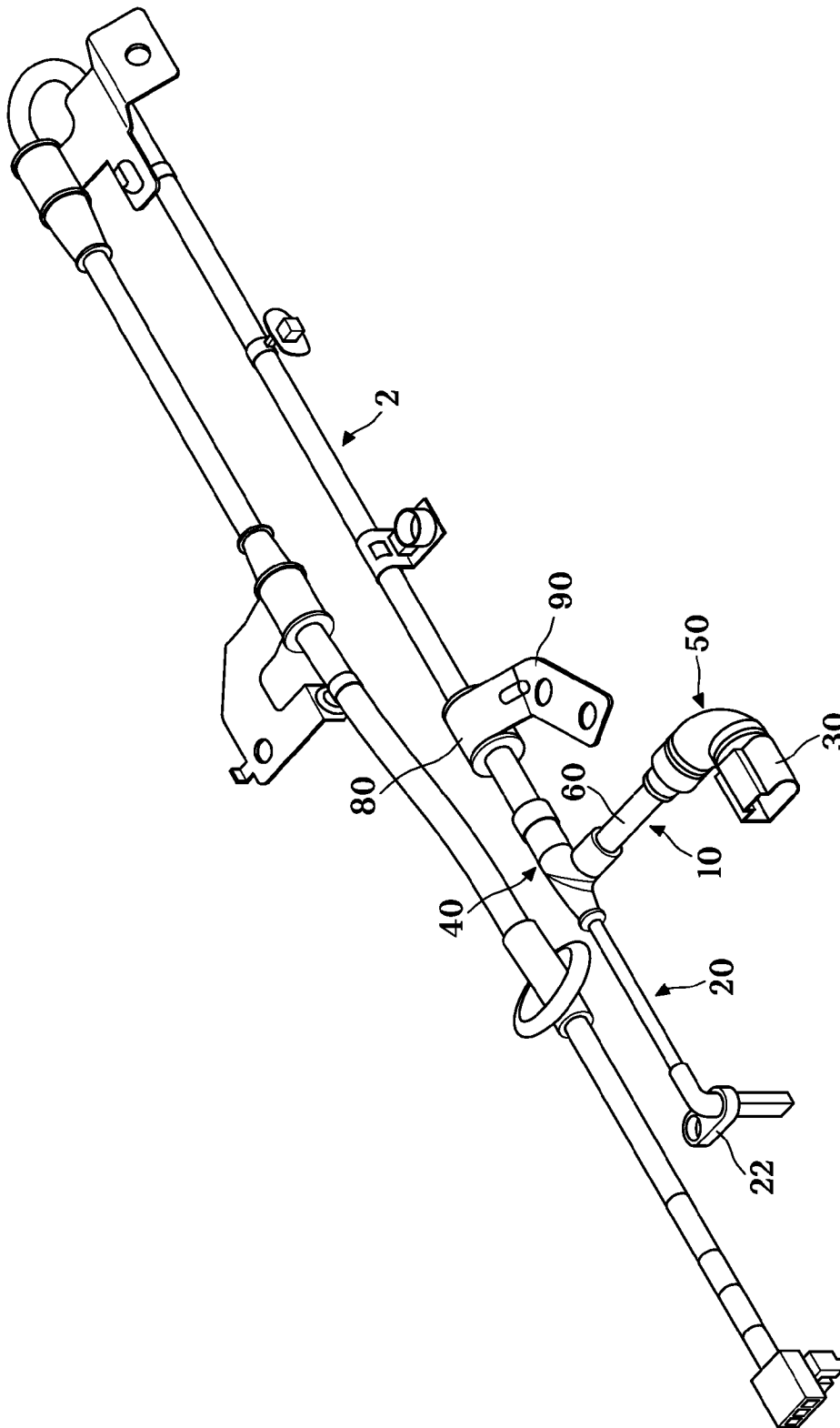
[Claim 7] Seal mold divided structure for combination cable according to Claim 1, characterized in that a cord grommet portion is formed and integrated on the outer surface of said division molding portion, allowing a mounting bracket to be installed.

[Claim 8] Seal mold divided structure for combination cable according to Claim 7, characterized in that said cord grommet portion is located on the integral portion of said division molding portion.

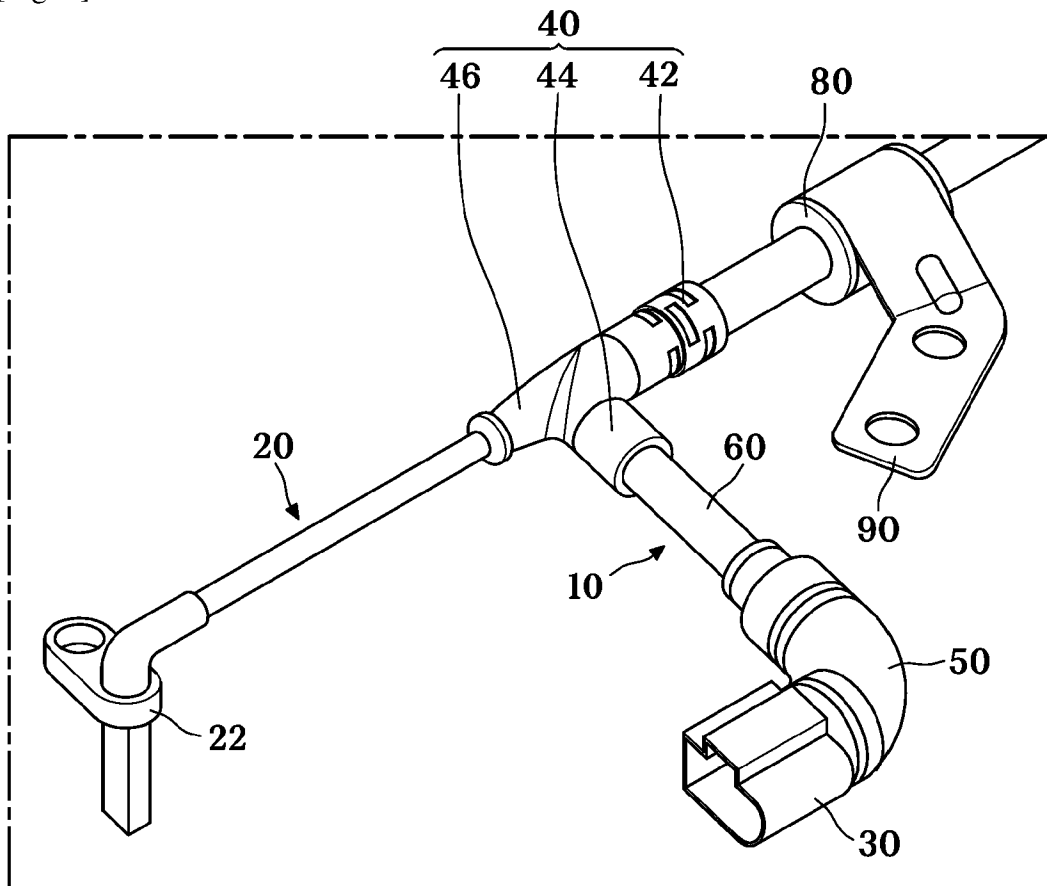
[Claim 9] Method for manufacturing a seal mold divided structure for combination cable, characterized in that said method comprises the following steps of:
removing the sheathing of the combination cable to expose the first cable and the second cable and separate them;
providing a protect tube on the outer surface of the separated first cable;
providing an EPB connector at the end of said first cable;
providing a WSS at the end of said second cable;
wrapping and molding the division portion between said first cable and second cable and one end of said protect tube to form a seal molded portion; and
wrapping and molding the division portion between said connector and said first cable and the other end of said protect tube to separate it from said seal molded portion, thus forming a connector molded portion.

[Claim 10] Method for manufacturing a seal mold divided structure for combination cable according to Claim 9, characterized in that the inner surface of said protect tube is elliptical, and the protect tube closely fits the outer surface of said first cable, which comprises two winding displacements, thus preventing the inflow of a molding compound.

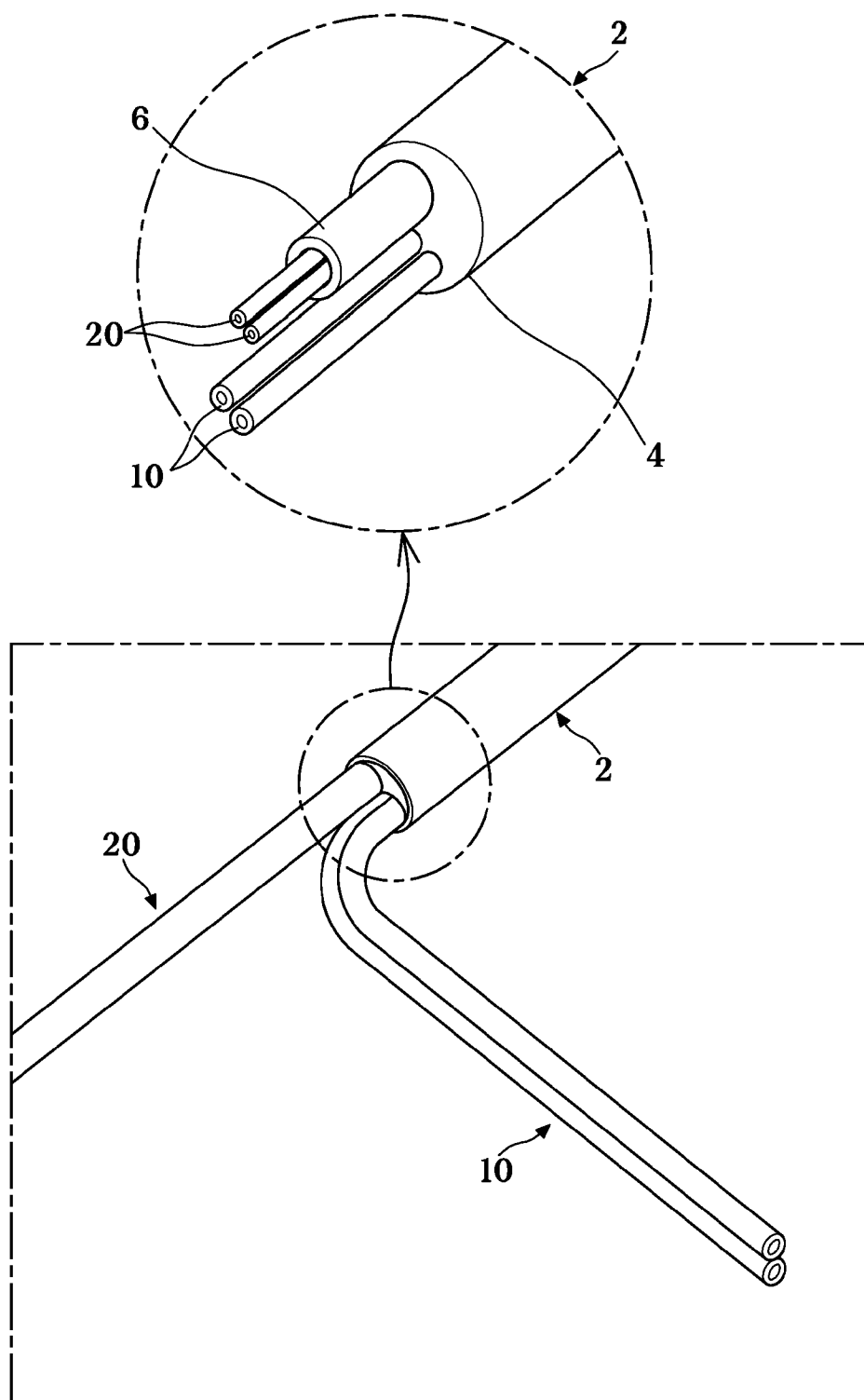
[Fig. 1]



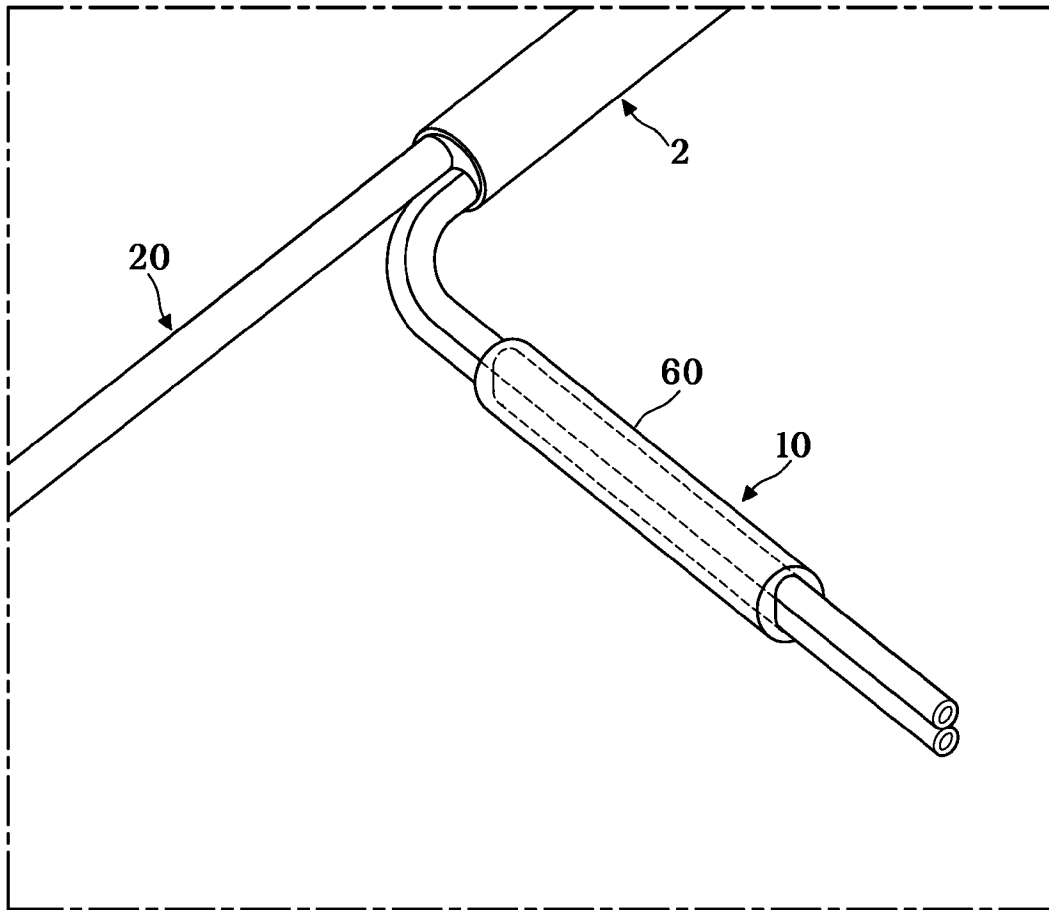
[Fig. 2]



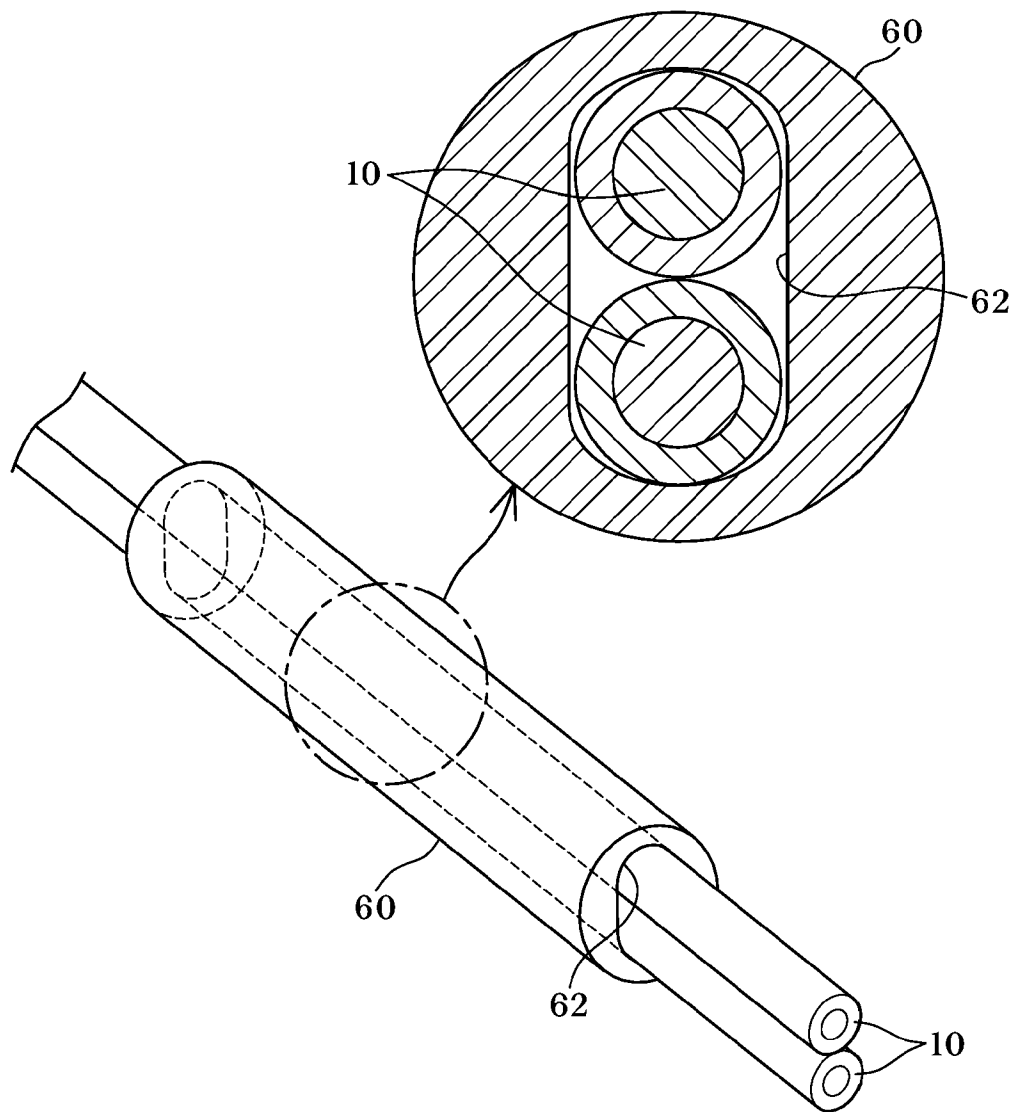
[Fig. 3]



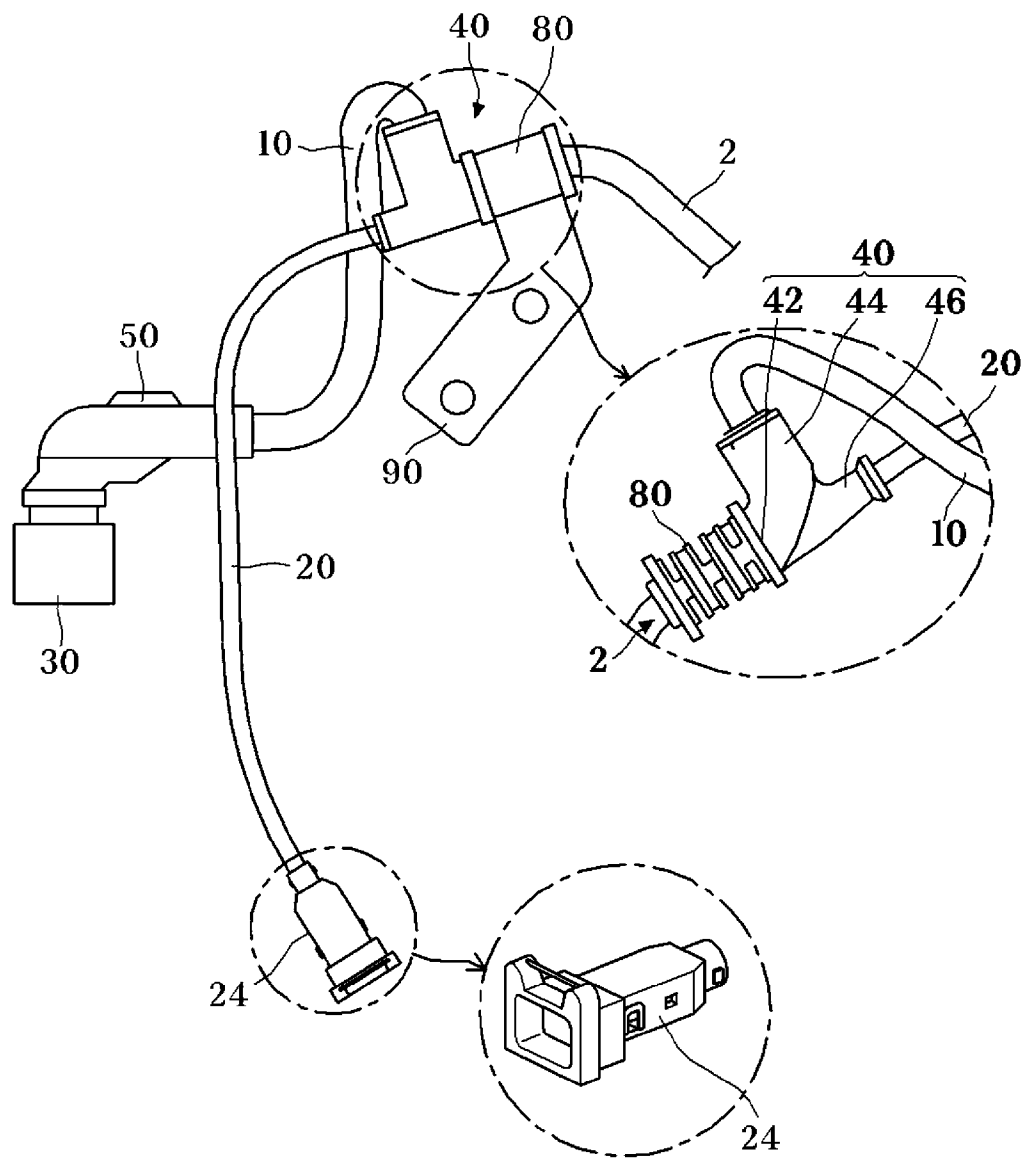
[Fig. 4]



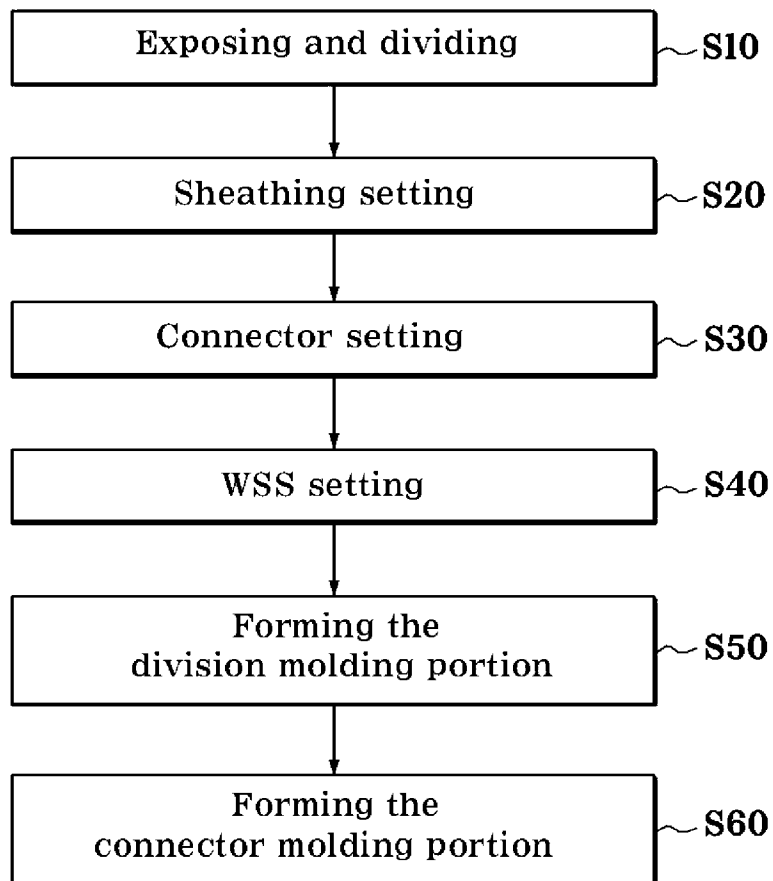
[Fig. 5]



[Fig. 6]



[Fig. 7]



INTERNATIONAL SEARCH REPORT

 International application No.
PCT/KR2016/001752

A. CLASSIFICATION OF SUBJECT MATTER

H02G 15/00 (2006.01) B60T 11/00 (2006.01) H01R 13/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases: EPODOC, WPIAP, Inspec, Google patents, Google scholar, Google images

Keywords: mold, heat shrink, division, cable, connector, EPB, WSS etc.

IPC marks: B60T, F16D, H02G, H01R13/00

Auspat, Espacenet and IP Australia's internal databases: Applicant's name (CONTINENTAL AUTOMOTIVE ELECTRONICS LLC.) inventor's name (CHO, Yong Woon), application title (Seal mold divided structure and method of making the same)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



Further documents are listed in the continuation of Box C



See patent family annex

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Date of the actual completion of the international search 28 June 2016	Date of mailing of the international search report 28 June 2016
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au	Authorised officer Riju Jacob AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832220

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. PCT/KR2016/001752
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/103499 A1 (SUMITOMO WIRING SYSTEMS, LTD.) 03 July 2014 Abstract, paras 0011-0049, figures 1-11	1-10
A	CN 201549861 U (CHONGQING CHANGAN AUTOMOBILE) 11 August 2010 Abstract, Figures 1, 2	1-10

INTERNATIONAL SEARCH REPORT Information on patent family members		International application No. PCT/KR2016/001752	
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Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
WO 2014/103499 A1	03 July 2014	WO 2014103499 A1	03 Jul 2014
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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. Form PCT/ISA/210 (Family Annex)(July 2009)			