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(54) CONNECTING STRUCTURE OF SHIELDED WIRE FOR SHIELD CONNECTOR

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(57) **ABSTRACT**

A terminal is provided on a first face of a conductive plate member. A holder member holds a shielded wire therein. The holder member is provided with a conductive part. The holder member is attached on a second face of the plate member, so that the shielded wire is electrically connected to the terminal. A resilient contact member is interposed between the holder member and the second face of the plate member. The contact member includes a flat face portion which is brought into surface contact with at least one of the conductive part of the holder member and the second face of the plate member.

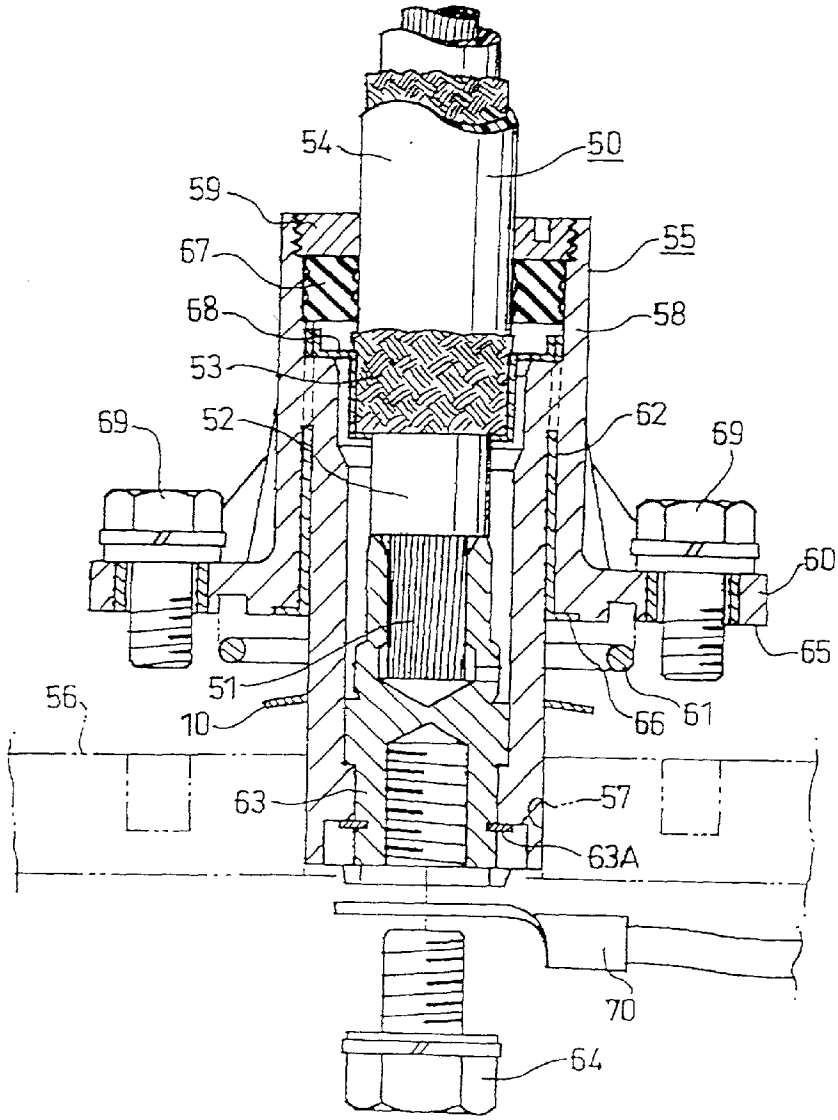


Fig. 1

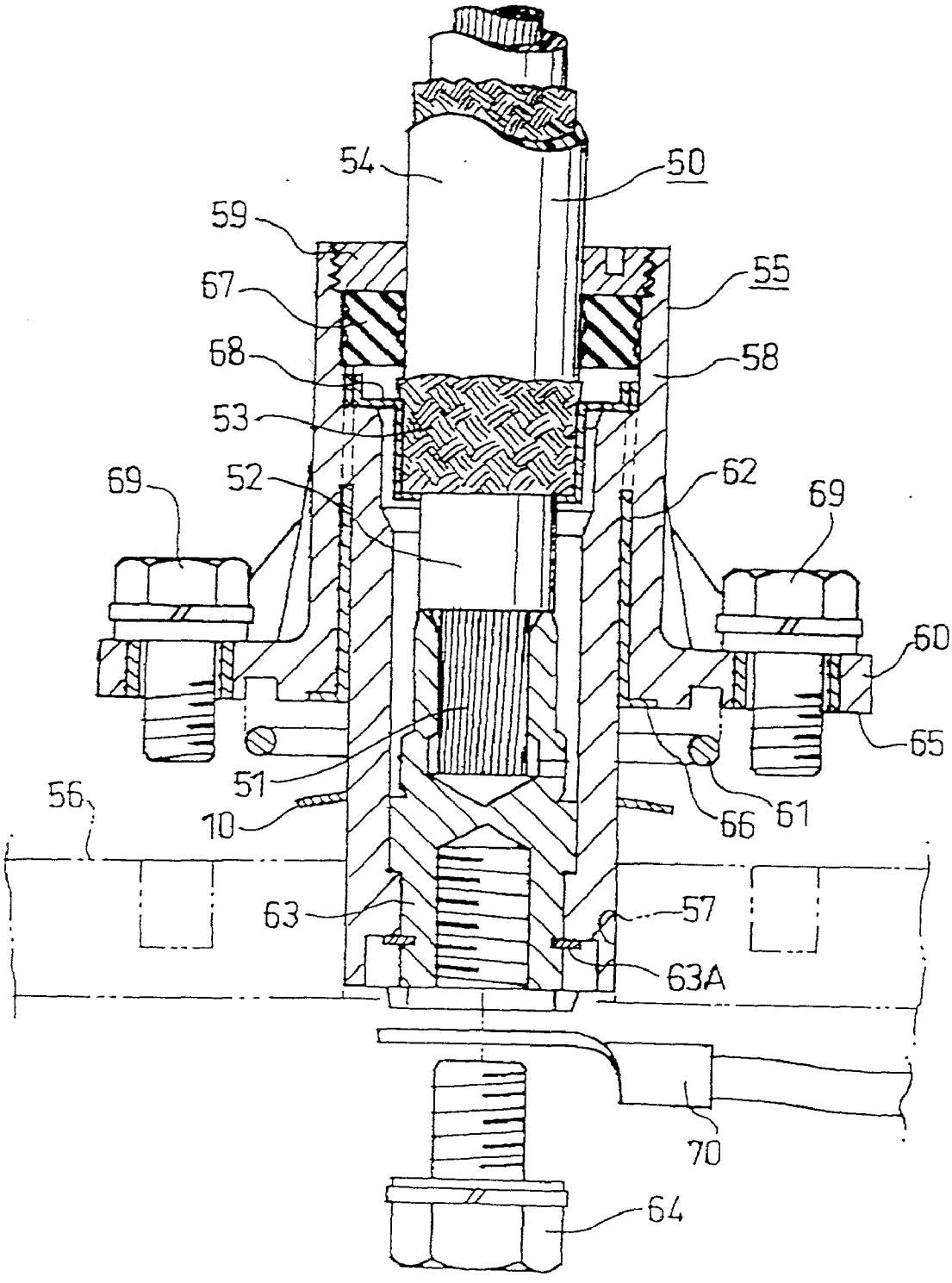


Fig. 2

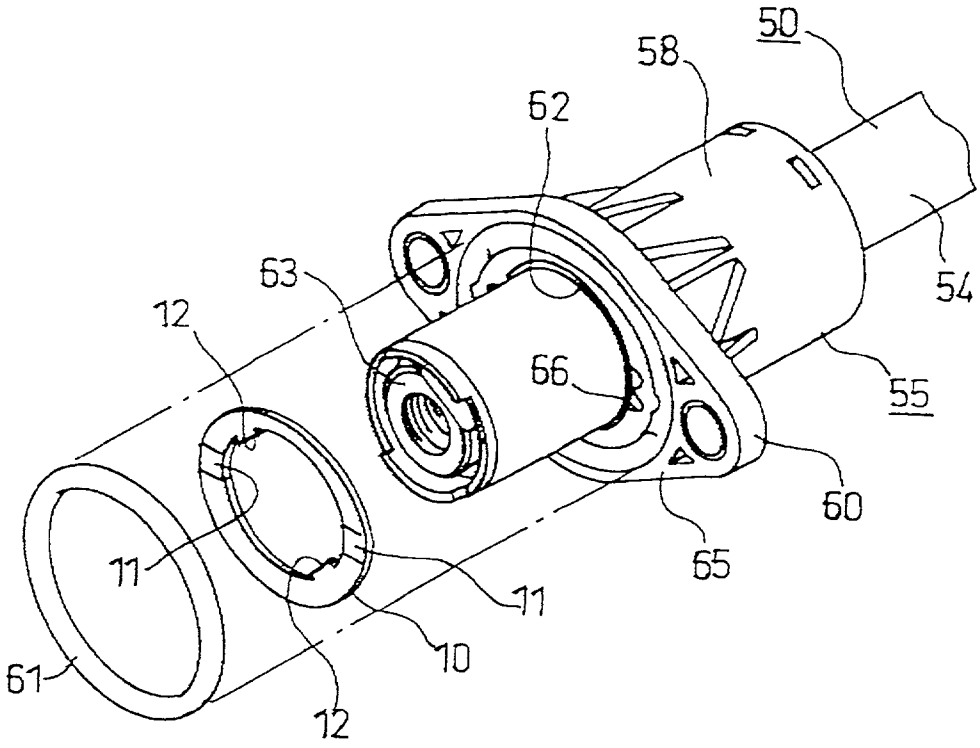


Fig. 3A

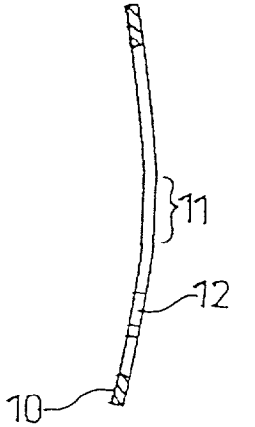


Fig. 3B

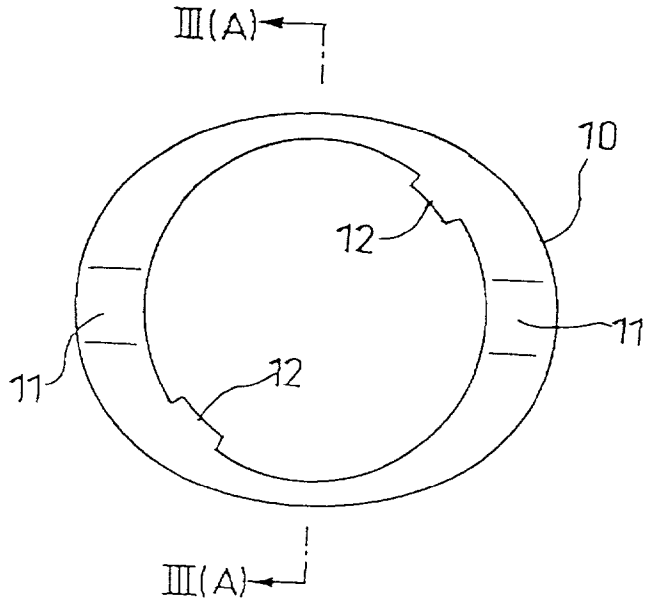


Fig. 4

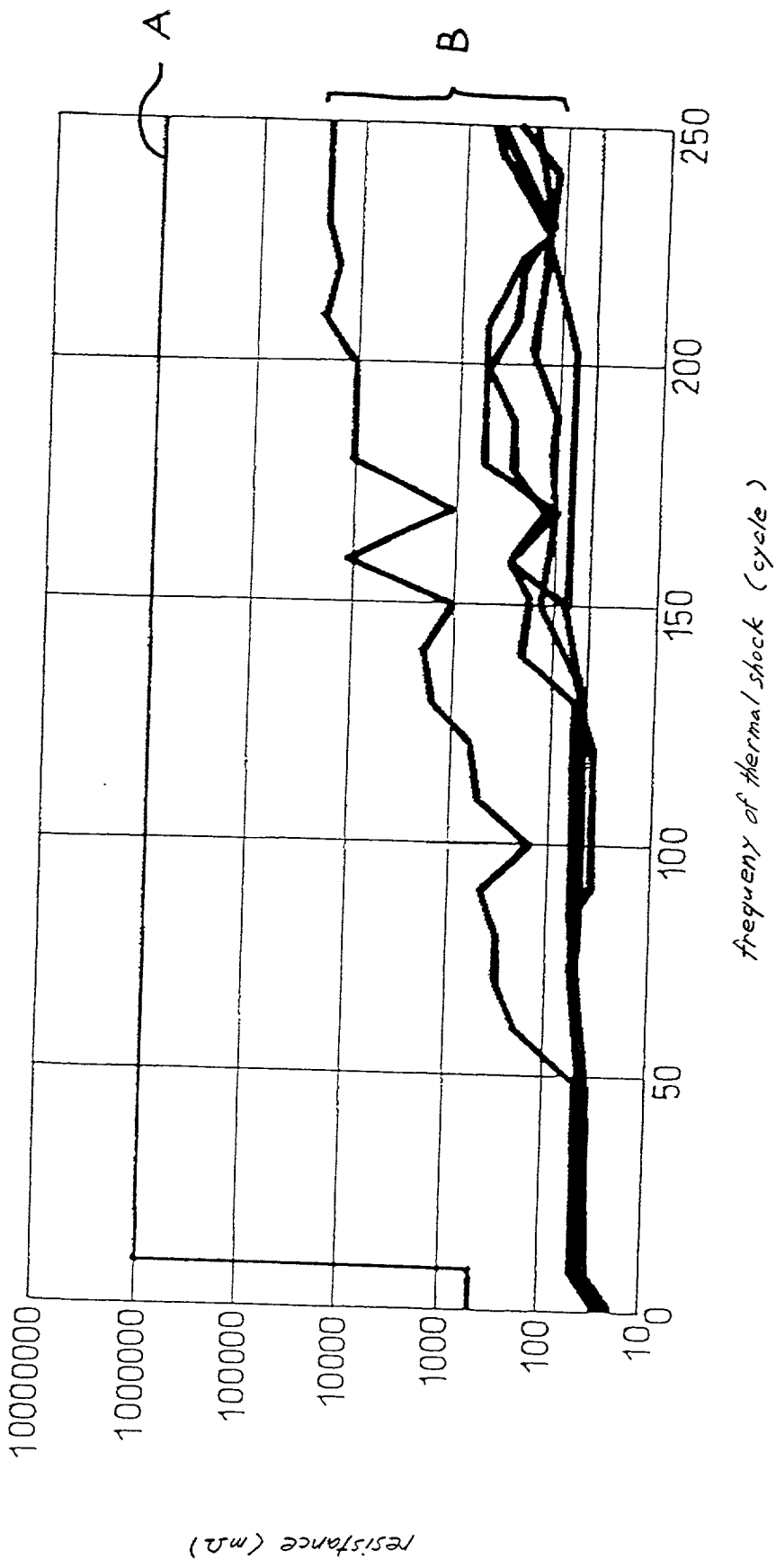
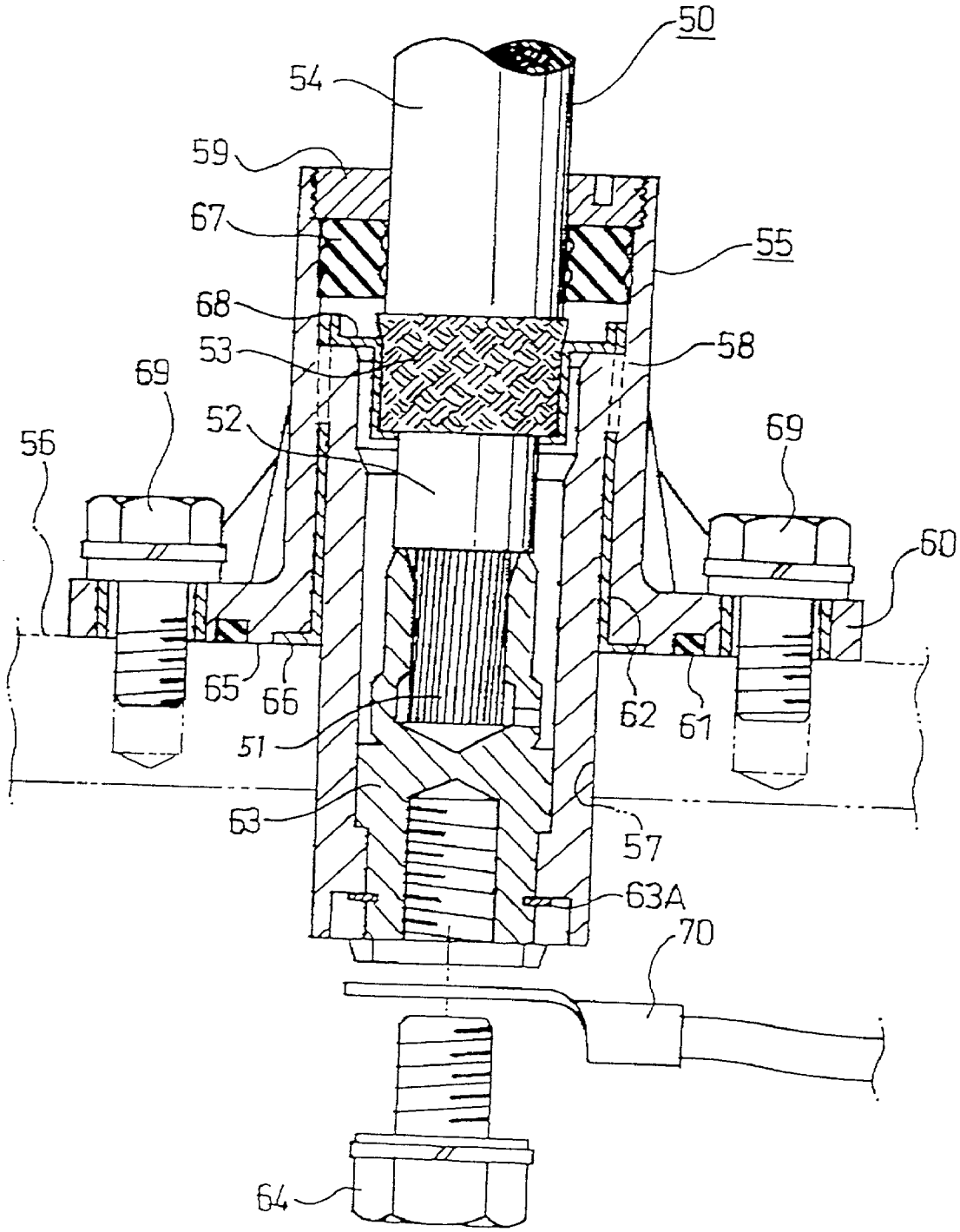

A
B
10000000
1000000
100000
10000
1000
100
10
0
50
100
150
200
250
resistance (mΩ)
frequency of thermal shock (cycle)

Fig. 3



CONNECTING STRUCTURE OF SHIELDED WIRE FOR SHIELD CONNECTOR

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a connecting structure of a shielded wire for a shield connector, and more particularly to connecting structure of the shielded wire of the shield connector which can maintain favorable electromagnetic shielding performance.

[0002] In a driving motor mounted on an automobile, for example, many shielded wires have been employed in order to prevent diffusion of noises which are generated from the motor.

[0003] As shown in **FIG. 5, a** shielded wire **50** consists of a core wire **52**, an insulating layer **52**, a braided shielding part **53**, and a sheath **54** which are laminated concentrically. In this shielded wire **50**, the core wire **51** is exposed to be press-fitted to a terminal by caulking, and the braided shielding part **53** is folded back so as to cover the sheath **54** and connected to a stepped metal cylinder **68** by caulking.

[0004] The shielded wire **50** of this type is fixed to an outer face of a motor case **56** by a shield connector **55**, while the braided shielding part **53** is electromagnetically connected to the motor case **56**.

[0005] The shield connector **55** includes: an insulating cylinder **58** which is adapted to be inserted into a through hole formed in the motor case **56**; a rear holder **59** which is fitted to the insulating cylinder **58** after the shielded wire **50** has been inserted into the insulating cylinder **58** thereby to retain a gasket **67** and to prevent vibration of the shielded wire **50**; a flange **60** which is provided on an outer face of the insulating cylinder **58** and can be fixed to the outer face of the motor case **56**; an O-ring **61** interposed between the motor case **56** and the flange **60**; and a metal cylinder **62** for electromagnetic shielding which is inserted into the insulating cylinder **58** coaxially therewith for fixation.

[0006] A terminal fitting **63** contained in the insulating cylinder **58** is not axially rotatable about the insulating cylinder **58**, and has one end (an upper end portion in **FIG. 5**) into which the core wire **51** can be inserted and the other end (a lower end portion in **FIG. 5**) into which a connecting bolt **64** is adapted to be screwed.

[0007] The metal cylinder **62** has an axial length extending from an end of the braided shielding part **53** to a contact face **65** of the flange **60**, and is provided with contact pieces **66** along the contact face of the flange **60**.

[0008] In the shield connector **55** of this type, the shielded wire **50** has been in advance passed through the rear holder **59**, the gasket **67** and the stepped metal cylinder **68**, then, the stepped metal cylinder **68** has been connected to the braided shielding part **53** by caulking, and further, the core wire **51** of the shielded wire **50** has been connected to the one end of the terminal fitting **63** by caulking. Thereafter, the terminal fitting **63** is allowed to be contained in the insulating cylinder **58**. The terminal fitting **63** is fixed to the insulating cylinder **58** by a C-ring **63A**.

[0009] In the next step, by screwing a fixing bolt **69** passed through the flange **60** with the outer face of the motor case **56**, the shield connector **55** is fixed to the motor case **56** so that a tip end of the insulating cylinder **58** (a lower end in **FIG. 5**) may project into the motor case **56**.

[0010] On this occasion, electromagnetic shielding performance of the shield connector **55** can be obtained through a contact between the contact pieces **66** of the metal cylinder **62** and the outer face of the motor case **56**, and in addition, waterproofing property at contact areas between the contact pieces **66** and the motor case **56** can be obtained by the O-ring **61**.

[0011] In the shield connector **55** having such a structure, a terminal **70** is connected to the terminal fitting **63** by the connecting bolt **64**.

[0012] However, in the above described shield connector **55**, the contact pieces **66** of the metal cylinder **62** is not resiliently in contact with the motor case **56**, and therefore, when the flange **60** is thermally shrank or thermally deformed under high temperature condition or by a thermal shock, etc., resistance value will be increased due to an incomplete contact which has occurred at the contact areas between the contact pieces **66** and the motor case **56**, and hence, there has been a probability that the electromagnetic performance may be deteriorated.

[0013] Especially, in the above described shield connector **55**, the O-ring **61** interposed between the motor case **56** and the flange **60** urges the flange **60** to be separated from the motor case **56**, and hence, there has been a probability that the deterioration of the electromagnetic performance under the high temperature condition or due to the thermal shock, etc. may be significantly increased.

[0014] In order to solve such problems, there is proposed a shield connector in which a conductive contact body having resiliency is interposed between the contact pieces and the motor case (Japanese Patent Publications Nos. 8-64306A and 8-78098A, for example).

[0015] According to these related structures, the deterioration of the electromagnetic performance will not be likely to occur, even under the high temperature condition or even though a thermal shock has been applied.

[0016] However, in the above described structures, because the conductive contact body is in a form of a spring washer, when the flange has been separated from the motor case under the high temperature condition or due to the thermal shock, etc., the conductive contact body is brought into spot contact or linear contact with either one or both of the motor case and the flange thereby to increase the resistance value. Thus, there has been a fear that the electromagnetic shielding performance may be deteriorated.

SUMMARY OF THE INVENTION

[0017] It is therefore an object of the invention to provide a structure of a shielded connector for a shield connector which is capable of maintaining favorable electromagnetic shielding performance even under high temperature conduction or even though a thermal shock has been applied.

[0018] In order to attain the above described object, according to the invention, there is provided a structure for connecting a shielded wire and a terminal, comprising:

[0019] a conductive plate member, on a first face of which the terminal is provided;

[0020] a holder member, for holding the shielded wire therein, the holder member provided with a conductive part, the holder member attached on a second face of the plate member, so that the shielded wire is electrically connected to the terminal; and

[0021] a resilient contact member, interposed between the holder member and the second face of the plate member, the contact member including a flat face portion which is brought into surface contact with at least one of the conductive part of the holder member and the second face of the plate member.

[0022] The conductive contact body may be in a form of a spring washer or a wave washer, and can be of any optional shape, provided that there exist the flat face portion intersecting an axis of the shielded wire substantially perpendicularly.

[0023] In this configuration, even though the holder member has been separated from the plate member under the high temperature condition or due to the thermal shock, etc., the contact member can maintain constant contact areas with at least one of the plate member and the holder member. Therefore, the probability that the electromagnetic shielding performance may be deteriorated due to the increase of the resistance value can be reduced.

[0024] Preferably, the contact member includes an engagement member engaged with the holder member so as to secure the surface contact part.

[0025] In this configuration, the surface contact of the flat face portion can be reliably maintained, whereby favorable electromagnetic shielding performance can be reliably maintained.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] In the accompanying drawings:

[0027] **FIG. 1** is a sectional view showing a connection structure of a shielded wire for a shield connector according to one embodiment of the invention;

[0028] **FIG. 2** is a perspective view showing an essential part of **FIG. 1**;

[0029] **FIGS. 3A and 3B** are sectional view and a plan view showing a conductive contact body, respectively.

[0030] **FIG. 4** is a graph showing relations between frequencies of thermal shocks and resistance values; and

[0031] **FIG. 5** is a sectional view showing a related connection structure of a shielded wire for a shield connector.

DETAILED DESCIPTION OF THE PREFERRED EMBODIMENTS

[0032] Now, one embodiment according to the invention will be described in detail referring to the accompanying drawings. In the embodiment which will be described below, those components as have already been described in **FIG. 5** will be denoted with the same or corresponding reference numerals, and their explanation will be simplified or omitted.

[0033] As shown in **FIG. 1**, the shield connector **55** includes, in the same manner as the related shield connector, the insulating cylinder **58**, the rear holder **59**, the flange **60** which can be fixed to the outer face of the motor case **56**, the O-ring **61** adapted to be interposed between the motor case **56** and the flange **60**, and the metal cylinder **62** which is coaxially inserted into the insulating cylinder **58**.

[0034] This shield connector **55** earths the braided shielding part **53** of the electric wire **50** and the motor case **56**. When the shield connector **55** is connected to the motor case **56**, a resilient conductive contact body **10** is interposed between the motor case **56** and the flange **60**.

[0035] As also shown in **FIGS. 2, 3A** and **3B**, the conductive contact body **10** is substantially in a form of a wave washer, and provided with flat faces **11** which can be in surface contact with the contact pieces **66** of the metal cylinder **62**, and a pair of claws **12** on its inner peripheral face.

[0036] This contact body **10** is not axially rotatable about the insulating cylinder **58** by locking the claws **12** with a groove (not shown) which is formed around an outer peripheral face of the insulating cylinder **58**, and thus, the flat faces **11** can be maintained in surface contact with the contact pieces **66** of the metal cylinder **62**.

[0037] According to the shield connector **55** having the described structure, because the contact body **10** has the flat faces **11** which can be in surface contact with the contact pieces **66** of the metal cylinder **62**, even though the flange **60** has been separated from the motor case **56** under high temperature condition or due to a thermal shock, etc., the contact body **10** can maintain constant contact areas with the contact pieces **66**, and hence, the probability that the electromagnetic shielding performance may be deteriorated due to the increase of the resistance value can be reduced.

[0038] Especially, the above described conductive contact body **10** is free from a probability of axially rotating about the insulating cylinder **58** because of presence of the claws **12** on the inner peripheral face thereof, and accordingly, the surface contact of the flat faces **11** with respect to the contact pieces **66** can be reliably maintained, whereby favorable electromagnetic shielding performance can be reliably maintained.

[0039] **FIG. 4** shows a graph representing changes of the resistance values between the outer face of the motor case **56** and the metal cylinder **62** relative to an increase of frequency of the thermal shock.

[0040] In this graph, A denotes a case wherein the contact body having no flat faces is employed, whereas B denotes a plurality of examples wherein the contact body provided with the flat faces is employed as in the present embodiment.

[0041] As seen in the drawing, it is found, in the case A, that when the frequency of the thermal shock exceeds a specific value, the resistance value is abruptly increased. On the other hand, in the cases B, it is found that even though the frequency of the thermal shock is increased, such an abrupt increase of the resistance value is not observed, but relatively stable resistance values can be obtained.

[0042] Therefore, it can be confirmed that it is effective to employ the contact body provided with the flat faces which can be in surface contact with the contact pieces of the metal cylinder.

[0043] It is to be noted that the invention is not restricted to the above described embodiments, but appropriate changes and modifications can be made. For example, material, shape, dimension, form, number, position, etc. of the fitting plate, the shielded wire, the core wire, the terminal, the insulating cylinder, the fixing member, the flange, the elastic member, the metal cylinder, the contact body, and the flat faces are not limited but optional, provided that the invention can be attained.

What is claimed is:

1. A structure for connecting a shielded wire and a terminal, comprising:

a conductive plate member, on a first face of which the terminal is provided;

a holder member, for holding the shielded wire therein, the holder member provided with a conductive part, the holder member attached on a second face of the plate member, so that the shielded wire is electrically connected to the terminal; and

a resilient contact member, interposed between the holder member and the second face of the plate member, the contact member including a flat face portion which is brought into surface contact with at least one of the conductive part of the holder member and the second face of the plate member.

2. The connecting structure as set forth in claim 1, wherein the contact member includes an engagement member engaged with the holder member so as to secure the surface contact part.

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