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(54) **SHIELDED FLAT CABLE**

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(57) **ABSTRACT**

A shielded flat cable includes a plurality of flat conductors arranged in parallel, a pair of resin insulating layers sandwiching the flat conductors from both sides of a parallel surface of the flat conductors, and covering portions other than end portions of the flat conductors in a length direction, a pair of shield layers in contact with an outer surface of at least one resin insulating layer of the pair of resin insulating layers, and a pair of first resin films with an adhesive covering an outer surface of the pair of resin insulating layers or the shield layer. A dielectric loss tangent of the resin insulating layer, of the pair of resin insulating layers, in contact with the shield layer is 0.001 or less at 10 GHz, and the adhesive or the pair of first resin films is made of a flame retardant material.

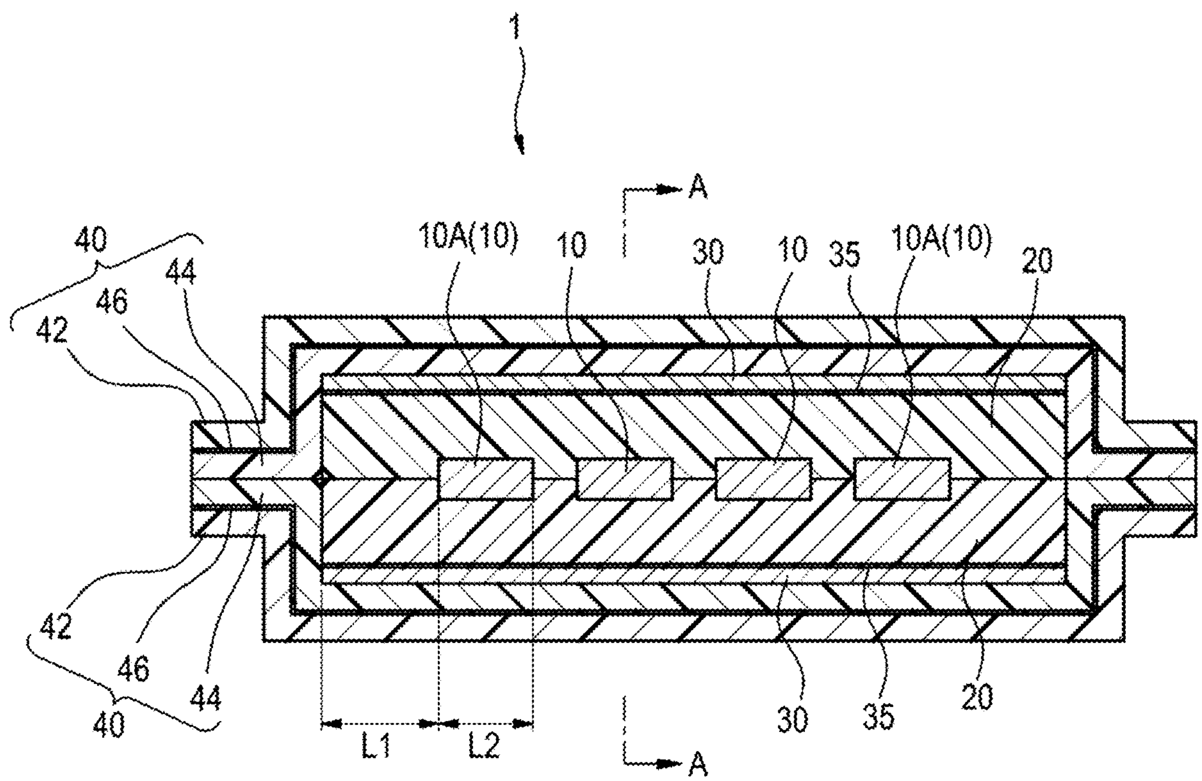


FIG. 1

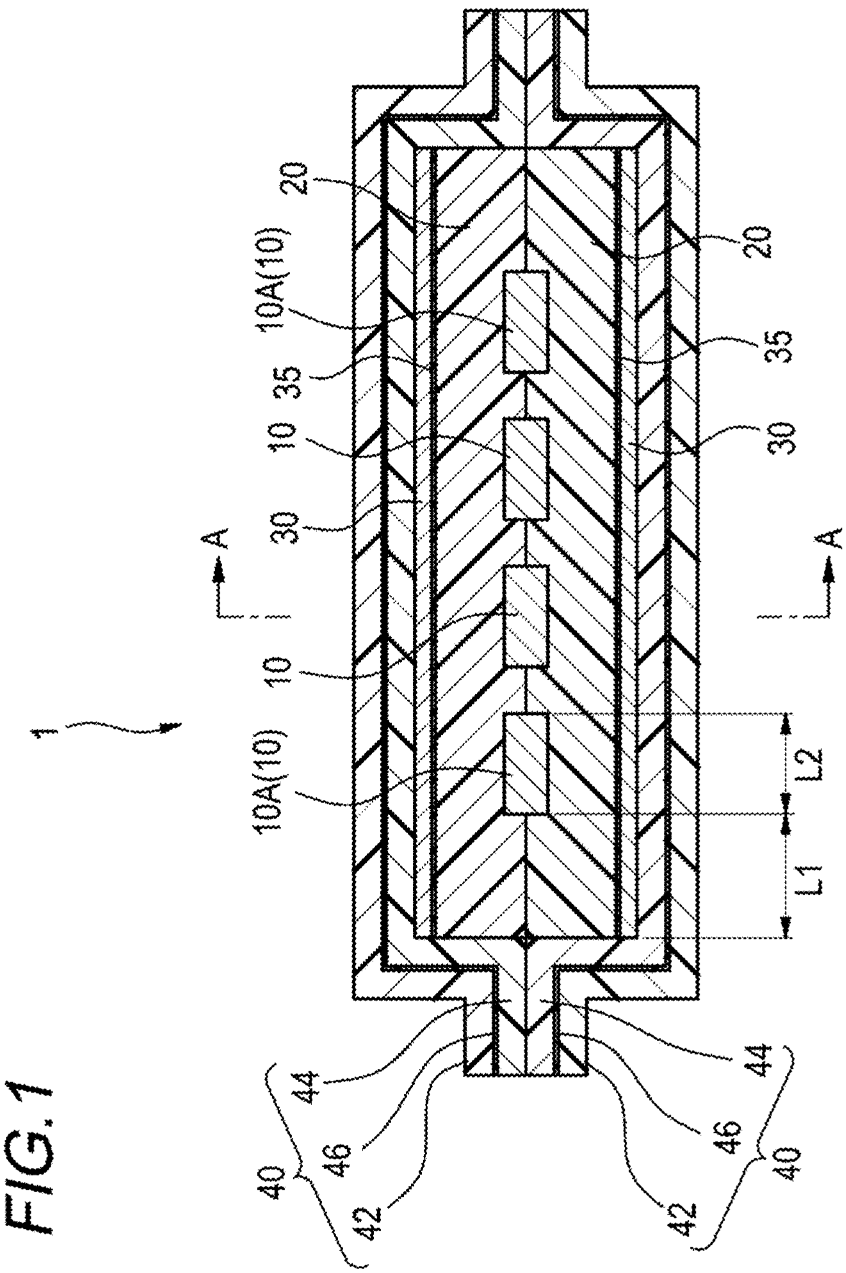
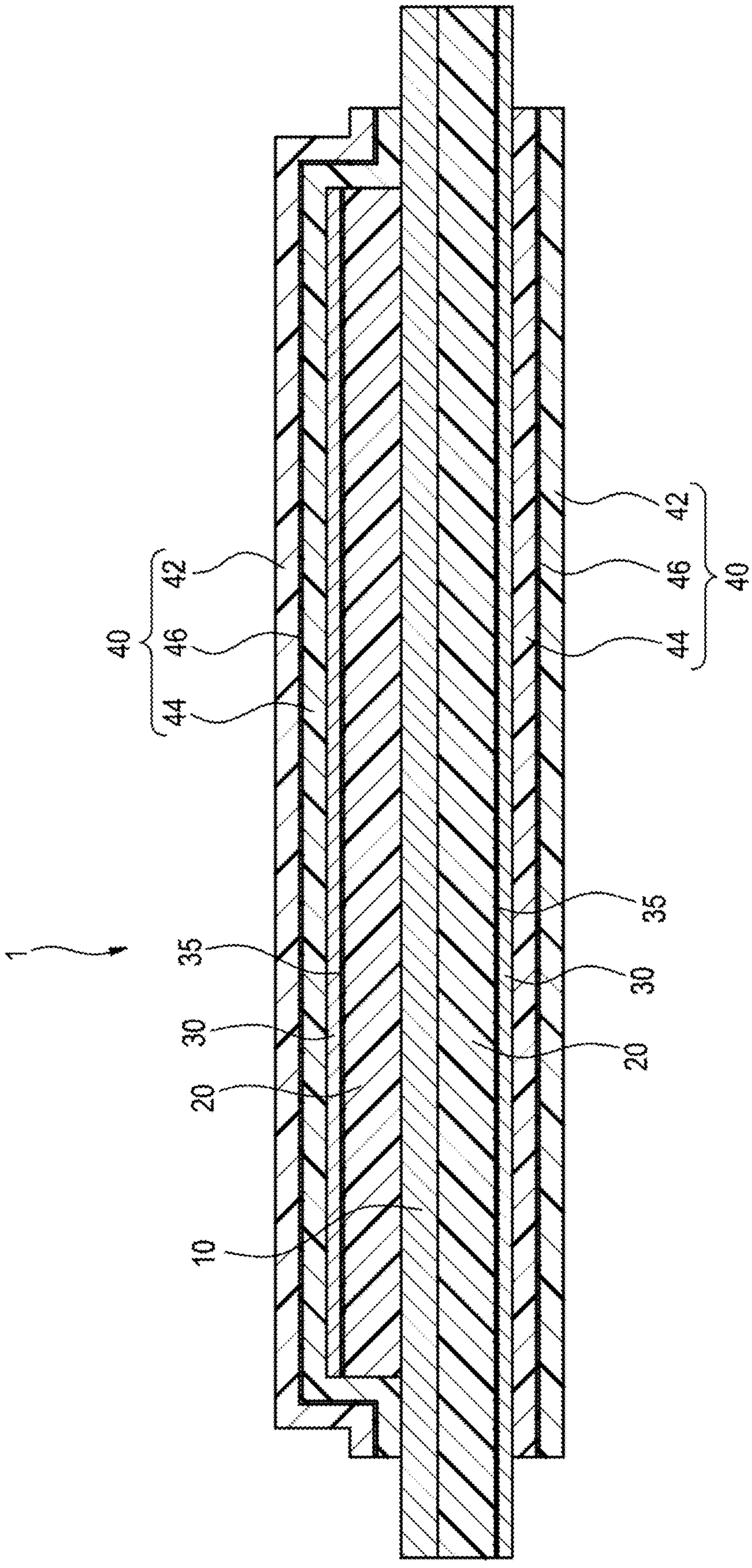


FIG.2



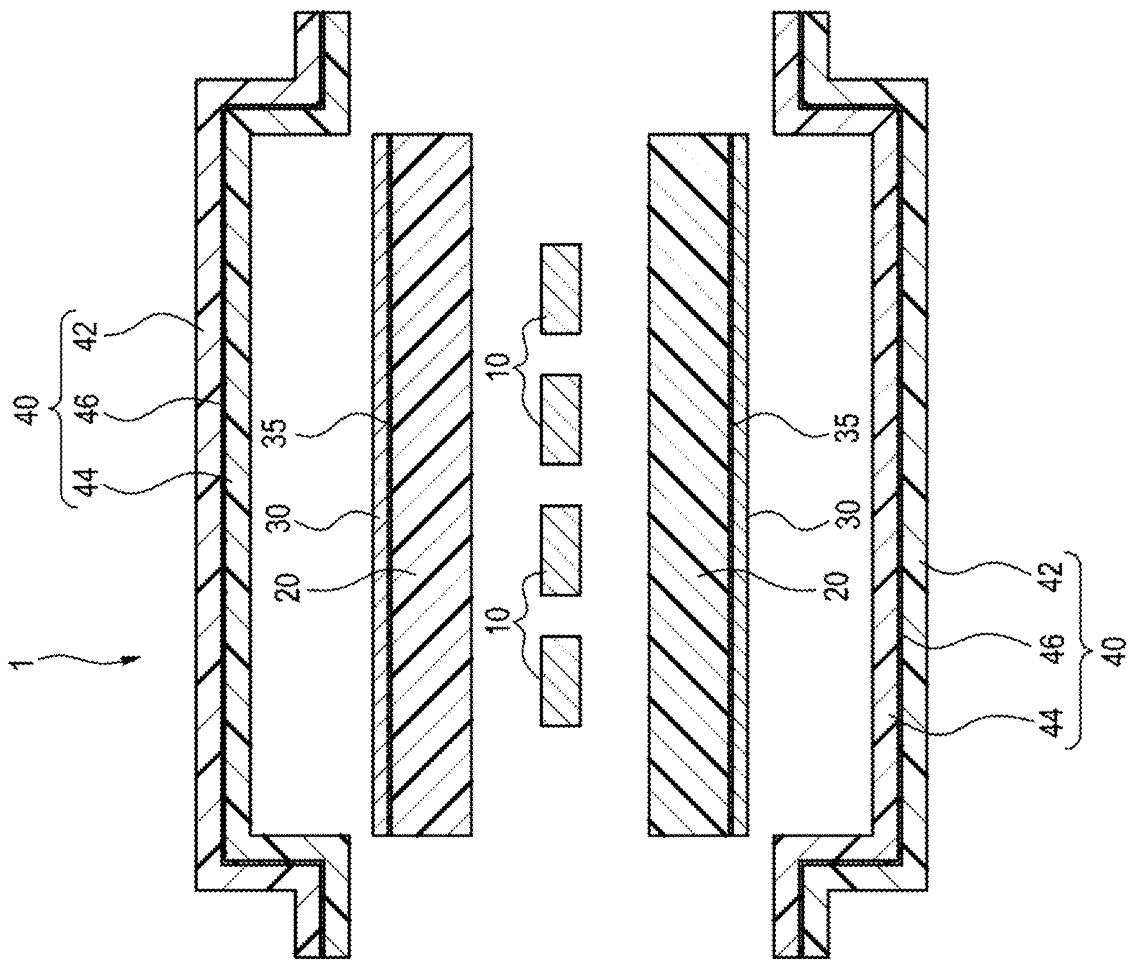


FIG. 3

FIG.4

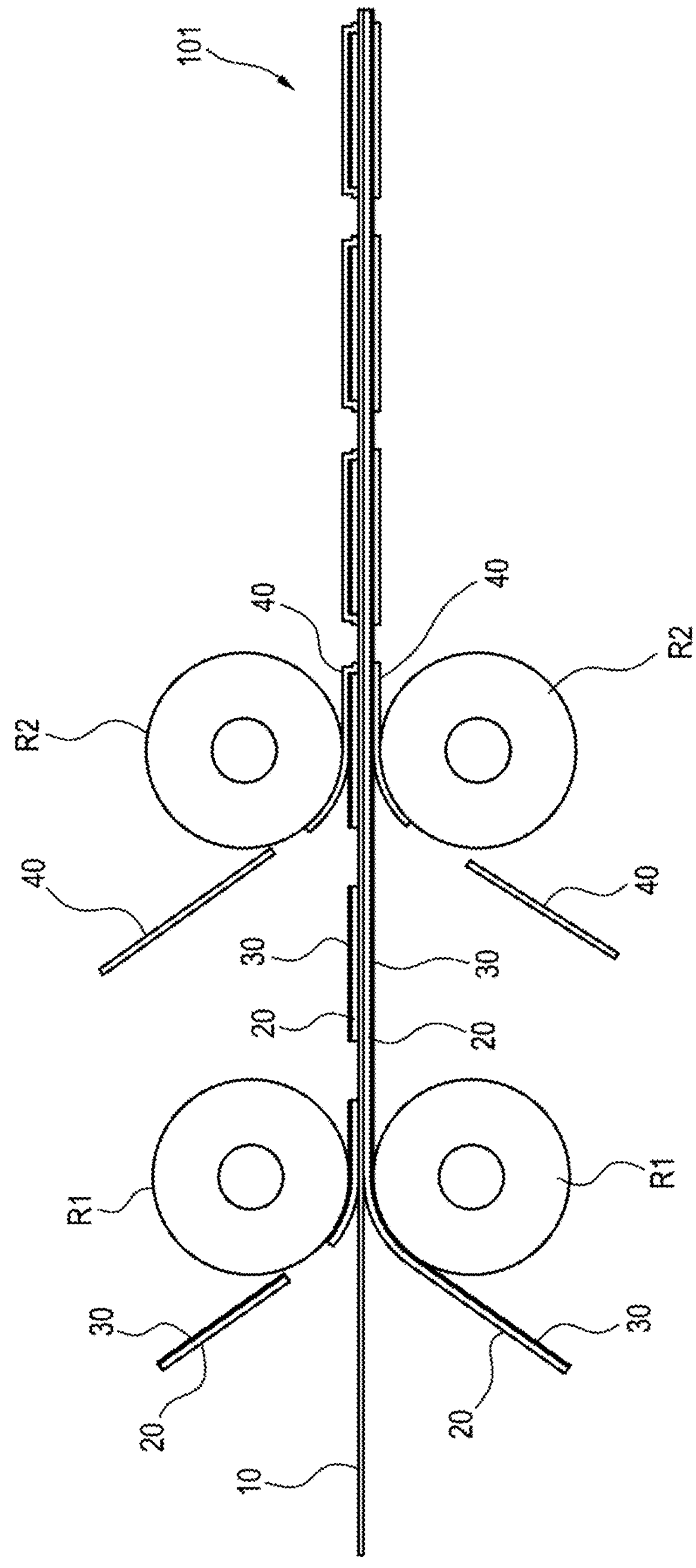
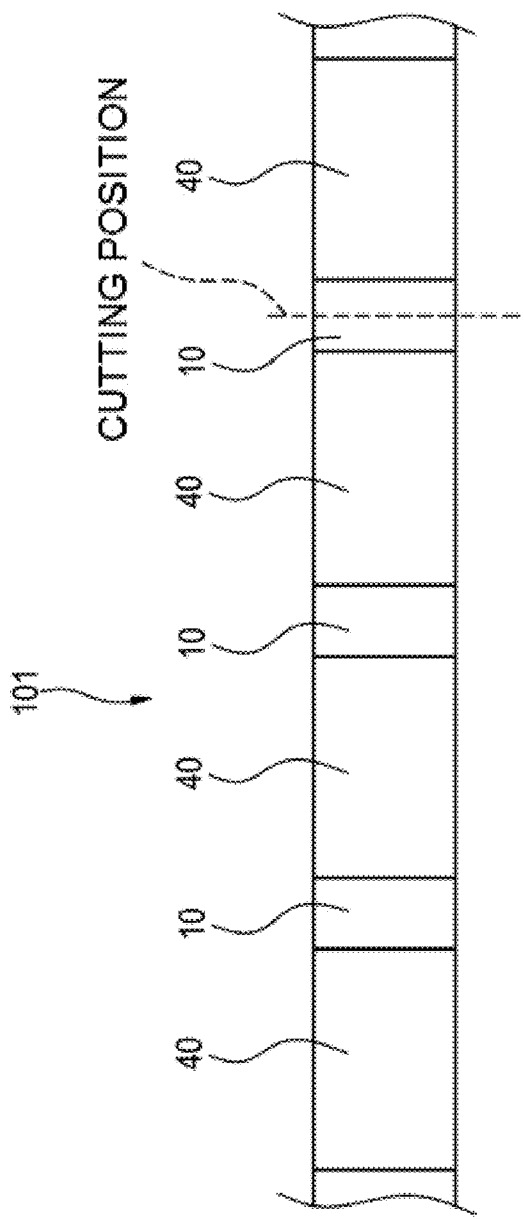


FIG.5



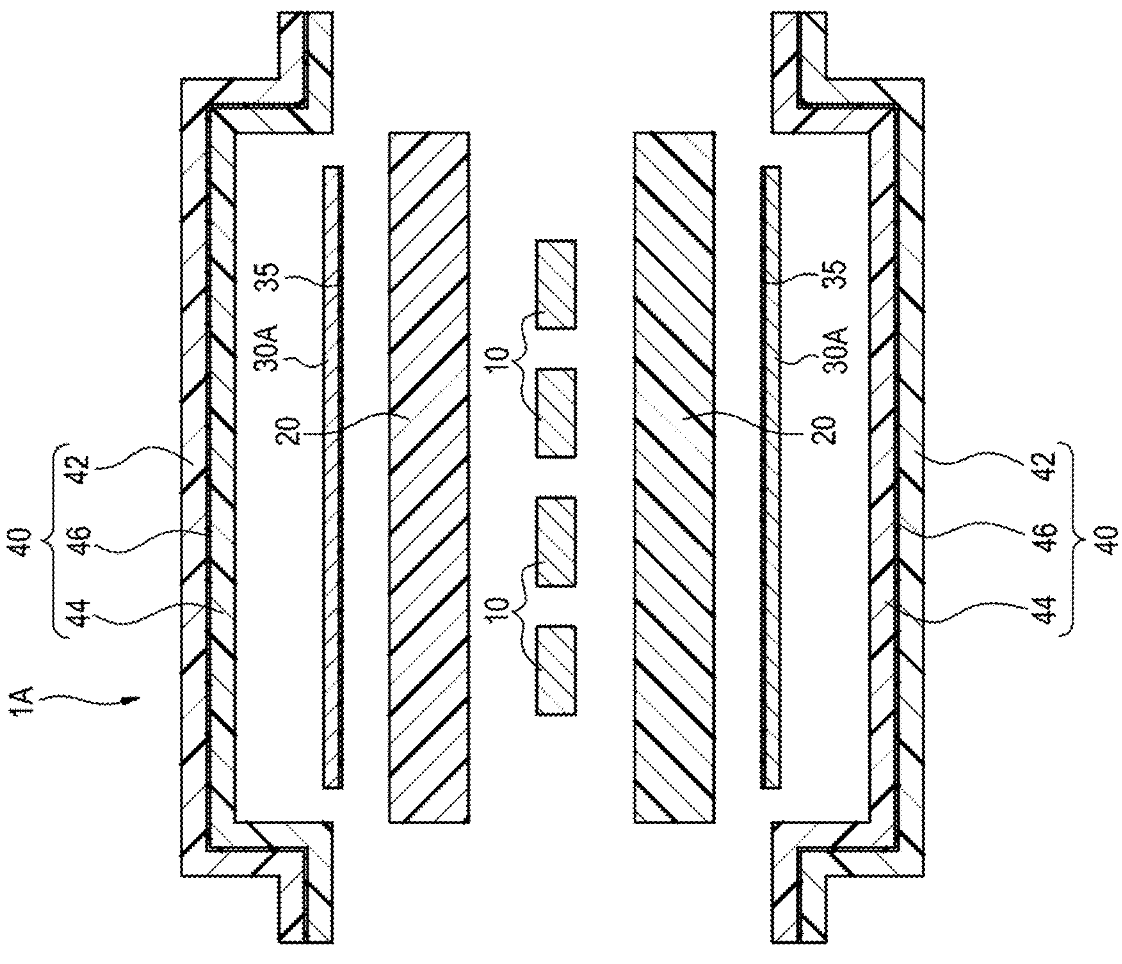
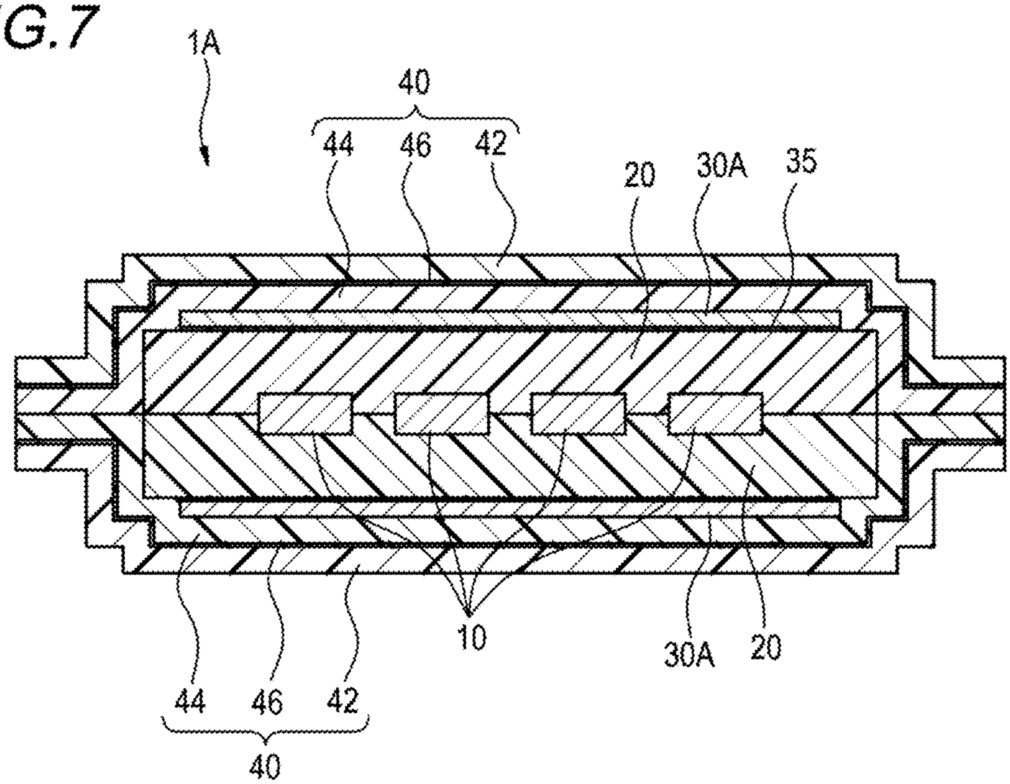


FIG.6

FIG.7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30A
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30A
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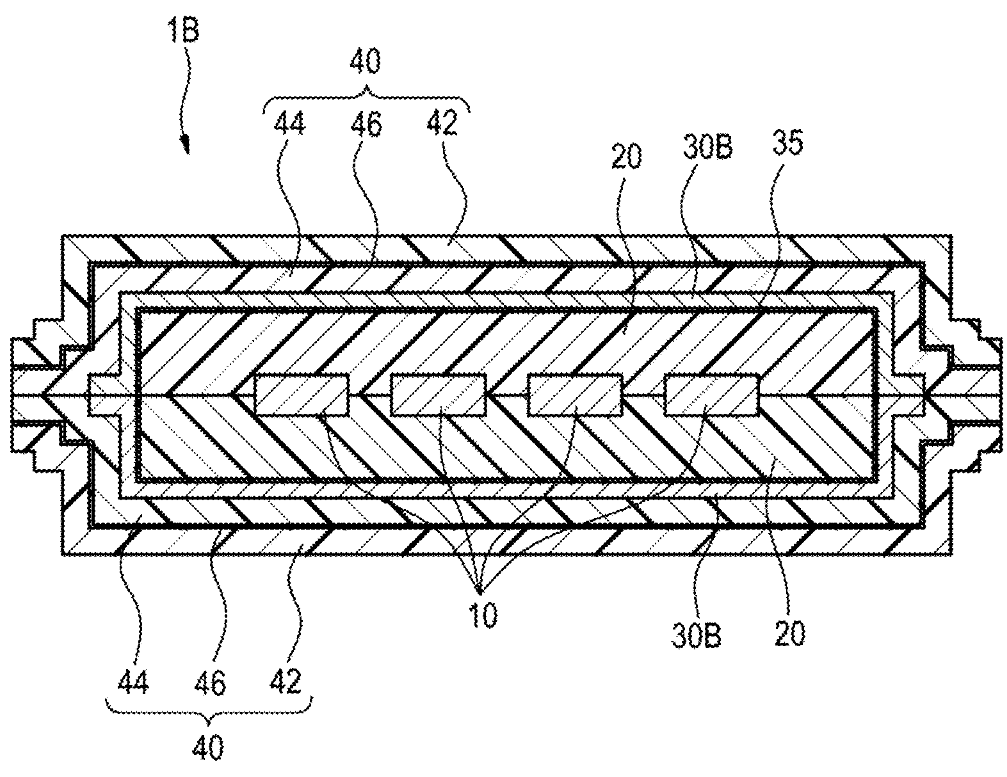
FIG.8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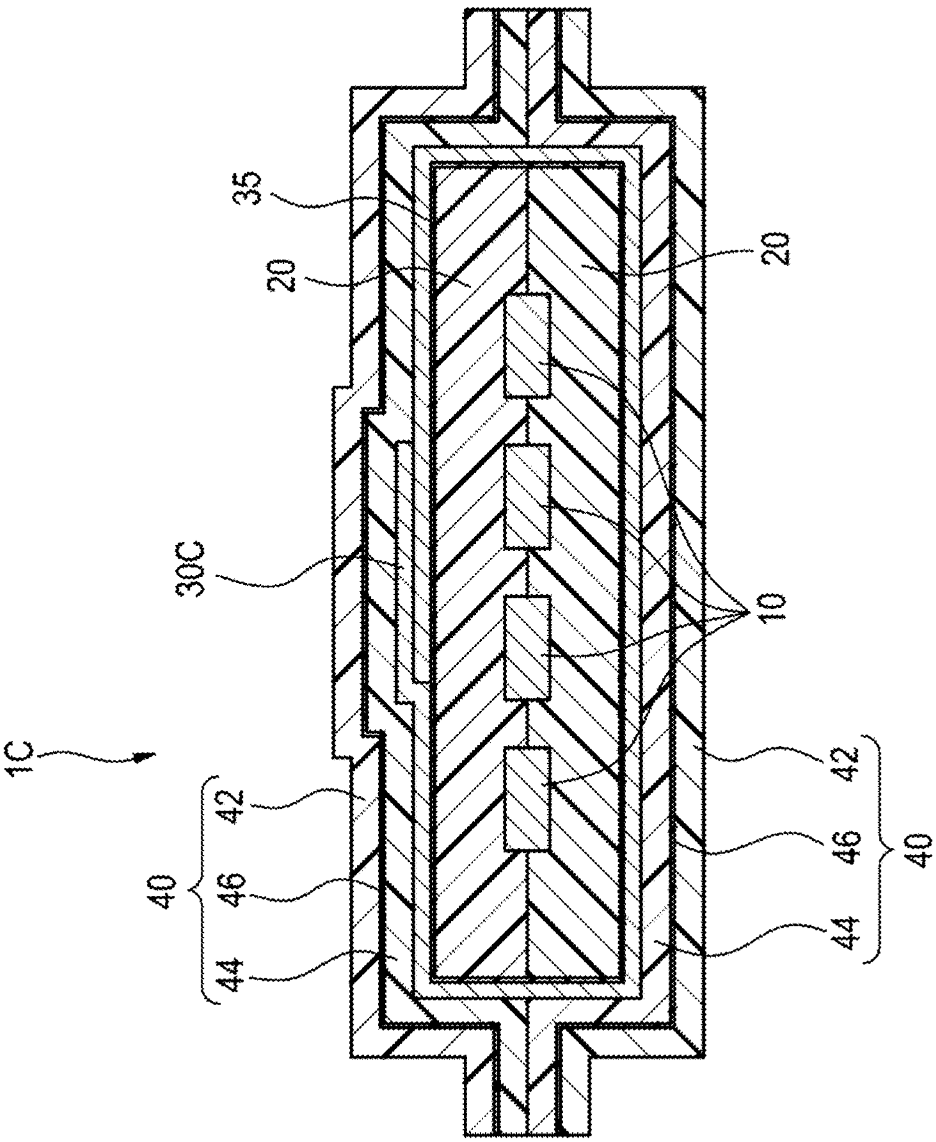


FIG.9

FIG. 10

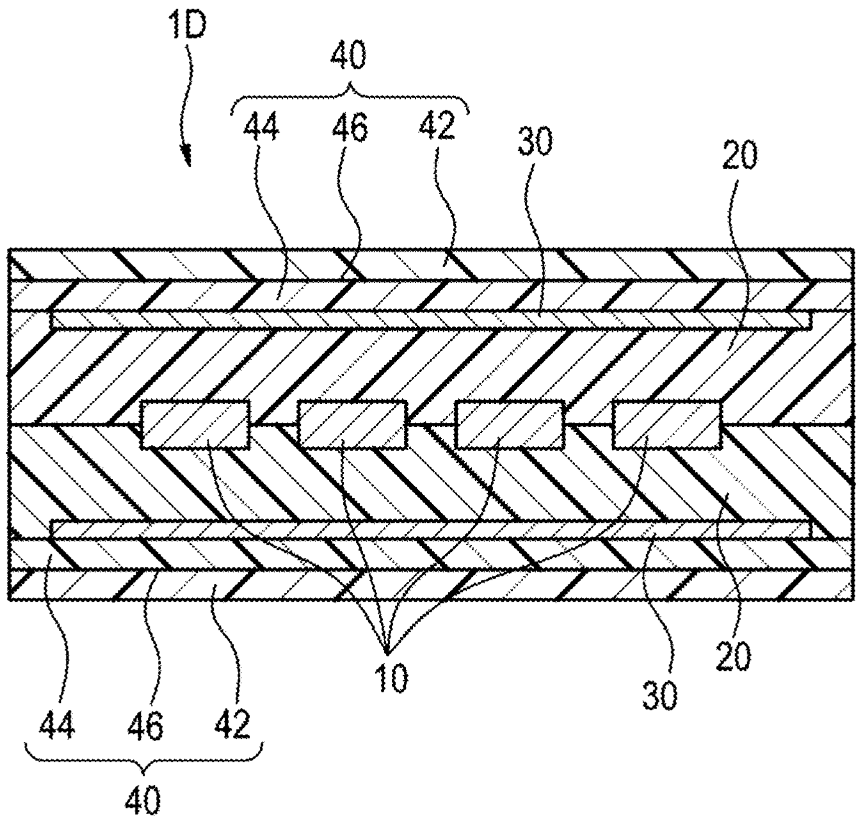


FIG. 11

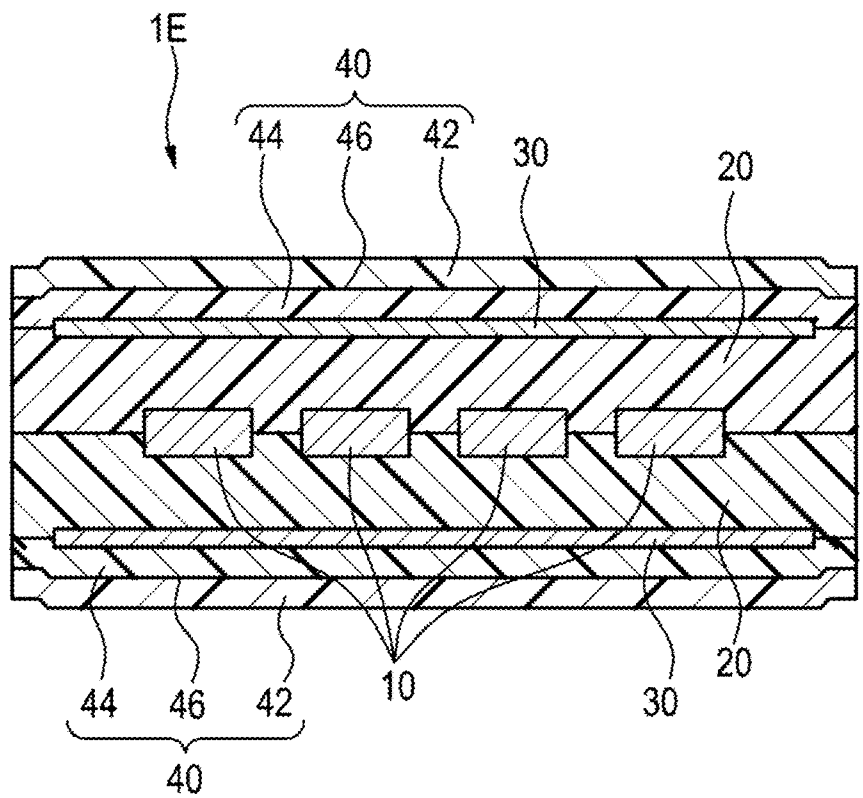


FIG. 12

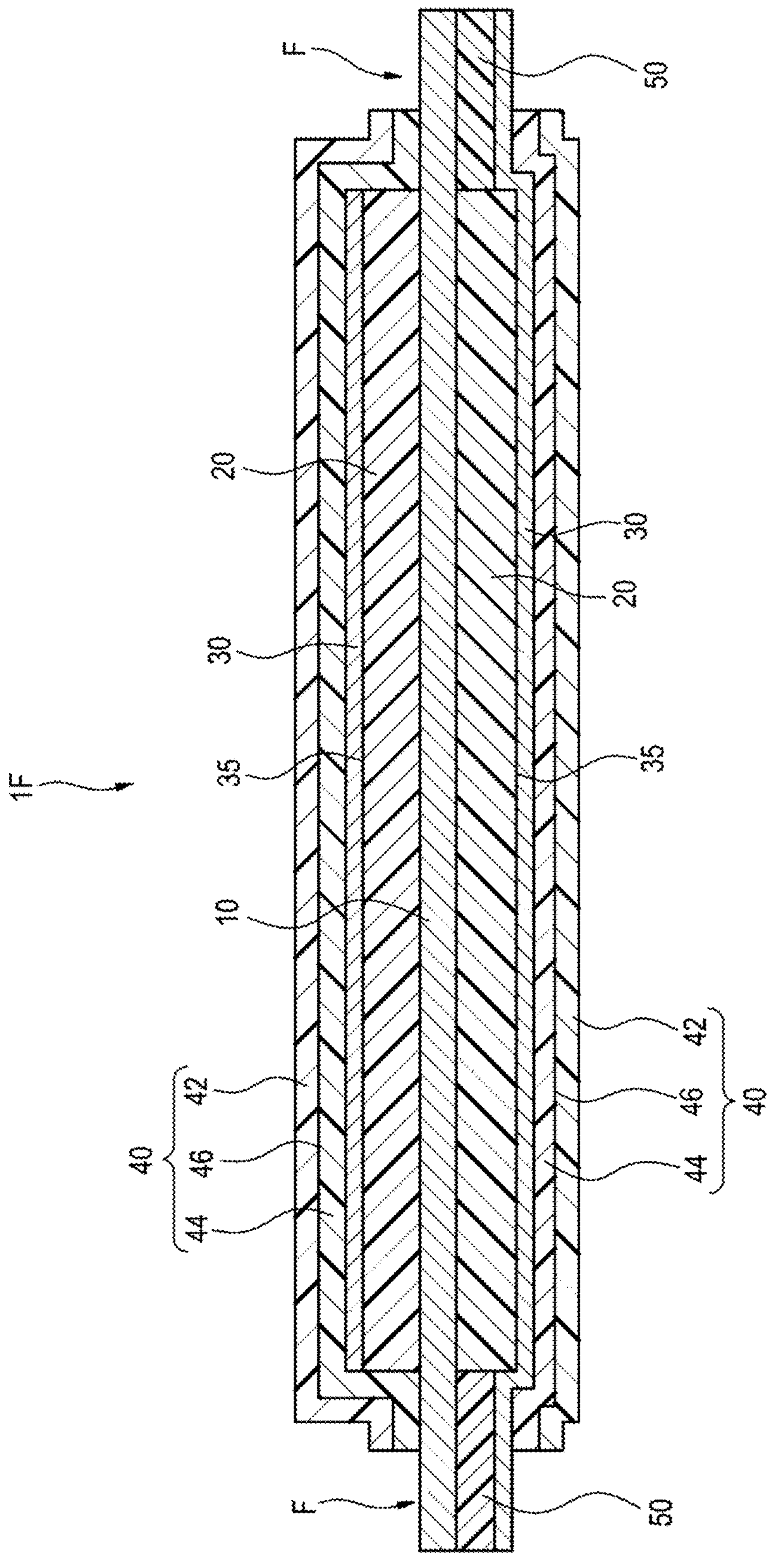


FIG. 13

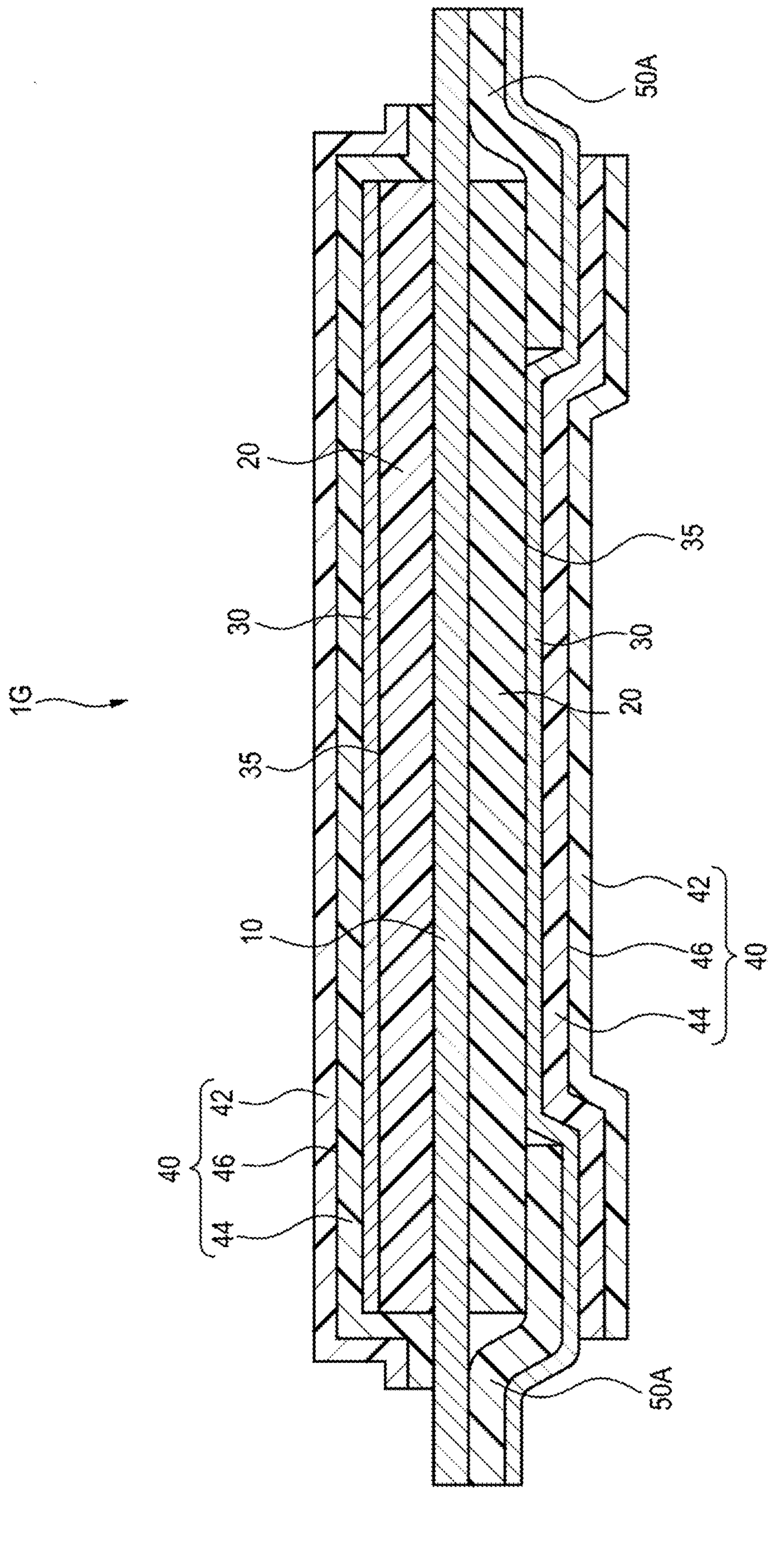


FIG. 14

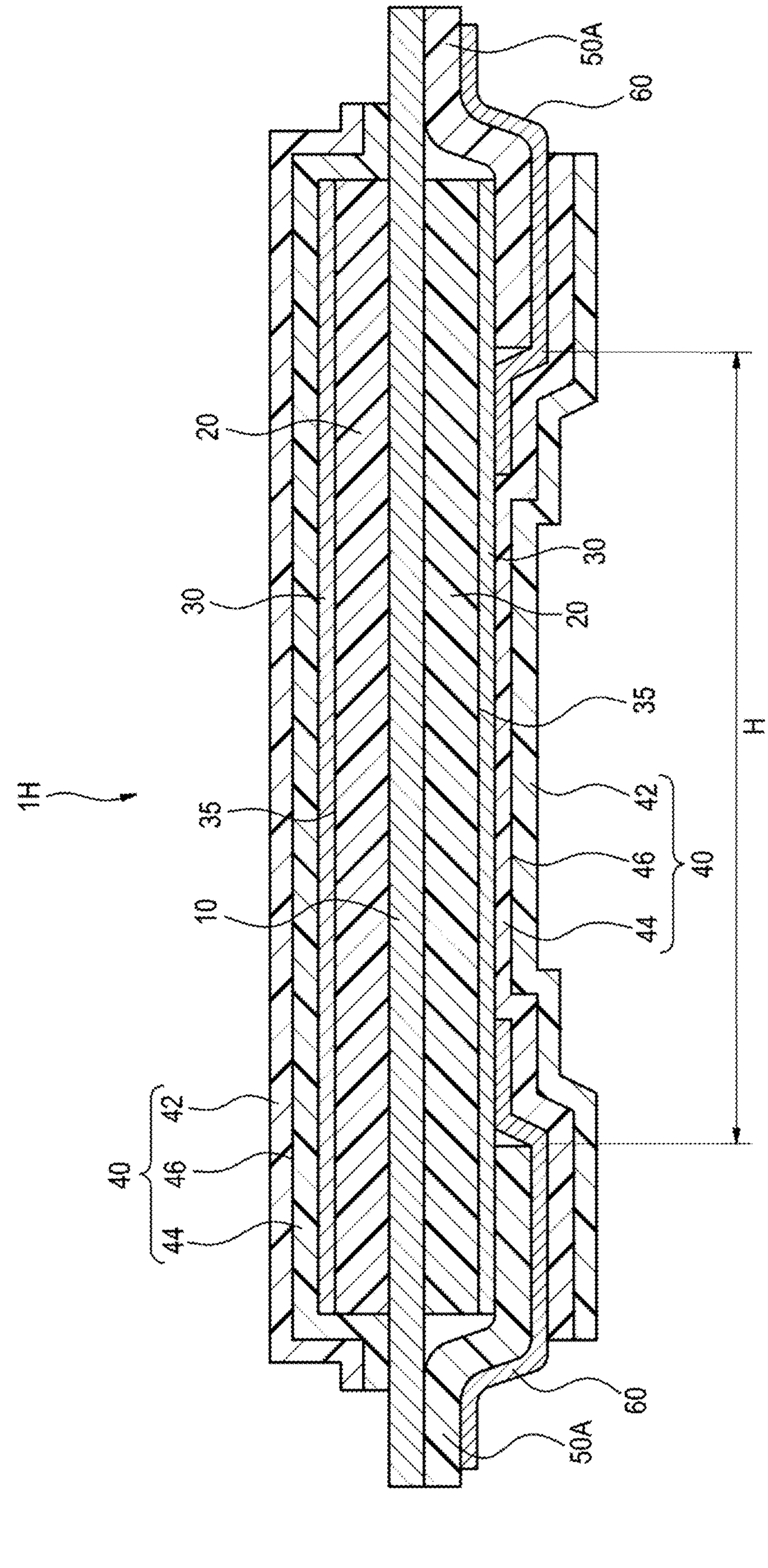


FIG. 15

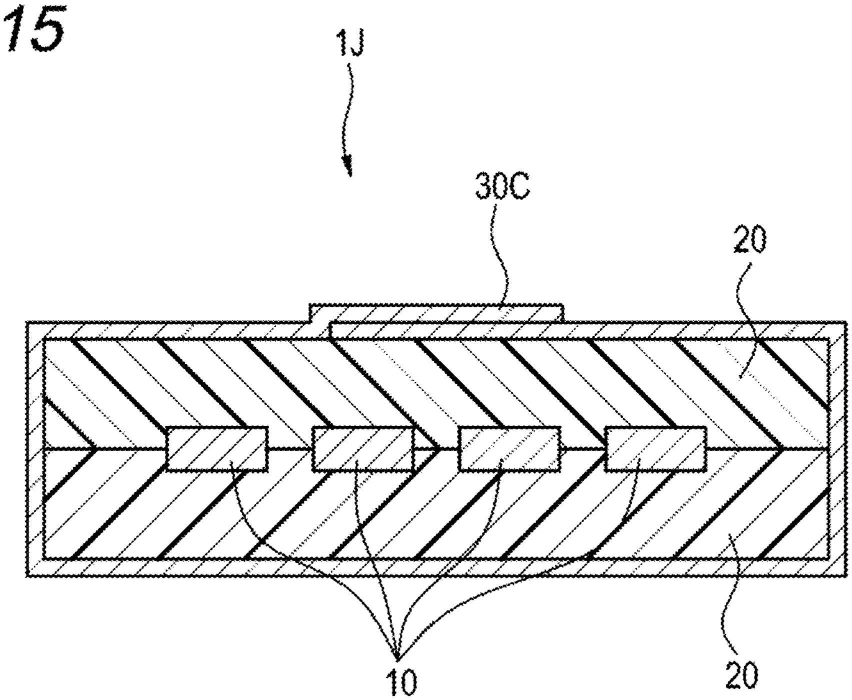


FIG. 16

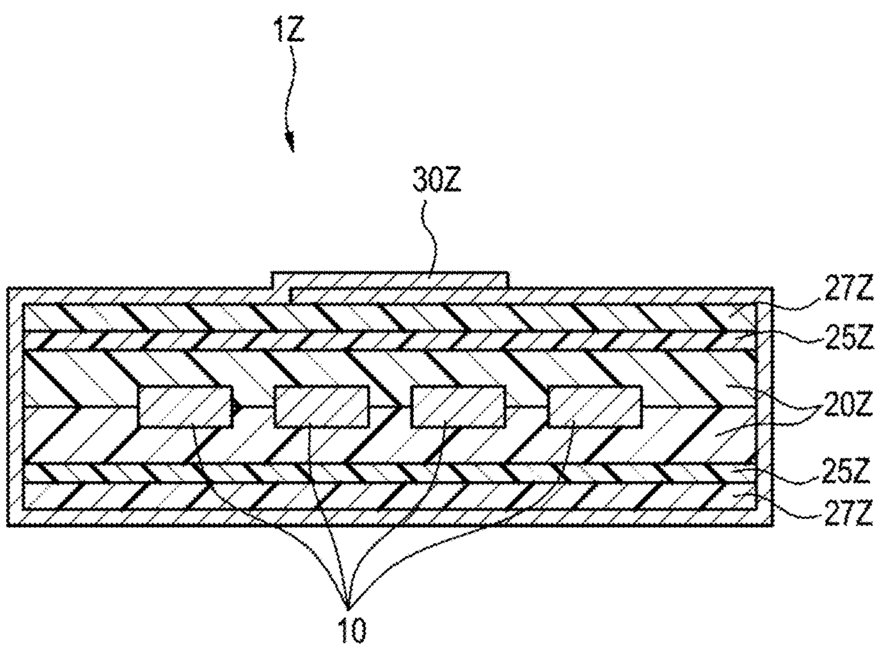


FIG. 17

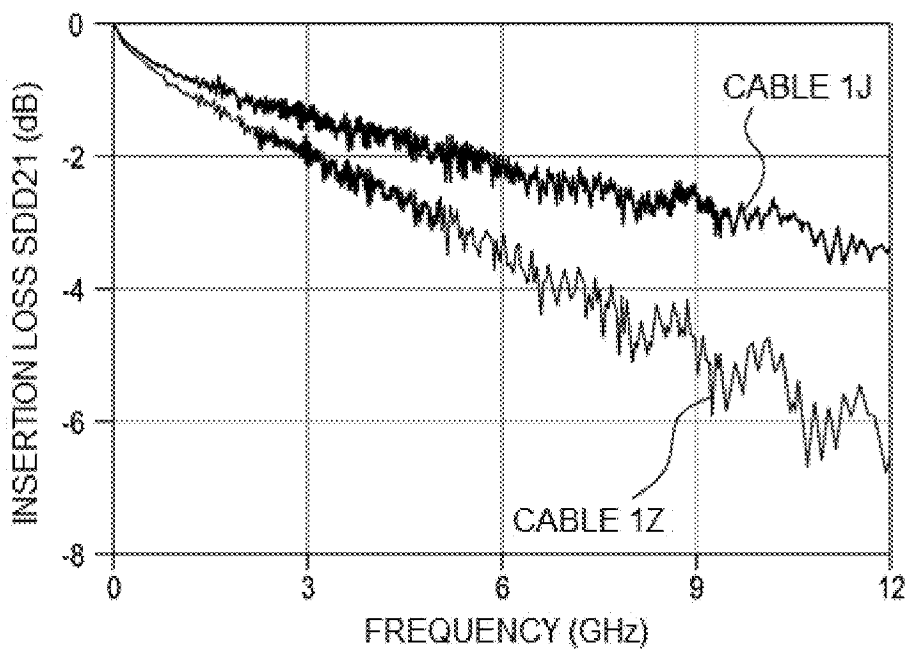
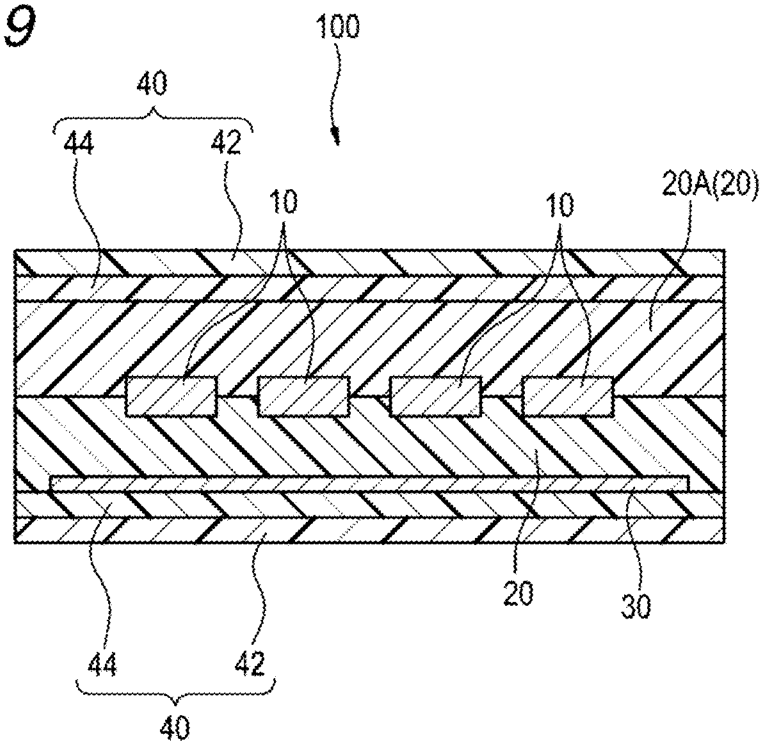


FIG. 18

	5GHz	6GHz	8GHz	10GHz
CABLE 1J (UNIT: dB)	-1.9	-2.2	-2.7	-3.0
CABLE 1Z (UNIT: dB)	-2.9	-3.4	-4.9	-4.9
IMPROVEMENT RATE	34%	36%	45%	39%

FIG.19


100
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20A(20)
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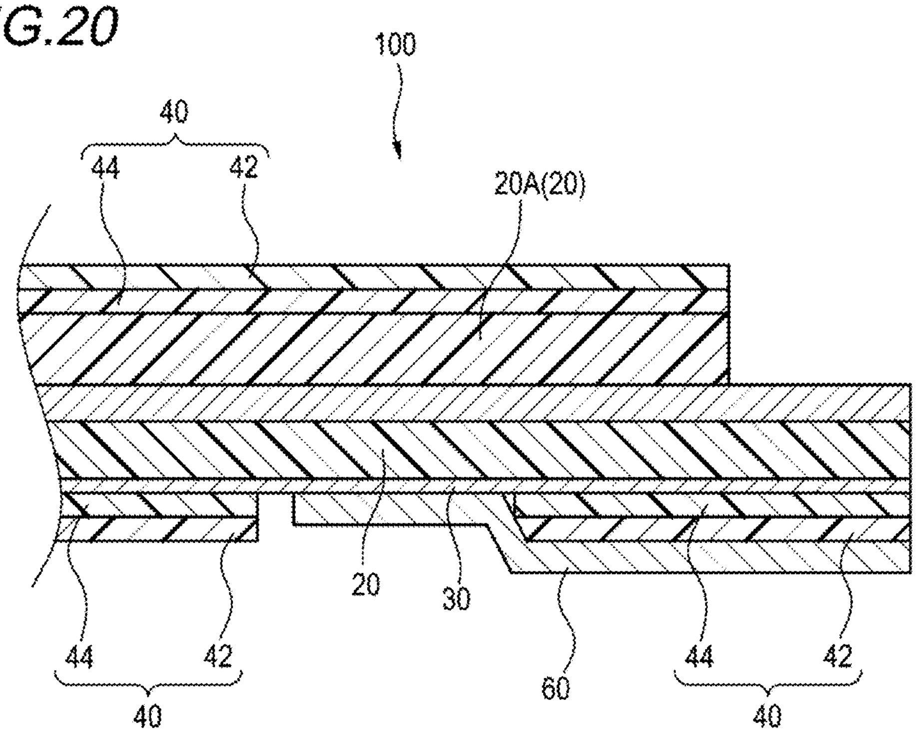
44
42
40

FIG.20


100
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20A(20)
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FIG.21

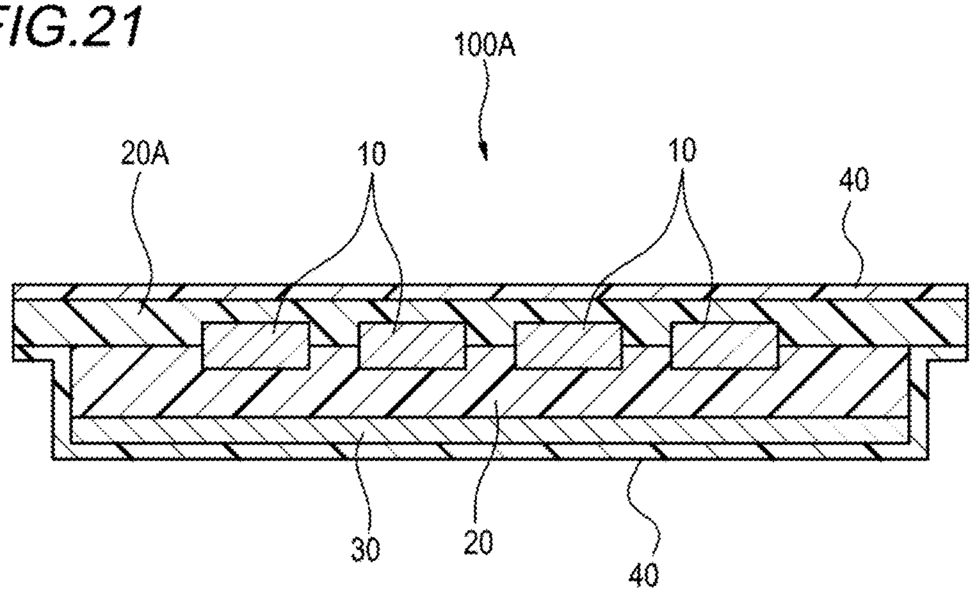


FIG.22

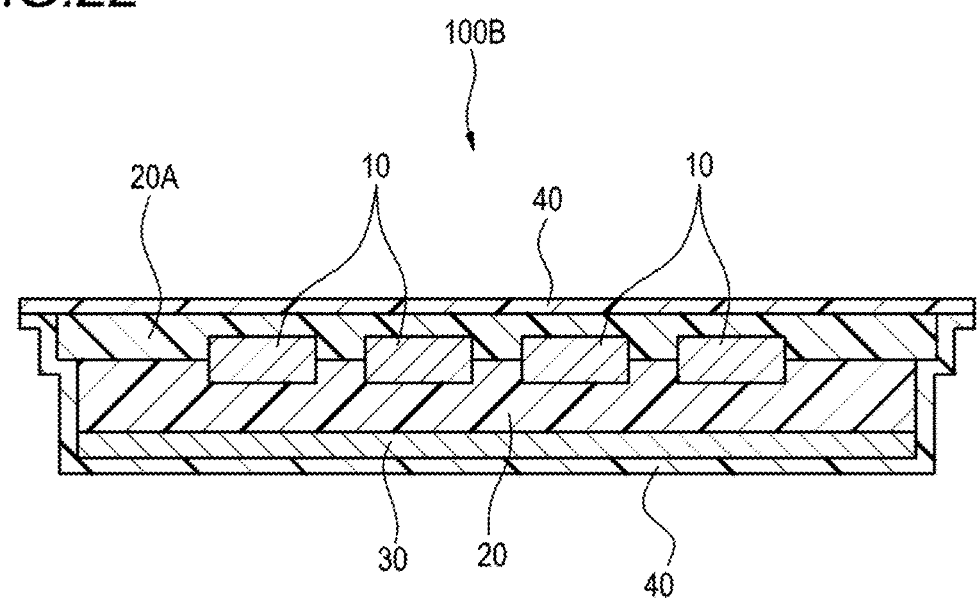


FIG.23

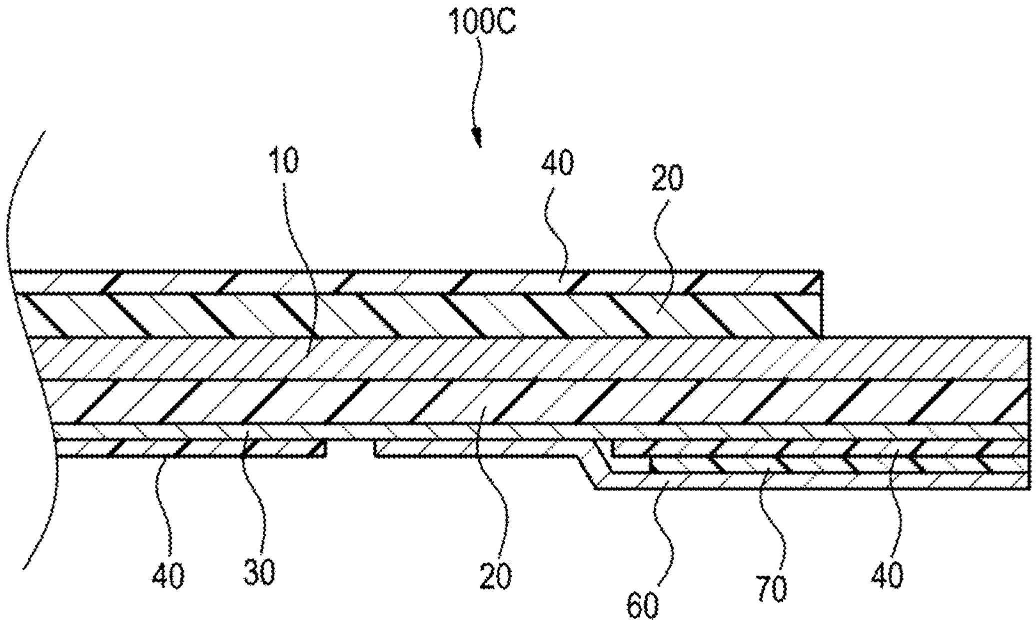


FIG.24

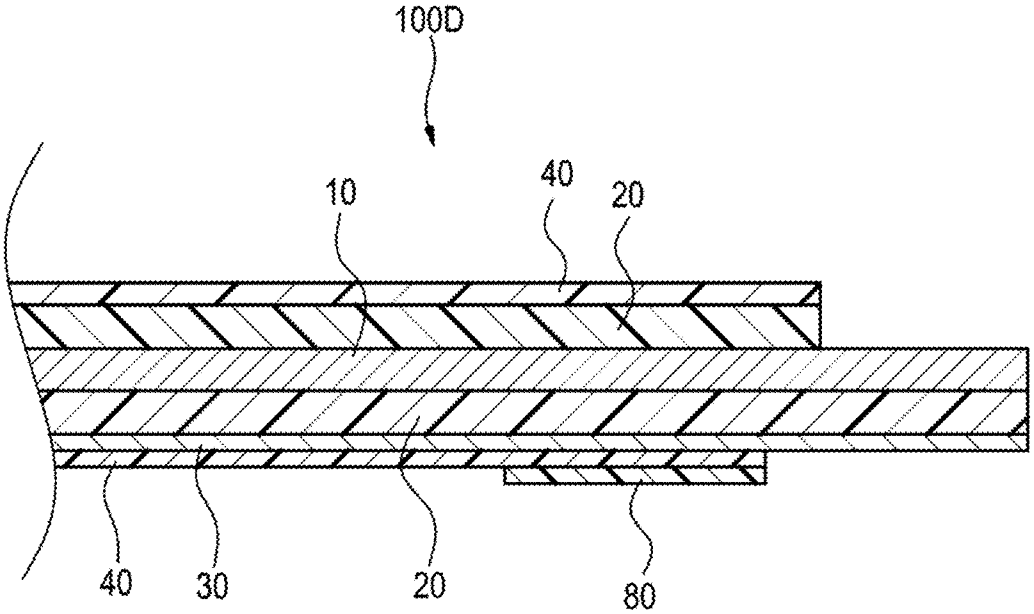


FIG.25

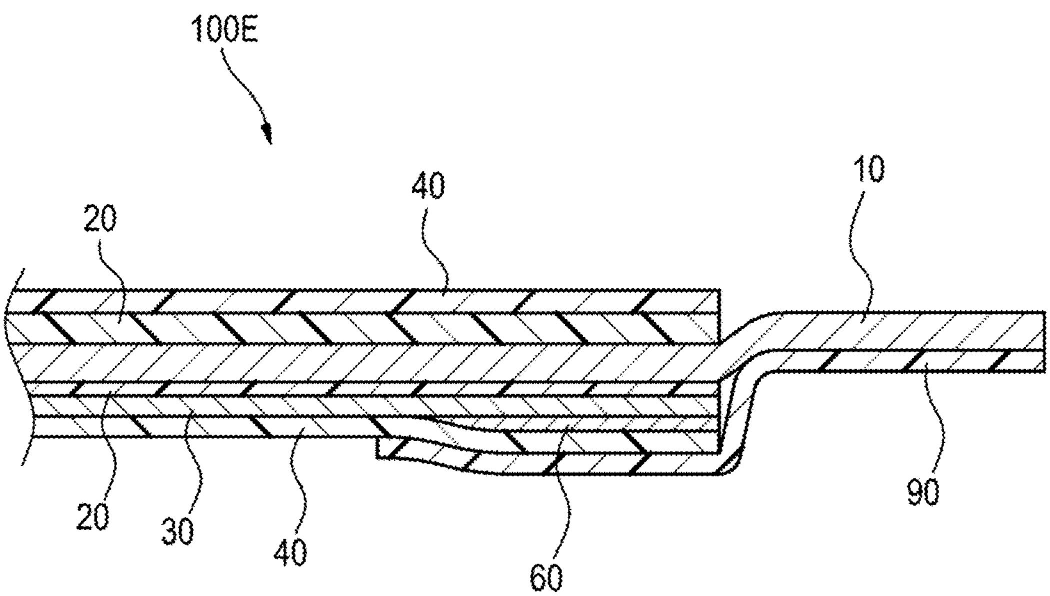


FIG.26

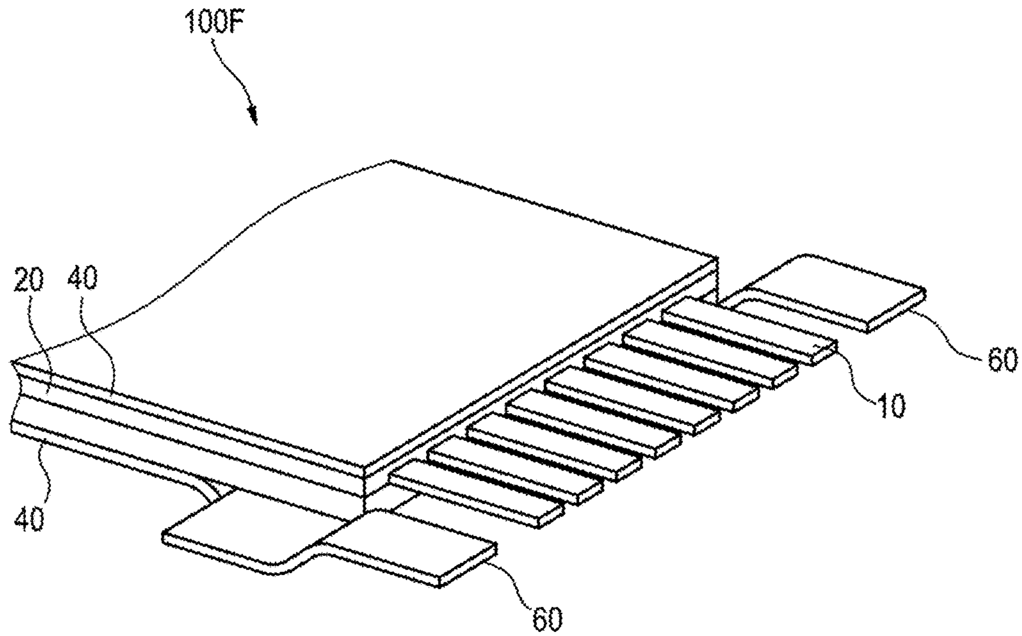
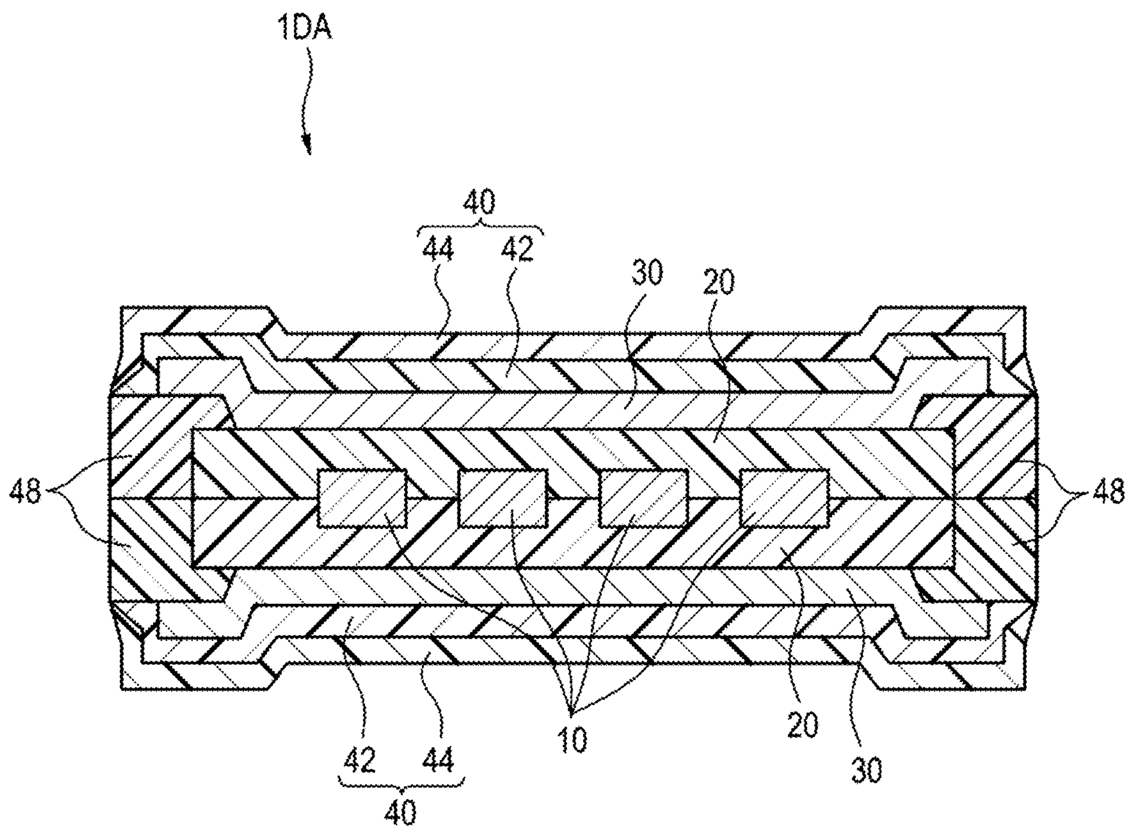


FIG.27



SHIELDED FLAT CABLE

TECHNICAL FIELD

[0001] The present invention relates to a shielded flat cable.

[0002] The present application claims priority from Japanese Patent Application No. 2017-035817, filed on Feb. 28, 2017, the entire subject content of which is incorporated herein by reference.

BACKGROUND ART

[0003] Patent Literature 1 discloses a flat cable in which a plurality of conductors are disposed in parallel with insulating resin films bonding from above and below, and a connection terminal connected to an electrical connector is provided on at least one cable end. On the insulating resin film, a metal foil film for shielding is disposed with a metal surface thereof facing outside, and the metal foil film is covered with a protective resin film except for a ground connecting portion to be connected to ground.

CITATION LIST

Patent Literature

[0004] Patent Literature 1: JP-A-2011-198687

SUMMARY OF INVENTION

Solution to Problem

[0005] In order to achieve the above objects, the present invention provides a shielded flat cable, including:

[0006] a plurality of flat conductors arranged in parallel;

[0007] a pair of resin insulating layers sandwiching the plurality of flat conductors from both sides of a parallel surface of the plurality of flat conductors, and covering portions other than end portions of the plurality of flat conductors in a length direction;

[0008] a pair of shield layers in contact with an outer surface of at least one resin insulating layer of the pair of resin insulating layers; and

[0009] a pair of first resin films with an adhesive covering an outer surface of the pair of resin insulating layers or the shield layer,

[0010] wherein a dielectric loss tangent of the resin insulating layer, of the pair of resin insulating layers, in contact with the shield layer is 0.001 or less at 10 GHz, and

[0011] wherein the adhesive or the pair of first resin films is made of a flame retardant material.

BRIEF DESCRIPTION OF DRAWINGS

[0012] FIG. **1** is a sectional view (cross-sectional view) in a plane perpendicular to a longitudinal direction of a flat cable according to an embodiment.

[0013] FIG. **2** is a sectional view (longitudinal sectional view) of the flat cable of FIG. **1** taken along a line A-A.

[0014] FIG. **3** is a schematic view showing a method for manufacturing the flat cable of FIG. **1**.

[0015] FIG. **4** is a schematic view showing a method for manufacturing the flat cable of FIG. **1**.

[0016] FIG. **5** is a view showing a long cable manufactured by the method shown in FIG. **4**.

[0017] FIG. **6** is an exploded view in a cross-sectional direction of a flat cable according to a first modification.

[0018] FIG. **7** is a cross-sectional view of the flat cable shown in FIG. **6**.

[0019] FIG. **8** is a cross-sectional view of a flat cable according to a second modification.

[0020] FIG. **9** is a cross-sectional view of a flat cable according to a third modification.

[0021] FIG. **10** is a cross-sectional view of a flat cable according to a fourth modification.

[0022] FIG. **11** is a cross-sectional view of a flat cable according to another example of the fourth modification.

[0023] FIG. **12** is a longitudinal sectional view of a flat cable according to a fifth modification.

[0024] FIG. **13** is a longitudinal sectional view of a flat cable according to another example of the fifth modification.

[0025] FIG. **14** is a longitudinal sectional view of a flat cable according to a sixth modification.

[0026] FIG. **15** is a cross-sectional view showing a flat cable used in signal attenuation evaluation of the present invention.

[0027] FIG. **16** is a cross-sectional view showing a flat cable according to a related art configuration used in the signal attenuation evaluation of the present invention.

[0028] FIG. **17** is a graph showing frequency characteristics of signal attenuation amounts for the flat cable shown in FIG. **15** and the flat cable shown in FIG. **16**.

[0029] FIG. **18** is a table showing improvement rates of the signal attenuation amounts for the flat cable shown in FIG. **15** and the flat cable shown in FIG. **16**.

[0030] FIG. **19** is a cross-sectional view of a flat cable according to a second embodiment.

[0031] FIG. **20** is a longitudinal sectional view showing an end portion of the flat cable shown in FIG. **19** in a length direction.

[0032] FIG. **21** is a cross-sectional view of a flat cable according to a seventh modification.

[0033] FIG. **22** is a cross-sectional view of a flat cable according to another example of the seventh modification.

[0034] FIG. **23** is a longitudinal sectional view showing an end portion in a length direction of a flat cable according to an eighth modification.

[0035] FIG. **24** is a longitudinal sectional view showing an end portion in a length direction of a flat cable according to a ninth modification.

[0036] FIG. **25** is a longitudinal sectional view showing an end portion in a length direction of a flat cable according to a tenth modification.

[0037] FIG. **26** is a perspective view showing an end portion in a length direction of a flat cable according to another example of the tenth modification.

[0038] FIG. **27** is a cross-sectional view of a flat cable according to still another example of the fourth modification.

DESCRIPTION OF EMBODIMENTS

Technical Problem

[0039] An object of the present invention is to provide a shielded flat cable capable of improving transmission characteristics.

Advantageous Effects of Invention

[0040] According to the present invention, it is possible to provide a shielded flat cable capable of improving transmission characteristics.

Description of Embodiments of Present Application

[0041] First, contents of the embodiments of the present invention will be listed and described.

[0042] (1) A shielded flat cable according to the embodiments of the present invention including:

[0043] a plurality of flat conductors arranged in parallel;

[0044] a pair of resin insulating layers sandwiching the plurality of flat conductors from both sides of a parallel surface of the plurality of flat conductors, and covering portions other than end portions of the plurality of flat conductors in a length direction;

[0045] a pair of shield layers in contact with an outer surface of at least one resin insulating layer of the pair of resin insulating layers; and

[0046] a pair of first resin films with an adhesive covering an outer surface of the pair of resin insulating layers or the shield layer,

[0047] wherein a dielectric loss tangent of the resin insulating layer, of the pair of resin insulating layers, in contact with the shield layer is 0.001 or less at 10 GHz, and

[0048] wherein the adhesive or the pair of first resin films is made of a flame retardant material.

[0049] According to the configuration, the dielectric loss tangent is lower than that of the flat cable in related art, so that the transmission characteristics can be improved. Further, the adhesive or the first resin film outside of the shield layer is made of a flame retardant material, so that the flame retardance of the shielded flat cable can be maintained.

[0050] (2) The shielded flat cable,

[0051] wherein in a parallel direction of the plurality of flat conductors, an end portion of the shield layer is on an outer side with respect to an end portion of the outermost flat conductor among the plurality of flat conductors by a half or more of a width dimension of the outermost flat conductor, and

[0052] wherein the end portion in the parallel direction of the shield layer may be covered with the resin insulating layer.

[0053] (3) The shielded flat cable,

[0054] wherein in a parallel direction of the plurality of flat conductors, an end portion of the shield layer is on an outer side with respect to an end portion of the outermost flat conductor among the plurality of flat conductors by a half or more of a width dimension of the outermost flat conductor, and

[0055] wherein the end portion in the parallel direction of the shield layer may be covered with the first resin film.

[0056] According to the configurations (2) and (3), the shield layer is on the outer side with respect to the end portion of the flat conductor, so that noise resistance and high frequency characteristics of the flat cable can be properly maintained, and since the end portion in the conductor parallel direction of the shield layer is not exposed, a defect (such as the occurrence of a spark) at the time of withstand voltage test after cable formation can be prevented.

[0057] (4) The shielded flat cable, further including:

[0058] a grounding member attached to an end portion in the length direction,

[0059] wherein a portion of the shield layer may be exposed from the first resin film, and the grounding member may be in contact with the shield layer at the exposed portion.

[0060] According to the configuration, the grounding member is provided, so that the shielded flat cable can be reliably grounded.

[0061] (5) The shielded flat cable,

[0062] wherein the shield layer may be exposed at an end portion in the length direction.

[0063] According to the configuration, it is possible to perform grounding by the shield layer without using the grounding member, and to realize a reduction in production cost and in thickness.

[0064] (6) The shielded flat cable,

[0065] wherein at an end portion in the length direction, each of the plurality of flat conductors may be completely exposed from the resin insulating layers.

[0066] (7) The shielded flat cable, further including:

[0067] a grounding member superimposed on and in contact with the outer surface of the shield layer at the end portion in the length direction,

[0068] wherein the first resin film may cover the shield layer and the grounding member.

[0069] (8) The shielded flat cable,

[0070] wherein a portion of the grounding member may protrude from the first resin film, and the protruding portion may be arranged in parallel with the plurality of flat conductors.

[0071] According to the configuration, a ground terminal can be connected to a circuit board or the like at the same time as a signal terminal by equalizing positions in the length direction in which the flat conductor and the grounding member are attached to the circuit board or the like. Further, the configuration of the circuit arrangement can be simplified. In addition, when mounted on the circuit board, the impedance can be adjusted by adjusting the thickness of the grounding member or the like.

[0072] (9) The shielded flat cable, further including:

[0073] a second resin film covering the first resin film,

[0074] wherein the second resin film may be bonded to at least a part of exposed portions of the plurality of flat conductors.

[0075] (10) The shielded flat cable, further including:

[0076] a third resin film bonded to at least a part of exposed portions of the plurality of flat conductors,

[0077] wherein the shield layer may be bonded to an outer surface of the third resin film.

[0078] (11) The shielded flat cable,

[0079] wherein the third resin film may be bonded to the resin insulating layer at the end portion in the length direction.

[0080] According to the configurations (9) and (11), the exposed portions of the flat conductors can be reinforced by the second resin film or the third resin film.

[0081] (12) The shielded flat cable, further including:

[0082] a third resin film bonded to exposed portions of the plurality of flat conductors and the shield layer at the end portion in the length direction; and

[0083] a grounding member superimposed on and in contact with the outer surface of the shield layer and bonded to the third resin film.

[0084] According to the configuration, the grounding member can be reinforced by the third resin film together with the exposed portions of the flat conductors.

[0085] (13) The shielded flat cable,

[0086] wherein at least a part of end portions of the resin insulating layers in the parallel direction of the flat conductors may be covered with the first resin film.

[0087] According to the configuration, at least a part of end portions of the shield layer in the width direction is not exposed, so that the flame retardance is further improved.

[0088] (14) The shielded flat cable,

[0089] wherein an entire surface of the end portions of the resin insulating layers may be covered with the first resin film.

[0090] According to the configuration, it is possible to further improve the flame retardance and to prevent a defect at the time of withstand voltage test after cable formation.

Details of Embodiments of the Present Application

[0091] Hereinafter, examples of embodiments of shielded flat cables according to the invention will be described with reference to the drawings.

[0092] FIG. **1** is a sectional view (cross-sectional view) in a direction perpendicular to a length direction of a shielded flat cable (hereinafter, referred to as flat cable) **1** according to a first embodiment. The flat cable **1** according to the present embodiment is a cable used to electrically connect devices or for wiring in the devices.

[0093] As shown in FIG. **1**, the flat cable **1** includes a plurality of (four in this case) flat conductors **10**, a pair of resin insulating layers **20**, a pair of shield layers **30**, and a pair of resin films **40** (an example of a first resin film).

[0094] The plurality of flat conductors **10** are arranged in a plane. Each flat conductor **10** is made of, for example, a tin-plated copper conductor. The flat conductor **10** is formed in a substantially flat rectangular shape in a cross section. In the present embodiment, the flat cable **1** includes four flat conductors **10**, but the number of the flat conductors **10** is optional.

[0095] The pair of resin insulating layers **20** are layers for securing the pressure resistance and high frequency characteristics of the flat cable **1**, and are formed of, for example, a resin such as polyethylene, polypropylene, polyimide, polyethylene terephthalate, polyester, or polyphenylene sulfide.

[0096] The resin insulating layer **20** electrically insulates between the plurality of flat conductors **10**, and intervenes between the flat conductors **10** and the shield layer **30** to function as a capacitor for forming electrostatic coupling for use in a high frequency region. Therefore, the resin insulating layer **20** is also referred to as a dielectric, and the dielectric loss tangent (tan δ) of the resin material configuring the resin insulating layer **20** is a parameter that influences the transmission characteristics of the flat cable **1**. The dielectric loss tangent is preferably small in terms of reducing dielectric loss (insertion loss).

[0097] In the present embodiment, for example, the resin material configuring the resin insulating layer **20** does not contain a flame retardant. A resin material in which the flame retardant is not blended (for example, polypropylene) has a dielectric loss tangent of about 0.0002 at 10 GHz, which is smaller than a dielectric loss tangent of a resin material in which the flame retardant is blended (for example, the dielectric loss tangent is about 0.0023 at 10 GHz). Therefore, when the resin insulating layer **20** is formed of the resin material not containing a flame retardant, the dielectric loss of a high frequency signal is particularly reduced as a result of the smaller dielectric loss tangent, which is preferable. Since the dielectric loss tangent of polyimide is about 0.001 at 10 GHz, the dielectric loss tangent of the resin insulating layer **20** in the present embodiment is preferably 0.001 or less.

[0098] The pair of resin insulating layers **20** are bonded to each other in a state where the plurality of flat conductors **10** arranged in the plane are sandwiched from both sides of a parallel surface. Accordingly, the plurality of flat conductors **10** are covered by the pair of resin insulating layers **20**.

[0099] The pair of shield layers **30** are layers provided with a shield function for securing noise resistance and high frequency characteristics of the flat cable **1**, and are formed of, for example, metal foil such as copper foil or aluminum foil. An adhesive layer **35** (hereinafter, referred to as anchor coat layer **35**) for adhering the resin insulating layer **20** and the shield layer **30** is provided between the resin insulating layer **20** and the shield layer **30**. Any material can be used as the anchor coat layer **35**. For example, a urethane-based anchor coat material in which an isocyanate-based curing agent is mixed with polyurethane, which is a main ingredient, can be used.

[0100] The pair of shield layers **30** is disposed such that the anchor coat layers **35** are respectively in contact with outer surfaces (surfaces opposite to the adhesive surfaces with flat conductor **10**) of the pair of resin insulating layers **20**. The pair of shield layers **30** are respectively bonded to the resin insulating layers **20** such that both end portions in a parallel direction of the plurality of flat conductors **10** (hereinafter, referred to as conductor parallel direction) substantially coincide with both end portions in the conductor parallel direction of the resin insulating layers **20**. That is, the pair of shield layers **30** is disposed such that both end portions in the conductor parallel direction are on an outer side with respect to end portions on the outer side of the outermost flat conductors **10**A among the plurality of flat conductors **10** in the conductor parallel direction. Specifically, a parallel pitch of the flat conductors **10** and a width dimension of the shield layer **30** are set such that a distance L**1** between the end portion on the outer side of the flat conductor **10**A and the end portion of the shield layer **30** in the conductor parallel direction is equal to or more than a half of a width dimension L**2** of the flat conductor **10**A. Accordingly, noise resistance and high frequency characteristics of the flat cable **1** can be properly maintained.

[0101] Each of the pair of resin films **40** includes a base layer **42**, a flame retardant insulating layer **44**, and an adhesive layer **46** (hereinafter, referred to as anchor coat layer **46**). The base layer **42** is a layer for securing the pressure resistance of the flat cable **1**, and is made of, for example, polyethylene terephthalate. The flame retardant insulating layer **44** is a layer for adhering the resin insulating layer **20** or the shield layer **30** to the base layer **42** while securing the flame retardance, pressure resistance, deterioration resistance or the like of the flat cable **1**, and is made of, for example, a thermoplastic resin material. As the flame retardant insulating layer **44**, for example, a thermoplastic polyester resin containing a phosphorus-based flame retardant or a nitrogen-based flame retardant can be adopted. The anchor coat layer **46** for adhering the base layer **42** and the flame retardant insulating layer **44** is provided between the base layer **42** and the flame retardant insulating layer **44**. The material used as the anchor coat layer **46** can be optional, and for example, it is preferable to use the same material as the anchor coat layer **35** of the shield layer **30**.

[0102] The pair of resin films **40** covers the shield layers **30** and outer surfaces of the resin insulating layers **20** at portions where the shield layer **30** is not attached. Each resin film **40** has a width dimension in the conductor parallel direction larger than the width dimension of the resin insulating layer **20** and the shield layer **30**. That is, both end portions (hereinafter, referred to as end portions on both sides) of the resin films **40** in the conductor parallel direction extend to the outer side with respect to end portions on both sides of the resin insulating layers **20** and the shield layers **30**. The entire surfaces of the end portions on both sides of the resin insulating layers **20** and the shield layers **30** are covered with the extended pair of resin films **40**. Further, the end portions on both sides of the base layers **42** of the pair of resin films **40** are bonded to each other via the flame retardant insulating layers **44** and the adhesive layers **46**. As described above, the pair of resin films **40** are bonded at end portions on both sides in the conductor parallel direction, so that the end portions on both sides of the resin films **40** can be prevented from being peeled off.

[0103] FIG. **2** is a longitudinal sectional view of the flat cable **1** taken along the line A-A.

[0104] As shown in FIG. **2**, the resin insulating layer **20** and the shield layer **30** are removed by a predetermined length on one surface (upper surface in FIG. **2**) at both end portions of the flat cable **1** in the length direction (hereinafter, referred to as cable length direction), so that the flat conductor **10** is exposed. The pair of resin films **40** are bonded to the outer surfaces of the pair of shield layers **30** so as to cover a part of the exposed portion of the flat conductor **10** at both ends in the cable length direction. That is, in the flat cable **1**, the flat conductor **10** is exposed on one surface and the shield layer **30** is exposed on the other surface at both end portions in the length direction. The end portion in the cable length direction of the flat cable **1** configured as described above is directly inserted and connected to a connecting member (not shown).

[0105] Next, a method for manufacturing the flat cable **1** according to the present embodiment will be described using FIGS. **3** to **5**. The basic concept of the method for manufacturing the flat cable **1** is the same as in the modifications and a second embodiment described later.

[0106] As shown in FIG. **3**, it is preferable to bond the resin insulating layer **20** and the shield layer **30** in advance via the anchor coat layer **35**. As shown in FIG. **4**, a plurality of flat conductors **10** are supplied in parallel at a predetermined interval between a pair of laminate rollers **R1**, **R1** facing and pressing with each other. Each flat conductor **10** is unwound from a bobbin (not shown). Next, the resin insulating layer **20** to which the shield layer **30** is bonded is supplied to both sides of the parallel surface of the flat conductors **10** between the pair of laminate rollers **R1**, **R1**. Here, on the upper surface side of FIG. **4**, the resin insulating layer **20** with the shield layer **30** is supplied to the pair of laminate rollers **R1**, **R1** at a predetermined interval in the cable length direction; and on the lower surface side of FIG. **4**, the resin insulating layer **20** with the shield layer **30** is continuously supplied to the pair of laminate rollers **R1**, **R1**. Then, the pair of laminate rollers **R1**, **R1** presses the pair of resin insulating layers **20** with the shield layer **30** sandwiching the flat conductor **10** at a predetermined interval to bond the resin insulating layers **20** to each other.

[0107] Next, the resin film **40** is supplied to outer sides of both the upper and lower shield layers **30** at predetermined intervals in the cable length direction between a pair of laminate rollers **R2**, **R2** facing and pressing with each other. Then, the pair of resin films **40** sandwiching the shield layer **30** are pressed by the pair of laminate rollers **R2**, **R2**, and the resin films **40** are bonded to each other to form a long cable **101**. At last, as shown in FIG. **5**, the long cable **101** produced as described above is cut at a portion where the flat conductor **10** is exposed from the resin film **40**, so as to obtain the flat cable **1** (see FIGS. **1** and **2**). Thus, by making the length of the resin insulating layer **20** with the shield layer **30** supplied to the laminate rollers **R1**, **R1** on the upper surface side in FIG. **4** correspond to a desired length of the flat cable **1**, the flat cable **1** having a desired length can be easily produced.

[0108] As described above, in the present embodiment, the flat cable **1** includes the plurality of flat conductors **10** arranged in parallel; the pair of resin insulating layers **20** sandwiching the flat conductors **10** from both sides of the parallel surface of the plurality of flat conductors **10** and covering portions other than the end portions in the length direction of the flat conductor **10**; the pair of shield layers **30** respectively in contact with the outer surfaces of the pair of resin insulating layers **20**; and the pair of resin films **40** covering the outer surfaces of the pair of resin insulating layers **20** or the pair of shield layers **30**. The dielectric loss tangent of the pair of resin insulating layers **20** is 0.001 or less at 10 GHz, and the flame retardant insulating layer **44** configuring the resin film **40** is made of a flame retardant material (a flame retardant is included). According to this configuration, the dielectric loss tangent of the resin insulating layer **20** is lower than that of the flat cable in related art, so that the transmission characteristics of the flat cable **1** can be improved. Further, since the resin film **40** is made of a flame retardant material, the flame retardance of the flat cable **1** can be maintained.

[0109] When an end portion of a shield layer in the conductor parallel direction is exposed, the exposed portion of the metal configuring the shield layer may spark during a withstand voltage test after a flat cable is produced and the withstand voltage test may not be performed. To address the above matters, in the flat cable **1** of the present embodiment, the end portion (side end) of the shield layer **30** in the conductor parallel direction is covered with the resin film **40**, and the metal portion is not exposed at the side end of the flat cable **1**, so that a defect such as the occurrence of a spark at the time of withstand voltage test after cable formation can be prevented.

[0110] In the flat cable **1**, the shield layer **30** is exposed on one surface side of both end portions in the length direction. Accordingly, it is also possible to perform grounding directly by the shield layer **30** without using a grounding member described later. Therefore, it is possible to reduce the production cost of the flat cable **1** and reduce the thickness thereof.

[0111] FIG. **6** is an exploded view in a cross-sectional direction of a flat cable **1A** according to a first modification, and FIG. **7** is a cross-sectional view of the flat cable **1A**.

[0112] In the method for manufacturing the flat cable **1** of the first embodiment described above, the resin insulating layer **20** and the shield layer **30** are bonded in advance via the anchor coat layer **35**, and the pair of resin insulating layers **20** with the shield layer **30** are bonded so as to sandwich the plurality of flat conductors **10** in parallel, but the present invention is not limited thereto. As shown in FIG. **6**, in the flat cable **1**A, the resin insulating layer **20** and a shield layer **30**A are not bonded in advance, and the shield layer **30**A is bonded to the outer surface of the resin insulating layer **20** via the anchor coat layer **35** after the pair of resin insulating layers **20** are bonded with the flat conductors **10** being sandwiched in parallel.

[0113] In the flat cable **1** according to the first embodiment, the width dimension of the resin insulating layer **20** and the width dimension of the shield layer **30** substantially coincide with each other, but the present invention is not limited thereto. When the distance between an end portion of the outermost flat conductor **10**A and an end portion of the shield layer **30**A in the conductor parallel direction is equal to or more than a half of the width dimension of the flat conductor **10**A, the width dimension of the shield layer **30**A may be smaller than the width dimension of the resin insulating layer **20** as shown in FIG. **7**. In the flat cable **1**A, the pair of resin films **40** are bonded to each other to stepwisely cover both end portions of the shield layers **30**A and both end portions of the resin insulating layers **20**.

[0114] FIG. **8** is a cross-sectional view of a flat cable **1**B according to a second modification.

[0115] As shown in FIG. **8**, in the second modification, the width dimension of a shield layer **30**B is larger than the width dimension of the resin insulating layer **20**. Both end portions (extending portions) of the pair of shield layers **30**B cover both end surfaces of the resin insulating layers **20** in the conductor parallel direction, and the pair of shield layers **30**B are bonded to each other. That is, the entire periphery of the pair of resin insulating layers **20** in the cross-sectional view is covered by the shield layers **30**B. The flat cable **1**B is formed by bonding the pair of resin films **40** so as to cover the outer surfaces of the pair of shield layers **30**B. As described above, the pair of shield layers **30**B is bonded to each other, so that the shield layers **30**B are electrically connected to each other. Therefore, during operation of an electronic device in which the flat cable **1**B is used, noise of a signal generated from the electronic circuit of the electronic device can be collectively released from both shield layers **30**B.

[0116] FIG. **9** is a cross-sectional view of a flat cable **1**C according to a third modification.

[0117] As shown in FIG. **9**, a shield layer **30**C of the flat cable **1**C is wound around the pair of resin insulating layers **20** sandwiching the flat conductors **10** so as to cover the entire periphery of the resin insulating layers **20** in the cross-sectional view. At this time, it is preferable that the shield layer **30**C is wound around the periphery of the resin insulating layers **20** such that one side end is bonded to the other side end (two end portions of the shield layer **30** overlap with each other). The flat cable **1**C is formed by bonding the pair of resin films **40** so as to cover the shield layer **30**C wound around the resin insulating layers **20**. In this configuration, noise can also be collectively released from the shield layer **30**C as in the second modification.

[0118] FIG. **10** is a cross-sectional view of a flat cable **1**D according to a fourth modification.

[0119] As shown in FIG. **10**, in the flat cable **1**D, positions of end portions on both sides of the pair of resin insulating layers **20** in the conductor parallel direction substantially coincide with those of the end portions on both sides of the pair of resin films **40**. That is, the pair of resin insulating layers **20** is exposed at the end portions on both sides. Further, end portions on both sides of the shield layers **30** are covered by the resin insulating layers **20**. According to such a flat cable **1**D, the transmission characteristics can be improved as in the first embodiment. From the viewpoint of flame retardance, the configuration of the flat cable **1** according to the first embodiment is more preferable in which the end portions on both sides of the resin insulating layers **20** are covered by the resin films **40** containing the flame retardant material. For example, as shown in FIG. **27**, the end portions on both sides of the resin insulating layers **20** may be covered with flame retardant insulating layers **48** which are made of the same flame retardant insulating material as the flame retardant insulating layers **44** of the resin films **40**.

[0120] In the flat cable **1**D according to the fourth modification, the end portions on both sides of the shield layers **30** are covered with the resin insulating layers **20**, but the present invention is not limited thereto. For example, as in a flat cable **1**E shown in FIG. **11**, at least a part of end portions on both sides of the shield layers **30** may be covered with the resin films **40**. In this case, it is possible to prevent a failure at the time of withstand voltage test after cable formation.

[0121] FIG. **12** is a longitudinal sectional view of a flat cable **1**F according to a fifth modification.

[0122] As shown in FIG. **12**, the resin insulating layer **20** and the shield layer **30** are removed by a predetermined length on one surface (upper surface in FIG. **12**) at both end portions of the flat cable **1**F in the length direction, so that the flat conductor **10** is exposed (exposed portions are indicated by a symbol F in FIG. **12**). On the other hand, the resin insulating layer **20** is removed by a predetermined length on the other surface (lower surface in FIG. **12**) of the flat cable **1**F, and a resin film **50** (an example of a third resin film) different from the resin film **40** intervenes between the flat conductor **10** and the shield layer **30** at portions where the resin insulating layer **20** is removed. That is, the resin film **50** is bonded to at least a part of the exposed portion F of the plurality of flat conductors **10**, so as to bond one shield layer **30**. Then, the pair of resin films **40** is bonded from the outer surfaces of the pair of shield layers **30**. According to this configuration, the flat conductor **10** in a state of being exposed from the resin insulating layer **20** and the resin film **40** can be reinforced by the resin film **50**. In the present embodiment, the resin film **50** may be made of the same resin material as the resin film **40** (for example, polyethylene terephthalate), and may also be made of a material different from the resin film **40** as long as the flat conductor **10** can be reinforced.

[0123] It is preferable that the pair of resin films **40** is bonded to each other to cover the part of the portions F of the flat conductor **10** exposed from the resin insulating layer **20**. Therefore, the resin insulating layer **20** is not exposed, so that the flame retardance can be enhanced.

[0124] In FIG. **12**, the resin film **50** attached to one surface of the flat conductor **10** is disposed only between the portions F of the flat conductor **10** exposed from the resin insulating layer **20** and the shield layer **30**, but the present invention is not limited thereto. For example, as in a flat cable **1**G shown in FIG. **13**, a resin film **50**A may extend between the resin insulating layer **20** and the shield layer **30**

in a portion where the flat conductor **10** is not exposed. That is, the resin film **50**A may be bonded to the resin insulating layer **20** at the end portions in the cable length direction. According to this configuration, the exposed flat conductor **10** can be more reliably reinforced.

[0125] FIG. **14** is a longitudinal sectional view of a flat cable **1**H according to a sixth modification.

[0126] As shown in FIG. **14**, grounding members **60** are respectively attached to both end portions on one surface (lower surface in FIG. **14**) of the flat cable **1**H in the cable length direction so as to be electrically connected to the shield layer **30**. The pair of resin insulating layers **20** and the pair of shield layers **30** are removed by a predetermined length on both surfaces (upper and lower surface of FIG. **14**) of the flat cable **1**H, so that the flat conductor **10** is exposed. A resin film **50**A of a predetermined length is bonded to one surface (lower surface in FIG. **14**) of the exposed portion of the flat conductor **10** so as to extend to one shield layer **30** of the pair of shield layers **30**. In this shield layer **30**, a portion H other than both end portions in the cable length direction is not covered by the resin film **50**A.

[0127] The grounding members **60** are disposed to be in contact with the outer surface of the resin films **50**A at both end portions in the cable length direction, and in contact with the shield layer **30** at the portion H which is not covered by the resin films **50**A. Therefore, the shield layer **30** is electrically connected to the grounding members **60**. Further, the pair of shield layers **30** and portions of the grounding members **60** other than both end portions are covered with the pair of resin films **40** so that the flat conductor **10**, the resin films **50**A, and the grounding members **60** are exposed at both end portions in the cable length direction. As in the fourth modification, it is preferable that the pair of resin films **40** are bonded to each other to cover a part of a portion of the flat conductor **10** exposed from the resin insulating layer **20** since the resin insulating layer **20** is not exposed. As described above, the grounding member **60** is provided at the end portion in the cable length direction, and a part of the grounding member **60** is covered by the resin film **40** together with the shield layer **30**, so that the grounding member **60** for reliably and easily grounding the flat cable **1**H can be integrated into the flat cable **1**H.

Characteristics Evaluation

[0128] The transmission characteristics (signal attenuation amount) are compared and evaluated for a flat cable configured according to the first embodiment (including modifications) described above and a flat cable configured according to related art.

[0129] FIG. **15** is a cross-sectional view showing a flat cable configured according to the above embodiment and used in this evaluation. Specifically, a flat cable (hereinafter, referred to as cable **1**J) in which the pair of resin films **40** are not bonded around the shield layer **30**C of the flat cable **1**C according to the third modification is adopted. The dielectric loss tangent of the cable **1**J is 0.0002 at 10 GHz.

[0130] FIG. **16** is a cross-sectional view showing a flat cable configured according to the related art and used in this evaluation. A cable **1**Z shown in FIG. **16** uses the same flat conductors **10** as those of the above embodiment. A pair of resin insulating layers **20**Z is bonded with four flat conductors **10** being sandwiched in parallel. The pair of resin insulating layers **20**Z contains a flame retardant. The dielectric loss tangent of the cable **1**Z is 0.0023 at 10 GHz. In the cable **1**Z according to the related art, in order to ensure flame retardance, a pair of insulating base layers **25**Z made of, for example, polyethylene terephthalate is provided on outer surfaces of a pair of resin insulating layers **20**Z. Further, on outer surfaces of the pair of insulating base layers **25**Z, for example, an intervening tape **27**Z made of polyethylene or polyester is disposed, and a shield layer **30**Z is wound around the intervening tape **27**Z. The shield layer **30**Z is made of the same material as the shield layer **30** of the present embodiment.

[0131] FIG. **17** is a graph showing frequency characteristics of signal attenuation amounts for the cable **1**J shown in FIG. **15** and the cable **1**Z shown in FIG. **16**. In the graph shown in FIG. **17**, the vertical axis represents a signal attenuation amount (dB), the horizontal axis represents frequency (GHz), and the frequency characteristics of signal attenuation amounts is shown. The signal attenuation amount is represented by insertion loss (SDD **21**) of a differential mode in a plurality of flat conductors. As shown in FIG. **17**, the drop of the signal attenuation amount of the cable **1**Z according to the related art is larger than that of the cable **1**J according to the present embodiment, and in particular, the signal attenuation amount of the cable **1**Z drops significantly as the frequency band goes up.

[0132] For example, as shown in the table in FIG. **18**, a signal attenuation amount at 5 GHz is −2.9 dB for the cable **1**Z and −1.9 dB for the cable **1**J, and an improvement rate of the signal attenuation amount for the cable **1**J with respect to the cable **1**Z is 34%. A signal attenuation amount at 10 GHz is −4.9 dB for the cable **1**Z and −3.0 dB for the cable **1**J, and an improvement rate of the signal attenuation amount for the cable **1**J with respect to the cable **1**Z is 39%. As described above, compared with the configuration (configuration according to related art) of the cable **1**Z in which the insulating base layer **25**Z or the intervening tape **27**Z is disposed between the flat conductor **10** and the shield layer **30**, in the configuration of the cable **1**J according to the present embodiment in which an insulating base layer or an intervening tape is not disposed between the flat conductor **10** and the shield layer **30**, it is confirmed that the transmission characteristics can be significantly improved since the dielectric loss tangent of the resin insulating layer **20** is lowered.

Second Embodiment

[0133] FIG. **19** is a cross-sectional view showing a flat cable **100** according to the second embodiment, and FIG. **20** is a longitudinal sectional view showing an end portion of the flat cable **100** in the length direction. In the flat cable **100**, the description of the same configuration as the flat cable **1** of the first embodiment is omitted. Further, in FIGS. **19** and **20**, illustration of the anchor coat layers **35** and **46** is omitted for simplification of the illustration.

[0134] As shown in FIG. **19**, in the flat cable **100** of the second embodiment, the shield layer **30** intervenes only between one resin insulating layer **20** of the pair of resin insulating layers **20** and one resin film **40** of the pair of resin films **40**. That is, in the flat cable **100**, the shield layer **30** is disposed only on one side of the parallel surface of the flat conductors **10**. Similarly to the flat cable **1** of the first embodiment, in the flat cable **100**, the end portions of the shield layer **30** are also on the outer side with respect to the outermost flat conductor **10** by a half or more of the width dimension of the flat conductor.

[0135] In the flat cable **100** shown in FIG. **19**, the width dimension of the pair of resin insulating layers **20** substantially coincide with the width dimension of the pair of resin films **40**, and end portions on both sides of the shield layer **30** in the conductor parallel direction are covered with the resin insulating layer **20**. Therefore, similarly to the first embodiment, the end portions on both sides of the shield layer **30** are not exposed, so that a defect such as the occurrence of a spark at the time of withstand voltage test after cable formation can be prevented.

[0136] In the flat cable **100** of the second embodiment shown in FIG. **19**, the width dimension of the pair of resin insulating layers **20** substantially coincide with the width dimension of the pair of resin films **40**, but the present invention is not limited thereto. For example, as in the flat cable **1** of the first embodiment shown in FIG. **1**, the width dimension of the resin films **40** is larger than the width dimension of the resin insulating layers **20**, and end portions on both sides of the pair of resin films **40** are bonded to each other so as to cover the end portions on both sides of the resin insulating layers **20** and the shield layers **30**.

[0137] As shown in FIG. **20**, a grounding member **60** is attached to the flat cable **100** at an end portion in the cable length direction. On a surface (upper surface in FIG. **20**) of the flat cable **100** at a side where the shield layer **30** is not provided, the resin insulating layer **20** and the resin film **40** are removed by a predetermined length to expose the flat conductor **10**. On the other hand, on a surface (lower surface in FIG. **20**) at a side where the shield layer **30** is provided, the resin film **40** is removed by a predetermined length at a portion which is on an inner side of the end portion by a predetermined distance, so that the shield layer **30** is exposed from the resin film **40**. One end side of the grounding member **60** is in contact with the exposed portion of the shield layer **30**. Further, the other end side of the grounding member **60** is in contact with the resin film **40** on the end portion in the cable length direction.

[0138] In the configuration of the flat cable **100** in which the shield layer **30** is provided only on one surface of the parallel surface of the flat conductors **10**, a resin insulating layer **20**A of the pair of resin insulating layers **20** on which the shield layer **30** is not provided may be made of a resin material containing a flame retardant material (for example, phosphorus-based flame retardants and nitrogen-based flame retardants). This is because that even when the flame retardant is contained in the resin insulating layer **20**A on the side where the shield layer **30** is not provided, the transmission characteristics of the flat cable **100** are not greatly affected. As described above, the resin insulating layer **20** on the shield layer **30** side is made of a resin material containing no flame retardant as in the first embodiment, and on the other hand, the resin insulating layer **20**A is made of a resin material containing the flame retardant (as in the related art), so that the flame retardance of the flat cable **100** can be further enhanced while the transmission characteristics are not reduced. For the side where the shield layer **30** is provided, the flame retardance is secured by the flame retardant insulating layer **44** of the resin film **40**.

[0139] FIG. **21** is a cross-sectional view of a flat cable **100**A according to a seventh modification. In the drawings after FIG. **21**, the resin film **40** collectively represents the base layer **42**, the flame retardant insulating layer **44** and the anchor coat layer **46** as one layer (reference numeral **40**) for simplification of the illustration.

[0140] In the second embodiment described above, the shield layer **30** is configured such that the width dimension in the conductor parallel direction is smaller than that of the resin insulating layer **20**, and the end portions on both sides are covered with the resin insulating layer **20**, but the present invention is not limited thereto. As in the flat cable **100**A shown in FIG. **21**, the width dimension of the resin insulating layer **20** on the side where the shield layer **30** is provided may substantially coincide with the width dimension of the shield layer **30**, and the resin film **40** covering the outer surface of the shield layer **30** also covers end portions on both sides of the shield layer **30** and end portions on both sides of the resin insulating layer **20** on the side covered with the shield layer **30**. As described above, the side end of the shield layer **30** and the side end of the resin insulating layer **20** on the shield layer **30** side are covered with the resin film **40** containing a flame retardant, so that the flame retardance of the flat cable **100**A is enhanced. The end portions on both sides of the shield layer **30** are not exposed, so that a defect (such as the occurrence of a spark) at the time of withstand voltage test after cable formation can be prevented.

[0141] In FIG. **21**, the end portions on both sides of the resin insulating layer **20**A on the side where the shield layer **30** is not provided are exposed, but the present invention is not limited thereto. As the configuration of a flat cable **100**B shown in FIG. **22**, the resin film **40** covering the shield layer **30** and the resin insulating layer **20** on the side where the shield layer **30** is provided may cover the end portions on both sides of a resin insulating layer **20**A on the other side. Accordingly, the flame retardance can be improved, and end portions on both sides (end portions in the width direction, which is the conductor parallel direction) of the resin film **40** can be prevented from being peeled off.

[0142] FIG. **23** is a longitudinal sectional view showing an end portion in the length direction of a flat cable **100**C according to an eighth modification.

[0143] As shown in FIG. **23**, on a surface (upper surface in FIG. **23**) of the flat cable **100**C at a side where the shield layer **30** is not provided, the resin insulating layer **20** and the resin film **40** are removed by a predetermined length to expose the flat conductor **10**. On the other hand, on a surface (lower surface in FIG. **23**) at a side where the shield layer **30** is provided, the resin film **40** is removed, by laser irradiation, for example, by a predetermined length at a portion which is on an inner side of the end portion by a predetermined distance, so that the shield layer **30** is exposed. Instead of the laser irradiation, a part of the shield layer **30** may be exposed by bonding the resin film **40** to the shield layer **30** at intervals by a laminating roller. One end side of the grounding member **60** is in contact with the exposed portion of the shield layer **30**. The other end side of the grounding member **60** is attached to the resin film **40** on the end portion in the cable length direction via a resin film **70**. That is, the resin film **70** different from the resin film **40** is intervened between the resin film **40** and the grounding member **60** on the end portion in the cable length direction. Similar to the resin film **50** in the fifth modification, the resin film **70** may be made of the same resin material as the resin film **40** (for example, polyethylene-terephthalate), and may also be made of a material different from the resin film **40**. As described above, the resin film **70** is attached between the resin film **40** and the grounding member **60** so as to correspond to the exposed portion of the flat conductor **10**, so that exposed portion of the flat conductor **10** and the grounding member **60** can be reinforced.

[0144] FIG. **24** is a longitudinal sectional view showing an end portion in the length direction of a flat cable **100**D according to a ninth modification.

[0145] As shown in FIG. **24**, at the end portion of the flat cable **100**D in the length direction, on a surface (upper surface in FIG. **24**) at the side where the shield layer **30** is not provided, the resin insulating layer **20** and the resin film **40** are removed by a predetermined length to expose the flat conductor **10**. On the other hand, on a surface (lower surface in FIG. **24**) at a side where the shield layer **30** is provided, the resin film **20** is removed by a predetermined length to expose the shield layer **30**. Then, on this surface, a resin film **80** for reinforcement is attached to the end portion of the resin film **40**. The resin film **80** may be made of the same resin material as the resin film **40** (for example, polyethylene terephthalate), and may also be made of a material different from the resin film **40** as long as the flat conductor **10** can be reinforced. In the ninth modification, grounding is performed by the exposed shield layer **30** without using the grounding member **60** of the sixth modification. That is, according to the flat cable **100**D, it is possible to realize a reduction in production cost and a reduction in thickness since the grounding member **60** is not required.

[0146] FIG. **25** is a longitudinal sectional view showing an end portion in the length direction of a flat cable **100**E according to a tenth modification.

[0147] In the flat cable **100**E shown in FIG. **25**, at the end portion in the cable length direction, the pair of resin insulating layers **20**, the shield layer **30** provided on the outer surface of one resin insulating layer **20**, and the pair of resin films **40** is removed by a predetermined length to expose the flat conductor **10**. The exposed portion of the flat conductor **10** is bent upward in FIG. **25**. Further, the grounding member **60** electrically connected to the shield layer **30** is provided between the shield layer **30** and the resin film **40** at the end portion in the cable length direction. A resin film **90** (an example of a third resin film) covers the outer surface of the resin film **40** at a position corresponding to an overlap portion of the shield layer **30** and the grounding member **60**. The resin film **90** also covers one surface (lower surface in FIG. **25**) of the flat conductor **10** exposed from the resin insulating layer **20** and the resin film **40**. That is, the resin film **90** is attached so as to extend from one surface side of the exposed portion of the flat conductor **10** to a portion where the grounding member **60** of the resin film **40** is provided. The resin film **90** may be made of the same resin material as the resin film **40** (for example, polyethylene terephthalate), and may also be made of a material different from the resin film **40**. The grounding member **60** protrudes from the resin film **40** in a direction perpendicular to the paper surface in FIG. **25**, and can be electrically connected to a ground terminal of a connecting member such as a connector at that portion. According to this configuration, at least a part of the grounding member **60** is covered with the resin film **40**, so that the bonding of the grounding member **60** to the shield layer **30** can be strengthened. Further, the flat conductor **10** protruding from the resin film **40** can be reinforced by the resin film **90**.

[0148] As in a flat cable **100**F shown in FIG. **26**, the grounding member **60** may be configured such that an end portion thereof protrudes from the resin film **40**, and the protruding portion is bent so as to have the same height as the plurality of flat conductors **10** in the direction orthogonal to the conductor parallel direction (hereinafter, referred to as cable thickness direction), and to be arranged in parallel with the flat conductors **10**. Therefore, impedance can be matched by adjusting the thickness balance of the grounding member **60** and the insulating material.

[0149] Although the present invention is described in detail with reference to a particular embodiment, it is apparent to those skilled in the art that various changes and modifications can be made without departing from the spirit and scope of the present invention. The numbers, positions, shapes or the like of components described above are not limited to the above embodiment, and can be changed to suitable numbers, positions, shapes or the like during carrying out the present invention.

[0150] In the above embodiments, the pair of resin insulating layers **20** are used as an insulator that integrates the plurality of flat conductors **10**, but the present invention is not limited thereto. For example, the insulator may be configured by extruding and covering a resin around a plurality of flat conductors **10** arranged in parallel. The configuration is suitable for mass production of similar flat cables (long cable).

REFERENCE SIGNS LIST

[0151] **1** flat cable
[0152] **10** flat conductor
[0153] **20** resin insulating layer
[0154] **30** shield layer
[0155] **35** anchor coat layer
[0156] **40** resin film (example of first resin film)
[0157] **42** base layer
[0158] **44** flame retardant insulating layer
[0159] **46** anchor coat layer
[0160] **50** resin film (example of third resin film)
[0161] **60** grounding member
[0162] **70**, **80** resin film
[0163] **90** resin film (example of second resin film)
[0164] R**1**, R**2** laminate roller

1. A shielded flat cable comprising:
a plurality of conductors arranged in parallel;
a pair of resin insulating layers sandwiching the plurality of conductors from both sides of a parallel surface of the plurality of conductors, and covering portions other than end portions of the plurality of conductors in a length direction;
a pair of shield layers in contact with an outer surface of at least one resin insulating layer of the pair of resin insulating layers; and
a pair of first resin films with an adhesive covering an outer surface of the pair of resin insulating layers or the shield layer,
wherein a dielectric loss tangent of the resin insulating layer, of the pair of resin insulating layers, in contact with the shield layer is 0.001 or less at 10 GHz, and
wherein the adhesive or the pair of first resin films is made of a flame retardant material.

2. The shielded flat cable according to claim **1**,
wherein in a parallel direction of the plurality of conductors, an end portion of the shield layer is on an outer side with respect to an end portion of the outermost

conductor among the plurality of conductors by a half or more of a width dimension of the outermost conductor, and

wherein the end portion in the parallel direction of the shield layer is covered with the resin insulating layer.

3. The shielded flat cable according to claim **1**,

wherein in a parallel direction of the plurality of conductors, an end portion of the shield layer is on an outer side with respect to an end portion of the outermost conductor among the plurality of conductors by a half or more of a width dimension of the outermost conductor, and

wherein the end portion in the parallel direction of the shield layer is covered with the first resin film.

4. The shielded flat cable according to claim **1**, further comprising:

a grounding member attached to an end portion in the length direction,

wherein a portion of the shield layer is exposed from the first resin film, and the grounding member is in contact with the shield layer at the exposed portion.

5. The shielded flat cable according to claim **1**,

wherein the shield layer is exposed at an end portion in the length direction.

6. The shielded flat cable according to claim **1**,

wherein at an end portion in the length direction, each of the plurality of conductors is completely exposed from the resin insulating layers.

7. The shielded flat cable according to claim **6**, further comprising:

a grounding member superimposed on and in contact with the outer surface of the shield layer at the end portion in the length direction,

wherein the first resin film covers the shield layer and the grounding member.

8. The shielded flat cable according to claim **7**,

wherein a portion of the grounding member protrudes from the first resin film, and the protruding portion is arranged in parallel with the plurality of conductors.

9. The shielded flat cable according to claim **7**, further comprising:

a second resin film covering the first resin film,

wherein the second resin film is bonded to at least a part of exposed portions of the plurality of conductors.

10. The shielded flat cable according to claim **6**, further comprising:

a third resin film bonded to at least a part of exposed portions of the plurality of conductors,

wherein the shield layer is bonded to an outer surface of the third resin film.

11. The shielded flat cable according to claim **10**,

wherein the third resin film is bonded to the resin insulating layer at the end portion in the length direction.

12. The shielded flat cable according to claim **6**, further comprising:

a third resin film bonded to exposed portions of the plurality of conductors and the shield layer at the end portion in the length direction; and

a grounding member superimposed on and in contact with the outer surface of the shield layer and bonded to the third resin film.

13. The shielded flat cable according to claim **1**,

wherein at least a part of end portions of the resin insulating layers in the parallel direction of the conductors is covered with the first resin film.

14. The shielded flat cable according to claim **13**,

wherein an entire surface of the end portions of the resin insulating layers is covered with the first resin film.

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