

(19)



(11)

EP 3 823 300 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

19.05.2021 Bulletin 2021/20

(51) Int Cl.:

H04R 1/10 (2006.01)

(21) Application number: **20207025.6**

(22) Date of filing: **11.11.2020**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA ME

Designated Validation States:

KH MA MD TN

(30) Priority: **15.11.2019 JP 2019206900**

(71) Applicant: **JVC Kenwood Corporation**

Yokohama-shi, Kanagawa 2210022 (JP)

(72) Inventor: **MIWA, Yasuhiro**

Yokohama-shi, Kanagawa 2210022 (JP)

(74) Representative: **Klang, Alexander H.**

Wagner & Geyer Partnerschaft mbB

Patent- und Rechtsanwälte

Gewürzmühlstrasse 5

80538 München (DE)

(54) **EARPHONE**

(57) An earphone includes a first housing and a second housing attached together in a first direction to compose a casing having a space therein, a speaker unit housed in the space, a supporter interposed and held

between the first housing and the second housing and having more flexibility than the first housing and the second housing, and an inner frame preventing a reduction in width of the supporter in the first direction.

EP 3 823 300 A1

Description

BACKGROUND

[0001] The present disclosure relates to earphones.

[0002] Earphones are known that include a body part to be put in the external ear, and a projection part (a supporter) projecting from the body part, as disclosed in Japanese Patent Application Publication No. 2009-060157. The projection part is in contact with the inner wall of the external ear when the body part is put in the external ear so that the earphone is stably fitted to the external ear.

[0003] The body part is preferably formed from hard resin, and the supporter is preferably formed from silicone rubber having flexibility. A housing serving as an outer frame of the body part and the supporter are thus typically integrally formed by insert molding.

[0004] The insert molding limits molding factories enabling the molding while ensuring high quality, since metal dies are typically expensive and require a high molding technique. If variations in shape of either the body part or the supporter are required to provide several types of earphones, a dedicated metal die for each shape needs to be prepared, which impedes constituent components from being used in common.

[0005] The conventional earphones as described above including the flexible supporter in contact with the external ear thus still have a problem with the insert molding in order to improve productivity.

SUMMARY

[0006] An object of one or more embodiments is to provide earphones contributing to achieving high productivity while including flexible supporters.

[0007] One or more embodiments provide an earphone including a first housing and a second housing attached together in a first direction to compose a casing having a space therein, a speaker unit housed in the space, a supporter interposed and held between the first housing and the second housing and having more flexibility than the first housing and the second housing, and an inner frame preventing a reduction in width of the supporter in the first direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a vertically cross-sectional view illustrating a modeled structure of an earphone 91 as an example of an earphone according to one or more embodiments.

Fig. 2 is an exploded view of Fig. 1.

Fig. 3 is a first external perspective view of an earphone 91A.

Fig. 4 is a second external perspective view of the

earphone 91A.

Fig. 5 is an assembly diagram of the earphone 91A to be assembled.

Fig. 6 is a partly cross-sectional view illustrating a supporter attachment structure TK1 as modified example 1 of a supporter attachment structure TK.

Fig. 7 is a partly cross-sectional view illustrating a supporter attachment structure TK2 as modified example 2 of the supporter attachment structure TK.

Fig. 8 is a partly cross-sectional view illustrating a supporter attachment structure TK3 as modified example 3 of the supporter attachment structure TK.

Fig. 9 is a partly cross-sectional view illustrating a supporter attachment structure TK4 as modified example 4 of the supporter attachment structure TK.

Fig. 10 is a partly cross-sectional view illustrating a supporter attachment structure TK5 as modified example 5 of the supporter attachment structure TK.

DETAILED DESCRIPTION

[0009] One or more embodiments will be illustrated below with earphones 91 and 91A according to the respective examples.

(Example)

[0010] Fig. 1 is a vertical cross-sectional view illustrating a modeled structure of the earphone 91, and Fig. 2 is an exploded view of the model of the earphone 91 illustrated in Fig. 1. The earphone 91 described below is a canal-type (earplug-type) earphone, and is to be put in the external ear on the right side. The earphone for the left ear has a symmetrical structure with respect to the earphone for the right ear, and the following explanations are made mainly for the earphone 91 for the right ear.

[0011] Fig. 1 indicates the respective directions of the left, the right, the top, and the bottom of the earphone 91 with the corresponding arrows when the earphone 91 is put in the right external ear. The front side of the earphone 91 is on the back side of the sheet of Fig. 1, and the rear side of the earphone 91 is on the front side of the sheet of Fig. 1.

[0012] The earphone 91 includes a first housing 11, a second housing 12, an inner frame 13, a supporter 14, a speaker unit 82, and a cord 83.

[0013] The first housing 11 and the second housing 12 are respectively located on the head side of the user and the opposite side of the head side when the earphone 91 is put in the external ear. The first and second housings 11 and 12 are attached together in the right-left direction, which is the first direction, so as to serve as a hollow casing 1K having a space Va therein.

[0014] The speaker unit 82 is housed in the space Va. The speaker unit 82 is connected with leads 83a, and a cord 83 enclosing the leads 83a is led out of the space Va through a penetration hole 122 of a cord-leading part 124 projecting from the second housing 12.

[0015] The first housing 11 is provided at the left end with a sound channel part 111 projecting toward the left. An ear piece 81 to be inserted into the external auditory meatus of the user when the earphone 91 is used, is removably attached to the sound channel part 111.

[0016] The inner frame 13 includes a base part 131 having a T-shape and including a narrow neck part 131a, and a projection part 13a projecting in the right-left direction from the lower end of the base part 131. A part of the projection part 13a projecting toward the left is defined as a projection part 13a1, and the other part of the projection part 13a projecting toward the right is defined as a projection part 13a2.

[0017] The first housing 11 has a frame engagement hollow 11a to which the projection part 13a1 is fitted to be engaged. The second housing 12 has a frame engagement hollow 12a to which the projection part 13a2 is fitted to be engaged.

[0018] The first housing 11, the second housing 12, and the inner frame 13 are formed from hard resin. The resin is acrylonitrile butadiene styrene (ABS), for example.

[0019] The supporter 14 has more flexibility than the first housing 11 and the second housing 12. The material used for the supporter 14 is silicone rubber, for example.

[0020] As illustrated in Fig. 1 and Fig. 2, the supporter 14 includes a base part 14a having a substantially U-shape and open on the bottom side in the vertical cross-sectional view, and a stretching part 14b stretching outward at the lower end of the open end part of the base part 14a in the right-left direction. A part of the stretching part 14b stretching outward toward the left is defined as a first stretching part 14b1, and the other part of the stretching part 14b stretching outward toward the right is defined as a second stretching part 14b2.

[0021] The first housing 11 has a supporter engagement hollow 11b as a first engagement part to which the stretching part 14b1 is fitted to be engaged, and the second housing 12 has a supporter engagement hollow 12b as a second engagement part to which the stretching part 14b2 is fitted to be engaged.

[0022] The earphone 91 is connected to a music reproduction device at the tip of the cord 83 so as to supply voice signals to the speaker unit 82. The speaker unit 82 converts the input voice signals to voice so as to output the voice toward the left. The output voice is emitted outward from the tip of the ear piece 81 through the inner space of the sound channel part 111.

[0023] The assembly of the earphone 91 starting from the exploded state of the model as illustrated in Fig. 2 is made as follows.

[0024] First, as indicated by the arrow DRa in Fig. 2, the inner frame 13 is fitted to the open end part of the supporter 14 such that the neck part 131a of the base part 13 and the projection part 13a are exposed to the outside.

[0025] The inner width of the opening of the supporter 14 is set to be slightly smaller than the outer width of the

inner frame 13 in the right-left direction, so that the inner frame 13 is fitted to be supported by the supporter 14 while being prevented from unintentionally being dropped off upon the friction with the supporter 14.

[0026] The leads 83a are then connected and fixed to the speaker unit 82. The first housing 11 and the second housing 12 are engaged together while interposing the engaged portion of the supporter 14 and the inner frame 13 supported by the supporter 14, so as to be assembled as in the state illustrated in Fig. 1. The engaged portion is indicated by a boundary part 15.

[0027] The engagement between the first housing 11 and the second housing 12 at the boundary part 15 may be a simple strong engagement between the recess and the projection, may be made via an adhesive, or may be made by welding.

[0028] The supporter 14 is not limited to the hollow member having an inner space V14 as illustrated in Fig. 1, and may be a member without space therein.

[0029] As illustrated in Fig. 1, the outer width D14 of the supporter 14 cannot be reduced if force is applied in the right-left direction to reduce the width D14 so as to intentionally remove the supporter 14, since the inner frame 13 is held at the open end part of the supporter 14 substantially with no gap.

[0030] Namely, the inner frame 13 can avoid the reduction in the width D14 of the supporter 14 in the right-left direction.

[0031] This can prevent the supporter 14 from coming out of the main body 1 during normal use.

[0032] Preparing the supporter 14 as an independent member without using any insert molding to assemble the earphone 91 can ensure substantially the same resistance to removal as in the case of the preparation of the supporter 14 obtained by the insert molding.

[0033] Since the inner frame 13 is arranged at the open end part of the supporter 14 with almost no gap, any other supporter different from the supporter 14 having different projecting levels and projecting shapes can be used to assemble the earphone 91 with the same inner frame 13 used in common.

[0034] The earphone 91 thus does not need to use a dedicated metal die for the insert molding, regardless of the use of the supporter 14. Therefore, productivity is improved.

[0035] An example of the above modeled structure used for a commercial earphone is described below with reference to the earphone 91A as illustrated in Fig. 3 to Fig. 5. The earphone 91A has a symmetrical structure between the right side and the left side, and the following explanations are made mainly for the earphone 91A for the right ear.

[0036] Fig. 3 illustrates the earphone 91A when put in the right ear as viewed from the back side of the head of the user, and Fig. 4 illustrates the earphone 91A as viewed from the diagonally upper front-right side of the head.

[0037] The earphone 91A includes the first housing 11

and the second housing 12 attached together at the boundary part 15. The supporter 14 is held in the region from the diagonally upper front side which is a part of the boundary part 15 in the circumferential direction to the diagonally rear bottom side via the top and back sides.

[0038] This configuration allows the supporter 14 to be in contact with the wide area in the inner wall of the antihelix when the earphone 91A is put in the external ear, so as to achieve a fine feel of fitting of the earphone 91A to the external ear.

[0039] The inner frame 13 (not illustrated but hidden inside the supporter 14) supported by the supporter 14 at the open end part of the supporter 14 is interposed and held between the first housing 11 and the second housing 12.

[0040] The cord 83 is led out of the penetration hole 122 of the cord-leading part 124 in the second housing 12.

[0041] Fig. 5 is an assembly diagram of the earphone 91A.

[0042] The inner frame 13 has a thin arc-like crescent shape as viewed from the side (for example, from the left). The projection part 13a of the inner frame 13 includes the projection parts 13a1 and 13a2 each projecting into a flange on both right and left sides at the middle portion of the arc-like shape in the longitudinal direction (the top-bottom direction).

[0043] The first housing 11 has the frame engagement hollow 11a to which the projection part 13a1 is fitted to be engaged, and the second housing 12 has the frame engagement hollow 12a to which the projection part 13a2 is fitted to be engaged.

[0044] The supporter 14 has an arc-like crescent shape having a greater height than the inner frame 13 as viewed from the side (for example, from the left). The supporter 14 has a sac-like shape open on the back side of the sheet of Fig. 5.

[0045] The stretching part 14b of the supporter 14 includes a set of three stretching parts 14b1 and a set of three stretching parts 14b2 each projecting into a flange on both right and left sides at the middle portion in the longitudinal direction (the top-bottom direction) at the open end part of the supporter 14. The supporter 14 is formed like a brim

[0046] The first housing 11 has the supporter engagement hollow 11b to which the stretching part 14b1 is fitted to be engaged, and the second housing 12 has the supporter engagement hollow 12b to which the stretching part 14b2 is fitted to be engaged.

[0047] The earphone 91A can be assembled through the following steps.

[0048] First, the inner frame 13 is fitted and engaged with the supporter 14 in the direction as indicated by the arrow DRb so as to obtain the engaged part.

[0049] The speaker unit 82 electrically connected with the leads 83a is housed in the first housing 11 in the direction indicated by the arrow DRc. The cord 83 on the tip side is caused to pass through to be led out of the

penetration hole 122 of the cord-leading part 124 (refers to Fig. 3) in the second housing 12, as indicated by the arrow of the chain line DRd.

[0050] The first housing 11 and the second housing 12 are then fitted together so as to interpose the engaged part of the inner frame 13 and the supporter 14.

[0051] At the same time, the projection part 13a1 of the inner frame 13 is engaged with the frame engagement hollow 11a of the first housing 11, and the stretching part 14b1 of the supporter 14 is engaged with the supporter engagement hollow 11b of the first housing 11.

[0052] The projection part 13a2 of the inner frame 13 is engaged with the frame engagement hollow 12a of the second housing 12, and the stretching part 14b2 of the supporter 14 is engaged with the supporter engagement hollow 12b of the second housing 12.

[0053] The projection parts 13a1 and 13a2 and the frame engagement hollows 11a and 12a are collectively referred to also as a frame engagement part FK. The engagement of the frame engagement part FK prevents the movement of the inner frame 13 with respect to the first housing 11 and the second housing 12 at least in the direction perpendicular to the right-left direction.

[0054] The earphone 91A and the earphone 91 as a model of the earphone 91A thus can be assembled easily through the steps as described above. This can also prevent the supporter 14 from being dropped off after the respective earphones 91A and 91 are assembled.

[0055] The respective earphones 91A and 91 can be manufactured while including the supporter 14 serving as a cushion without using insert molding.

[0056] The cost for metal dies to be used can be reduced and the respective constituent components are easy to manufacture, so as to prevent available molding factories from being limited. The earphones 91A and 91 thus contribute to the improved productivity.

[0057] The respective earphones 91A and 91 can also be assembled while using the same inner frame 13 but enabling the shape of the supporter to be varied. The earphones 91A and 91 thus enable the respective members to be used in common and contribute to the improved productivity accordingly.

[0058] The respective earphones 91A and 91 can also be assembled while using the first housing 11 and the second housing 12 but enabling the shape of either the inner frame 13 or the supporter 14 to be varied. The earphones 91A and 91 thus have the advantage of the improved productivity in view of the components to be used in common.

[0059] The present embodiment thus can achieve the effect of contributing to the improved productivity while including the flexible supporter to be in contact with the external ear.

[0060] The above example is not limited to the configurations as described above, and may be modified as appropriate without departing from the scope of the present embodiment.

[0061] The structure of the supporter 14 to be fitted to

the first housing 11 and the second housing 12 is not limited to that described above, and may be modified as illustrated in the following modified examples 1 to 5 with reference to Fig. 6 to Fig. 10.

[0062] The respective supporter attachment structures TK1 to TK5 illustrated in Fig. 6 to Fig. 10 can be substituted for the supporter attachment structure TK indicated in the area with reference sign A in Fig. 1. The earphones of the modified examples 1 to 5 obtained such that the supporter attachment structure TK of the earphone 91 is replaced with the respective supporter attachment structures TK1 to TK5, are referred to below as earphones 911 to 915.

(Modified Example 1)

[0063] As illustrated in Fig. 6, the supporter attachment structure TK1 of the earphone 911 of the modified example 1 differs from the supporter attachment structure TK in not including the engaged portion between the inner frame 13 and the first housing 11 or the second housing 12, and in that the supporter 14 is provided with a part interposed between the inner frame 13 and the respective first and second housings 11 and 12.

[0064] In particular, the supporter 14 includes the stretching part 14b1 engaged with the first housing 11 and the stretching part 14b2 engaged with the second housing 12, as in the case of the supporter attachment structure TK. The supporter 14 further includes an inner stretching part 14c including inner stretching parts 14c1 and 14c2 respectively engaged with inner engagement parts 13c1 and 13c2 provided as an inner engagement part 13c in the inner frame 13.

[0065] The supporter attachment structure TK1 does not allow the width D14 of the supporter 14 to be reduced if the supporter 14 is attempted to be removed, since the inner frame 13 is held at the open end part of the supporter 14 with substantially no gap. This can prevent the supporter 14 from being dropped out of the main body 1 after the earphone 911 is assembled.

[0066] According to the supporter attachment structure TK1, since the inner frame 13 is not engaged with the first housing 11 or the second housing 12, the boundary part 15 is defined to be provided with a step at which the first housing 11 and the second housing 12 are engaged together.

[0067] The inner frame 13 may be fixed to the first housing 11 or the second housing 12 by adhesion or welding so as to be integrated together more firmly.

(Modified Example 2)

[0068] As illustrated in Fig. 7, the supporter attachment structure TK2 of the earphone 912 of the modified example 2 differs from the supporter attachment structure TK in not including the engaged portion between the inner frame 13 and the first housing 11 or the second housing 12.

[0069] The supporter attachment structure TK2 does not allow the width D14 of the supporter 14 to be reduced if the supporter 14 is attempted to be removed, since the inner frame 13 is held at the open end part of the supporter 14 with substantially no gap. This can prevent the supporter 14 from being dropped out of the main body 1 after the earphone 912 is assembled.

[0070] According to the supporter attachment structure TK2, since the inner frame 13 is not engaged with the first housing 11 or the second housing 12, the boundary part 15 is defined to be provided with a step at which the first housing 11 and the second housing 12 are engaged together.

[0071] The inner frame 13 may be fixed to the first housing 11 or the second housing 12 by adhesion or welding so as to be integrated together more firmly.

(Modified Example 3)

[0072] As illustrated in Fig. 8, the supporter attachment structure TK3 of the earphone 913 of the modified example 3 differs from the supporter attachment structure TK in that the supporter 14 is provided with a part interposed between the inner frame 13 and the respective first and second housings 11 and 12.

[0073] In particular, the supporter 14 includes an inner stretching part 14c including an inner stretching part 14c1 interposed between the inner frame 13 and the first housing 11, and an inner stretching part 14c2 interposed between the inner frame 13 and the second housing 12.

[0074] The supporter attachment structure TK3 does not allow the width D14 of the supporter 14 to be reduced if the supporter 14 is attempted to be removed, since the inner frame 13 is held at the open end part of the supporter 14 with substantially no gap. This can prevent the supporter 14 from being dropped out of the main body 1 after the earphone 913 is assembled.

[0075] According to the supporter attachment structure TK3, the boundary part 15 is configured such that the first housing 11 and the second housing 12 are simply in contact with each other with no step required, since the engaged part between the first housing 11 and the second housing 12 in the thickness direction is defined by the inner frame 13.

(Modified Example 4)

[0076] As illustrated in Fig. 9, the supporter attachment structure TK4 of the earphone 914 of the modified example 4 differs from the supporter attachment structure TK in that the engaged part of the inner frame 13 with the first housing 11 and the second housing 12 projects toward the space Va.

[0077] In particular, the inner frame 13 includes a T-shaped projection part 13d projecting downward, as illustrated in Fig. 9.

[0078] The neck part of the T-shaped projection part 13d has a housing recessed part 13d1 which is a recess

to which the edge of the first housing 11 is fitted to be engaged, and has a housing recessed part 13d2 which is a recess to which the edge of the second housing 12 is fitted to be engaged. The tip part of the T-shaped projection part 13d projects toward the space Va.

[0079] The supporter attachment structure TK4 does not allow the width D14 of the supporter 14 to be reduced if the supporter 14 is attempted to be removed, since the inner frame 13 is held at the open end part of the supporter 14 with substantially no gap. This can prevent the supporter 14 from being dropped out of the main body 1 after the earphone 914 is assembled.

[0080] According to the supporter attachment structure TK4, the engaged part between the first housing 11 and the second housing 12 in the thickness direction is defined by the T-shaped projection part 13d of the inner frame 13, while the projected part is present in the space Va. Since the space Va serves as a back cavity of the speaker unit 82, the projected part may have an influence on the reproduced sound of the earphone 914, which may have reproduction characteristics different from the other supporter attachment structures TK1 to TK3 without being provided with the projected part in the space Va, in view of the airtight properties of the back cavity.

(Modified Example 5)

[0081] As illustrated in Fig. 10, the supporter attachment structure TK5 of the earphone 915 of the modified example 5 differs from the supporter attachment structure TK in that the supporter 14 and the first and second housings 11 and 12 are engaged together and positioned by the inner frame 13.

[0082] In particular, the inner frame 13 is provided with a dowel 13e including a dowel 13e1 and a dowel 13e2 each projecting in the right-left direction.

[0083] The supporter 14 has a dowel hole 14d1 and a dowel hole 14d2 through which the dowel 13e1 and the dowel 13e2 respectively penetrate.

[0084] The first housing 11 and the second housing 12 have dowel hollows 11d and 12d to which the dowel 13e1 and the dowel 13e2 can be fitted to be engaged.

[0085] During the assembling process, the dowel 13e1 and the dowel 13e2 of the inner frame 13 are caused to be inserted to the dowel hole 14d1 and the dowel hole 14d2 of the supporter 14. The dowel 13e1 and the dowel 13e2, which each have a sufficient length to project, are engaged with the dowel hollow 11d of the first housing 11 and the dowel hollow 12d of the second housing 12 so that the first housing 11 and the second housing 12 are attached together.

[0086] The supporter attachment structure TK5 does not allow the width D14 of the supporter 14 to be reduced if the supporter 14 is attempted to be removed, since the inner frame 13 is held at the open end part of the supporter 14 with substantially no gap. This can prevent the supporter 14 from being dropped out of the main body 1 after the earphone 915 is assembled.

[0087] The frame engagement part FK corresponds to the part including the dowels 13e1 and 13e2 of the inner frame 13 and the dowel hollow 11d of the first housing 11 and the dowel hollow 12d of the second housing 12 in the supporter attachment structure TK5. The engagement of the frame engagement part FK in the supporter attachment structure TK5 also suppresses the movement of the inner frame 13 with respect to the first housing 11 and the second housing 12 at least in the direction perpendicular to the right-left direction.

[0088] According to the supporter attachment structure TK5, the inner frame 13, the supporter 14, and the respective first and second housings 11 and 12 are positioned by the single dowel 13e. This configuration can reduce the dimensions in the upper-lower direction in Fig. 10, so as to facilitate a reduction in size of the earphone 915.

[0089] The respective earphones 911 to 915 having the respective supporter attachment structures TK1 to TK5 of the modified examples 1 to 5 can be manufactured while including the supporter 14 serving as a cushion without using insert molding. This can reduce the cost of metal dies to be used to prevent molding factories from being limited. The earphones 911 to 915 contribute to the improved productivity accordingly.

[0090] The respective earphones 911 to 915 can also be assembled while using the same inner frame 13 but enabling the shape of the supporter to be varied. The earphones 911 to 915 thus have the advantage of the improved productivity in view of the components to be used in common.

[0091] The modified examples 1 to 5 can be combined as appropriate within the available scope of the present embodiment.

[0092] The earphone 91 is not limited to the canal type in which the ear piece 81 is inserted into the external auditory meatus. The earphone 91 may be an in-ear type in which the main body 1 without including the sound channel part 111 is fitted to the external ear.

[0093] The earphones 91, 91A, and 911 to 915 are fitted to the outer ear of the user such that the supporter 14 is brought into contact with the inner wall of the outer ear when the casing 1K is put in the concha. The inner wall of the outer ear is the inner wall of the antihelix, for example.

[0094] The supporter 14 is typically slightly contracted in the put state, and presses the inner wall by the elastic repulsive force, so as to keep the stable fitted state while the user can ensure a fine feel of fitting.

[0095] The supporter 14 is not limited to that to be in contact with the inner wall of the antihelix, and may be brought into contact with the inner wall of any other part of the outer ear.

Claims

1. An earphone comprising:

a first housing (11) and a second housing (12) attached together in a first direction to compose a casing (1K) having a space (Va) therein; a speaker unit (82) housed in the space (Va); a supporter (14) interposed and held between the first housing (11) and the second housing (12) and having more flexibility than the first housing (11) and the second housing (12); and an inner frame (13) preventing a reduction in width of the supporter (14) in the first direction.

2. The earphone according to claim 1, wherein:

the supporter (14) includes a first stretching part (14b1) stretching outward on one side in the first direction and a second stretching part (14b2) stretching outward on another side in the first direction; and the first housing (11) includes a first engagement part (11b) engaged with the first stretching part (14b1) and a second engagement part (12b) engaged with the second stretching part (14b2).

3. The earphone according to claim 1, wherein:

the supporter (14) includes a first stretching part (14b1) stretching outward on one side in the first direction and a second stretching part (14b2) stretching outward on another side in the first direction, and a first inner stretching part (14c1) stretching inward on the one side in the first direction and a second inner stretching part (14c2) stretching inward on the other side in the first direction; the first housing (11) includes a first engagement part (11b) engaged with the first stretching part (14b1) and the second housing (12) includes a second engagement part (12b) engaged with the second stretching part (14b2); and the inner frame (13) includes a first inner engagement part (13c1) engaged with the first inner stretching part (14c1) and a second inner engagement part (13c2) engaged with the second inner stretching part (14c2).

4. The earphone according to claim 1, wherein:

the supporter (14) includes a first stretching part (14b1) stretching outward on one side in the first direction and a second stretching part (14b2) stretching outward on another side in the first direction; the first housing (11) includes a first engagement part (11b) engaged with the first stretching part (14b1) and the second housing (12) includes a second engagement part (12b) engaged with the second stretching part (14b2); and the inner frame (13) includes a T-shaped pro-

jection part (13d) projecting into the space (Va), a neck part of the T-shaped projection part (13d) has a first housing recessed part (13d1) which is a recess to which an edge of the first housing (11) is fitted to be engaged and a second housing recessed part (13d2) which is a recess to which an edge of the second housing (12) is fitted to be engaged.

5. The earphone according to claim 1, wherein:

the inner frame (13) includes a first dowel (13e1) projecting outward on one side in the first direction and a second dowel (13e2) projecting outward on another side in the first direction; the supporter (14) has a first dowel hole (14d1) through which the first dowel (13e1) penetrates and a second dowel hole (14d2) through which the second dowel (13e2) penetrates; and the first housing (11) has a first dowel hollow (11d) to which the first dowel (13e1) is fitted to be engaged, and the second housing (12) has a second dowel hollow (12d) to which the second dowel (13e2) is fitted to be engaged.

6. The earphone according to any one of claims 1 to 5, further comprising a frame engagement part (FK) preventing a movement of the inner frame (13) with respect to the first housing (11) and the second housing (12) in a direction perpendicular to the first direction.

7. The earphone according to any one of claims 1 to 6, wherein the housing (1K) is put in a concha of an outer ear, and the supporter (14) is brought into contact with an inner wall of the outer ear so as to be fitted to the outer ear.

8. The earphone according to claim 7, wherein the inner wall is an inner wall of an antihelix.

FIG. 1

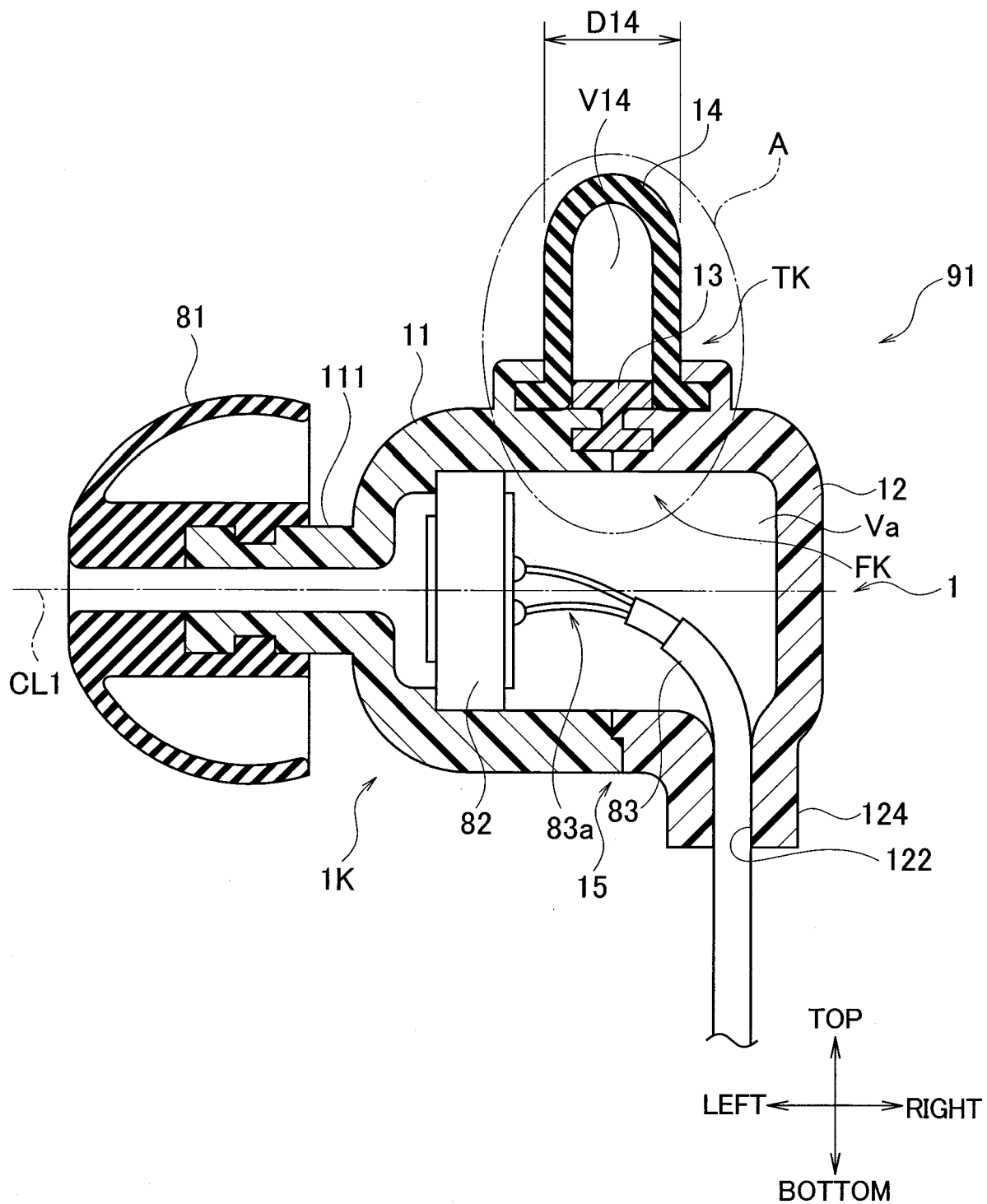


FIG. 2

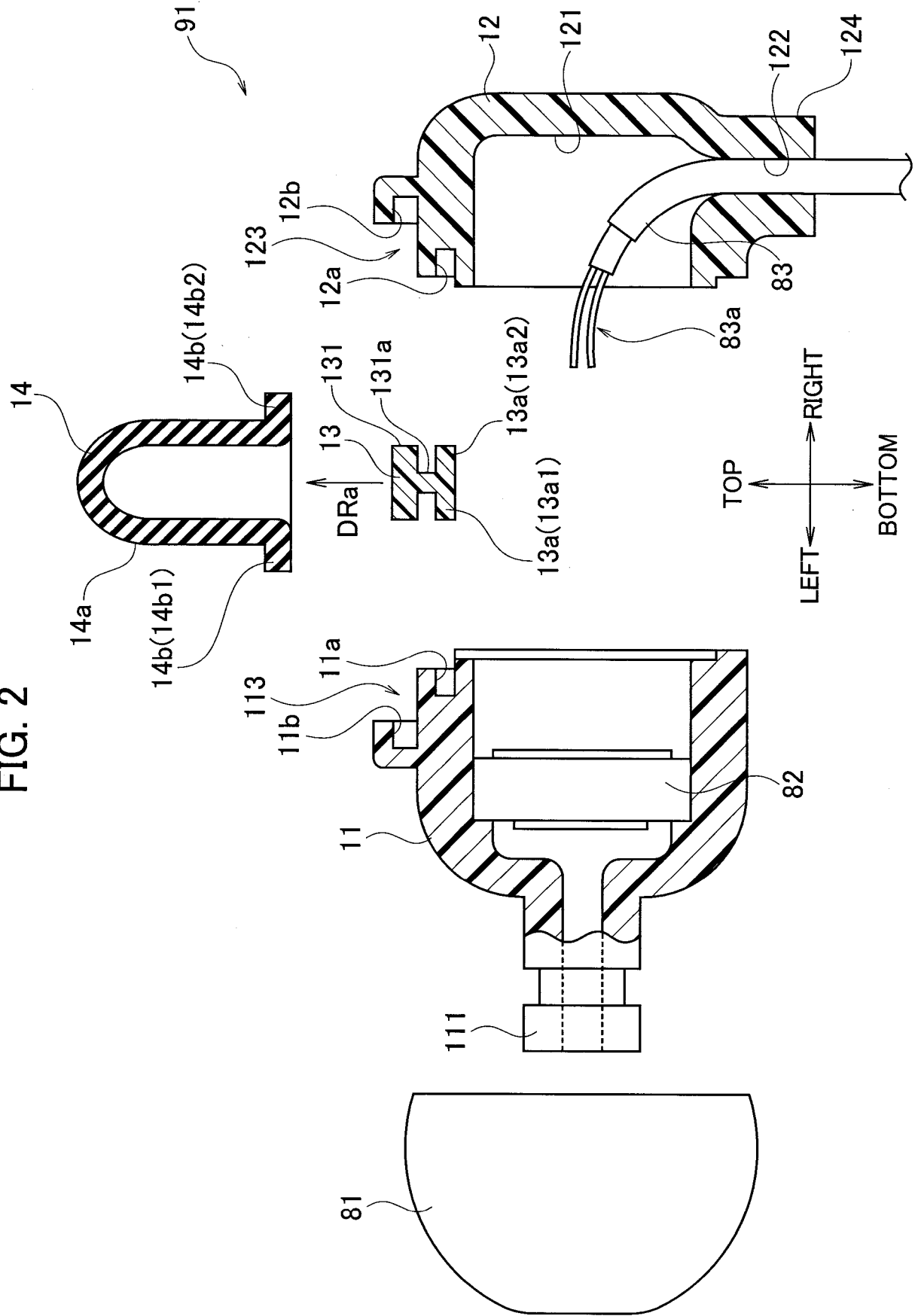


FIG. 3

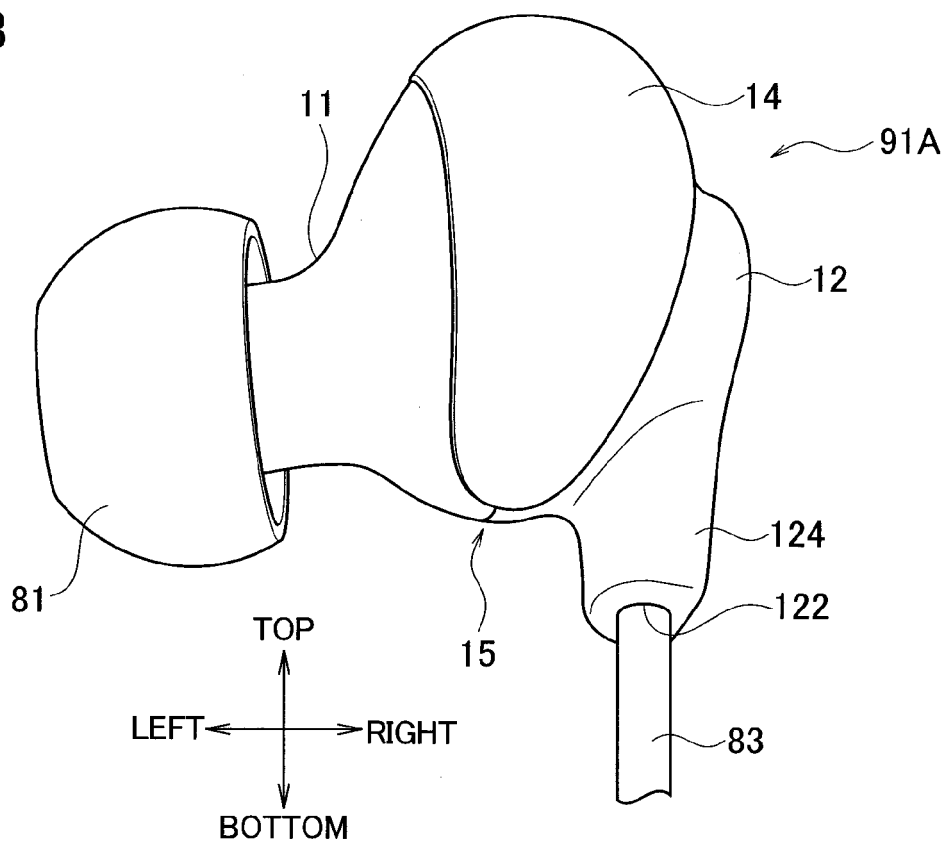


FIG. 4

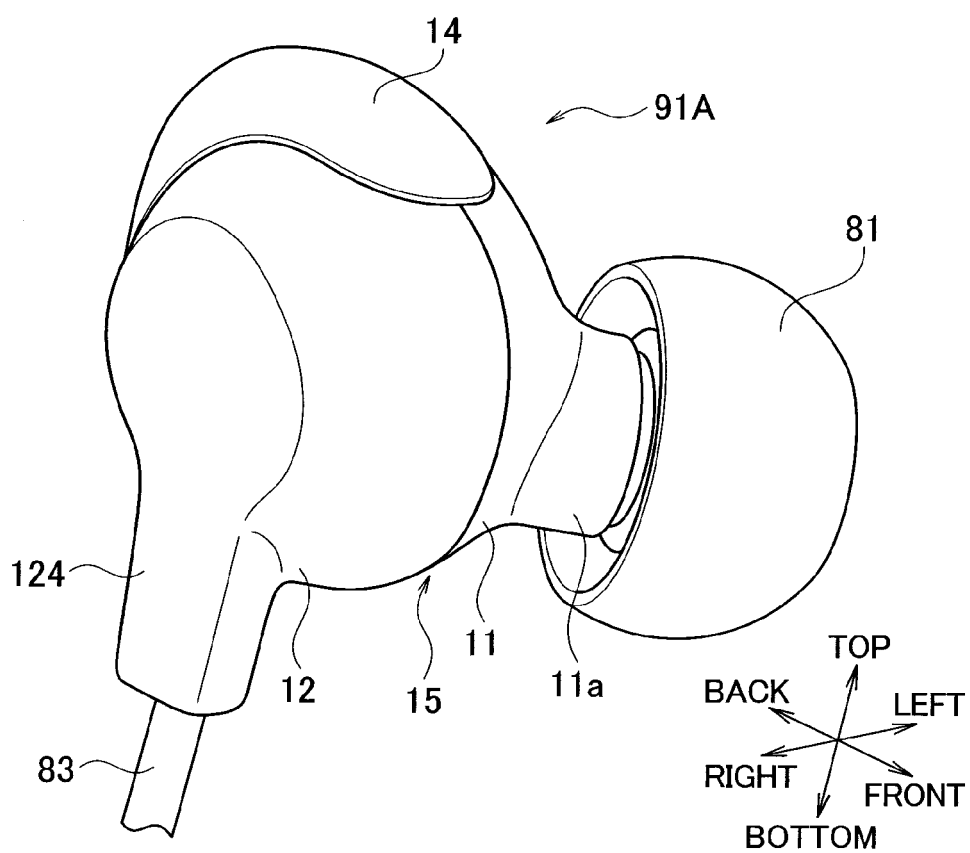


FIG. 5

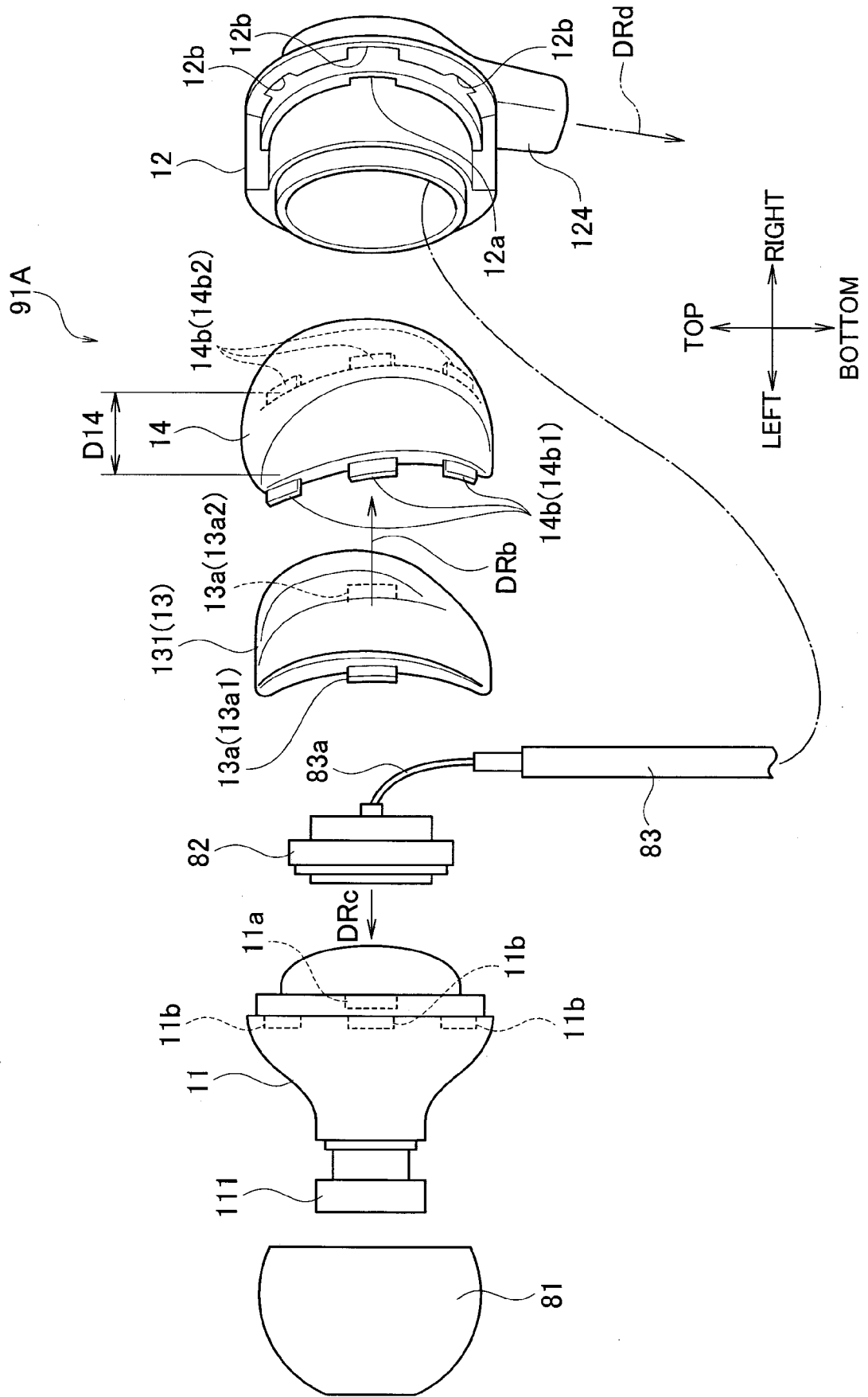


FIG. 6

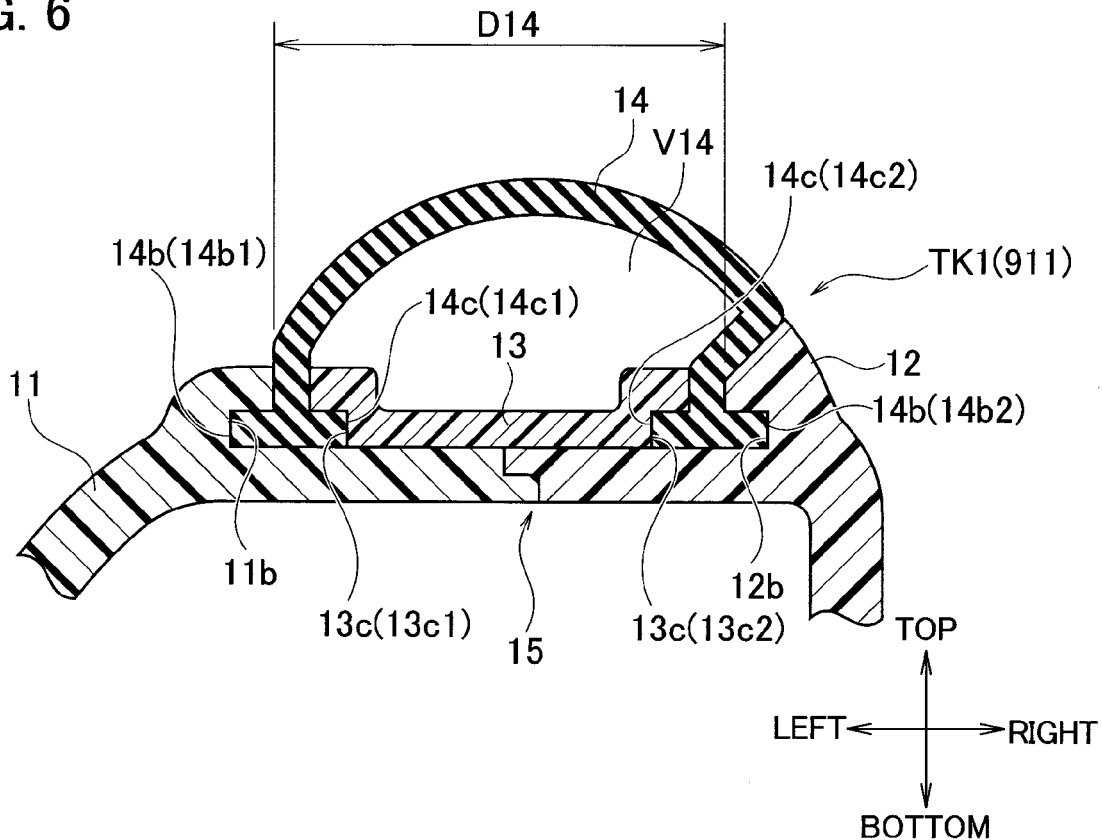


FIG. 7

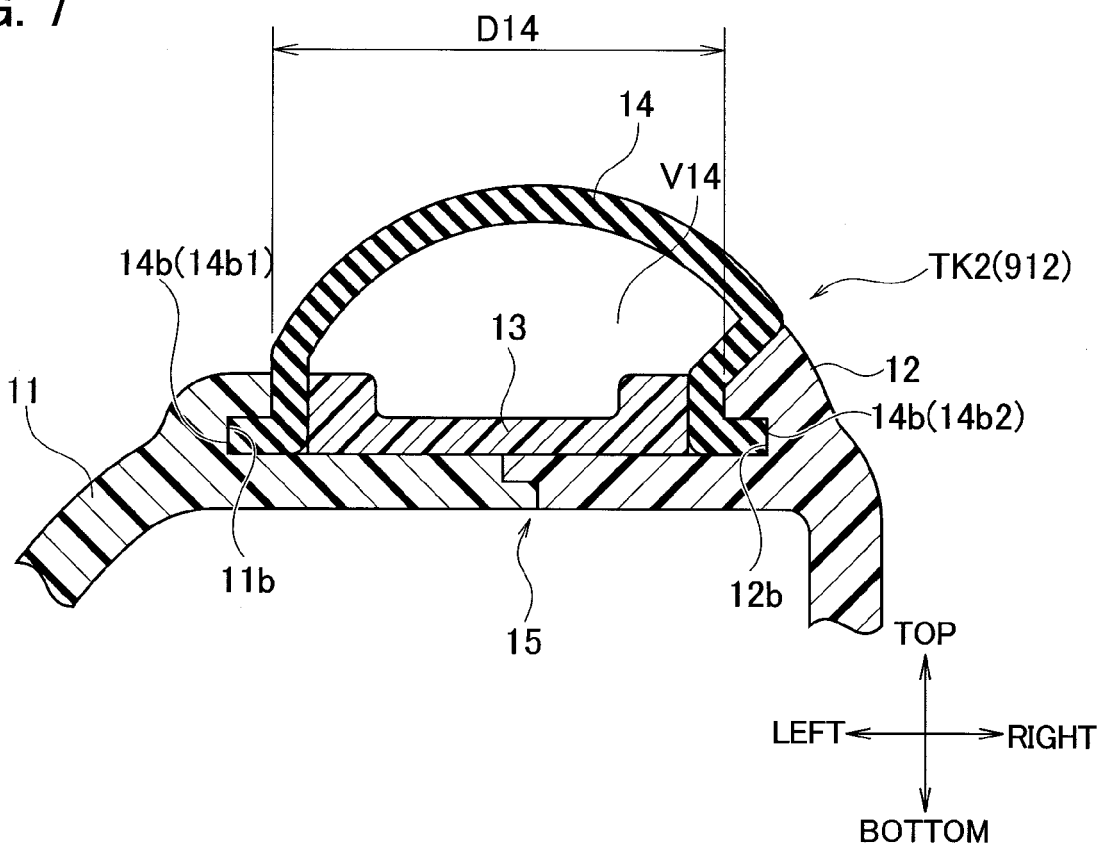


FIG. 8

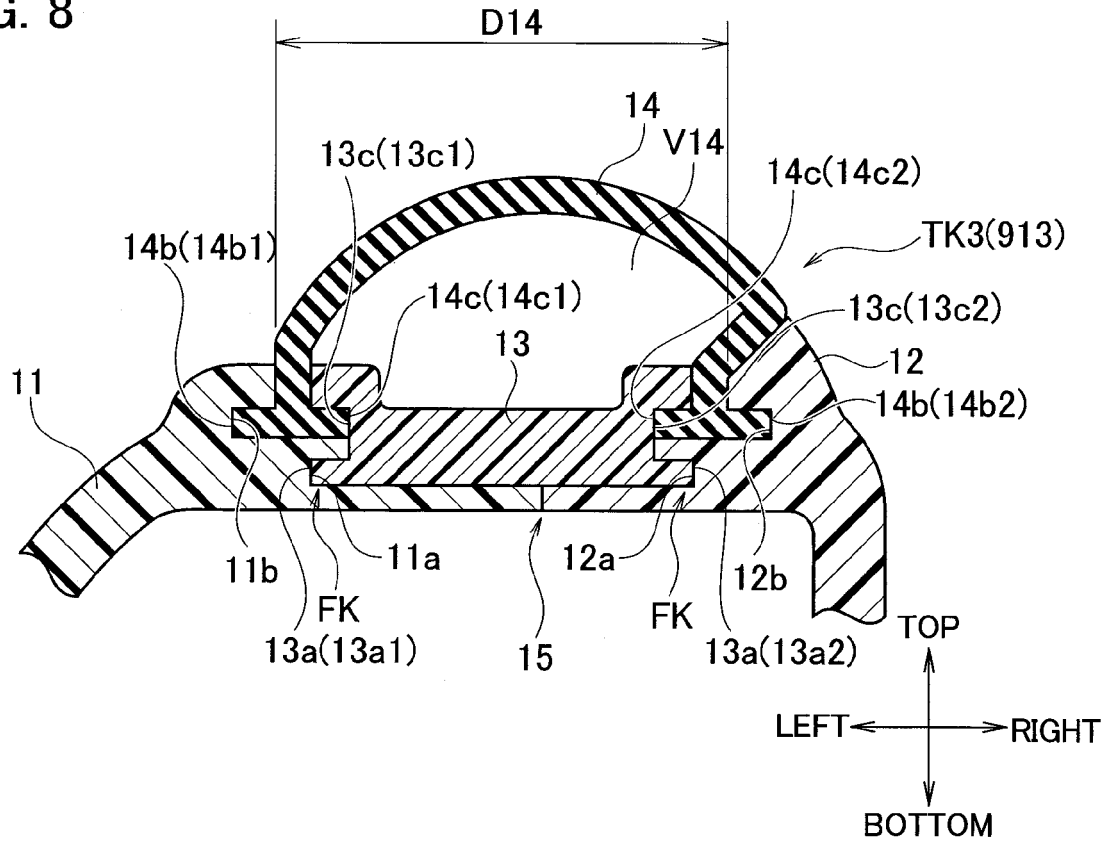


FIG. 9

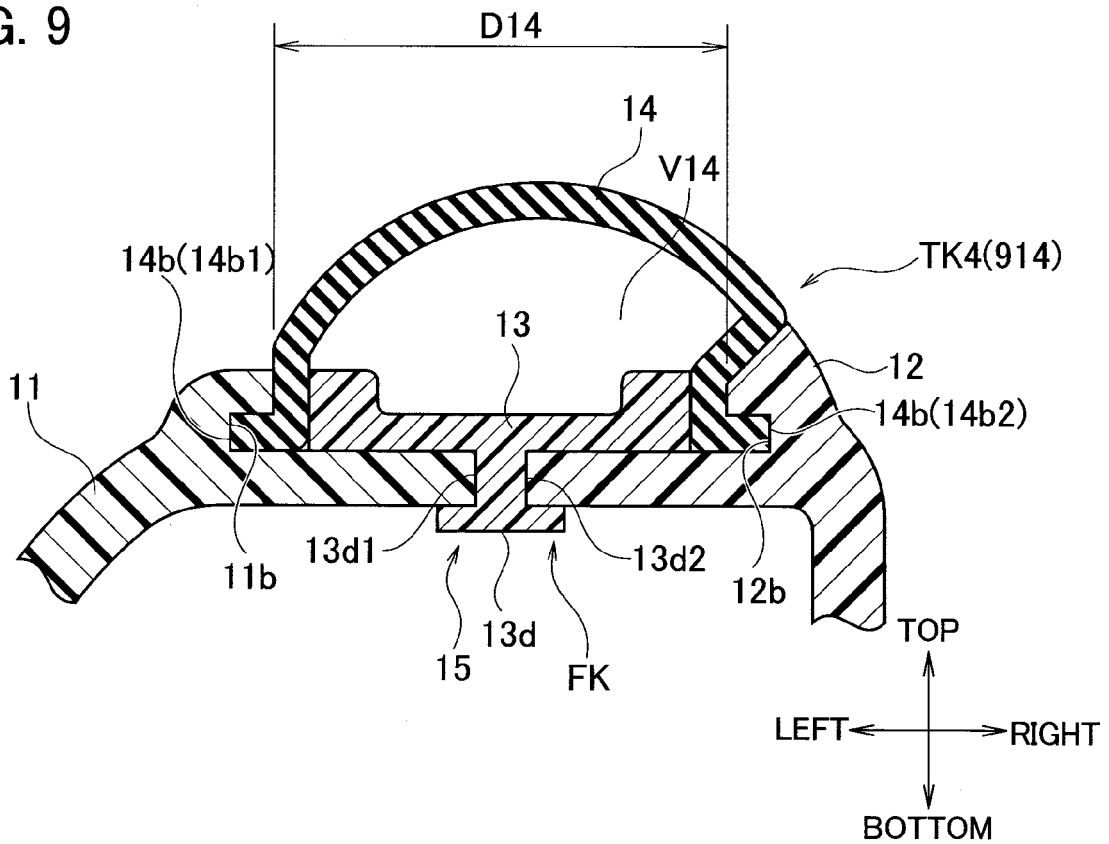
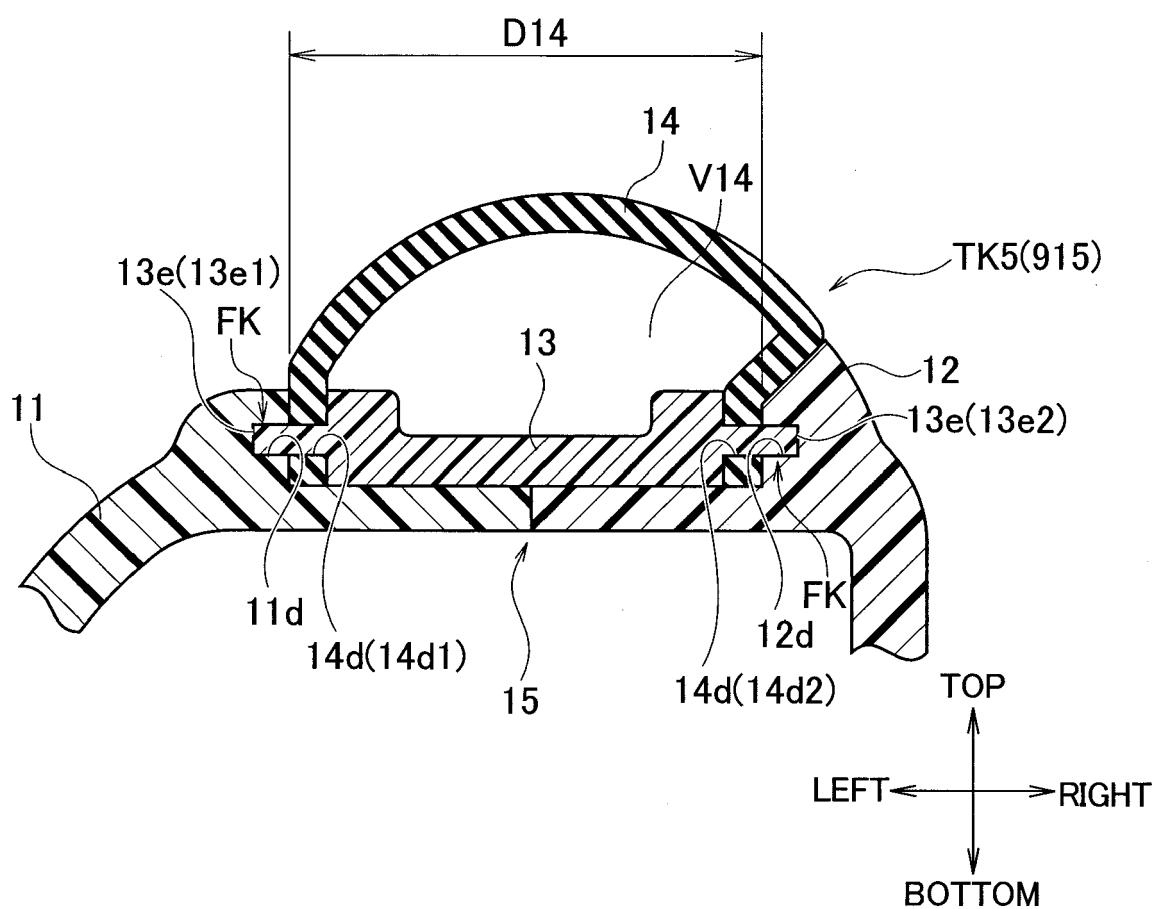


FIG. 10





EUROPEAN SEARCH REPORT

Application Number
EP 20 20 7025

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 101 851 740 B1 (ESTEC CORP [KR]) 24 April 2018 (2018-04-24)	1,2,7,8	INV. H04R1/10
A	* paragraphs [0022] - [0038]; figures 2-5 *	3-6	
A	----- US 2009/041284 A1 (TANAKA MASAOKI [JP] ET AL) 12 February 2009 (2009-02-12) * paragraphs [0040] - [0093] * -----	1-8	
			TECHNICAL FIELDS SEARCHED (IPC)
			H04R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 March 2021	Examiner Pigniez, Thierry
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 20 20 7025

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-03-2021

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 101851740	B1	24-04-2018	NONE
US 2009041284	A1	12-02-2009	NONE

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2009060157 A [0002]