



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.01.2020 Bulletin 2020/03

(51) Int Cl.:
H01Q 1/12 (2006.01) H01Q 1/24 (2006.01)

(21) Application number: **19183239.3**

(22) Date of filing: **28.06.2019**

(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

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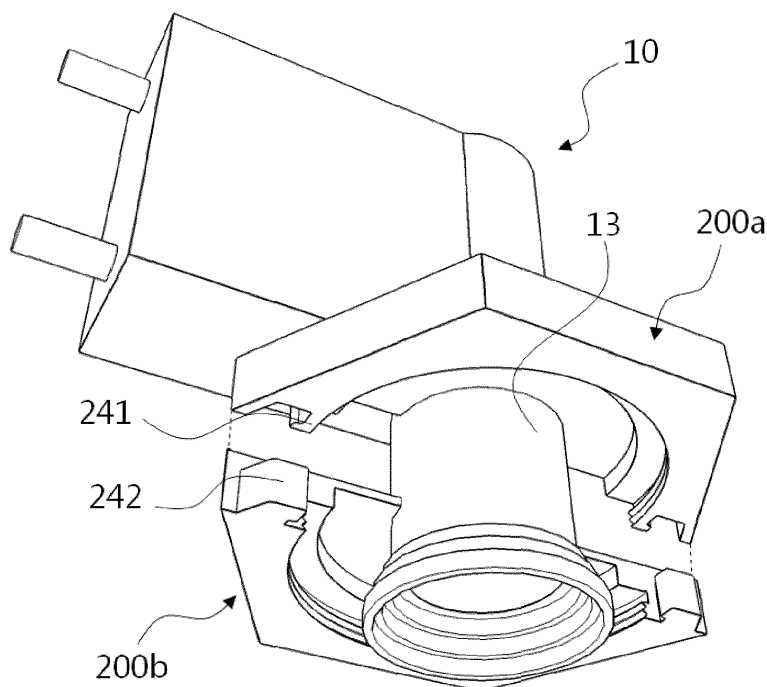
(30) Priority: **13.07.2018 KR 20180081769**

(54) **SATELLITE ANTENNA LNB FIXING APPARATUS**

(57) Provided is a satellite antenna LNB fixing apparatus capable of easily coupling an LNB (10) integrated with a feed horn to an antenna without a separate tool, coupling an LNB (10) integrated with various types of

feed horns to the antenna using a single or a few fixing apparatuses, and easily changing a polarization angle of the LNB.

FIG. 6



Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. §119 to Korean Patent Application No. 10-2018-0081769, filed on July 13, 2018, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The following disclosure relates to a satellite antenna low-noise block converter (LNB) fixing apparatus which may easily fix an LNB used in a satellite antenna and easily change a polarization angle (SKEW angle) of the antenna.

BACKGROUND

[0003] A low-noise block converter (LNB) is an apparatus that is installed in a satellite antenna and amplifies radio wave received by the satellite antenna to change it to a standardized intermediate frequency.

[0004] In general, the LNB is manufactured integrally with a feed horn used in the antenna in order to improve reception efficiency, and when the LNB is installed in the satellite antenna in which the feed horn is installed, a flange-type LNB with no feed horn and a separate coupling structure had to be used. However, since the flange-type LNB is relatively expensive and the product itself is not so large, a method is mainly used in which only a feed horn portion is cut off from the LNB in which the conventional feed horn is integrated, and then the LNB is coupled to the rear of the antenna.

[0005] In the case of the method in which the LNB in which the feed horn is cut off is coupled to the rear of the antenna, the LNB was fixed by manufacturing a separate bracket for fixing the LNB, and then inserting the cut portion (the feeder) of the LNB into the bracket, and inserting a fixing screw from the outside of the bracket so as to penetrate through the bracket in a direction perpendicular to a direction into which the feeder of the LNB is inserted, thereby pressurizing the feeder inserted into the bracket.

[0006] In the above-mentioned method, when it is necessary to exchange the LNB for different types, it is necessary to manufacture/install a new standard bracket, and there is a problem that in order to disassemble the LNB and the bracket, a separate tool is required to disassemble the fixing screw. In addition, the LNB needs to change a polarization angle (SKEW angle) according to a positional relationship between the satellite and the area in which the antenna is installed. In order to adjust the polarization angle in the conventional method described above, it is necessary to unscrew the fixing screw of the LNB with the separate tool, then rotate the LNB and tighten the screw again. As a result, there are problems that it is relatively difficult to adjust the polarization angle of

the LNB, and the fixing screw itself causes damage to the feeder.

[Related Art Document]

[Patent Document]

[0007] Korean Patent No. 10-1491725 ("Duplex Band Feed Horn" published on February 16, 2015)

SUMMARY

[0008] An embodiment of the present invention is directed to providing a satellite antenna LNB fixing apparatus capable of allowing a user to easily fix an LNB integrated with a feed horn without a separate tool, changing a polarization angle of the LNB without the separate tool in a state in which the LNB is fixed, and fixing the LNB integrated with a feed horn of various specifications.

[0009] According to the invention, a satellite antenna low noise block converter (LNB) fixing apparatus as defined in claim 1 is provided. The dependent claims define preferred and/or advantageous embodiments of the invention. In one general aspect, the satellite antenna low noise block converter (LNB) fixing apparatus comprises a fixing and coupling portion extending to one side, including a screw thread formed on an outer circumferential surface of thereof and a first inner space, coupled at the rear of an antenna so that the first inner space is connected to a hole in which a feed of the antenna is positioned; and a catching and coupling portion extending to one side, including a second inner space, a screw thread formed on an inner circumferential surface and a catching jaw having an inner diameter smaller than an inner diameter of the second inner space and that is threaded with the fixing and coupling portion so that the catching jaw covers the fixing and coupling portion; wherein the catching and coupling portion includes a first catching and coupling portion and a second catching and coupling portion that are separated from coupled to each other, and a low noise block converter (LNB) integrated with a feed horn has a feeder inserted into the catching and coupling portion, and an end portion of the feeder is caught with the catching jaw and is fixed.

[0010] The first catching and coupling portion and the second catching and coupling portion may be separated from coupled to each other in a direction perpendicular to an extending direction of the catching and coupling portion.

[0011] The first catching and coupling portion may include at least one catching portion formed on one surface of the first catching and coupling portion in the direction of the second catching and coupling portion, the second catching and coupling portion may include an insertion member formed on one surface of the second catching and coupling portion in the direction of the first catching and coupling portion to be inserted into the catching portion when being coupled to the first catching and coupling

portion and the second catching and coupling portion.

[0012] The catching and coupling portion may include an accommodating space which may be formed by spacing apart the catching jaw and the screw thread of the catching and coupling portion, and the accommodation space may accommodate an end portion of the feeder.

[0013] One surface of the fixing and coupling portion except for the outer perimeter may be depressed.

[0014] A outline of a cross section in a plane perpendicular to the extending direction of the catching and coupling portion may be a circle, an ellipse or a polygon.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a perspective view of an LNB integrated with a feed horn, which is an object to be fixed according to the present invention.

FIG. 2 is an exploded perspective view of a satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

FIG. 3 is a perspective view of a fixing and coupling portion of the satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

FIG. 4a and 4b are a coupled and exploded perspective view of a catching and coupling portion of the satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

FIG. 5 is a partial coupled perspective view of the satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

FIG. 6 is a coupled perspective view of the catching and coupling portion and the LNB integrated with the feed horn of the satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

FIG. 7 is a perspective view of a state in which the LNB integrated with the feed horn is coupled using the satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

[Detailed Description of Main Elements]

[0016]

10 : LNB integrated with feed horn
 11 : feed horn
 12 : body
 13 : feeder
 100 : fixing and coupling portion
 110 : inner space
 120 : screw thread
 130 : fixing portion
 140 : one surface

200 : catching and coupling portion
 200a : first catching and coupling portion
 200b : second catching and coupling portion
 210 : inner space
 220 : screw thread
 230 : catching jaw
 241 : catching portion
 242 : insertion member

10 DETAILED DESCRIPTION OF EMBODIMENTS

[0017] Hereinafter, before describing a satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention, an LNB integrated with a feed horn to be fixed according to the present invention will be described first.

[0018] FIG. 1 illustrates an LNB 10 integrated with a feed horn that is fixed according to the present invention.

[0019] As illustrated in FIG. 1, the LNB 10 integrated with the feed horn may include a feed horn 11 formed at one side thereof and a body 12 connected to the feed horn 11.

[0020] As illustrated in FIG. 1, the feed horn 11 has a shape in which it extends toward one side and an inner diameter thereof is increased toward the one side. The feed horn 11 is connected to a feeder 13. The feeder 13 refers to a portion in which the feed horn 11 is formed at one end thereof.

[0021] The body 12 illustrated in FIG. 1 refers to a portion integrated with the feeder 13, and is a portion having a board embedded therein and serving as the LNB.

[0022] When the LNB 10 integrated with the feed horn illustrated in FIG. 1 is coupled to an antenna that does not require the feed horn (an antenna installed with the feed horn), a user cuts off a portion of the feed horn 11 and couples the cut feed horn 11 to the antenna. That is, the portion of the feed horn 11 of the LNB 10 integrated with the feed horn illustrated in FIG. 1 may be cut off and cut out to be used.

[0023] Hereinafter, exemplary embodiments of a satellite antenna LNB fixing apparatus according to the present invention will be described in detail with reference to the accompanying drawings.

[0024] FIG. 2 is an exploded perspective view of a satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention.

[0025] As illustrating in FIG. 2, the satellite antenna LNB fixing apparatus according to an exemplary embodiment of the present invention may include a fixing and coupling portion 100 and a catching and coupling portion 200. The fixing and coupling portion 100 and the catching and coupling portion 200 are screw-coupled/disassembled with each other.

[0026] FIG. 3 is an enlarged view of the fixing and coupling portion 100 illustrated in FIG. 2.

[0027] As illustrated in FIG. 3, the fixing and coupling portion 100 is coupled to one surface or a rear surface of the antenna while having an annular shape. The fixing

and coupling portion 100 having the annular shape has an inner space 110 formed therein, and is coupled to one surface of the antenna so that the inner space 110 is connected to a hole formed in the antenna. Here, in the hole formed in the antenna, a point at which satellite signals received from the antenna are finally gathered, that is, a feed of the antenna is located, and the feed of the antenna and the feed of the LNB are engaged and connected with each other by the hole and the satellite antenna LNB fixing apparatus according to the present invention.

[0028] The hole in which the feed of the antenna described above is positioned may be formed in any portion of the antenna as well as on one side thereof.

[0029] As illustrated in FIG. 3, the fixing and coupling portion 100 has a screw thread 120 formed on an outer circumferential surface thereof and has fixing portions 130 formed on a lower surface thereof (a portion that is contact with one surface of the antenna). In the present exemplary embodiment illustrated in FIG. 3, the fixing portion 130 is formed in a shape of a hole into which the screw is inserted, and has a shape in which the screw fixes the fixing and coupling portion 100 and one surface of the antenna to each other. However, in the present invention, the shape of the fixing portion 130 is not limited to the shape illustrated in FIG. 3, and the fixing and coupling portion 100 and the antenna may be coupled to each other through the fixing portion having various shapes.

[0030] As illustrated in FIG. 3, one surface 140 of the fixing and coupling portion 100 is depressed downwardly by a predetermined depth except for a portion on which the screw thread 120 is formed. This is to secure a space in which the feeder 13 of the LNB 10 integrated with the feed horn described above is inserted, but unlike this, according to another exemplary embodiment, one surface 140 of the fixing and coupling portion 100 may not be depressed.

[0031] However, in FIG. 3, all portions of the one surface 140 of the fixing and coupling portion 100 except for the portion on which the screw thread 120 is formed are depressed downwardly by the predetermined depth, but the present invention is not limited thereto, and according to various exemplary embodiments, a portion of one surface on which the screw thread 120 of the fixing and coupling portion 100 is formed may be depressed stepwise or only a portion thereof may be depressed.

[0032] FIG. 4a and 4b illustrates an enlarged view of the catching and coupling portion 200 illustrated in FIG. 2, and illustrate a state where the catching and coupling portion 200 illustrated in FIG. 2 is turned upside down by 180 degrees, that is, upper and lower sides of the catching and coupling portion 200 are inverted.

[0033] As illustrated in FIG. 4a and 4b, the catching and coupling portion 200 may include a first catching and coupling portion 200a and a second catching and coupling portion 200b which may be separated from/coupled with each other, while having an annular shape similarly

to the fixing and coupling portion 100.

[0034] The first catching and coupling portion 200a and the second catching and coupling portion 200b may be separated in a direction crossing the extending direction of the catching and coupling portion 200. This is to allow a portion of the feeder 13 of the LNB 10 integrated with the feed horn inserted into the inner space of the catching and coupling portion 200 to be more easily coupled to the inner space 210.

[0035] The first catching and coupling portion 200a and the second catching and coupling portion 200b may be separated from/coupled to each other through a coupling portion, and one example of the coupling portion is illustrated in FIG. 4a and 4b. As illustrated in FIG. 4a and 4b, according to an exemplary embodiment of the present invention, as one example of the coupling portion, the first catching and coupling portion 200a may include catching portions 241 depressed in one surface thereof, and the second catching and coupling portion 200b may include insertion members 242 protruding toward the first catching and coupling portion 200a and inserted into the catching portions 241. That is, the second catching and coupling portion 200b is moved downwardly from an upper side of the first catching and coupling portion 200a based on FIG. 4a and 4b so that the insertion members 242 are inserted into the catching portions 241, thereby making it possible to couple the first and second catching and coupling portions 200a and 200b to each other.

[0036] The reason why the coupling portion 241 is formed so as to be depressed by the predetermined depth instead of penetrating through the first catching and coupling portion 200a is to prevent the catching and coupling portion 200 from being separated into the first and second catching and coupling portions 200a and 200b even through the catching and coupling portion 200 is coupled to the fixing and coupling portion 100 by allowing the insertion members 242 coupled to the catching portions 241 to be inserted/separated toward only one side to limit a direction in which the first and second catching and coupling portions 200a and 200b are separated from/coupled to each other.

[0037] However, the coupling portion according to the present invention is limited to the present exemplary embodiment illustrated in FIG. 4a and 4b, and according to another exemplary embodiment, the first and second catching and coupling portions 200a and 200b may be separated from/coupled to each other through various different methods.

[0038] As illustrated in FIG. 4a, the catching and coupling portion 200 may further include a screw thread 220 and a catching jaw 230, in addition to the inner space 210 described above.

[0039] The screw thread 220, which is coupled to the screw thread 120 formed on the outer circumferential surface of the fixing and coupling portion 100 described above, may be formed on an inner circumferential surface of the catching and coupling portion 200. The screw thread 220 may be formed on the entirety of the inner

circumferential surface of the catching and coupling portion 200, but in the present exemplary embodiment, the screw thread 220 may be formed on a portion of the inner circumferential surface of the catching and coupling portion 200

[0040] As illustrated in FIG. 4a, the catching jaw 230 is a portion having an inner diameter narrower than that of a portion on which the screw thread 220 is formed so that the feeder 13 is not separated from the inner space 210 after being inserted into the inner space 210. Since the cut portion of the feed horn 11 having a trumpet shape, of which the inner diameter is expanded, remains at the end of the feeder 13, the feeder 13 is caught with the catching jaw 230 by the cut portion of the feed horn 11 when being accommodated in the inner space 210, thereby making it possible to couple the LNB integrated with the feed horn and the catching and coupling portion 200 to each other.

[0041] In the present exemplary embodiment illustrated in FIG. 4a and 4b, the catching jaw 230 is spaced apart from the portion on which the screw thread 220 is formed by a predetermined distance, and is formed at an end in the extending direction of the catching and coupling portion 200. However, the present invention does not limit the position at which the catching jaw 230 is formed to the end in the extending direction of the catching and coupling portion 200, and the catching jaw 230 may be formed at a middle end in the extending direction of the catching and coupling portion 200 as long as the catching jaw 230 is spaced apart from the screw thread 220 by a predetermined distance.

[0042] As illustrated in FIG. 4a and 4b, in the present exemplary embodiment, a shape of an outer portion of a cross section of the catching and coupling portion 200 in the extending direction thereof may be a polygonal shape. This is to allow the user to easily couple or separate the catching and coupling portion 200 without a separate tool.

[0043] However, the present invention does not limit the shape of the outer portion of the cross section of the catching and coupling portion 200 to the polygonal shape, and the shape of the cross section of the catching and coupling portion 200 may be a circular shape or an oval shape as long as a diameter of the outer portion of the catching and coupling portion 200 is sufficiently large and it is easy for the user to rotate the catching and coupling portion 200. In addition, by forming fine grooves on the outer circumferential surface of the catching and coupling portion 200 to improve a frictional force, the user may easily rotate the catching and coupling portion 200.

[0044] FIG. 5 illustrates a state in which only the fixing and coupling portion 100 and the first catching and coupling portion 200a described above are coupled to each other to describe the present invention. However, when the exemplary embodiments of the present invention are used, the first catching and coupling portion 200a and the second catching and coupling portion 200b need to be used together with each other.

[0045] As illustrated in FIG. 5, the screw thread 220 of the first catching and coupling portion 200a is screw-coupled to the screw thread 120 of the fixing and coupling portion 100 coupled to the antenna, such that the fixing and coupling portion 100 and the catching and coupling portion 200 may be coupled to each other. The user may adjust the degree of fixing of the LNB 10 integrated with the feed horn by adjusting the degree to which the catching and coupling portion 200 is screw-coupled to the fixing and coupling portion 100.

[0046] Hereinafter, a method of fixing the LNB 10 integrated with the feed horn using an exemplary embodiment of the present invention will be described in detail.

[0047] FIG. 6 illustrates a state in which the catching and coupling portion of the satellite antenna LNB fixing apparatus and the LNB integrated with the feed horn 10 are coupled to each other according to an exemplary embodiment of the present invention.

[0048] As illustrated in FIG. 6, the first catching and coupling portion 200a and the second catching and coupling portion 200b are disposed to surround the feeder 13 and are then coupled to each other to thereby allow the feeder 13 to be positioned in the inner space of the catching and coupling portion. Here, since the diameter of the feed horn 11 that is cut and left at one end of the feeder 13 is larger than the inner space of the catching and coupling portion, the catching and coupling portion 200 is not separated from the feeder 13 as long as the first catching and coupling portion 200a and the second catching and coupling portion 200b are separated from each other.

[0049] FIG. 7 illustrates a state in which the catching and coupling portion 200 coupled to the feeder 13 of FIG. 6 is coupled to the fixing and coupling portion 100, and illustrates only the first catching and coupling portion 200a for convenience of explanation.

[0050] As illustrated in FIG. 7, the first catching and coupling portion 200a is screw-coupled to the fixing and coupling portion 100 in a state in which the feeder 13 is inserted thereto. As the extent in which the catching and coupling portion is screw-coupled to the fixing and coupling portion 100 is increased, a space between the fixing and coupling portion 100 and the catching and coupling portion becomes narrower. As a result, the feed horn 11 in the cut state, which is positioned at one end of the feeder 13 is compressed and fixed by the fixing and coupling portion 100 and the catching and coupling portion 200. That is, when only the fixing and coupling portion 100 is coupled to the antenna, the user may cut the feed horn from the LNB integrated with various types of feed horns and then easily couple the LNB to the antenna through the processes described above without any other tool (but, the feeder or the feed horn of the LNB integrated with the feed horn needs to be able to be inserted into the inner space of the catching and coupling portion).

[0051] According to the present invention, it is easy to change a polarization angle of the LNB. According to the present invention, when the coupled antenna is used in

different areas, the polarization angle of the LNB needs to be changed. In this case, the user rotates the catching and coupling portion 200 to loosen the degree of screw-coupling with the fixing and coupling portion 100 to a certain extent so that the LNB 10 integrated with the feed horn may move, and then rotates the LNB 10 as necessary, tightens the catching and coupling portion 200 again to fix the LNB 10 integrated with the feed horn, thereby changing the polarization angle of the LNB.

[0052] According to the satellite antenna LNB fixing apparatus according to the present invention as described above, in the state in which the feeder portion of the LNB integrated with the feed horn is inserted into the inner space of the catching and coupling portion, the catching and coupling portion is coupled to the fixing and coupling portion fixed to the antenna by the screw, thereby making it possible to allow the user to easily fix the LNB integrated with the feed horn without the separate tool.

[0053] In addition, the user loosens the catching and coupling portion to some extent, then rotates the LNB integrated with the feed horn, and tightens the catching and coupling portion again, thereby making it possible to easily change the polarization angle (SKEW angle) of the LNB integrated with the feed horn without the separate tool.

[0054] In addition, according to the present invention, the LNB is fixed by tightening the feeder accommodated between the fixing and coupling portion and the catching and coupling portion, thereby making it possible to fix the LNB integrated with the feed horn of various specifications using a single fixing apparatus according to the present invention.

[0055] The present invention is not limited to the above-mentioned exemplary embodiments, but may be variously applied. In addition, the present invention may be variously modified by those skilled in the art to which the present invention pertains without departing from the gist of the present invention claimed in the claims.

Claims

1. A satellite antenna low noise block converter, LNB, fixing apparatus comprising:

a fixing and coupling portion (100) extending to one side, including a screw thread (120) formed on an outer circumferential surface of thereof and a first inner space (110), coupled at the rear of an antenna so that the first inner space (110) is connected to a hole in which a feed of the antenna is positioned; and
a catching and coupling portion (200) extending to one side, including a second inner space (210), a screw thread (220) formed on an inner circumferential surface and a catching jaw (230) having an inner diameter smaller than an inner

diameter of the second inner space (210) and that is threaded with the fixing and coupling portion (110) so that the catching jaw (230) covers the fixing and coupling portion (110);

wherein the catching and coupling portion (200) includes a first catching and coupling portion (200a) and a second catching and coupling portion (200b) that are separated from coupled to each other, and

a low noise block converter (10), LNB, integrated with a feed horn has a feeder (13) inserted into the catching and coupling portion (200), and an end portion of the feeder (13) is caught with the catching jaw (230) and is fixed.

2. The satellite antenna LNB fixing apparatus of claim 1, wherein the first catching and coupling portion (200a) and the second catching and coupling portion (200b) are separated from coupled to each other in a direction perpendicular to an extending direction of the catching and coupling portion (200).
3. The satellite antenna LNB fixing apparatus of claim 1 or claim 2, wherein the first catching and coupling portion (200a) includes at least one catching portion (241) formed on one surface of the first catching and coupling portion (200a) in the direction of the second catching and coupling portion (200b), the second catching and coupling portion (200b) includes an insertion member (242) formed on one surface of the second catching and coupling portion (200b) in the direction of the first catching and coupling portion (200a) to be inserted into the catching portion (200) when being coupled to the first catching and coupling portion (200a) and the second catching and coupling portion (200b).
4. The satellite antenna LNB fixing apparatus of any one of claims 1-3, wherein the catching and coupling portion (200) includes an accommodating space which is formed by spacing apart the catching jaw (230) and the screw thread (120) of the catching and coupling portion (200), and the accommodation space accommodates an end portion of the feeder (13).
5. The satellite antenna LNB fixing apparatus of any one of claims 1-4, wherein one surface of the fixing and coupling portion (100) except for the outer perimeter is depressed.
6. The satellite antenna LNB fixing apparatus of any one of claims 1-5, wherein an outline of a cross section in a plane perpendicular to the extending direction of the catching and coupling portion (200) is a circle, an ellipse or a polygon.

FIG. 1

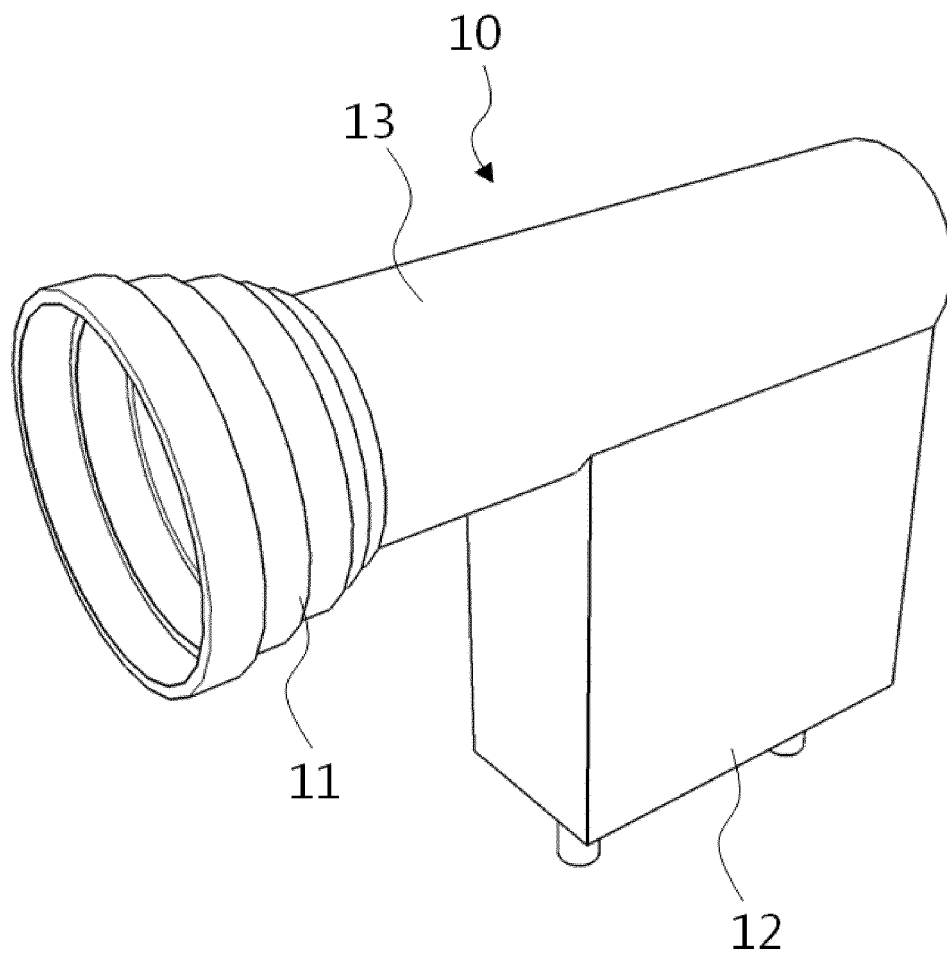


FIG. 2

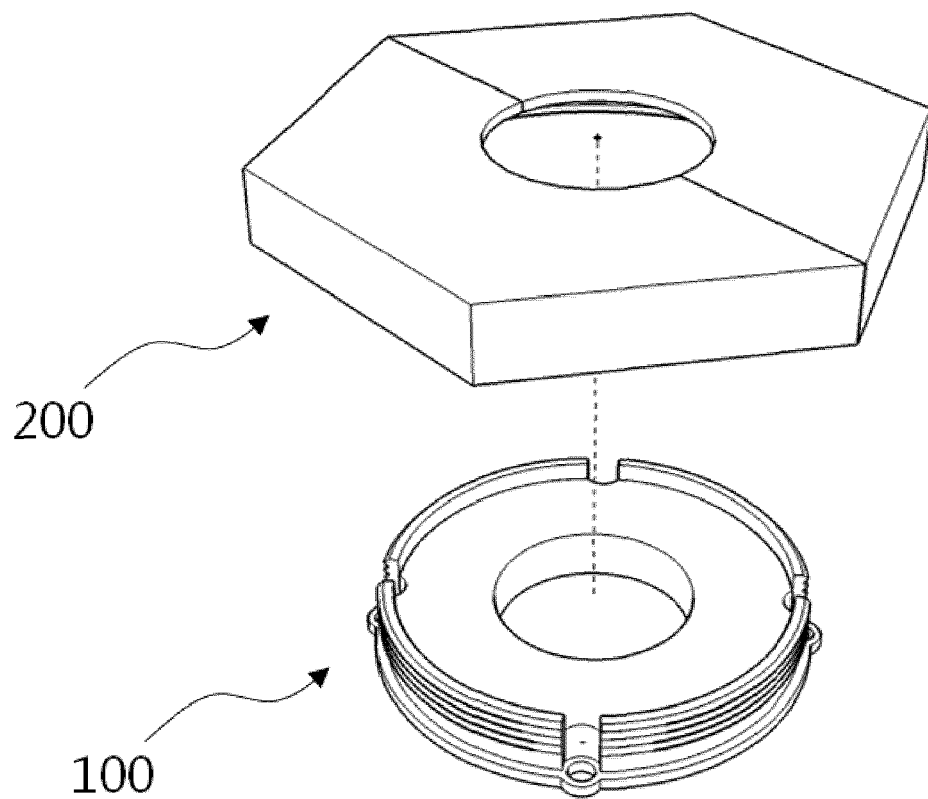


FIG. 3

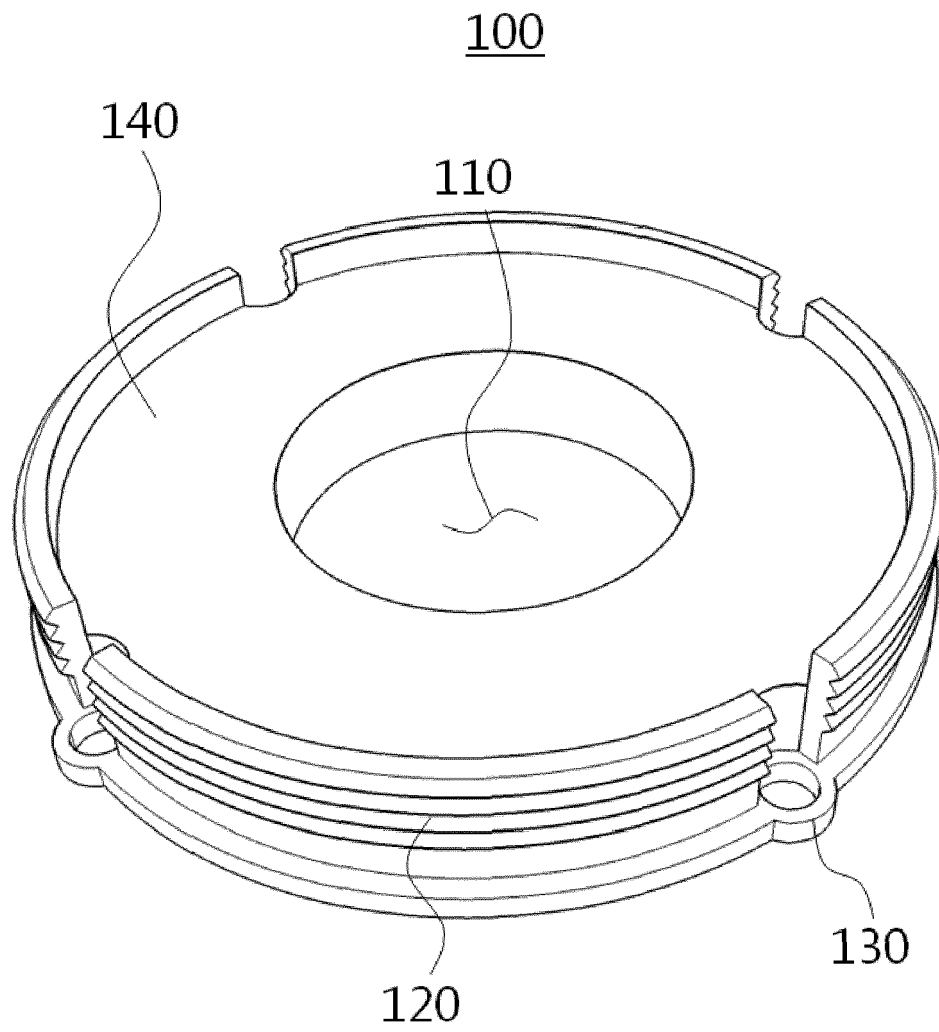


FIG. 4a

200

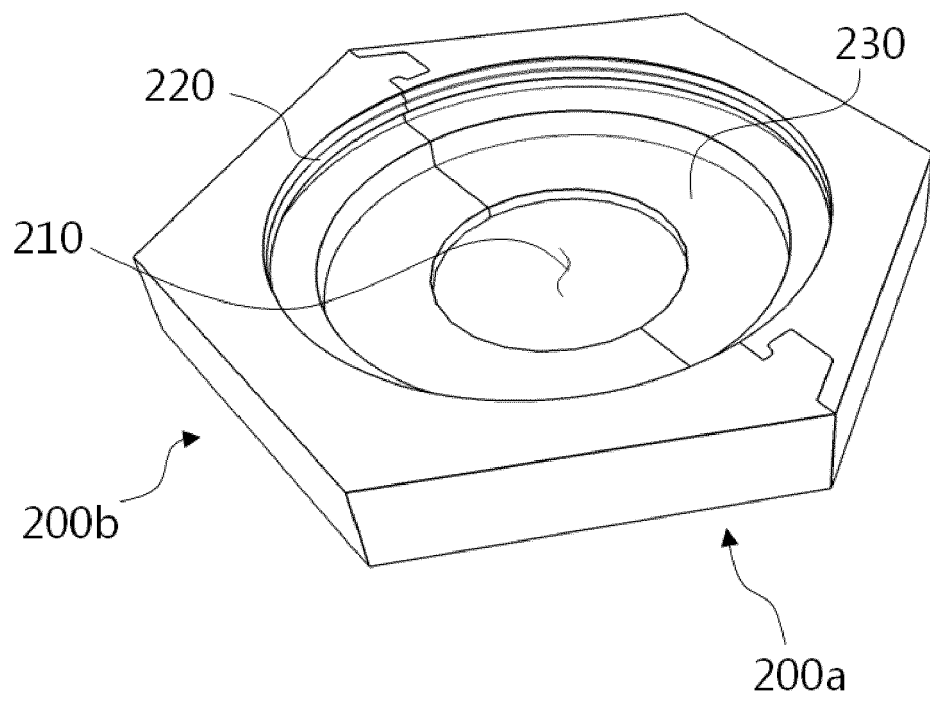


FIG. 4b

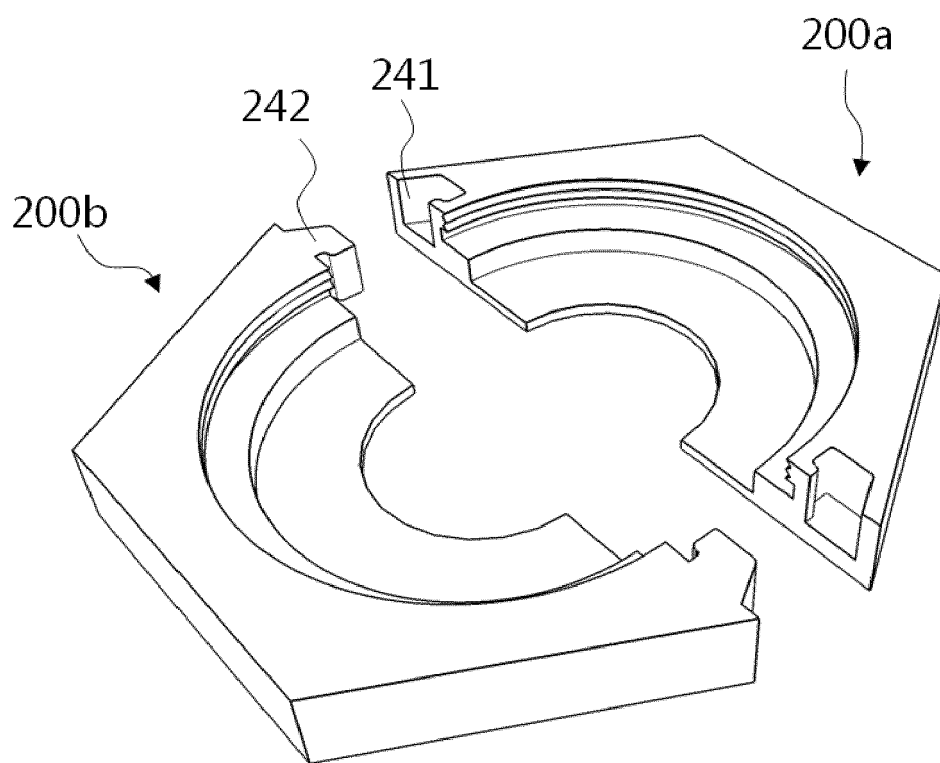


FIG. 5

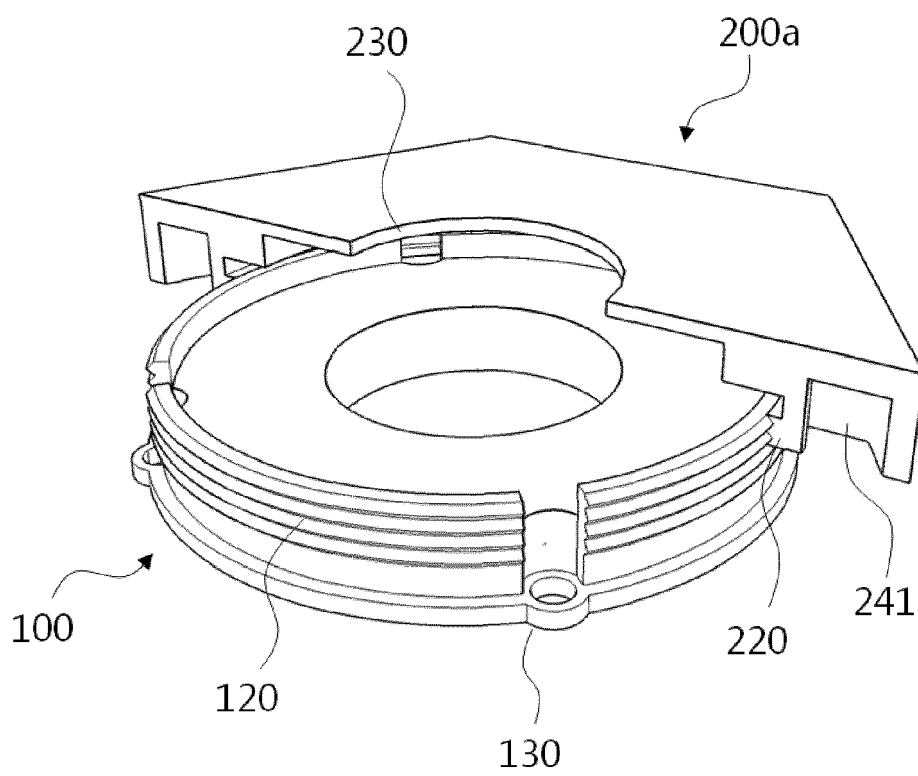


FIG. 6

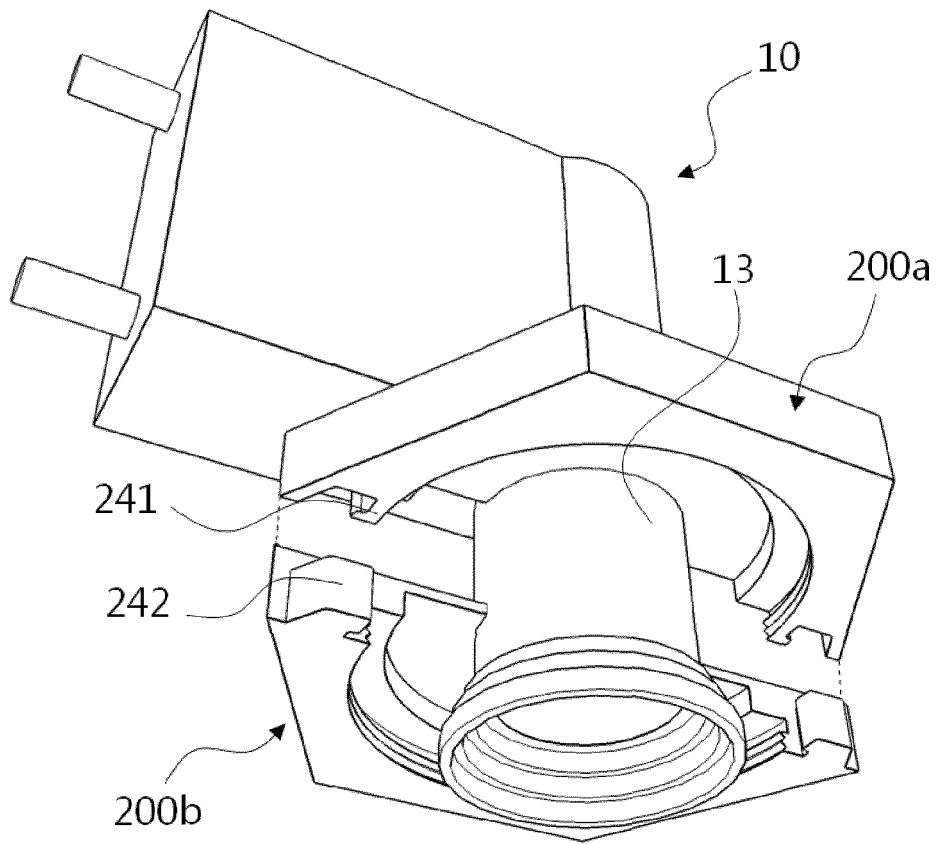
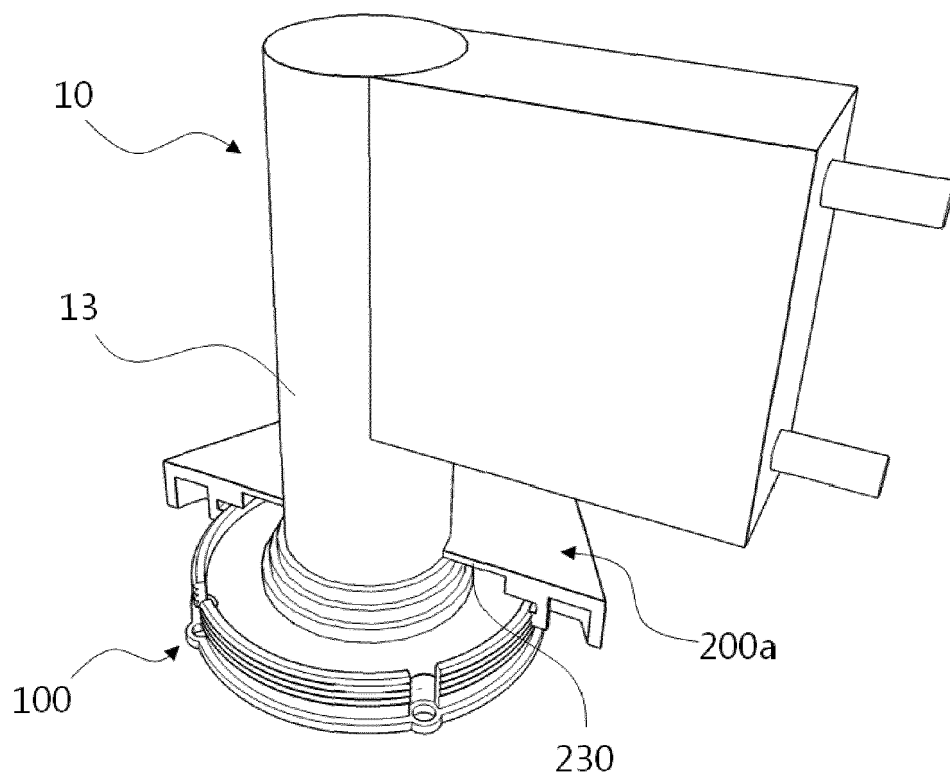


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 19 18 3239

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 November 2019	Examiner Vial, Antoine
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EPO FORM 1503 03/82 (P04C01)

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

EP 19 18 3239

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
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08-11-2019

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REFERENCES CITED IN THE DESCRIPTION

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- KR 101491725 [0007]