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(54) MICROPHONE ASSEMBLY FOR A VEHICLE WITH A HOUSING COVER COMPRISING A FIRST GRID AND A SECOND GRID

(57) The invention relates to microphone assembly (1) for a vehicle, said microphone assembly (1) comprising:
- a housing base (10) that is configured to receive an electronic support (11),
- said electronic support (11),
- an acoustic membrane (12) that is configured to be in contact with said electronic support (11),
- a sealing cover (13) that comprises an opening (131) which is configured to be in front of said acoustic membrane (12),
- a housing cover (14) that is configured to cover said sealing cover (13), wherein :
- said housing cover (14) comprises a first grid and a second grid that are shifted from each other so as to form a path for sound waves (5) coming from the exterior of the microphone assembly (1) to reach said acoustic membrane (12).

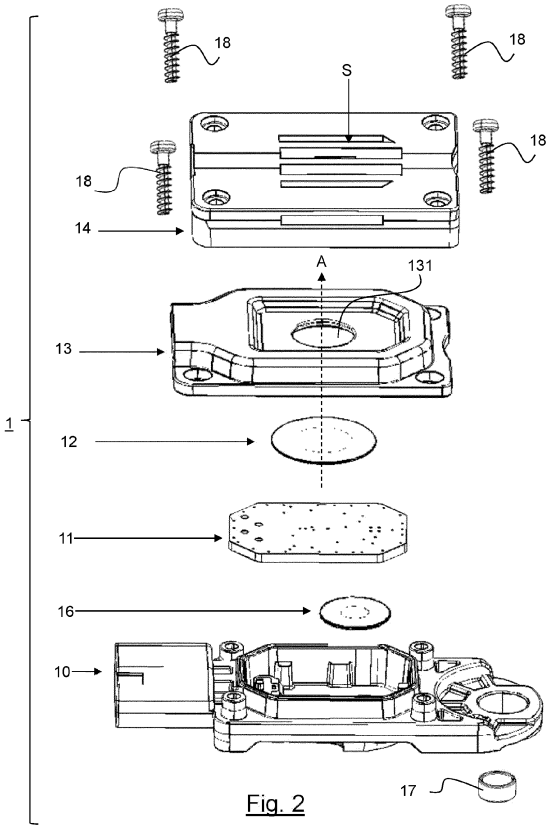


Fig. 2

EP 4 539 497 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a microphone assembly for a vehicle. Such microphone assembly, may be used, but not exclusively, in the automotive domain.

BACKGROUND OF THE INVENTION

[0002] In the automotive domain, a microphone assembly for a vehicle, well-known by the person skilled in the art, comprises:

- a housing base that is configured to receive an electronic support,
- an electronic support,
- an acoustic membrane that is configured to be in contact with said electronic support,
- a sealing cover with one opening which is configured to be in front with said acoustic membrane,
- a housing cover with a first grid,
- a shielding cover with a second grid.

[0003] The housing cover and the shielding cover are assembled to the housing base with screws. The housing cover is placed between the shielding cover and the housing base. The housing cover and the shielding cover prevent the high pressure water from altering the acoustic membrane.

[0004] The microphone assembly is usually placed near the number plate and is configured to detect the emergency vehicles. When an emergency vehicle is detected near the vehicle, information is sent to the driver of the vehicle.

[0005] One problem of this prior art is that it needs two molds to manufacture the housing cover and the shielding cover. Thus, this leads to an increase of manufacturing cost.

[0006] It is an object of the invention to provide a microphone assembly for a vehicle, which resolves the problem above-stated.

SUMMARY OF THE INVENTION

[0007] To this end, it is provided a microphone assembly for a vehicle , said microphone assembly comprising:

- a housing base that is configured to receive an electronic support,
- said electronic support,
- an acoustic membrane that is configured to be in contact with said electronic support,
- a sealing cover that comprises an opening which is configured to be in front of said acoustic membrane,
- a housing cover that is configured to cover said sealing cover, wherein :
  - said housing cover comprises a first grid and a second grid that are shifted from each other so as to form a path for sound waves coming from the exterior of the microphone assembly to reach said acoustic membrane.

[0008] As we will see in further details, thanks to the first grid and the second grid that are part of one unique piece which is the housing cover, it permits to suppress the shielding cover of the prior art. Therefore, only one mold is needed to manufacture the housing cover. This leads to decrease the manufacturing time and the cost of the microphone assembly.

[0009] According to non-limitative embodiments of the invention, the microphone assembly for a vehicle further comprises the following characteristics.

[0010] In a non-limitative embodiment, said sealing cover comprises at least one sealing ring that is configured to hold the acoustic membrane to said electronic support.

[0011] In a non-limitative embodiment, said acoustic membrane has an inner area and an external area that is coaxially arranged around said inner area and that is configured to cooperate with said at least one sealing ring.

[0012] In a non-limitative embodiment, said acoustic membrane comprises three sealing rings.

[0013] In a non-limitative embodiment, said first grid and said second grid are spaced in height.

[0014] In a non-limitative embodiment, said first grid and said second grid are configured to face said acoustic membrane via said opening of said sealing cover.

[0015] In a non-limitative embodiment, said first grid comprises first stanchions alternating with first slots, and said second grid comprises second stanchions alternating with second slots, and the first stanchions and the second stanchions are shifted from each other with an offset, and the first slots and the second slots are shifted from each other with the same offset.

[0016] In a non-limitative embodiment, said microphone assembly further comprises a pressure membrane.

[0017] In a non-limitative embodiment, said pressure membrane is place on one side of said electronic support that is opposed to another side of the electronic support where the acoustic membrane is disposed.

[0018] In a non-limitative embodiment, said acoustic membrane is of a PET material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Some embodiments of methods and/or system in accordance with embodiments of the present invention are now described, by way of example only, and with reference to the accompanying drawings, in which:

Figure 1 is an assembled view in perspective of a microphone assembly for a vehicle according to a

non-limitative embodiment of the invention, said microphone comprising a housing base, an electronic support, an acoustic membrane, a sealing cover and a housing cover,

Figure 2 is an exploded view in perspective of the microphone assembly of figure 1,

Figure 3 is a longitudinal sectional view of the microphone assembly of figure 1,

Figure 4 is a bottom view of the housing base of figure 2, according to a non-limitative embodiment,

Figure 5 is a top view of the housing base of figure 2, according to a non-limitative embodiment,

Figure 6a is the top view of the housing base of figure 5 with a pressure membrane, according to a non-limitative embodiment,

Figure 6b is the top view of the housing base of figure 6a with the acoustic membrane of figure 2, according to a non-limitative embodiment,

Figure 6c is the top view of the housing base of figure 6b with the electronic support of figure 2, according to a non-limitative embodiment,

Figure 7 is a top view of the electronic support of figure 2 with the acoustic membrane of figure 2, according to a non-limitative embodiment,

Figure 8 is the top view of the electronic support figure 7 with the acoustic membrane on one side and with a pressure membrane on the other side, according to a non-limitative embodiment,

Figure 9 is a top view of the sealing cover of figure 2, according to a non-limitative embodiment,

Figure 10 is a bottom view of the sealing cover of figure 2, according to a non-limitative embodiment,

Figure 11 is a top view of the housing cover of figure 2, according to a non-limitative embodiment,

Figure 12 is a bottom view of the housing cover of figure 2, according to a non-limitative embodiment,

Figure 13 is a sectional view of the housing cover of figures 11 and 12,

Figure 14 is a zoom of part of the sectional view of figure 13,

Figure 15 is a first view in perspective of the microphone assembly of figure 1 without the housing base, without the sealing cover, and without the electronic support,

Figure 16 is a second view in perspective of the microphone assembly of figure 1 without the housing base, without the acoustic membrane, and without the electronic support,

Figure 17 is a third view in perspective of the microphone assembly of figure 1 without the housing base.

DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0020] In the following description, well-known functions or constructions by the person skilled in the art are not described in detail since they would obscure the invention in unnecessary detail.

[0021] The present invention relates to a microphone assembly 1 for a vehicle, said microphone assembly 1 being described in reference to figures 1 to 17. In the following, the microphone assembly 1 is also called microphone 1 in the following. In a non-limitative embodiment, the vehicle is a motor vehicle. In non-limitative variants of embodiment, the motor vehicle has a combustion engine, has an electric engine, or a hybrid engine.

[0022] In a non-limitative embodiment, the microphone assembly 1 is mounted near the number plate of the vehicle. In a non-limitative embodiment, it is mounted outside the vehicle. It permits the microphone 1 to detect the sounds coming from outside the vehicle, such as the sounds of the sirens of emergency vehicles in a non-limitative example, that are approaching the vehicle.

[0023] As illustrated in figures 1 and 2, the microphone assembly 1 comprises :

- a housing base 10,
- an electronic support 11 (illustrated in figure 2),
- an acoustic membrane 12 (illustrated in figure 2),
- a sealing cover 13,
- a housing cover 14.

[0024] In a non-limitative embodiment, it further comprises a pressure membrane 16.

[0025] These different elements are described in detail hereinafter.

Housing base 10:

[0026] The housing base 10 is illustrated in figures 1 to 6c.

[0027] The housing base 10 is configured to receive the electronic support 11.

[0028] As illustrated in figure 5, the housing base 10 extends along a longitudinal axis Y in its length, and along a transversal axis X in its width, said transversal axis X being perpendicular to the longitudinal axis Y and to a

vertical axis Z. In a non-limitative embodiment, the length of the housing base 10 is greater than its width.

[0029] In a non-limitative embodiment, the housing base 10 comprises a compartment 100 that is configured to receive the electronic support 11.

[0030] As illustrated in figures 5 to 6c, the housing base 10 comprises a support 10.1 from which the compartment 100 extends.

[0031] As illustrated in figures 5 to 6c, the compartment 100 comprises a wall 100.1 that defines the area where the electronic support 11 can be enclosed. The wall 100.1 comprises a sealing rib 100.2 that is configured to co-operate with a groove 130.2 of the sealing cover 13 (described later in the following) to form a sealing when all the elements of the microphone 1 are assembled.

[0032] Furthermore, the wall 100.1 comprises an outside flank 100.3 that is configured to come into contact with an inside flank 130.3 of the sealing cover 13 (described later in the following) when the housing base 10 and the sealing cover 13 are assembled together. Thus, the compartment 100 of the housing base 10 slots into the compartment 130 of the sealing cover 13.

[0033] As illustrated in figure 5, in a non-limitative embodiment, the compartment 100 comprises a vent hole 101 that is configured to receive a pressure membrane 16 described later in the following. Figure 6a illustrates the pressure membrane 16 that is placed on said vent hole 101.

[0034] As illustrated in figures 4 and 5 for example, In a non-limitative embodiment, the housing base 10 further comprises an electrical alimentation connector 102.

[0035] As illustrated in figure 4 for example, in a non-limitative embodiment, the housing base 10 further comprises a mounting tab 103 with a hole 104 to fix an insert 17. The insert 17 is configured to fix the microphone 1 to the body of the vehicle. In a non-limitative embodiment, the insert 17 is located on the front-end of the vehicle so that the microphone 1 is fixed at the front-end. The mounting tab 103 is on the opposite side from the electrical alimentation connector 102.

[0036] As illustrated in figure 5, in a non-limitative embodiment, the housing base 10 further comprises screwing sockets 108 that are configured to receive screws 18 (illustrated in figure 2). In a non-limitative embodiment, it comprises four screwing sockets 108.

[0037] In a non-limitative embodiment, the housing base 10 is of plastic material. In a non-limitative example, it is made of PET (Polyethylene Terephthalate).

Electronic support 11:

[0038] The electronic support 11 is illustrated in figures 2, 3, 6c, 7, 8 and 17.

[0039] The electronic support 11 comprises electronic components (not-illustrated) such as in non-limitative example an electronic component that is configured to convert the vibrations of the acoustic membrane 12 and to transform said vibrations into an electrical signal that is sent to an electronic control unit (not illustrated) of the vehicle. This electronic control unit is configured to send a warning signal (visual message, a vocal sound in non-limitative example) via an interface human machine to a driver of the vehicle to inform him/her that an emergency vehicle is approaching. Hence, the emergency vehicles are detected.

[0040] In a non-limitative embodiment, the electronic support 11 is a printed circuit board assembly also referred to as PCBA.

[0041] As illustrated in figures 6b and 6c, the electronic support 11 is configured to be placed in the compartment 100 of the housing base 10.

[0042] As illustrated in figure 7, the electronic support 11 is configured to receive the acoustic membrane 12 on one side 11.1. As illustrated in figure 8, the pressure membrane 16 is placed on the other side 11.2 that is opposed to the side 11.1 where the acoustic membrane 12 is.

[0043] In a non-limitative embodiment, the electronic support 11 further comprises a pin header 111 (illustrated in figure 17) that is configured to connect the electronic support 11 to the electrical alimentation connector 102.

Acoustic membrane 12:

[0044] The acoustic membrane 12 is illustrated in figures 2, 3, 6b to 8, and 15.

[0045] The acoustic membrane 12 is configured to be in contact with the electronic support 11. In a non-limitative embodiment, it is placed on the electronic support 11 with glue or with adhesive layers.

[0046] In a non-limitative embodiment, the acoustic membrane 12 is made of a flexible material. In a non-limitative variant of embodiment, it is made of PET. It is a flexible material that permits the acoustic membrane 12 to vibrate.

[0047] The acoustic membrane 12 is configured to vibrate when sound waves S coming from the exterior of the vehicle enters the microphone 1 and reaches the acoustic membrane 12. The vibrations of the acoustic membrane 12 are transmitted to an electronic component of the electronic support 11 that will convert it into an electrical signal as above-mentioned.

[0048] As illustrated in figure 6b and 6c, the acoustic membrane 12 is enclosed in the compartment 100 of the housing base 10 as it is stuck to the electronic support 11.

[0049] As illustrated in figure 7 and 8, the acoustic membrane 12 is placed on the electronic support 11 on a side 11.1 that is opposed to the side 11.2 where the pressure membrane 16 is.

[0050] As illustrated in figure 3, the acoustic membrane 12 is configured to be in front of the opening 131. The acoustic membrane 12 is disposed substantially coaxially with the opening 131 of the sealing cover 13 (described hereinafter) so that the sound waves S can reach the acoustic membrane 12 through said opening 131. In other words, the center of the opening 131 is substantially

collinear with the center 12.3 of the acoustic membrane 12. The opening 131 and the acoustic membrane 12 are both arranged coaxially around the same axis A, but on two different plans which are substantially parallel to each other, as illustrated in figure 3.

[0051] In a non-limitative embodiment, the acoustic membrane 12 has a smaller diameter than the opening 131 so that the sealing cover 13 can be in contact with the acoustic membrane 12 through its sealing rings 130.4, 130.5 and 130.6 described later in the following.

[0052] As illustrated in figure 7, the acoustic membrane 12 has an inner area 12.1 and an external area 12.2 that is coaxially arranged around the inner area 12.1. The external area 12.2 is configured to cooperate with the sealing rings 130.4, 130.5, 130.6 of the sealing cover 13.

[0053] In a non-limitative embodiment, the acoustic membrane 12 is water resistant. So it is not impaired by water that could flow along the grids 140 and 141 of the housing cover 14 (described later in the following) and reach the acoustic membrane 12.

Sealing cover 13:

[0054] The sealing cover 13 is illustrated in figures 1, 2, 3, 9, 10, and 16.

[0055] The sealing cover 13 is configured to protect the electronic support 11 and the acoustic membrane 12 in particular from splashes coming from high pressure water.

[0056] To this end, the sealing cover 13 is configured to protect the electronic support 11 and to seal the housing base 10.

[0057] The sealing cover 13 cooperates with the housing base 10 to close the compartment 100 of the housing base 10. Thus, as illustrated in figure 9 and figure 10, the sealing cover 13 comprises a compartment 130 with a wall 130.1 that is configured to be in contact with the wall 100.1 of the compartment 100 of the housing base 10. In particular, the inside flank 130.3 of the wall 130.1 is in contact with the outside flank 100.3 of the wall 100.1 of the housing base 10 when the sealing cover 13 is assembled with the housing base 10. Thus, the compartment 130 of the sealing cover 13 receives the compartment 100 of the housing base 10.

[0058] As illustrated in figures 9 and 10, the sealing cover 13 comprises a support 13.1 from which the compartment 130 extends.

[0059] As illustrated in figure 9, the sealing cover 13 comprises an opening 131 that is configured to be in front of the acoustic membrane 12. It is coaxially arranged around substantially the same vertical axis A of the acoustic membrane 12 when all the elements of the microphone 1 are assembled. It permits the sound waves S to reach the acoustic membrane 12 via said opening 131. In other words, it is positioned in regards with the acoustic membrane 12 when the microphone 1 is assembled.

[0060] In a non-limitative embodiment, the sealing cover 13 further comprises at least one sealing ring 130.4 that is coaxially arranged around the opening 131 of the sealing cover 13.

[0061] In a non-limitative variant of embodiment, the sealing cover 13 further comprises a plurality of sealing rings that are coaxially arranged around the opening 131 of the sealing cover 13. In a non-limitative example, there are three sealing rings referred to as 130.4, 130.5, 130.6 in figure 10. Hence, the acoustic membrane 12 is rigidly hold into its position. They are configured to be in contact with the external area 12.2 of the acoustic membrane 12 so as to form several seals when the sealing cover 13 is assembled with the housing base 10 and to hold the acoustic membrane 12 to the electronic support 11. When the sealing cover 13 covers the electronic support 11, the sealing rings 130.4, 130.5 and 130.6 cover partly the acoustic membrane 12 as they are in contact with its external area 12.2.

[0062] Thus, if some water enters the microphone assembly 1, and reach the inner area 12.1 of the acoustic membrane 12, no water can pass through the inner area 12.1 and reach the electronic support 11 as the sealing cover 13 seals the external area 12.2 of the acoustic membrane 12 to the electronic support 11. Hence the electronic support 11 is safe from damages that could be caused by water or any other external fluids or dust in non-limitative examples.

[0063] It is to be noted that even when the acoustic membrane 12 vibrates, the seals formed by the sealing rings 130.4, 130.5, 130.6 resist as there is a compression on them due to the assembly of the sealing cover 13 to the housing base 10 by means of the screws 18.

[0064] In a non-limitative embodiment, the sealing cover 13 is made of a flexible material. In a non-limitative variant of embodiment, it is made of silicon. Hence, the sealing rings 130.4, 130.5, 130.6 can be deformed when a compression is applied onto the sealing cover 13 via the screws 18, thus forming the seals.

[0065] When the sealing cover 13 is assembled with the housing base 10, the compression applies by means of the screws 18 permits to have a tight contact between the support 13.1 of the sealing cover 13 and the support 10.1 of the housing base 10, thus providing a seal that protects the inside area of the compartment 100 and thus the electronic support 11. This tight contact is enhanced when the sealing cover 13 is flexible.

[0066] Furthermore, the contact between the inside flank 130.3 of the wall 130.1 of the sealing cover 13 and the inside flank 100.3 of the wall 100.1 of the housing base 10 provides also a seal that protects the inside area of the compartment 100 and thus the electronic support 11.

[0067] In a non-limitative embodiment, the sealing cover 13 comprises a plurality of holes 138 that are configured to receive the screwing sockets 108 of the housing base 10. In a non-limitative embodiment, it comprises four holes 138 that are arranged at the four corners of the support 13.1 of the sealing cover 13.

Housing cover 14:

[0068] The housing cover 14 is illustrated in figures 1, 2, 3 and 11 to 17.

[0069] In a non-limitative embodiment, the housing cover 14 is of a plastic material. It is a light material with a reduced cost. In a non-limitative example, the plastic material is PBT GF30.

[0070] In a non-limitative embodiment, the housing cover 14 is configured to cover the sealing cover 13. Thus, it comprises a counterpart 140.1 illustrated in the view in figure 12 to fit the shape of the wall 130.1 of the sealing cover 130.

[0071] As illustrated in figure 13, the housing cover 14 comprises a first grid 141 and a second grid 142.

[0072] The first grid 141 is configured to face the acoustic membrane 12 when the microphone 1 is assembled. The first grid 141 comprises a plurality of first stanchions 141.1 alternating with a plurality of first slots 141.2. In particular, the first stanchions 141.1 are configured to face directly the acoustic membrane 12 via the opening 131 of the sealing cover 13. The plurality of first slots 141.2 form an entry to the microphone assembly 1 for the sound waves S. As illustrated in figure 11, sound waves S can enter the microphone assembly 1 via the first slots 141.2 of the first grid 141. As illustrated in figure 11, also some water W can enter the microphone assembly 1 via the first slots 141.2 of the first grid 141.

[0073] The second grid 142 is configured to face the acoustic membrane 12 as illustrated in figure 15. It comprises a plurality of second stanchions 142.1 alternating with a plurality of second slots 142.2. The second stanchions 142.1 and the second slots 142.2 face directly the acoustic membrane 12 via the opening 131 of the sealing cover 13.

[0074] The first grid 141 and the second grid 142 extend along two different plans that are substantially parallel from each other. The first grid 141 and the second grid 142 face each other. The second stanchions 142.1 face the first slots 141.2 of the first grid 141.

[0075] The first grid 141 and the second grid 142 are shifted from each other from an offset 143 (illustrated in figure 14) and are spaced in height along the vertical axis Z. The offset 143 and the space in height permits to have some gaps 144 (illustrated in figure 14) between the first stanchions 141.1 and the adjacent second stanchions 142.1. Thus, a path 15 is created for the sound waves S coming from the exterior of the microphone assembly 1 to reach the acoustic membrane 12. In other words, as illustrated in figure 15, the first stanchions 141.1 and the second stanchions 142.1 are shifted from each other with the offset 143, and the first slots 141.2 and the second slots 142.2 are shifted from each other with the same offset 143. In a non-limitative example, the offset 143 is about 2.45millimeters. In figure 14, in a non-limitative embodiment, the offset 143 is the distance between the center of a second stanchion 142.1 and the center of a first stanchion 141.1.

[0076] In a non-limitative embodiment, the first stanchions 141.1 and the second stanchions 141.2 have the same width. In another non-limitative embodiment, they have a different width.

[0077] In a non-limitative embodiment, the first stanchions 141.1 and the second stanchions 141.2 have the same thickness. In another non-limitative embodiment, they have a different thickness. The thicknesses are sized based on acoustical requirements.

[0078] In a non-limitative embodiment, the first slots 141.2 of the first grid 141 have the same length. In another non-limitative embodiment, they have a different length. As illustrated in figure 13, the first slots 141.2 at the extremity of the first grid 141 are shorter than the ones at the center of the first grid 141. This later embodiment permits to adapt the first grid 141 to the form of the acoustic membrane 12. The same applies for the second slots 142.2 of the second grid 142.

[0079] Thus, thanks to the arrangement of the first grid 141 and of the second grid 142, as illustrated in figure 13 and 14, the path 15 is not a straight passthrough passage from the exterior of the microphone assembly 1 to the acoustic membrane 12 for the sound waves S, but a passthrough passage with meanders. Thus, thanks to this arrangement, water that is sprayed at high pressure can't alter the acoustic membrane 12. The first grid 141 and the second grid 142 break the high pressure of the water, so that only some water with a low flow can flow along the vertical walls of the first stanchions 141.1 and of the second stanchions 142.1 and reach the acoustic membrane 12. But, as the acoustic membrane 12 is water resistant and thanks to the seal provided by the sealing cover 13, the electronic support 11 cannot be damaged.

[0080] It is to be noted that as the first grid 141 and the second grid 142 are part of the housing cover 14, they are molded as a whole when the housing cover 14 is molded. Only one mold is used to mold the housing cover 14.

Pressure membrane 16:

[0081] In a non-limitative embodiment, the microphone assembly 1 further comprises a pressure membrane 16 illustrated in figures 2, 3, 6a, 8, and 15 to 17.

[0082] The pressure membrane 16 is configured to release the heat or pressure that is inside the microphone assembly 1, in particular inside the compartment 100. It allows the heat or pressure to escape outside the microphone assembly 1. The pressure membrane 16 is configured to continuously equalize the pressure. Constant pressure equalization helps in preventing condensation which can corrode and damage the electrical components.

[0083] In a non-limitative embodiment, the pressure membrane 16 (also called pressure vent) is made of PTFE material (Polytetrafluoroethylene).

[0084] The pressure membrane 16 is configured to be disposed in the housing base 10 as illustrated in figure 6a. In particular it is placed in the vent hole 101 of the

compartment 100 of the housing base 10 intended for this purpose as illustrated in figure 5.

[0085] As illustrated in figure 8, the pressure membrane 16 is disposed at one side of the electronic support 11 that is arranged opposite to the side where the acoustic membrane 12 is. As illustrated in figures 15 and 16, the pressure membrane 16 is disposed at the side of the sealing cover 13 that is opposite to the side where the acoustic membrane 12 is.

[0086] It is to be understood that the present invention is not limited to the aforementioned embodiments and variations and modifications may be made without departing from the scope of the invention. All statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass equivalents thereof. In this respect, the following remarks are made.

[0087] Hence, some embodiments of the invention may comprise one or a plurality of the following advantages:

- it provides a water jet proof integral cover (aka the housing cover 14) designed for the microphone assembly 1,
- it permits to have a path 15 for the sound waves S to enter the microphone assembly 1 and to reach the acoustic membrane 12, while protecting the acoustic membrane 12 from high pressure water jetting,
- it suppresses the shielding cover of the prior art, thus reducing the tooling cost as the number of molds needed to manufacture the elements of the microphone assembly 1 is reduced, thus reducing the overall cost of the microphone assembly 1,
- as it suppress the shielding cover of the prior art by integrating the first grid 141 and the second grid 142 in one unique element, here the housing cover 14, it suppresses assembly cost as it reduces the complexity of assembly because there is no need to forecast assembly means for the housing cover 14 to be assemble with a shielding cover. Thus, time manufacturing is also reduced.

Claims

1. Microphone assembly (1) for a vehicle, said microphone assembly (1) comprising :

- a housing base (10) that is configured to receive an electronic support (11),
- said electronic support (11),
- an acoustic membrane (12) that is configured to be in contact with said electronic support (11),
- a sealing cover (13) that comprises an opening (131) which is configured to be in front of said acoustic membrane (12),
- a housing cover (14) that is configured to cover said sealing cover (13), wherein :
- said housing cover (14) comprises a first grid (140) and a second grid (141) that are shifted from each other so as to form a path (15) for sound waves (S) coming from the exterior of the microphone assembly (1) to reach said acoustic membrane (12).

2. Microphone assembly (1) according to claim 1, wherein said sealing cover (13) comprises at least one sealing ring (130.4) that is configured to hold the acoustic membrane (12) to said electronic support (11).

3. Microphone assembly (1) according to the preceding claim, wherein said acoustic membrane (12) has an inner area (12.1) and an external area (12.2) that is coaxially arranged around said inner area (12.1) and that is configured to cooperate with said at least one sealing ring (130.4).

4. Microphone assembly (1) according to claim 2 or 3, wherein said acoustic membrane (12) comprises three sealing rings (130.4, 130.5, 130.6).

5. Microphone assembly (1) according to any of the preceding claims, wherein said first grid (141) and said second grid (142) are spaced in height.

6. Microphone assembly (1) according to any of the preceding claims, wherein said first grid (141) and said second grid (142) are configured to face said acoustic membrane (12) via said opening (131) of said sealing cover (13).

7. Microphone assembly (1) according to any of the preceding claims, wherein said first grid (141) comprises first stanchions (141.1) alternating with first slots (141.2), and said second grid (142) comprises second stanchions (142.1) alternating with second slots (142.2), and wherein the first stanchions (141.1) and the second stanchions (142.1) are shifted from each other with an offset (143), and the first slots (141.2) and the second slots (142.2) are shifted from each other with the same offset (143).

8. Microphone assembly (1) according to any of the preceding claims, wherein said microphone assembly (1) further comprises a pressure membrane (16).

9. Microphone assembly (1) according to the preceding claim, wherein said pressure membrane (16) is place on one side (11.2) of said electronic support (11) that is opposed to another side (11.1) of the electronic support (11) where the acoustic membrane (12) is disposed.

10. Microphone assembly (1) according to any of the

preceding claims, wherein said acoustic membrane (12) is of a PET material.

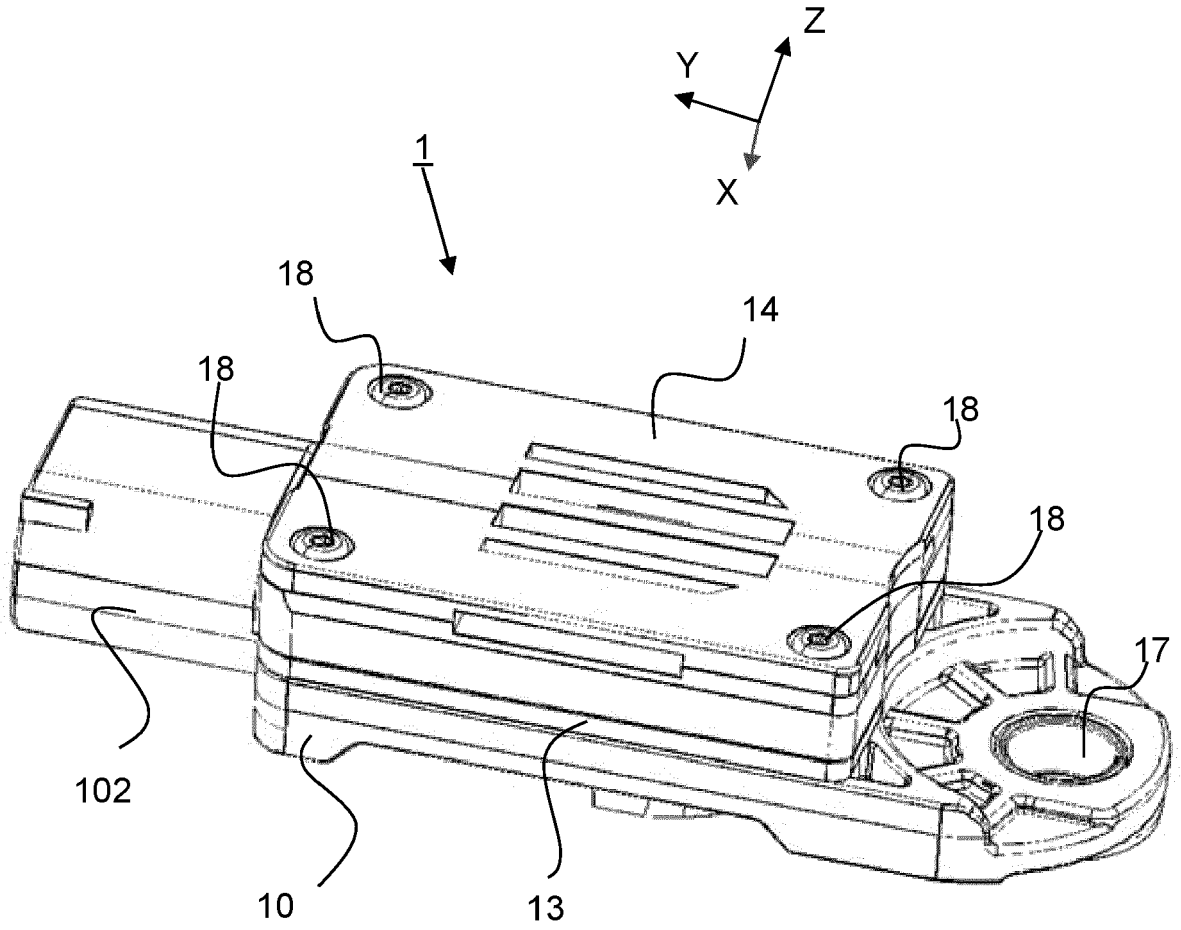


Fig. 1

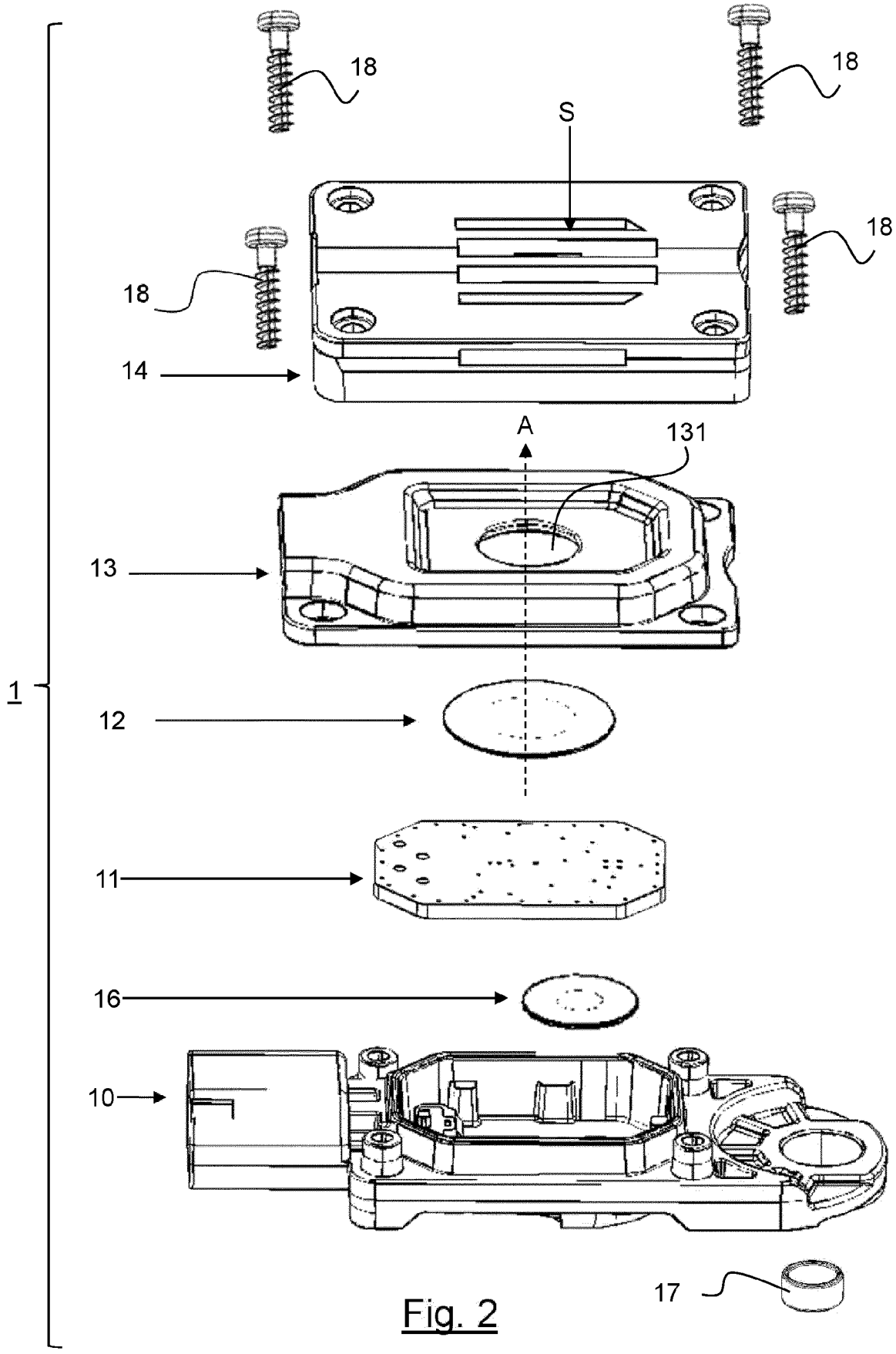


Fig. 2

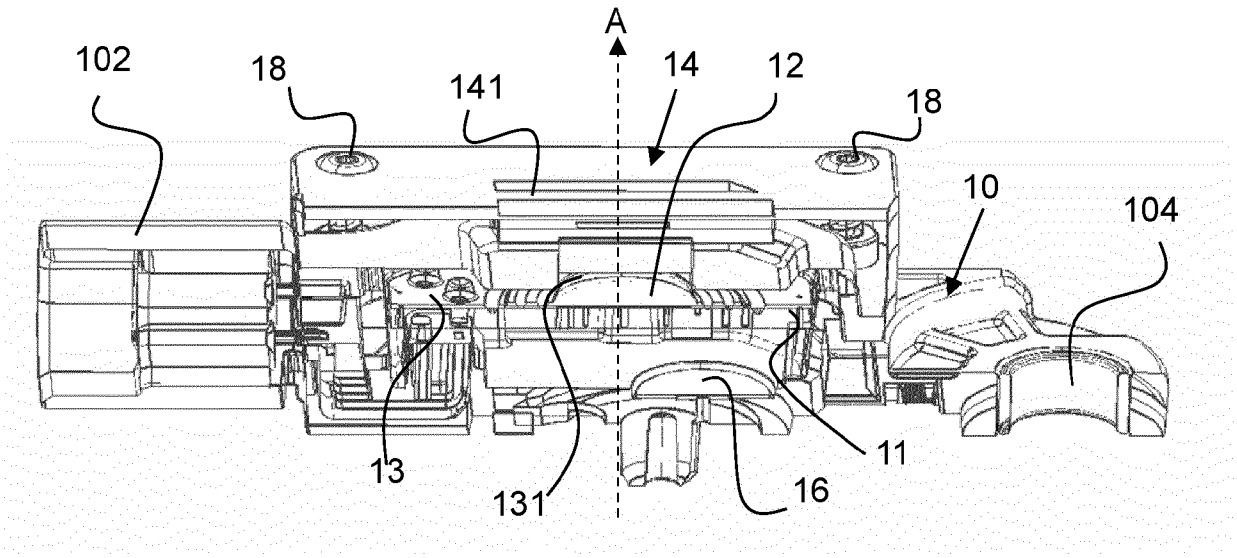


Fig. 3

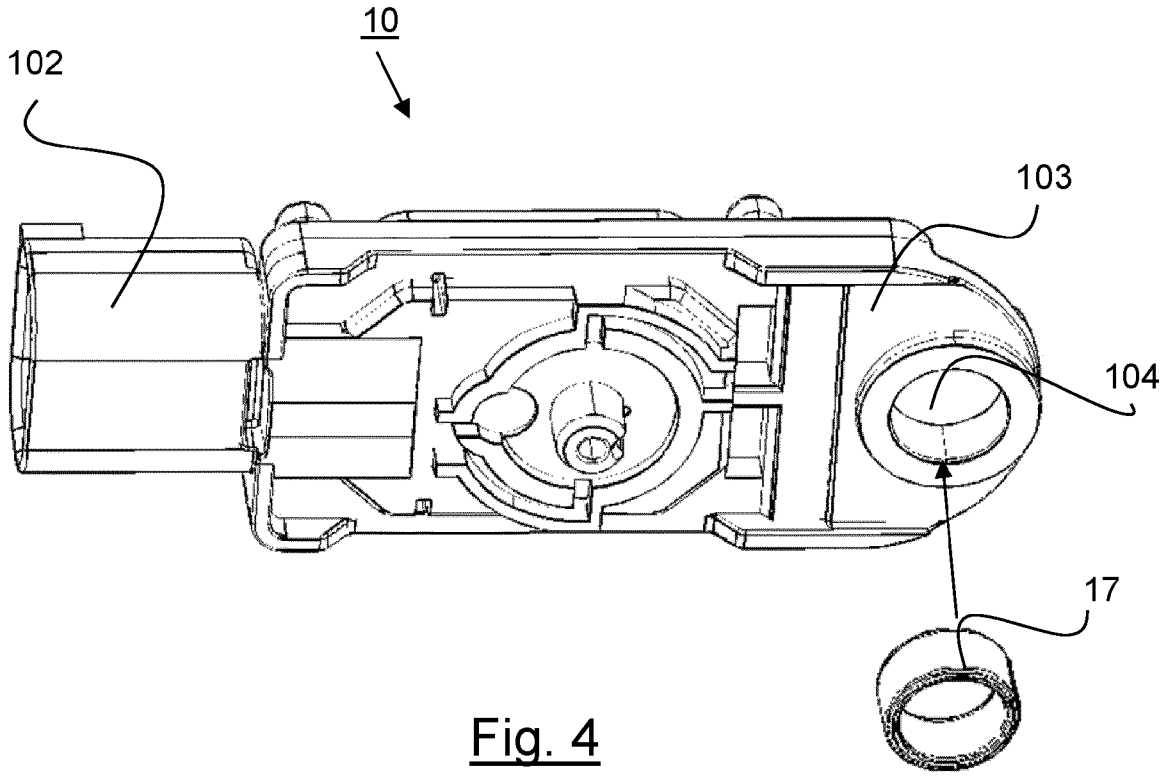
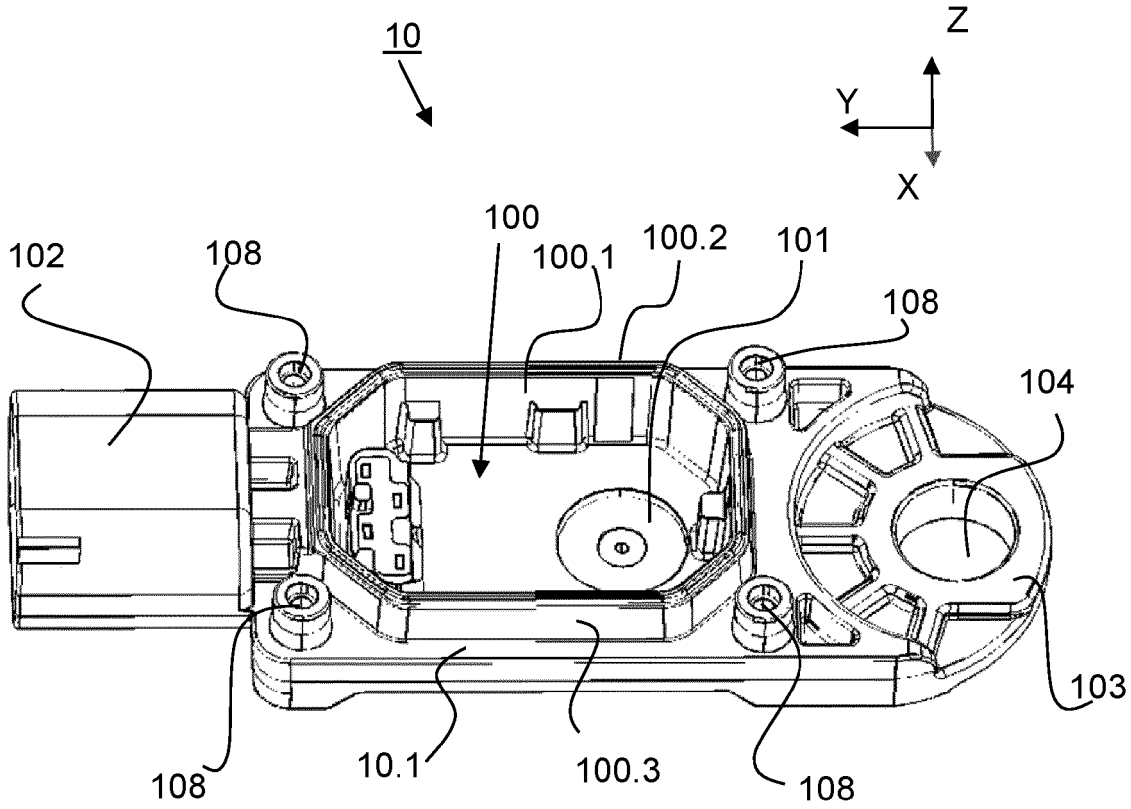


Fig. 4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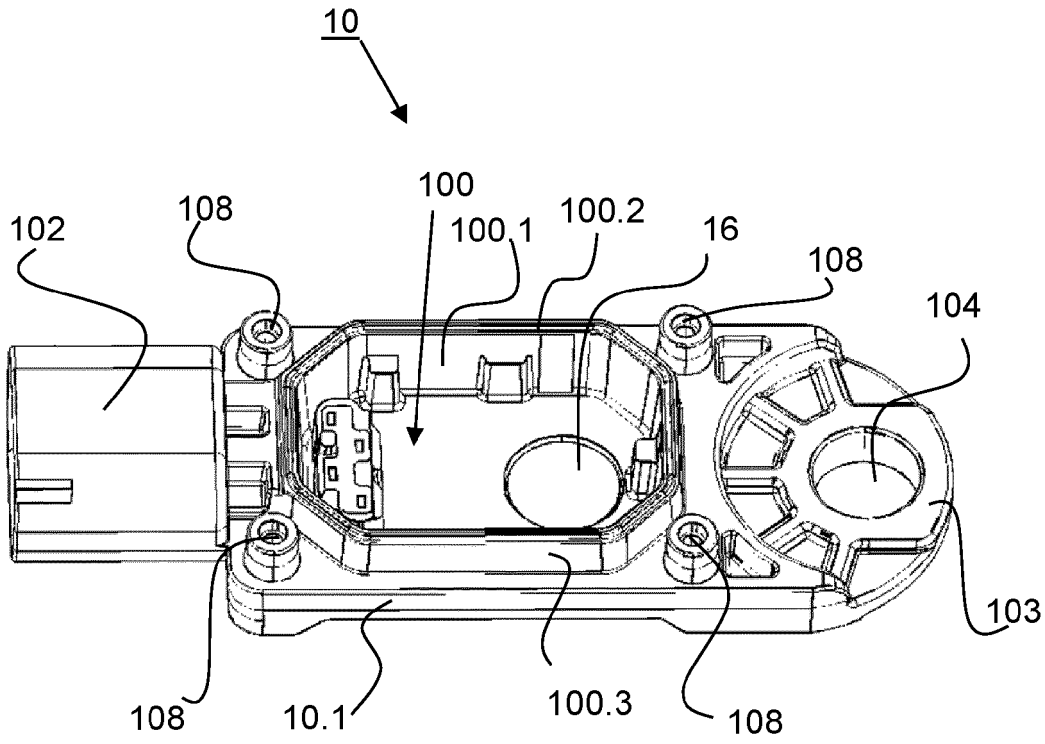
10.1
100.3
108

Fig. 5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100.3
108

Fig. 6a

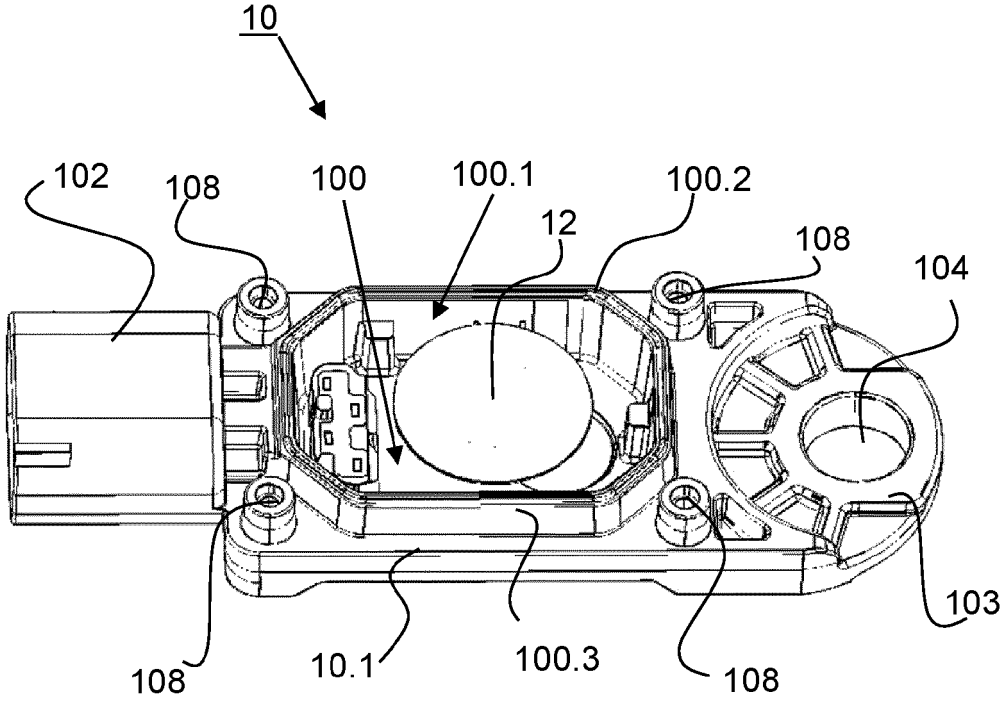
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Fig. 6b

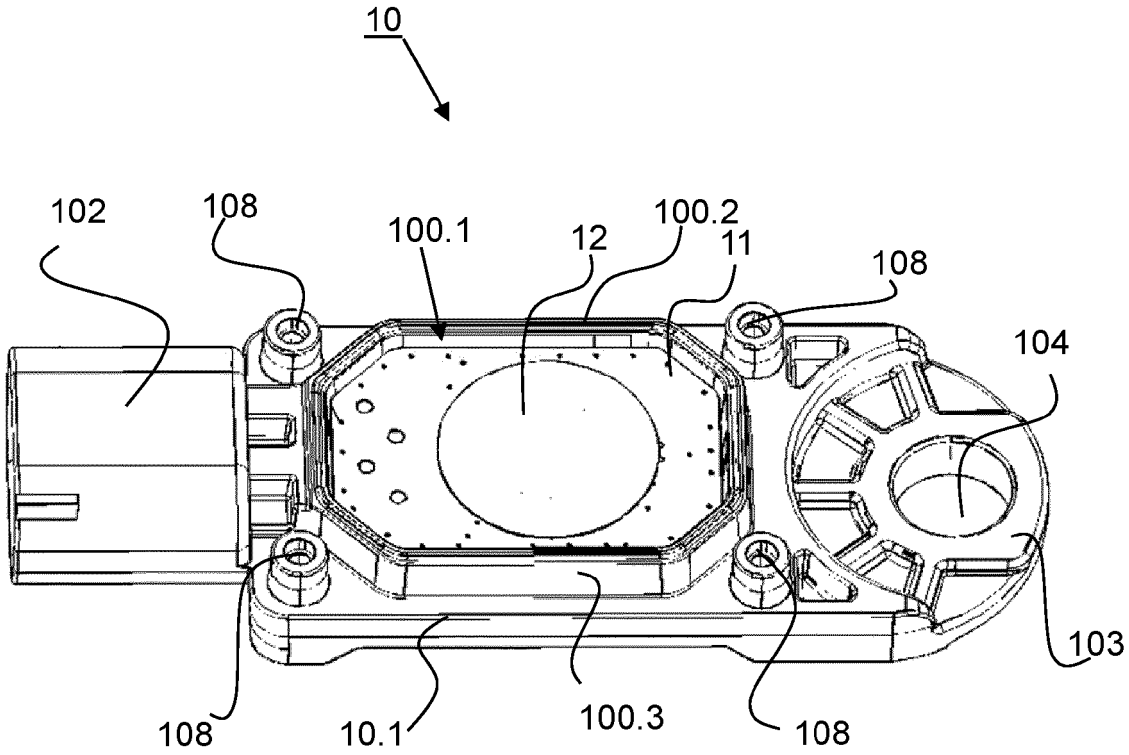
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Fig. 6c

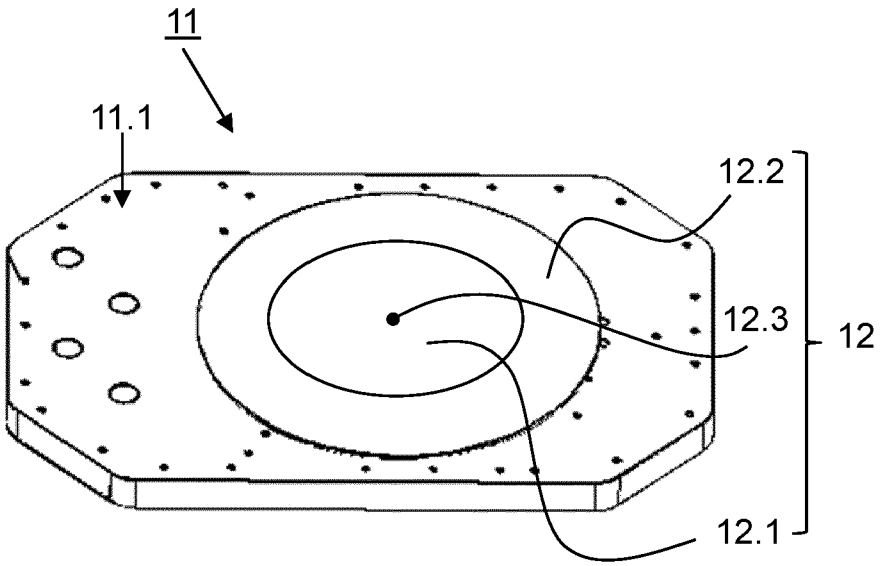

Fig. 7

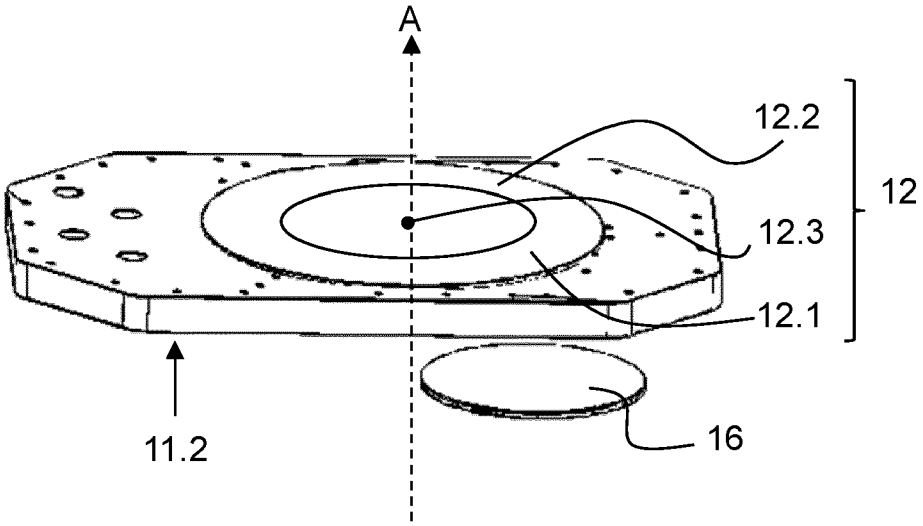

Fig. 8

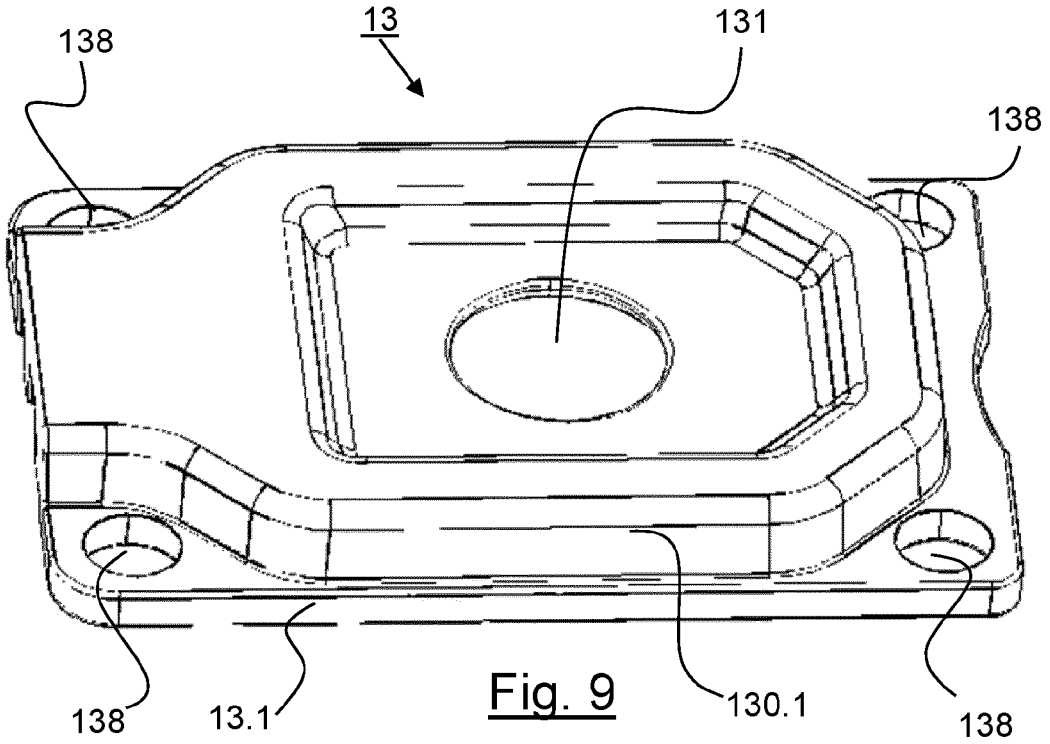
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Fig. 9

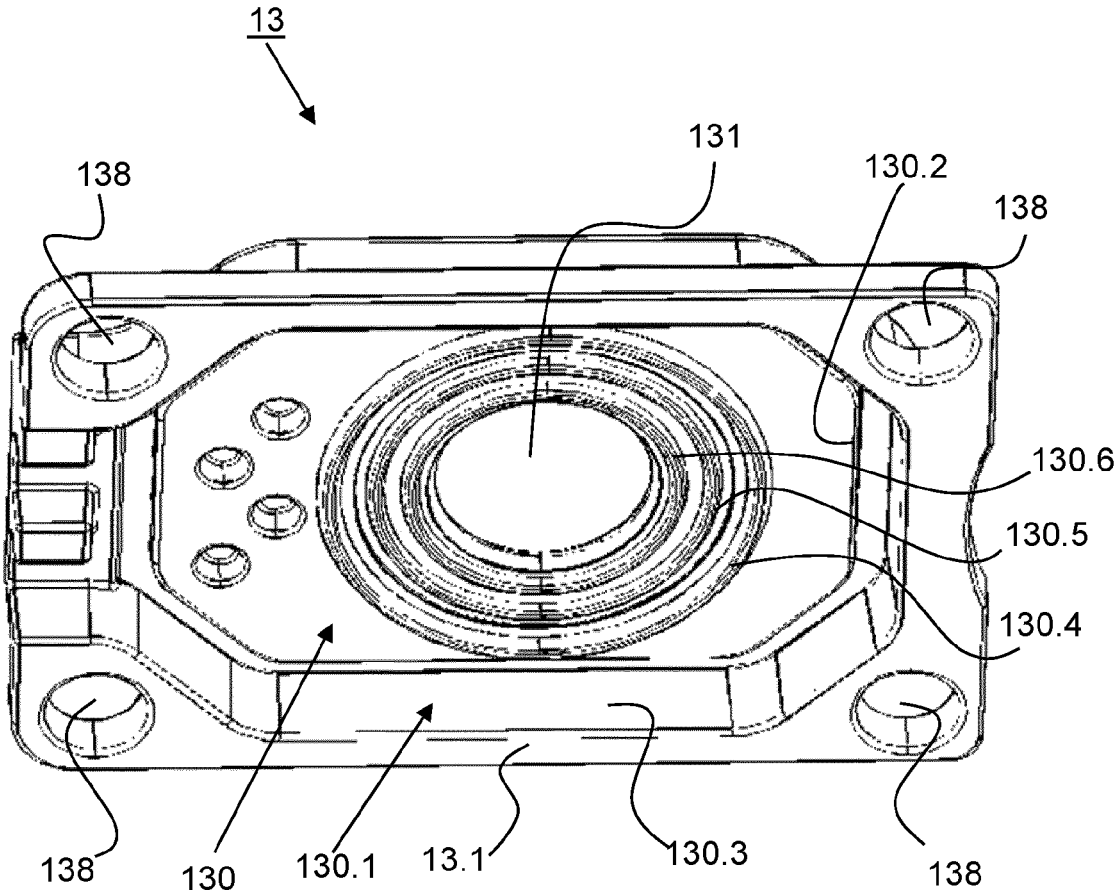
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Fig. 10

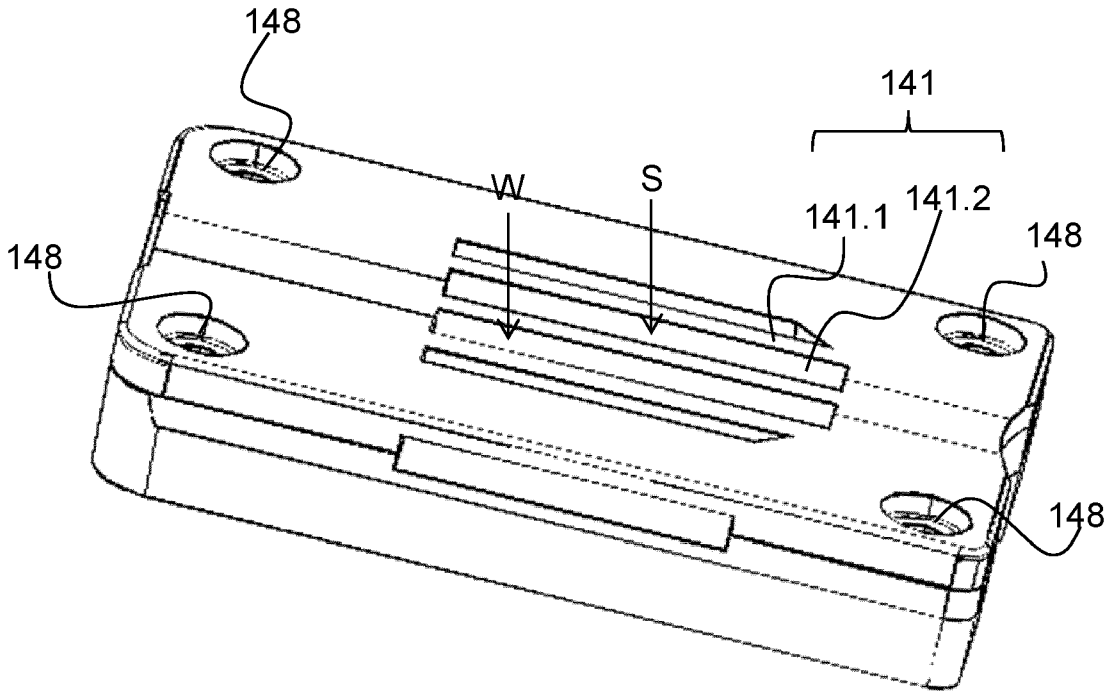


Fig. 11

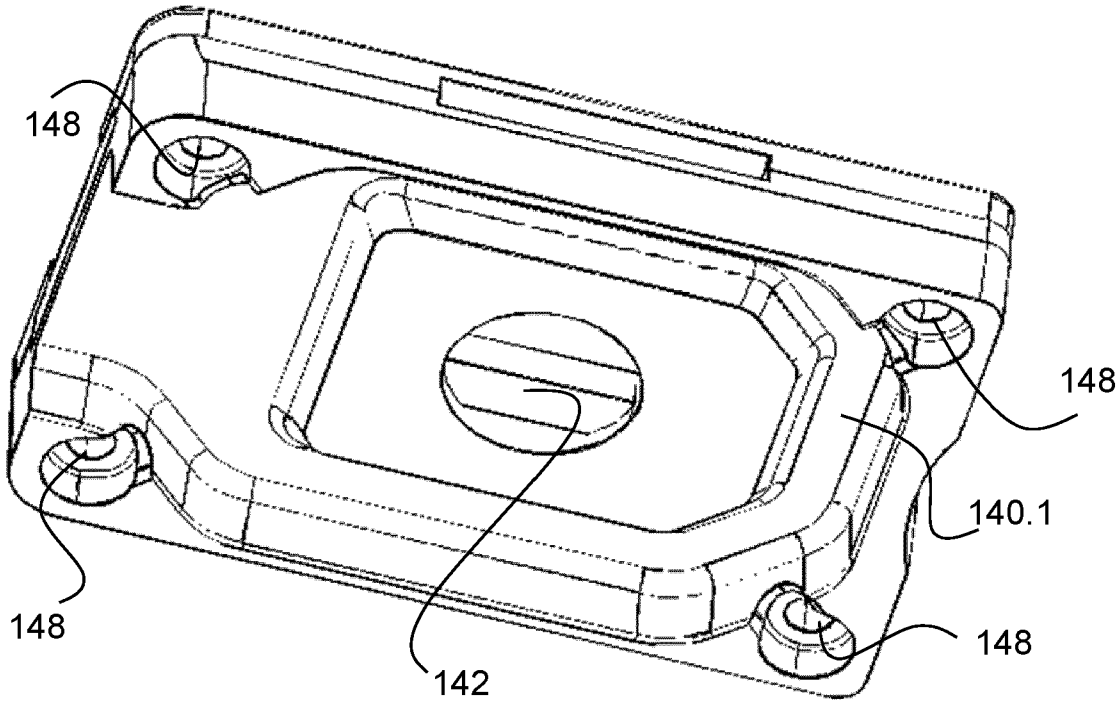
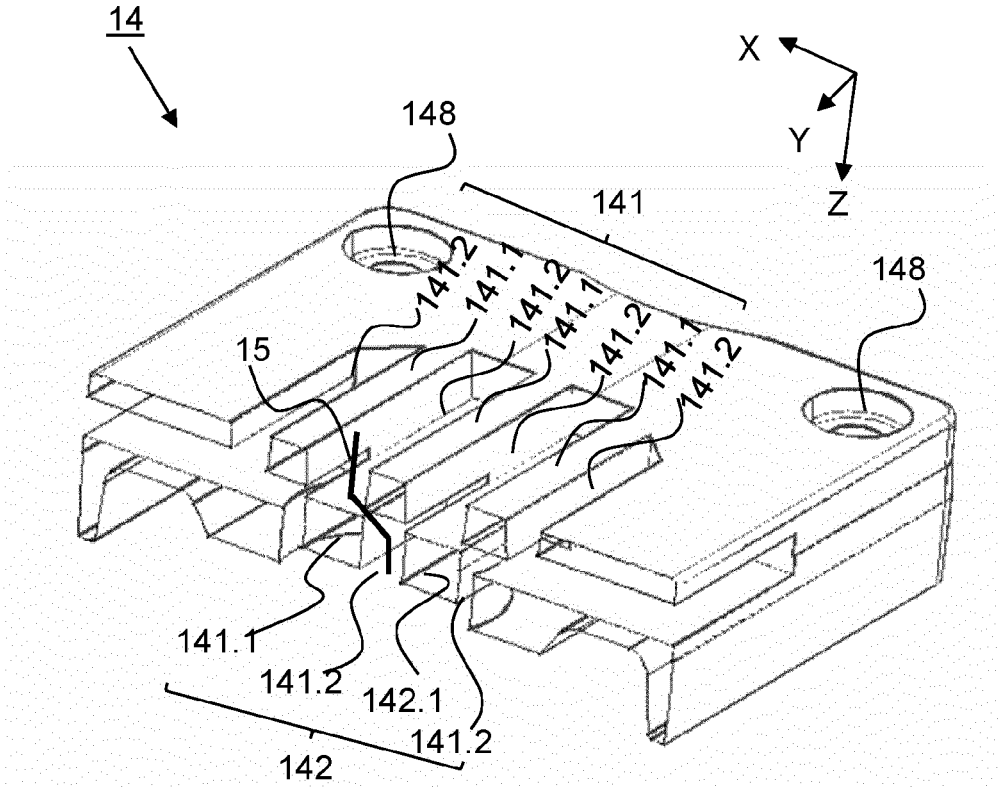


Fig. 12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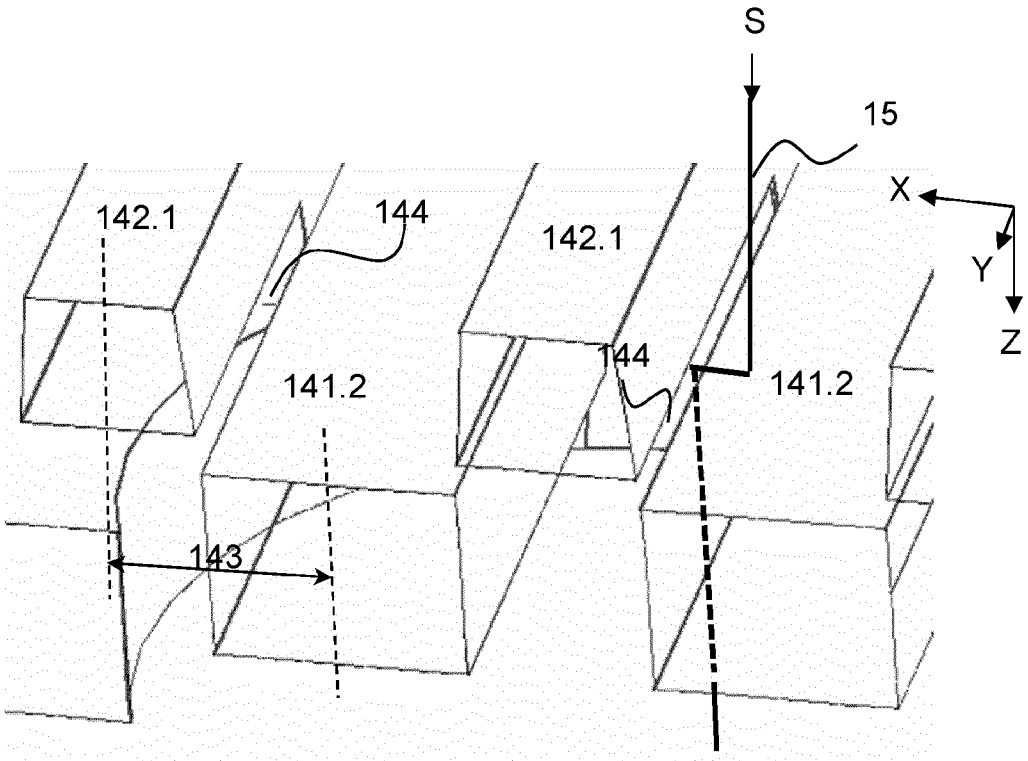
142.1
141.2
142

Fig. 13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Z
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142.1
144
141.2
141.2
143

Fig. 14

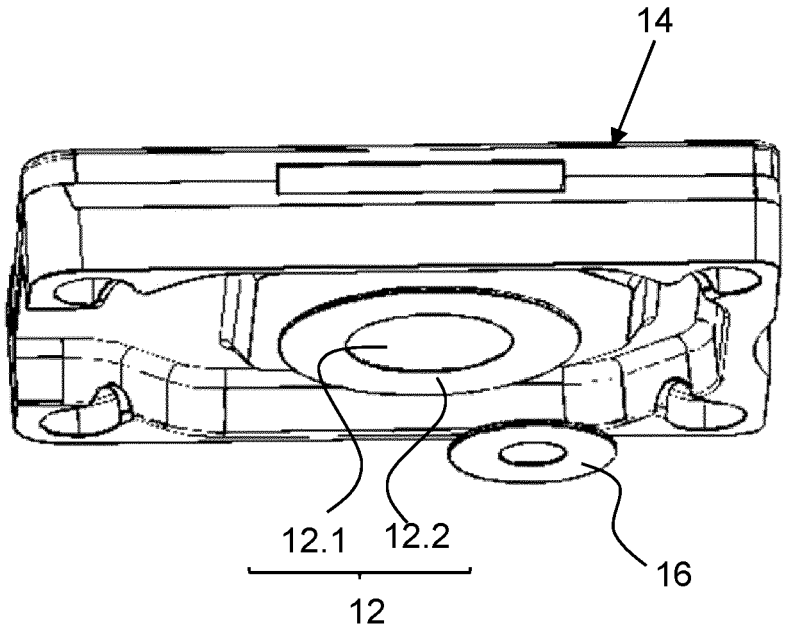

Fig. 15

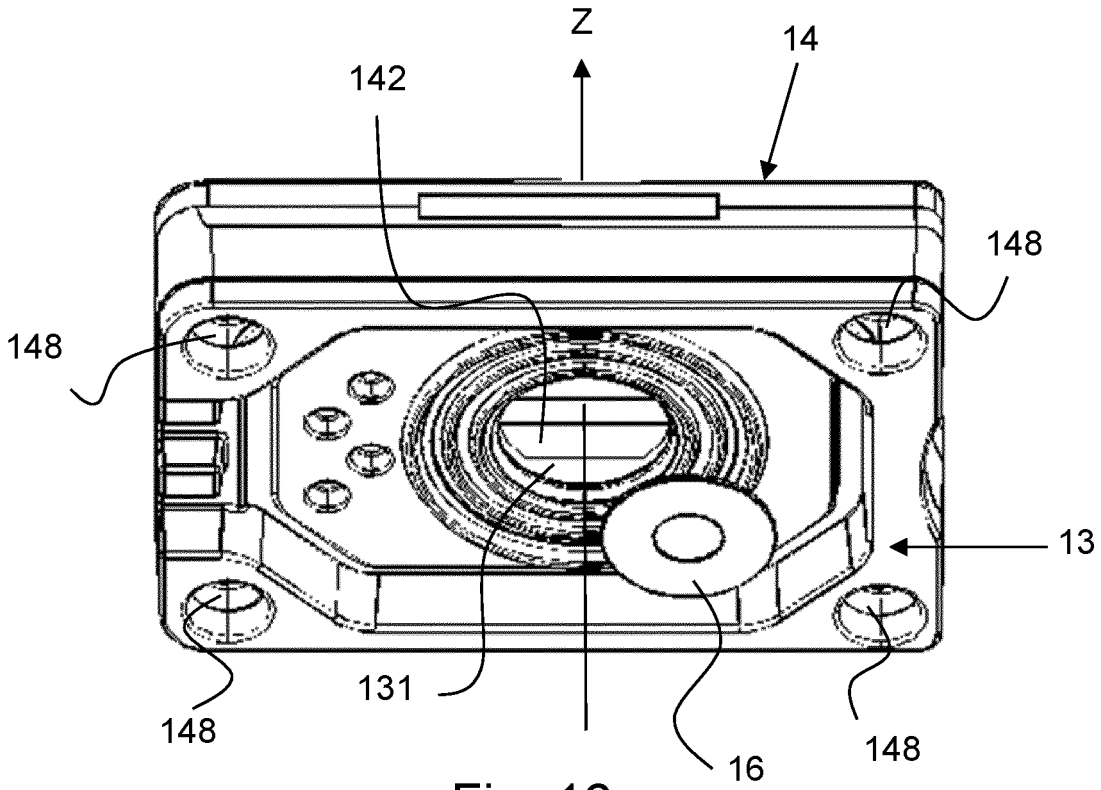

Fig. 16

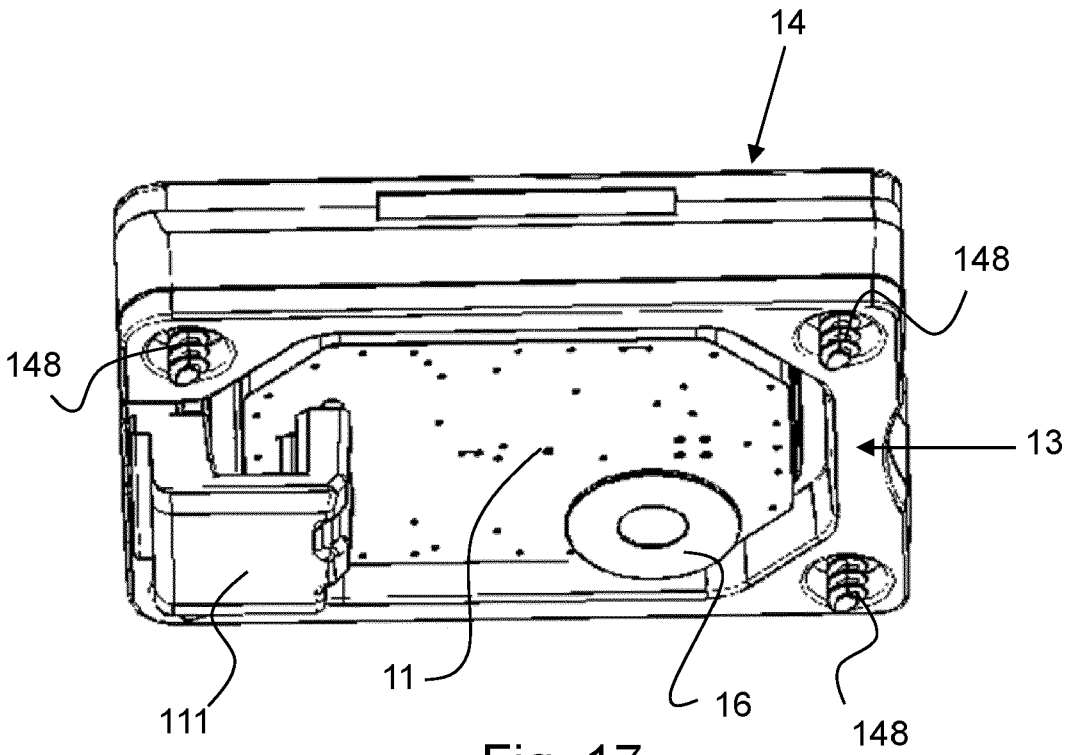

Fig. 17

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Y	US 2020/280782 A1 (KLEINHEINCZ ZOLTAN GIANG-SON [HU] ET AL) 3 September 2020 (2020-09-03) * paragraphs [0022] - [0025]; figure 1.2 *	8-10	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 March 2024	Navarri, Massimo

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