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(71) Applicant(s): L&T TECHNOLOGY SERVICES LIMITED

(72) Inventor(s): Ganapathi, Venkatachalam Gagansekaran

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(54) Title: A COUPLING DEVICE FOR AN AIR INTAKE ASSEMBLY OF A VEHICLE

(57) Abstract: The present disclosure discloses a coupling device (100) for an air intake assembly (200) of a vehicle. The coupling device (100) comprises a core, a sleeve (4), and at least one retaining member (5). The core (1) is engageable about at least one projection (3a) of the air intake assembly (200) and the sleeve (4) is operatively disposable on the core (1) and is defined with a first receiving portion (4a) to receive the at least one projection (3a). The at least one retaining member (5) is configured to toggle between a first position and a second position to selectively lock and unlock the at least one projection (3a). With such configuration, manufacturing of the coupling device (100) may be simpler and may reduce the price of the coupling device (100) and further reduce or eliminate need for rotation of the ducts.

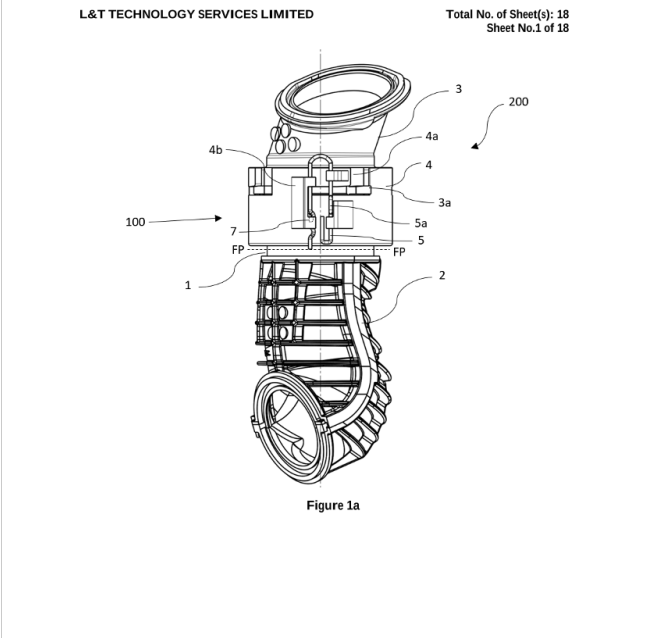

Figure 1a

FORM 2

THE PATENTS ACT 1970
(39 OF 1970)
&
The Patent Rules, 2003

Complete Specification
(See Section 10 and Rule 13)

1. TITLE OF THE INVENTION

A COUPLING DEVICE FOR AN AIR INTAKE ASSEMBLY OF A VEHICLE

2. APPLICANT(S)

(a) NAME : **L&T TECHNOLOGY SERVICES LIMITED**
(b) NATIONALITY : **INDIAN**
(c) ADDRESS : **DLF IT SEZ Park, 2nd Floor – Block 3**
1/124, Mount Poonamallee Road,
Ramapuram, Chennai – 600 089,
INDIA.

3. PREAMBLE TO THE DESCRIPTION

COMPLETE

The following specification describes the invention and the manner in which it is to be performed

TECHNICAL FIELD

[0001] Present disclosure, in general, relates to the field of mechanical engineering. Particularly, but not exclusively, the present disclosure relates to an air intake assembly for a vehicle. Further, embodiments of the present disclosure relate to a coupling device of the air intake assembly.

BACKGROUND OF THE DISCLOSURE

[0002] An automotive internal combustion engine employs an air intake system to provide flow of air into the engine for combustion. The air intake system may include at least one duct, that is configured to receive air for supplying to the engine. Such ducts generally employ coupling devices to couple said ducts or other conduits to supply air, for example, a connector may couple an inlet duct of the engine to a charged air cooler. Likewise, the coupling devices may also be used to join various conduits in the exhaust gas circulation system of a vehicle.

[0003] As is well known in the existing art, a type of coupling device, commonly referred to as a “quick connector,” is used to quickly and simply connect ducts or conduits to one another. Quick connectors connect a tubular insertion member to a receiving member to convey mediums therethrough, such as a variety of liquid and gas systems, to provide connection between a pair of conduits for establishing a continuous flow path therebetween. For example, in the automotive applications, quick connectors are used in various air/vapor management systems, such as evaporative emissions systems, fuel vapor, oil vapor, crankcase ventilation systems, air intake manifolds, brake boosters and engine vacuum systems. However, such coupling devices require at least one of the ducts to be rotated in clockwise or anti-clockwise directions at connecting ends of the ducts while locking and unlocking said ducts or conduits. Such rotation may cause damage to at least one of the ducts and the coupling devices due to misalignment or tension in the ducts due to rotation and the like. Further, such rotation may make the connecting process complex while orienting/rotating the ducts. Such damage to the ducts or the coupling devices necessitates replacement of the coupling devices and the ducts which is expensive. Also, the coupling devices require the ducts to be oriented in a specific orientation, making the construction and manufacturing of the coupling devices complicated and thereby increasing price of the coupling devices.

[0004] With advent of technology, various attempts have been made to simplify coupling of the ducts by employing coupling devices. One of such coupling devices involve two halves where each half receives one end of each duct. Such halves are secured by employing locks to hold the ducts together. However, such coupling devices are temporarily coupled to the ducts

and are prone to dismantling. Furthermore, locks of such coupling devices are prone to failure due to fatigue and load of the coupling device on the locks.

[0005] The present disclosure is directed to overcome one or more limitations stated above or any other limitations associated with the conventional mechanisms.

SUMMARY OF THE DISCLOSURE

[0006] One or more shortcomings of the prior art are overcome by a method and a system as claimed and additional advantages are provided through the method and the system as claimed in the present disclosure. Additional features and advantages are realized through the techniques of the present disclosure. Other embodiments and aspects of the disclosure are described in detail herein and are considered a part of the claimed disclosure.

[0007] In one non-limiting embodiment of the present disclosure a coupling device of an air intake assembly is disclosed. The coupling device comprises a core, a sleeve, and at least one retaining member. The core defines a first end and a second end, wherein the core is engageable about at least one projection of the air intake assembly. The sleeve is operatively disposable on a portion of the core and is defined with a first receiving portion and a second receiving portion. The first receiving portion is adapted to receive the at least one projection of the air intake assembly. The at least one retaining member is slidably disposed in the second receiving portion of the sleeve and the at least one retaining member is defined with at least one protrusion. The at least one retaining member is configured to toggle between a first position and a second position to selectively lock and unlock the at least one projection.

[0008] In an embodiment, the core is defined with a guide member, adapted to guide the sleeve.

[0009] In an embodiment, the guide member is configured to receive the sleeve at one end and the air intake assembly at an other end opposite to the one end.

[0010] In an embodiment, the coupling device comprises a sealing member positioned proximal to the guide member to seal the core.

[0011] In an embodiment, the at least one protrusion of the at least one retaining member and the first receiving portion of the sleeve are selected from at least one of a slot, an arcuate bend, and a groove.

[0012] In an embodiment, the first end of the core is fixedly connected to the air intake assembly.

[0013] In an embodiment, the second receiving portion is defined with at least one extension to accommodate and guide a portion of the at least one retaining member into the at least one of the first position and the second position.

[0014] In an embodiment, the at least one extension engages with the at least one protrusion of the at least one retaining member in at least one of the first position and the second position.

[0015] In an embodiment, the at least one retaining member is a U-shaped member defined with at least two arms and where at least one arm of the at least two arms is defined with the at least one protrusion.

[0016] In an embodiment, the at least one protrusion is defined along a length of the at least two arms and is configured to allow movement of the at least one projection in the first position and restrict movement of the at least one projection from the first receiving portion in the second position.

[0017] In another non-limiting embodiment, an air intake assembly for a vehicle is disclosed. The air intake assembly comprises a first duct, a second duct and a coupling device. The second duct is connectable to the first duct and the second duct being defined with at least one projection, wherein the first duct and the second duct to supply air to an engine of the vehicle. The coupling device configured to removably connect the first duct and the second duct. The coupling device comprises a core, a sleeve, and at least one retaining member. The core defines a first end and a second end, wherein the core is engageable about at least one projection of the air intake assembly. The sleeve is operatively disposable on a portion of the core and is defined with a first receiving portion and a second receiving portion. The first receiving portion is adapted to receive the at least one projection of the air intake assembly. The at least one retaining member is slidably disposed in the second receiving portion of the sleeve and the at least one retaining member is defined with at least one protrusion. The at least one retaining member is configured to toggle between a first position and a second position to selectively lock and unlock the at least one projection.

[0018] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0019] The novel features and characteristic of the disclosure are set forth in the appended claims. The disclosure itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying

figures. One or more embodiments are now described, by way of example only, with reference to the accompanying figures wherein like reference numerals represent like elements and in which:

[0020] Figure 1a is a perspective view of an air intake assembly in accordance with an embodiment of the present disclosure.

[0021] Figure 1b is another perspective view of the air intake assembly in accordance with an embodiment of the present disclosure.

[0022] Figure 2a is a perspective view of a second duct of the air intake assembly in accordance with an embodiment of the present disclosure.

[0023] Figure 2b is a top view of the second duct of the air intake assembly in accordance with an embodiment of the present disclosure.

[0024] Figure 2c is a side view of the second duct of the air intake assembly in accordance with an embodiment of the present disclosure.

[0025] Figure 2d is a front view of the second duct of the air intake assembly in accordance with an embodiment of the present disclosure.

[0026] Figure 2e is a perspective view of the second duct of the air intake assembly in accordance with an embodiment of the present disclosure.

[0027] Figure 3a is a sectional view of the air intake assembly in accordance with an embodiment of the present disclosure.

[0028] Figure 3b is a magnified sectional view of the air intake assembly depicting a coupling device in accordance with an embodiment of the present disclosure.

[0029] Figure 4a is a front view of a core of the coupling device in accordance with an embodiment of the present disclosure.

[0030] Figure 4b is a sectional front view of the core of the coupling device in accordance with an embodiment of the present disclosure.

[0031] Figure 4c is a perspective view of the core of the coupling device in accordance with an embodiment of the present disclosure.

[0032] Figure 4d is a top view of the core of the coupling device in accordance with an embodiment of the present disclosure.

[0033] Figure 5a is a front view of a sleeve of the coupling device in accordance with an embodiment of the present disclosure.

[0034] Figure 5b is a sectional view of the sleeve positioned upside down of the coupling device in accordance with an embodiment of the present disclosure.

[0035] Figure 5c is a bottom view of the sleeve of the coupling device in accordance with an embodiment of the present disclosure.

[0036] Figure 5d is a perspective view of the sleeve of the coupling device in accordance with an embodiment of the present disclosure.

[0037] Figure 5e is a side view of the sleeve of the coupling device in accordance with an embodiment of the present disclosure.

[0038] Figure 5f is another side view of the sleeve of the coupling device in accordance with an embodiment of the present disclosure.

[0039] Figure 6a is a perspective view of at least one retaining member of the coupling device in accordance with an embodiment of the present disclosure.

[0040] Figure 6b illustrates different side views of the at least one retaining member of the coupling device in accordance with an embodiment of the present disclosure.

[0041] Figure 6c is an isometric view of the at least one retaining member of the coupling device in accordance with an embodiment of the present disclosure.

[0042] Figure 6d is a side view of the at least one retaining member in a horizontal position in accordance with an embodiment of the present disclosure.

[0043] Figure 6e is a top view of the at least one retaining member in accordance with an embodiment of the present disclosure.

[0044] Figure 7a is an exploded view of the air intake assembly of the coupling device in accordance with an embodiment of the present disclosure.

[0045] Figure 7b is a front view of the air intake assembly depicting engagement of the second duct with the sleeve in accordance with an embodiment of the present disclosure.

[0046] Figure 7c is a front view of the air intake assembly depicting rotation of the sleeve and a second position of the at least one retaining member in accordance with an embodiment of the present disclosure.

[0047] Figure 7d is a front view of the air intake assembly depicting a first position of the at least one retaining member and a locked position of the coupling device in accordance with an embodiment of the present disclosure.

[0048] Figure 7e is a perspective view of the air intake assembly depicting the second position of the at least one retaining member and an unlocked position of the coupling device in accordance with an embodiment of the present disclosure.

[0049] Figure 7f is another perspective view of the air intake assembly depicting the first position of the at least one retaining member and the locked position of the coupling device in accordance with an embodiment of the present disclosure.

[0050] The figures depict embodiments of the disclosure for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the system and method illustrated herein may be employed without departing from the principles of the disclosure described herein.

DETAILED DESCRIPTION

[0051] While the embodiments in the disclosure are subject to various modifications and alternative forms, specific embodiment thereof has been shown by way of example in the figures and will be described below. It should be understood, however, that it is not intended to limit the disclosure to the particular forms disclosed, but on the contrary, the disclosure is to cover all modifications, equivalents, and alternative falling within the scope of the disclosure.

[0052] The terms “comprises”, “comprising”, or any other variations thereof used in the disclosure, are intended to cover a non-exclusive inclusion, such that a device, assembly, mechanism, system, method that comprises a list of components does not include only those components but may include other components not expressly listed or inherent to such system, or assembly, or device. In other words, one or more elements in a system proceeded by “comprises… a” does not, without more constraints, preclude the existence of other elements or additional elements in the system or method.

[0053] Embodiments of the present disclosure discloses a coupling device of an air intake assembly is disclosed. The coupling device comprises a core, a sleeve, and at least one retaining member. The core defines a first end and a second end, wherein the core is engageable about at least one projection of the air intake assembly. The sleeve is operatively disposable on a portion of the core and is defined with a first receiving portion and a second receiving portion. The first receiving portion is adapted to receive the at least one projection of the air intake assembly. The at least one retaining member is slidably disposed in the second receiving portion of the sleeve and the at least one retaining member is defined with at least one protrusion. The at least one retaining member is configured to toggle between a first position and a second position to selectively lock and unlock the at least one projection. With such configuration, requirement of at least one duct to be rotated while locking and unlocking ducts or conduits may be reduced or eliminated. Further, due to simplicity in construction,

manufacturing of the coupling device may be simpler and may reduce the price of the coupling device. Furthermore, by reducing or eliminating the damage to the ducts or conduits connectable by the coupling device, the need for frequent replacement of the air intake assembly and the coupling device may be reduced or eliminated.

[0054] The disclosure is described in the following paragraphs with reference to Figures 1a to 7f. In the figures, the same element or elements which have same functions are indicated by the same reference signs. It is to be noted that, the vehicle is not illustrated in the figures for the purpose of simplicity. One skilled in the art would appreciate that the device and the assembly as disclosed in the present disclosure may be used in any vehicle including but not liming to commercial vehicles, passenger vehicles and the like. The system and the method of the present disclosure may also be implemented in vehicles having at least two ducts for suitably routing fluids/gases to and from the engine without deviating from the principles of the present disclosure.

[0055] Figures 1a and 1b illustrate exemplary embodiments of the present disclosure which illustrate an air intake assembly (200) of a vehicle. The air intake assembly (200) comprises a first duct (2), a second duct (3) and a coupling device (100). The first duct (2) may be part of or includes at least a portion of an air inlet duct, where such first duct (2) may be configured to receive a fluid such as air and/or fuel or air-fuel mixture at one end and supply at the other end opposite to the one end. The second duct (3) may be connectable to a fluid source at one end and may be connectable to the first duct (2) at an other end via the coupling device (100) to receive and route the fluid to the first duct (2). In an embodiment, the first duct (2) may be an air intake duct and the second duct (3) may be another air intake duct connectable to the fluid source to route the fluid to the engine and the same shall not be considered a limitation. In an exemplary embodiment, the second duct (3) may be a coupling connector configured to connect the second duct (3) to the coupling device (100). The first duct (2) may be fixedly connected to the engine on one end and the second duct (3) may be fixedly connected to the fluid source. The first duct (2) and the second duct (3) may be configured to supply air to an engine of the vehicle.

[0056] Referring now to Figures 2a to 2e, the air intake assembly (200) may be defined with at least one projection (3a). The at least one projection (3a) may be defined on at least one of the first duct (2) and the second duct (3). For sake of explanation, the at least one projection (3a) is defined on the second duct (3) as can be seen in Figure 2a. However, the at least one projection (3a) may also be defined on the first duct (2) and the same shall not be considered a limitation. The at least one projection (3a) may be defined along a circumference of the second

duct (3). In the illustrative embodiment, the second duct (3) may be defined with four projections which may radiate circumferentially and be spaced apart as best seen in Figure 2b. The first duct (2) and the second duct (3) may define a flow path for the fluid as can be seen in Figure 2c to route the fluid to the engine from the fluid source. However, the number of projections on the second duct (3) may be varied based on design requirements. The second duct (3) of the air intake assembly (200) may be defined with at least one projection (3a) on one end connectable to the first duct (2). The at least one projection (3a) may be defined on the circumference of the second duct (3) at a predetermined length from the end. The predetermined length may be defined based on length of the coupling device (100) and may be varied based on requirement. The predetermined length may be in a range of 10mm to 40mm from the end of the second duct (3). The at least one projection (3a) may be received by the coupling device (100) for connecting the second duct (3) with the first duct (2).

[0057] Further, the at least one projection (3a) may be defined by a profile which extends from the circumference of the air intake assembly (200). The profile of the at least one projection (3a) may be selected from a flange, an elongated member, an L-shaped profile, a T-shaped profile, a curved profile, and the like. for sake of simplicity, the profile of the at least one projection (3a) is depicted as an L-shaped profile, which may be easily manufactured and the same shall not be considered a limitation. The at least one projection (3a) may be integrally formed on the air intake assembly (200) and defined along the circumference of the air intake assembly (200). For sake of explanation, profile of the multiple projections circumferentially distributed on the air intake assembly (200) is depicted to be same as can be seen in Figures 2d and 2e and the same shall not be considered a limitation. In an exemplary embodiment, the air intake assembly (200) may be defined with multiple projections where each projection may be defined by a different profile based on design requirements of the air intake assembly (200) and the coupling device (100).

[0058] Referring now to Figures 3a and 3b, the air intake assembly (200) may include the coupling device (100). The coupling device (100) removably connects the first duct (2) and the second duct (3) of the air intake assembly (200). The coupling device (100) may be configured to receive the first duct (2) on one end and the second duct (3) on an other end opposite to the one end. The coupling device (100) may fluidly connect the flow paths of the first duct (2) and the second duct (3) to define a combined flow path and route the fluid to the engine of the vehicle as best seen in Figure 3b. The coupling device (100) may be fixedly connectable to at least one of the first duct (2) and the second duct (3). In an embodiment, the coupling device (100) may be detachably connected to the second duct (3) and may be fixedly connected to the

first duct (2) and the same shall not be considered a limitation, as the type of connection of the coupling device (100) with the first duct (2) and the second duct (3) may be varied based on position of the at least one projection (3a) and design requirements of the air intake assembly (200).

[0059] Referring now to Figures 4a to 4d, the coupling device (100) may include a core (1), a sleeve (4) and at least one retaining member (5). The core (1) may be defined by a cylindrical profile and may be defining a first end (1a) and a second end (1b). However, other profiles such as cuboidal profile, hexagonal profile and the like may also be possible to operate the coupling device (100). The core (1) may be engageable with at least one of the first duct (2) and the second duct (3) at one of the first end (1a) and the second end (1b). The first end (1a) and the second end (1b) of the core (1) may be either fixedly connected to the first duct (2) and the second duct (3). In the illustrative embodiment, the first end (1a) of the core (1) is depicted to be connected to the first duct (2) and the second end (1b) of the core (1) may be connectable to the second duct (3). In an embodiment, the first end (1a) of the core (1) may be fixedly connected to the first duct (2) and the second end (1b) of the core (1) may be removably connectable to the second duct (3) as can be seen in Figure 3b. The core (1) may be integrally formed at an end of the first duct (2) to reduce additional fastening of the first duct (2) and the core (1) and the same shall not be considered a limitation. In an exemplary embodiment, the core (1) may also be connectable detachably to the first duct (2). The first end (1a) of the core (1) may be fixedly connectable to the first duct (2) by at least one of welding such as vibration welding, infrared welding, laser welding and plurality of fasteners and the like. However, other means of fastening such as adhesives, fasteners may also fixedly connect the first end (1a) of the core (1) to the first duct (2) such that one of the first duct (2) and the second duct (3) may be stationary and the other duct is required to be pivoted to comparatively a lower degree of rotation and the same shall not be considered a limitation.

[0060] Referring back to Figures 4a to 4d, the core (1) may be defined with a guide member (1c) on a portion of the core. The guide member (1c) may be defined along at least one of length, and circumference of the core. For sake of explanation, the guide member (1c) of is depicted to be defined along the circumference of the core (1) as can be seen in Figure 4a and 4c. The guide member (1c) may be defined along the circumference of the core (1) and may be configured to receive a portion of the sleeve (4). The guide member (1c) may be configured to guide the sleeve (4) on the core. The guide member (1c) may be defined by a flange, an elongated member, an L-shaped profile, a T-shaped profile, a curved profile, and the like. The guide member (1c) may extend from the circumference of the core (1) in a range of 25 to 100%

of length of the circumference of the core (1) to guide the sleeve (4). The guide member (1c) may be configured to receive the sleeve (4) at one end and the air intake assembly (200) at an other end opposite to the one end and restrict movement of the air intake assembly (200) and the sleeve (4) in directions other than longitudinal and rotational directions relative to the core (1).

[0061] Further, the guide member (1c) may define a plurality of surfaces based on profile of the guide member (1c). The plurality of surfaces may be configured to receive the sleeve (4) and the air intake assembly (200) to enclose and guide a portion of the sleeve (4) and the air intake assembly (200). For sake of explanation, the plurality of surfaces may include an upper surface (1d), a lateral surface (1d') and a lower surface (1d'') as can be seen in Figure 4b. However, the guide member (1c) may be defined with the upper surface (1d) and the lower surface (1d'') alone and the lateral surface (1d') may not be required to operate the coupling device (100). The sleeve (4) may be received by at least one of the upper surface (1d) and the lateral surface (1d') and the air intake assembly (200) may be received by the lower surface (1d'') of the guide member (1c). The upper surface (1d) of the guide member (1c) is depicted to receive the sleeve (4) and the lower surface (1d'') of the guide member (1c) is depicted to receive the second duct (3) of the air intake assembly (200) as can be seen in Figure 3b.

[0062] Referring back to Figures 4a to 4d, the lateral surface (1d') and the lower surface (1d'') may enclose a portion of the second duct (3) within the guideway defined by the lower surface (1d'') of the guide member (1c). The coupling device (100) may include a sealing member (6) positioned proximal to the guide member (1c) to seal the core (1) of the coupling device (100) while connecting the first duct (2) and the second duct (3). The sealing member (6) may be positioned within the guideway defined by the guiding member, as can be seen in Figure 3b and Figure 4b, to seal the core (1) upon engagement of the second duct (3) with the core (1) at the guiding member and the same shall not be considered a limitation. The sealing member (6) may include a diaphragm seal, a hydraulic seal, a pneumatic seal, a gasket and the like. further, the sealing member (6) may also be positioned proximal to the second end (1b) to seal the core (1) upon engagement with the second duct (3). The sealing member (6) may be configured to restrict flow of the fluid from the core (1) at the first end (1a) and the second ends, upon connection of the first duct (2) and the second duct (3). The sealing member (6) may from a continuous flow path for the fluid from the first duct (2) to the second duct (3) through the coupling device (100).

[0063] Referring now to Figures 5a to 5f, the sleeve (4) of the coupling device (100) may be disposed on a portion of the core (1). The sleeve (4) may be received by the guide member (1c) of the core (1) and may be configured to slide along at least one surface of the guide member (1c) thereby rotating about the core (1). The sleeve (4) may be defined with a cylindrical profile, where the sleeve (4) may be dimensionally larger in size compared to the core (1) to receive at least a portion of the guide member (1c) of the core (1) and the same shall not be considered a limitation. One end of the sleeve (4) may be defined with a ring portion where diameter of the ring portion may be less than the diameter of the core (1) and the ring portion may be configured to slide on the guide member (1c) of the core (1) allowing rotation of the sleeve (4) about the core (1). The ring portion of the sleeve (4) may enclose the core (1) within the sleeve (4) and may restrict removal of the core (1) from the sleeve (4) as can be seen in Figure 3b. Referring back to Figures 5a to 5F, the sleeve (4) may be defined with a first receiving portion (4a), where the first receiving portion (4a) may be adapted to receive the at least one projection (3a) of the air intake assembly (200). The first receiving portion (4a) of the sleeve (4) may be selected from at least one of a slot, an arcuate bend, and a groove. In the illustrative embodiment, the first receiving portion (4a) of the sleeve (4) is depicted as a slot to receive the at least one projection (3a) of the air intake assembly (200) and the same shall not be considered a limitation, as the first receiving portion (4a) may also be defined by the arcuate bend and the groove to allow smooth movement of the at least one projection (3a) through the first receiving portion (4a).

[0064] Further, the sleeve (4) may be defined with the first receiving portion (4a) proximal to one end opposite to the end being received by the core (1) as can be seen in Figure 3a and Figure 3b. The first receiving portion (4a) of the sleeve (4) may be defined by an L-shaped profile, a T-shaped profile, a curved profile, and the like, where the first receiving portion (4a) may be defined along at least one of circumference or length of the sleeve (4). For sake of explanation, the first receiving portion (4a) may be defined along circumference of the sleeve (4) and defined by an L-shaped profile as can be seen in Figure 5b to receive the at least one projection (3a) of the air intake assembly (200) upon rotation of the sleeve (4) along the guide member (1c) of the core (1) and the same shall not be considered a limitation. Referring again to Figures 5a to 5f, the sleeve (4) may be defined with a plurality of first receiving portions corresponding to plurality of projections defined on the second duct (3) of the air intake assembly (200). Further, the profile of the first receiving portion (4a) may be varied based on the profile of the at least one projection (3a) to accommodate the at least one projection (3a) within the first receiving portion (4a). Dimensions of the first receiving portion (4a) may be

defined such that upon receiving the at least one projection (3a), the sleeve (4) may be guided by the at least one projection (3a) up to a predetermined angle of rotation and restrict rotation of the sleeve (4) at the predetermined angle and the same shall not be considered a limitation. For example, profile of the first receiving portion (4a) may be extended to a predetermined circumference of the sleeve (4) as can be seen in Figure 5f to allow sliding of the sleeve (4) to receive the at least one projection (3a) after a predetermined angle of rotation. The predetermined angle may be in a range of 5 to 180 degrees.

[0065] Referring again to Figures 5a to 5f, the sleeve (4) may be defined with a second receiving portion (4b). The second receiving portion (4b) may be defined proximal to the first receiving portion (4a) to receive at least one retaining member (5). The second receiving portion (4b) may be selected from at least one of a slot, an arcuate bend, and a groove and the like. The second receiving portion (4b) may be configured to guide a portion of the at least one retaining member (5) into at least one of a first position (FP) and a second position (SP) as can be seen in Figures 7a to 7f. The first receiving portion (4a) and the second receiving portion (4b) of the sleeve (4) may be easily defined and manufactured on the sleeve (4) and profiles of the first receiving portion (4a), and the second receiving portion (4b) may be customized by varying the dimensions and profiles based on configuration of the air intake assembly (200) and thereby reducing expense of the coupling device (100) and the air intake assembly (200). Further, such configuration of the coupling device (100) may also reduce maintenance costs in case of replacement of the coupling device (100) and/or the air intake assembly (200). Furthermore, the air intake assembly (200) may require minimal modification to one of the two ducts by defining the at least one projection (3a) and may thereby reduce manufacturing costs involved.

[0066] Referring back to Figures 5a to 5f, the at least one retaining member (5) may be configured to toggle within the second receiving portion (4b) relative to the sleeve (4), where the first position and the second position are defined relative to at least one of length, circumference, and width of the sleeve (4). For sake of explanation, the first position and the second position are defined along length of the sleeve (4), where the at least one retaining member (5) may toggle up and down along the second receiving portion (4b) of the sleeve (4), guided by the second receiving portion (4b) and the same shall not be considered a limitation. The second receiving portion (4b) may define a gap (4b') over the circumference of the sleeve (4) to enclose a portion of the at least one retaining member (5) within the gap (4b') as can be seen in Figures 5c and 5d. In an embodiment, the second receiving portion (4b) may be defined across the first receiving portion (4a), as can be seen in Figure 5d, to allow sliding of the at

least one retaining member (5) between the first position and the second position selectively based on rotation of the sleeve (4) and based on displacement of the at least one projection (3a) in the first receiving portion (4a). For example, the at least one retaining member (5) may be in the first position when the sleeve (4) may not be rotated and the at least one projection (3a) may be received at one end of the first receiving portion (4a). The at least one retaining member (5) may be in the second position when the sleeve (4) may be rotated about the core (1) to receive the at least one retaining member (5) at other end of the first receiving portion (4a). Further, on receiving the at least one projection (3a), the at least one retaining member (5) may be displaced to the first position to lock the at least one projection (3a) at the other end of the first receiving portion (4a) and the same shall not be considered a limitation.

[0067] Further, the second receiving portion (4b) may be defined with at least one extension (7) to accommodate and guide a portion of the at least one retaining member (5) into the at least one of the first position (FP) and the second position (SP). The at least one extension (7) may be defined along sliding path of the at least one retaining member (5) and may be configured to engage with the at least a portion of the at least one retaining member (5) in at least one of the first position (FP) and the second position (SP). The at least one extension (7) may be defined by a bump, an elongated member and the like extending from the second receiving portion (4b) towards the sliding path of the at least one retaining member (5) as can be seen in Figure 5a.

[0068] Referring now to Figures 6a to 6e, the at least one retaining member (5) may be defined with at least one protrusion (5a) and may be configured to toggle within the second receiving portion (4b) of the sleeve (4) and between the first position and the second position. The at least one protrusion (5a) may be configured to engage with the at least one extension (7) of the second receiving portion (4b) of the sleeve (4) to guide the at least one retaining member (5) between the first position and the second position. For sake of explanation, the at least one retaining member (5) may be a U-shaped member defined with at least two arms (5b), however, other shaped members such as but not limited to, C-shaped member, V-shaped member, L-shaped member, l-shaped member and the like, may also be possible to operate the coupling device (100). The at least one retaining member (5) may be defined with plurality of protrusions such as at least one curved portion (5a'), and a bent portion (5c) as can be seen in Figures 6a and 6c, apart from the at least one protrusion (5a).

[0069] In the illustrative embodiment, the at least one retaining member (5) may be defined with the at least one curved portion (5a') on one arm of the at least two arms (5b) and may be defined with the at least one protrusion (5a) and the bent portion (5c) on an other arm of the at

least two arms (5b) to restrict bending of the one arm while selectively engaging with the at least one extension (7) of the second receiving portion (4b). Such configuration of the at least one retaining member (5) may eliminate or reduce damage or fatigue of the at least one retaining member (5) while toggling between the first position and the second position and the same shall not be considered a limitation. The positions and the number of protrusions may be varied based on design of the second receiving portion (4b) and the at least one projection (3a) of the air intake assembly (200). In an embodiment, the at least one retaining member (5) may be defined with a bottom portion (5d) defined with an inclination to allow finger/hand of a user to hook the at least one retaining member (5) by hand or any other pulling/pushing mechanism to toggle the at least one retaining member (5) as can be clearly seen in Figures 6b and 6d. The at least one retaining member (5) may be non-removably positioned within the second receiving portion (4b) of the sleeve (4) for the at least one retaining member (5) to be defined as an integral part of the sleeve (4).

[0070] Referring now to Figures 7a to 7f, the sleeve (4) may be rotated to slide over the guide member (1c) of the core (1) to a position such that the at least one projection (3a) of the second duct (3) may be in-line with the first receiving portion (4a) of the sleeve (4) as can be seen in Figure 7a to connect the coupling device (100) to the second air duct. The at least one retaining member (5) may toggle within the second receiving portion (4b) of the sleeve (4) selectively based on engagement of the coupling device (100) with the air intake assembly (200). For example, the at least one retaining member (5) may be positioned in at least one of the first position and the second position when the coupling device (100) may be engaging with the air intake assembly (200) to lock the first duct (2) and the second duct (3) and the at least one retaining member (5) may be in at least one of the first position and the second position when the coupling device (100) may not be engaging with the air intake assembly (200) to unlock the first duct (2) and the second duct (3). The at least one retaining member (5) may be in a first position as can be seen in Figure 7a, when the air intake assembly (200) may not be locked by the coupling device (100). In the first position, the at least one extension (7) may be engaged with the at least one curved portion (5a') of the at least one retaining member (5).

[0071] Further, the sleeve (4) and the second duct (3) may be moved axially to fit the at least one projection (3a) of the second duct (3) in the first receiving portion (4a) of the sleeve (4) as can be seen in Figure 7b. Once the at least one projection (3a) is received by the first receiving portion (4a), the at least one retaining member (5) may be toggled from the first position to the second position by pulling the bottom portion (5d) upward as can be seen in Figure 7b. While the at least one retaining member (5) may be toggling from the first position to the second

position, the at least one extension (7) may guide the at least one retaining member (5) by engaging with the at least one curved portion (5a'). The at least one retaining member (5) may be bent away from the at least one extension (7) while engaging with crests of the at least one curved portion (5a') and may regain original position when the at least one extension (7) engages with troughs of the at least one curved portion (5a'). The at least one extension (7) engages with the bottom trough of the at least one curved portion (5a') when the at least one retaining member (5) is in the second position, where the at least one extension (7) and the at least one curved portion (5a') indicate the position of the at least one retaining member (5) to the user by selective engagement with the at least one curved portion (5a') of the at least one retaining member (5).

[0072] The first position may be defined as a position of the at least one retaining member (5) when one end of the at least one retaining member (5) may be at farthest position from the second receiving portion (4b). The second position may be defined as a position of the at least one retaining member (5) when one end of the at least one retaining member (5) may be at nearest position from the second receiving portion (4b) as can be seen in Figure 7b. Such positions of the at least one retaining member (5) may not be construed as a limitation, as the first position and the second position may be varied based on length of at least one retaining member (5), length of the at least one protrusion (5a) and the like. The at least one protrusion (5a) of the at least one retaining member (5) may be configured to selectively lock and unlock the at least one projection (3a) of the air intake assembly (200) within the first receiving portion (4a) of the sleeve (4), while toggling between the first position and the second position. Referring again to Figure 7b, the at least one protrusion (5a) of the at least one retaining member (5) may be in line with a portion of the first receiving portion (4a) to define a passage and allow the first receiving portion (4a) to receive the at least on projection from one end at an other end opposite to the one end through the passage as can be seen in Figures 7c and 7e. The sleeve (4) may be rotated about the core (1) to the predetermined angle to allow movement of the first receiving portion (4a) relative to the at least one projection (3a) and accommodate the at least one projection (3a) at the other end upon receiving the at least one projection (3a) through the at least one protrusion (5a) of the at least one retaining member (5). The rotation of the sleeve (4) may reduce or eliminate the need for rotating the first duct (2) and the second duct (3) while locking and unlocking the first duct (2) and the second duct (3).

[0073] Referring again to Figures 7d and 7f, the at least one retaining member (5) may be toggled to the first position upon receiving the at least one projection (3a) at the other end of the first receiving portion (4a). The at least one retaining member (5) may be pushed down by

pushing the bottom portion (5d) to slide the at least one retaining member (5) from the second position to the first position as can be seen in Figure 7d. The at least one protrusion (5a) of the at least one retaining member (5) may not be in-line with the first receiving portion (4a) in the first position thus, obstructing the passage and retaining the at least one projection (3a) within the first receiving portion (4a) proximal to the other end as can be seen in Figure 7d. The at least one retaining member (5) may lock the first duct (2) and the second duct (3) in the first position, since the at least one projection (3a) may not be removable while the at least one retaining member (5) is in the first position and the at least one projection (3a) is at the other end of the first receiving portion (4a). while the first duct (2) and the second duct (3) may be locked, the sleeve (4) may not be rotatable about the core.

[0074] Further, the at least one retaining member (5) may be pulled back to the second position to allow rotation of the sleeve (4) and to unlock the first duct (2) and the second duct (3) as shown in Figure 7e. The at least one retaining member (5) may not bear any axial load of the air intake assembly (200), as the at least one retaining member (5) only restricts the radial movement of the second duct (3) and the sleeve (4) and the axial load may be borne by the coupling device (100) alone. Thus the at least one retaining member (5) may be made of any low strength material such as, but not limited to, spring steel, aluminium and the like and does not require high strength materials such as Iron, and the like. In an embodiment, the at least one retaining member (5) may be made of spring steel material and the same shall not be considered a limitation. The sleeve (4) may be rotated in a direction opposite to that while rotated to lock the first duct (2) and the second duct (3). for example, the sleeve (4) may be rotated in a clockwise direction to lock the first duct (2) and the second duct (3) and may be rotated in an anti-clockwise direction to unlock the first duct (2) and the second duct (3). such configuration of rotation of the sleeve (4) may not be construed as a limitation, since the direction of rotation for locking and unlocking may be varied based on profile of the first receiving portion (4a), profile of the at least one projection (3a) and the like.

[0075] In above description, the first duct (2) and the second duct (3) are illustrated to be a part of an air intake assembly (200), however, ducts of other assemblies such as an exhaust assembly, HVAC assembly, air charger assembly and any other assembly configured to route a fluid may also be defined as the first duct (2) and the second duct (3) to route the fluid and the same shall not be considered a limitation.

EQUIVALENTS

[0076] With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

[0077] It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the term "including" should be interpreted as "including but not limited to," the term "having" should be interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited to," etc.). It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases "at least one" and "one or more" to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim recitation to inventions containing only one such recitation, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an" (e.g., "a" and/or "an" should typically be interpreted to mean "at least one" or "one or more"); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation *is* explicitly recited, those skilled in the art will recognize that such recitation should typically be interpreted to mean *at least* the recited number (e.g., the bare recitation of "two recitations," without other modifiers, typically means *at least* two recitations, or *two or more* recitations). Furthermore, in those instances where a convention analogous to "at least one of A, B, and C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, and C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to "at least one of A, B, or C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, or C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or more

alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase “A or B” will be understood to include the possibilities of “A” or “B” or “A and B.”

[0078] In addition, where features or aspects of the disclosure are described in terms of Markush groups, those skilled in the art will recognize that the disclosure is also thereby described in terms of any individual member or subgroup of members of the Markush group.

[0079] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

Referral Numeral:

Component	**Referral numeral**
Coupling device	100
Core	1
First end	1a
Second end	1b
Guide member	1c
Upper surface	1d
Lateral surface	1d’
Lower surface	1d’’
First duct	2
Second duct	3
At least one projection	3a
Sleeve	4
First receiving portion	4a
Second receiving portion	4b
Gap	4b’
At least one retaining member	5
At least one protrusion	5a
At least one curved portion	5a’
Bent portion	5c
At least two arms	5b
Bottom portion	5d
Sealing member	6
At least one extension	7
Air intake assembly	200

WE CLAIM:

1. A coupling device (100) of an air intake assembly (200), the coupling device (100) comprising:

a core (1) defining a first end (1a) and a second end (1b), wherein the core (1) is engageable about at least one projection (3a) of the air intake assembly (200);

a sleeve (4) operatively disposable on a portion of the core (1), the sleeve (4) defined with a first receiving portion (4a) and a second receiving portion (4b), wherein the first receiving portion (4a) is adapted to receive the at least one projection (3a) of the air intake assembly (200); and

at least one retaining member (5) slidably disposed in the second receiving portion (4b) of the sleeve (4) and the at least one retaining member (5) is defined with at least one protrusion (5a),

wherein the at least one retaining member (5) is configured to toggle between a first position (FP) and a second position (SP) to selectively lock and unlock the at least one projection (3a).

2. The coupling device (100) as claimed in claim 1, wherein the core (1) is defined with a guide member (1c), adapted to guide the sleeve (4).

3. The coupling device (100) as claimed in claim 2, wherein the guide member (1c) is configured to receive the sleeve (4) at one end and the air intake assembly (200) at an other end opposite to the one end.\

4. The coupling device (100) as claimed in claim 2, comprises a sealing member (6) positioned proximal to the guide member (1c) to seal the core (1).

5. The coupling device (100) as claimed in claim 1, wherein the at least one protrusion (5a) of the at least one retaining member (5) and the first receiving portion (4a) of the sleeve (4) are selected from at least one of a slot, an arcuate bend, and a groove.

6. The coupling device (100) as claimed in claim 1, wherein the first end (1a) of the core (1) is connectable to the air intake assembly (200).

7. The coupling device (100) as claimed in claim 1, wherein the second receiving portion (4b) is defined with at least one extension (7) to accommodate and guide a portion of the at least one retaining member (5) into the at least one of the first position (FP) and the second position (SP).

8. The coupling device (100) as claimed in claim 7, wherein the at least one extension (7) engages with the at least one protrusion (5a) of the at least one retaining member (5) in at least one of the first position (FP) and the second position (SP).

9. The coupling device (100) as claimed in claim 7, wherein the at least one retaining member (5) is a U-shaped member defined with at least two arms (5b) and where at least one arm of the at least two arms (5b) is defined with the at least one protrusion (5a).

10. The coupling device (100) as claimed in claim 9, wherein the at least one protrusion (5a) is defined along a length of the at least two arms (5b) and is configured to allow movement of the at least one projection (3a) in the first position (FP) and restrict movement of the at least one projection (3a) from the first receiving portion (4a) in the second position (SP).

11. An air intake assembly (200) for a vehicle, comprising:

a first duct (2);

a second duct (3) connectable to the first duct (2) and the second duct (3) being defined with at least one projection (3a), wherein the first duct (2) and the second duct (3) are configured to supply air to an engine of the vehicle;

a coupling device (100) configured to removably connect the first duct (2) and the second duct (3), the coupling device (100) comprising:

a core (1) defining a first end (1a) and a second end (1b), wherein the core (1) is engageable about the at least one projection (3a) of the air intake assembly (200);

a sleeve (4) operatively disposable on a portion of the core (1), the sleeve (4) defined with a first receiving portion (4a) and a second receiving portion (4b), wherein the first receiving portion (4a) is adapted to receive the at least one projection (3a) of the air intake assembly (200); and

at least one retaining member (5) slidably disposed in the second receiving portion (4b) of the sleeve (4) and the at least one retaining member (5) is defined with at least one protrusion (5a),

wherein the at least one retaining member (5) is configured to toggle between a first position (FP) and a second position (SP) to selectively lock and unlock the at least one projection (3a).

Dated this 12th day of June 2023

-- Digitally Signed--
Bhanu Prasad
(INPA No: **3253**)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

ABSTRACT

"**A COUPLING DEVICE FOR AN AIR INTAKE ASSEMBLY OF A VEHICLE**"

The present disclosure discloses a coupling device (100) for an air intake assembly (200) of a vehicle. The coupling device (100) comprises a core, a sleeve (4), and at least one retaining member (5). The core (1) is engageable about at least one projection (3a) of the air intake assembly (200) and the sleeve (4) is operatively disposable on the core (1) and is defined with a first receiving portion (4a) to receive the at least one projection (3a). The at least one retaining member (5) is configured to toggle between a first position and a second position to selectively lock and unlock the at least one projection (3a). With such configuration, manufacturing of the coupling device (100) may be simpler and may reduce the price of the coupling device (100) and further reduce or eliminate need for rotation of the ducts.

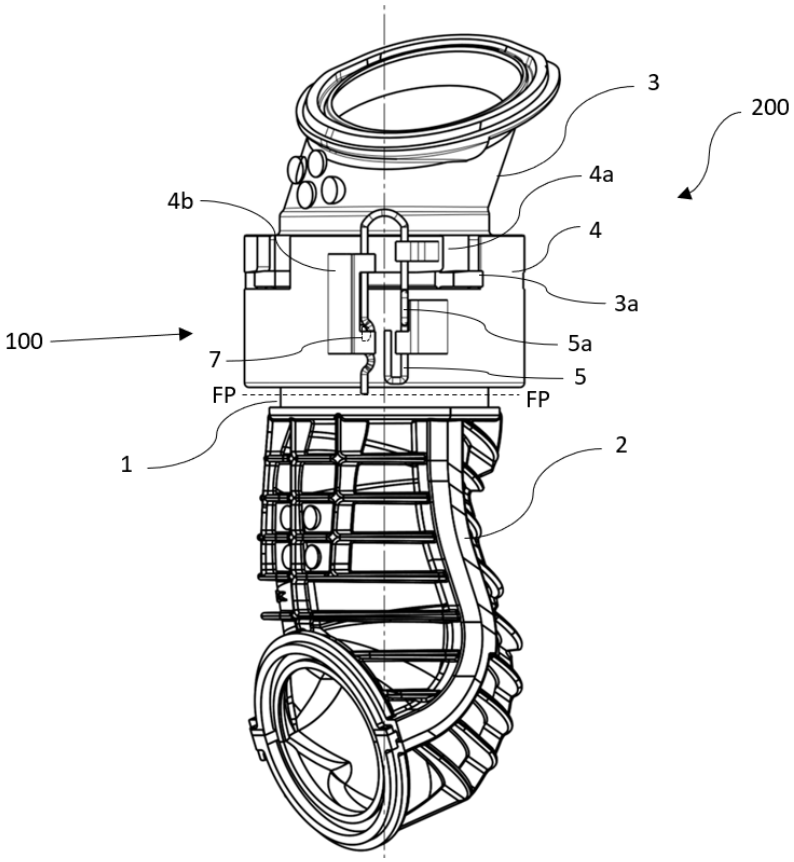

Fig 1a

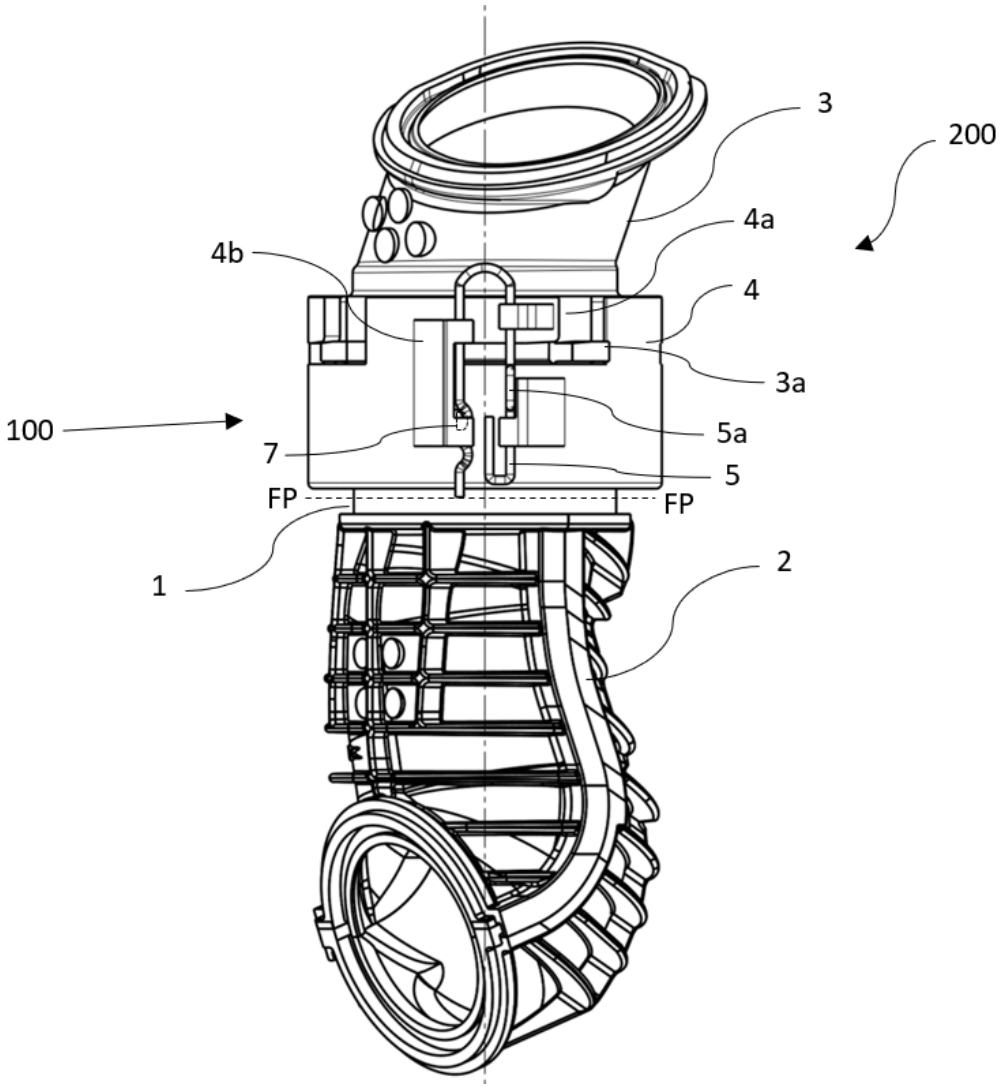

Figure 1a

-- Digitally Signed--
Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

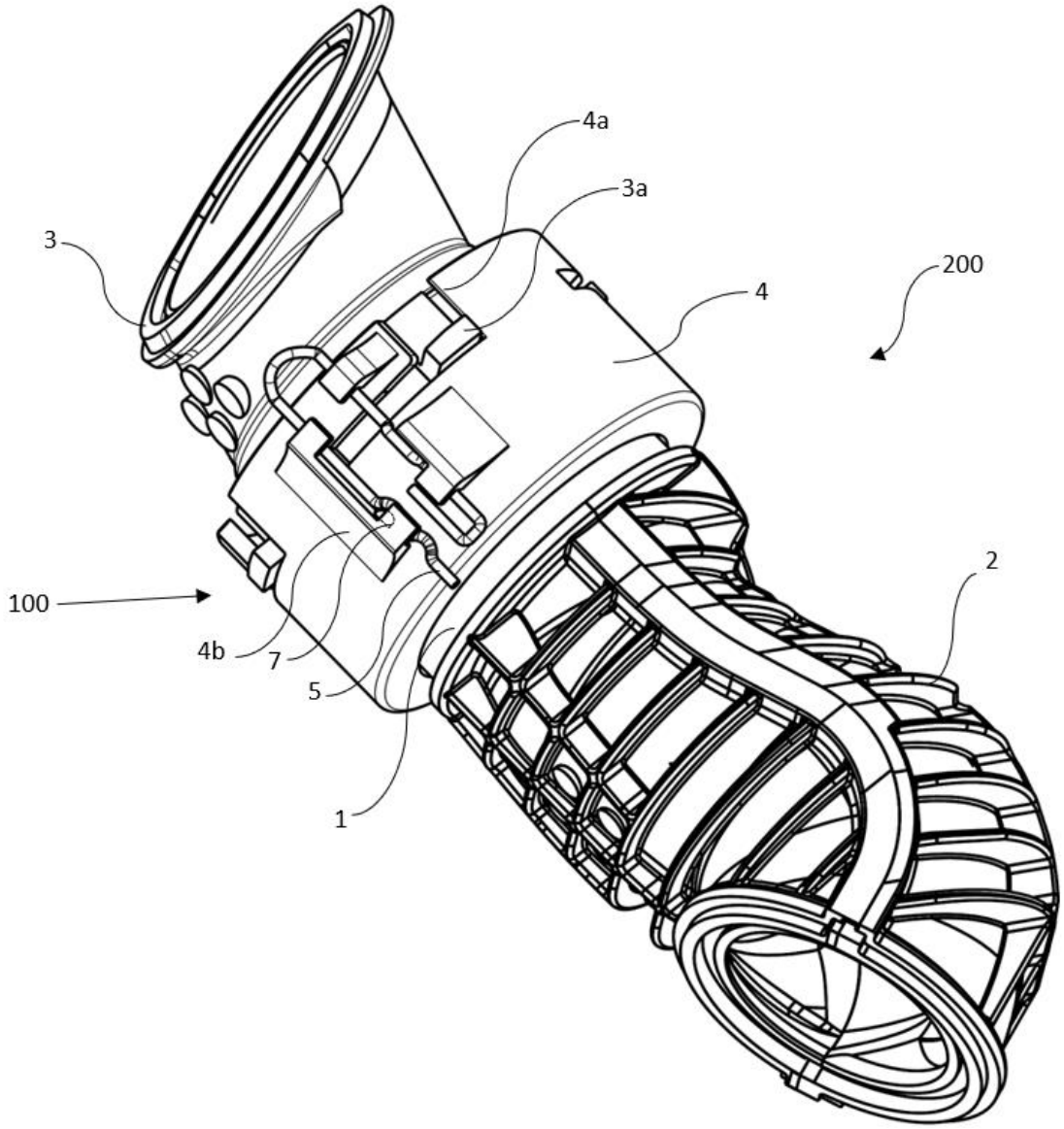

Figure 1b

-- Digitally Signed--
Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

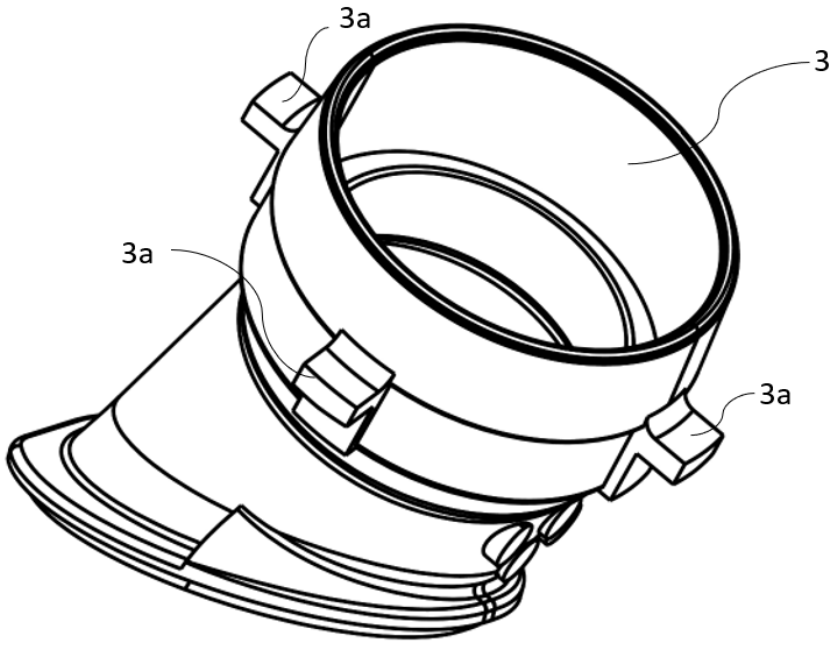

Figure 2a

-- Digitally Signed--
Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

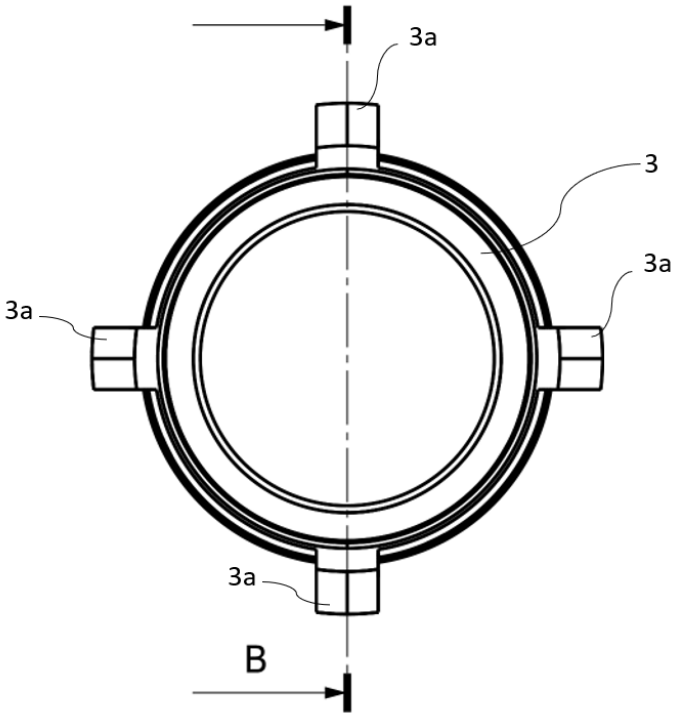

Figure 2b

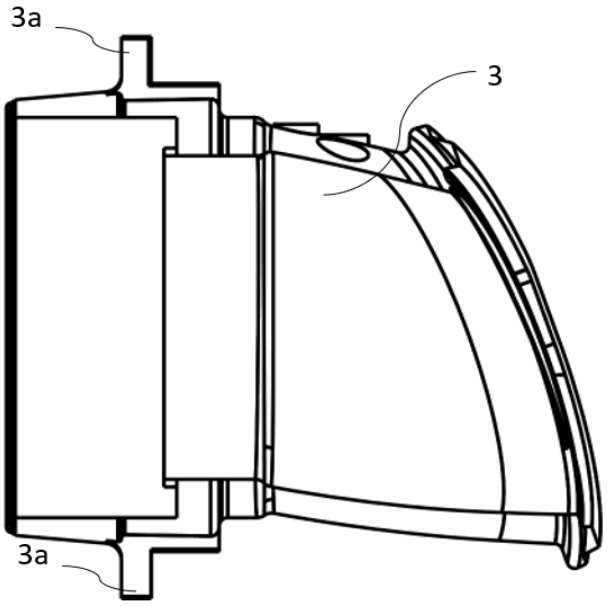

Figure 2c

-- Digitally Signed--
Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

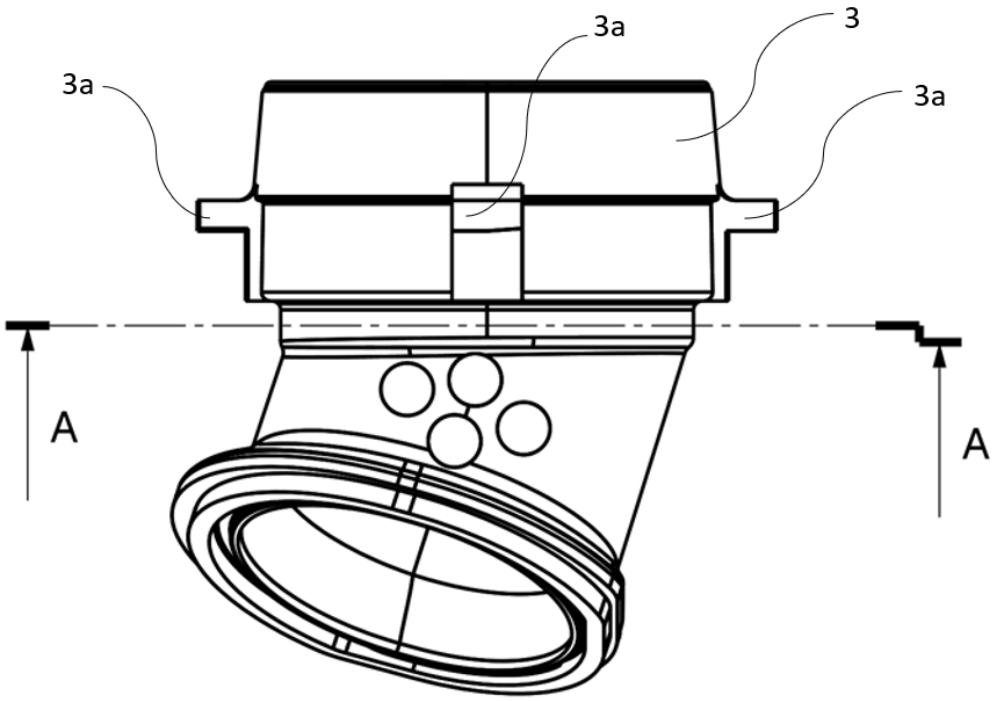

Figure 2d

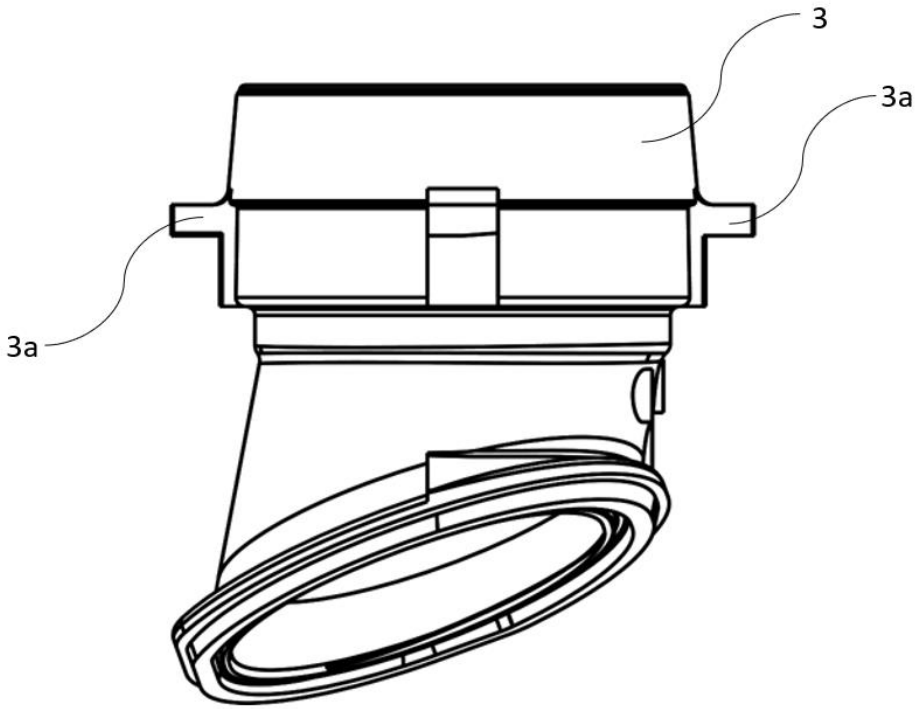

Figure 2e

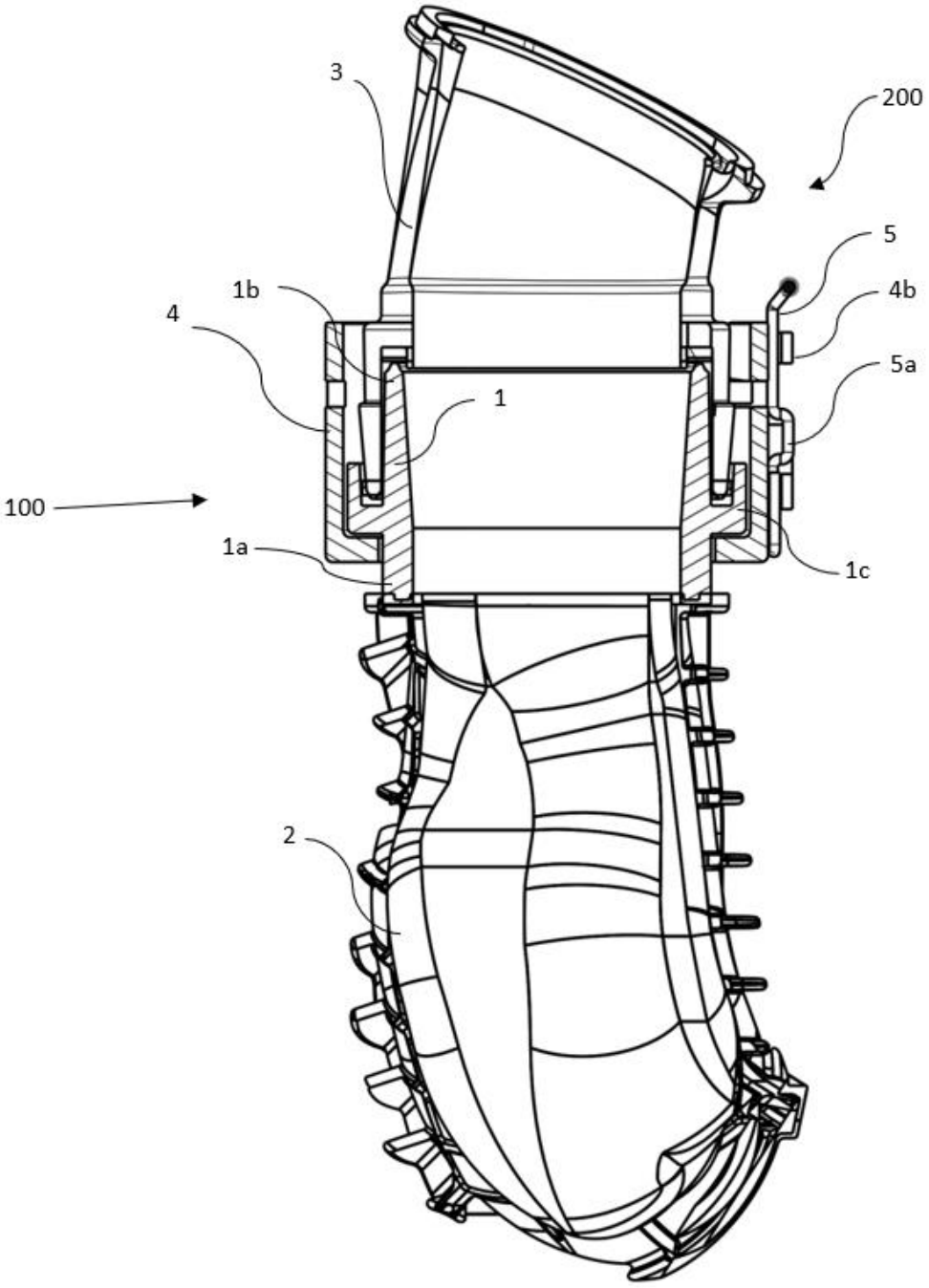

Figure 3a

-- Digitally Signed--
Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

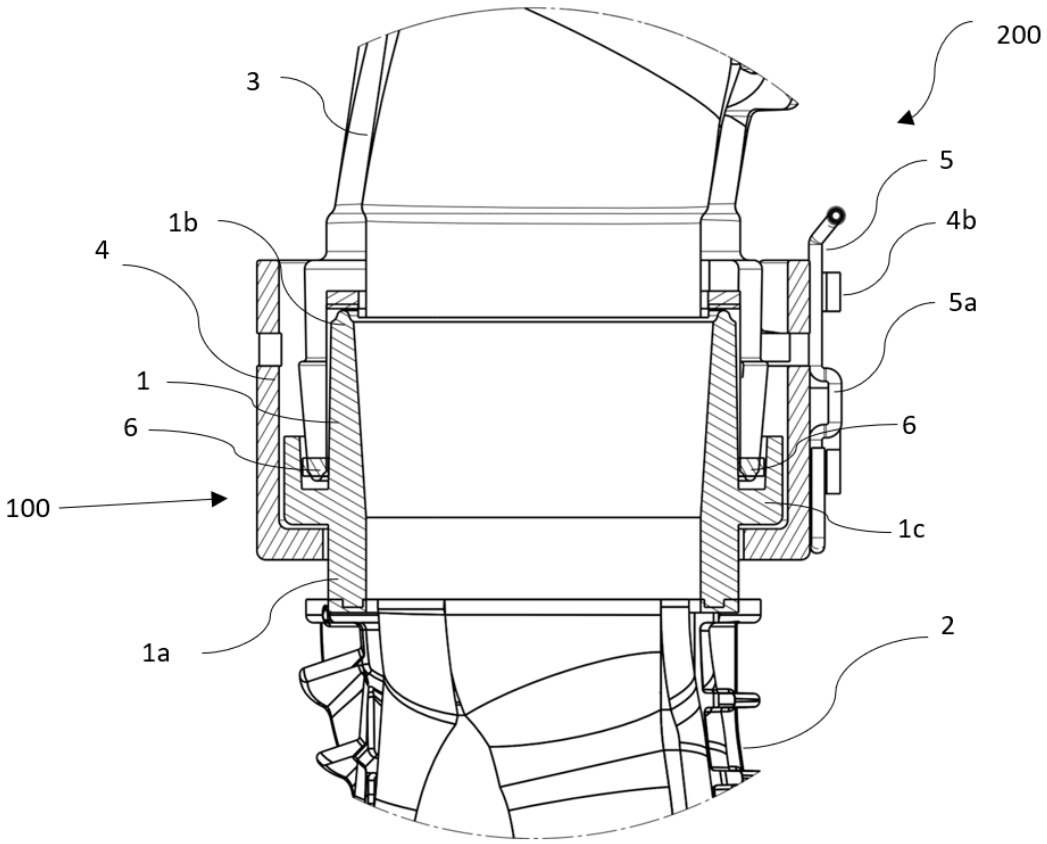

Figure 3b

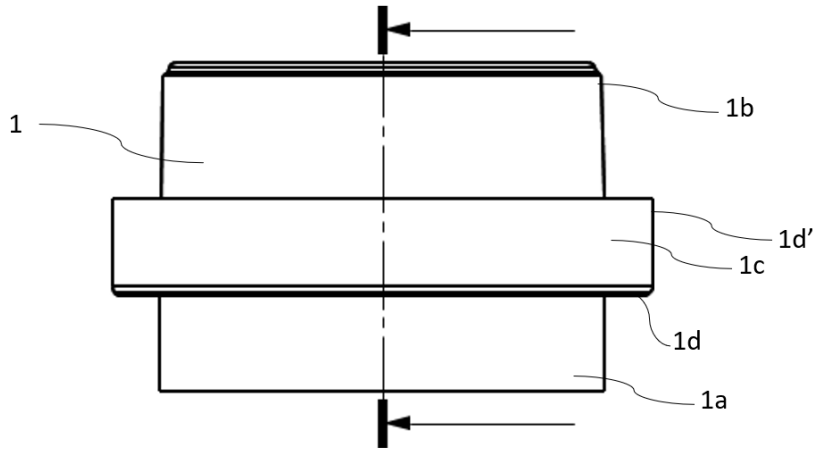

Figure 4a

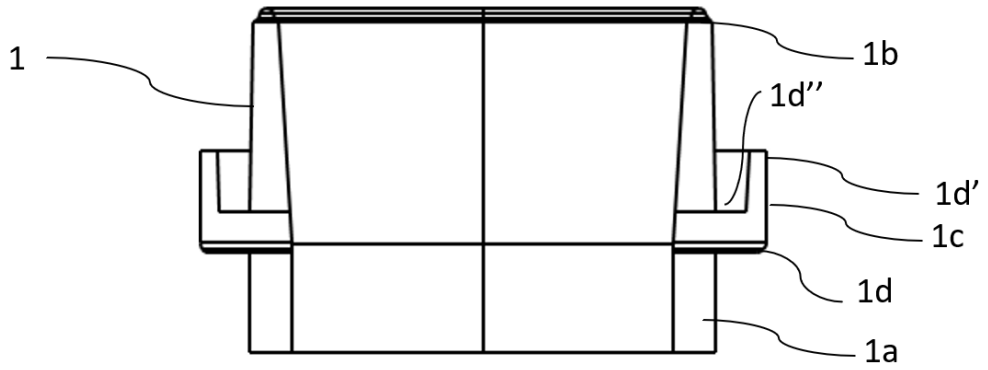

Figure 4b

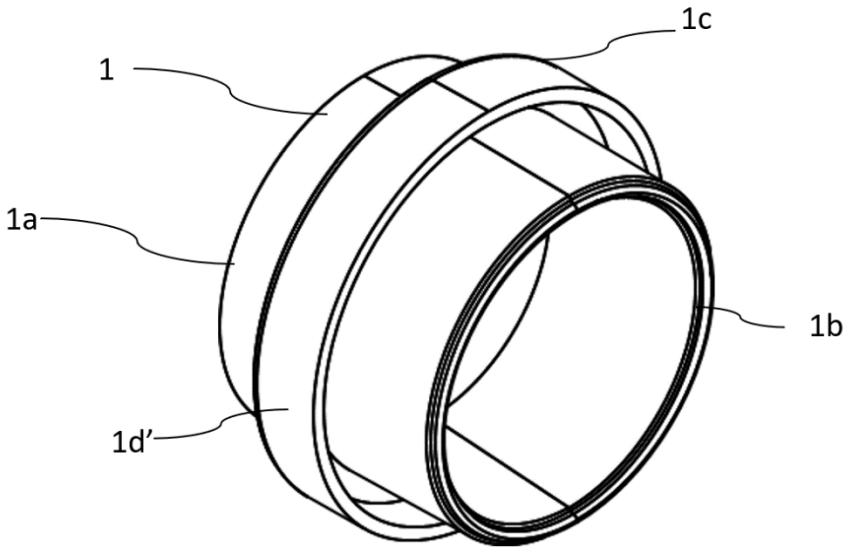

Figure 4c

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

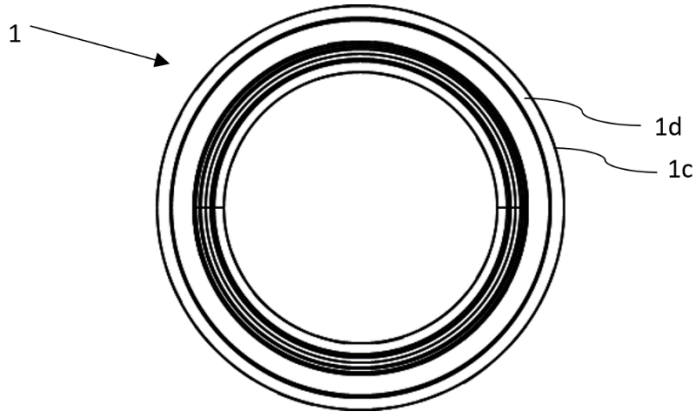
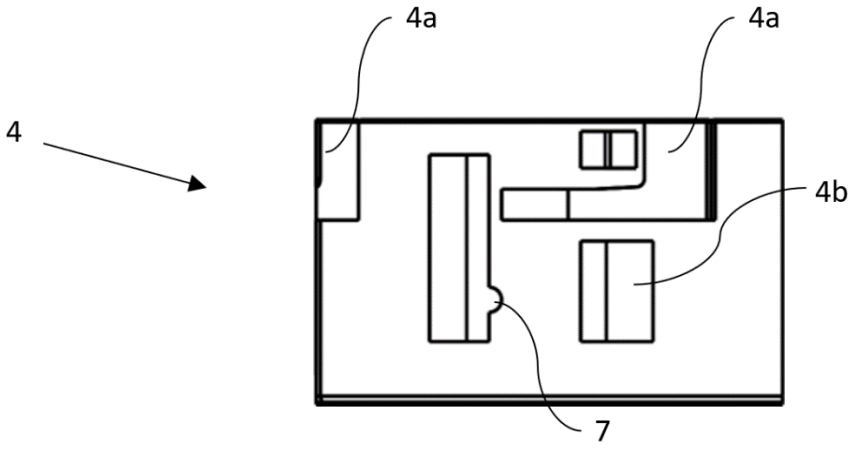


Figure 4d



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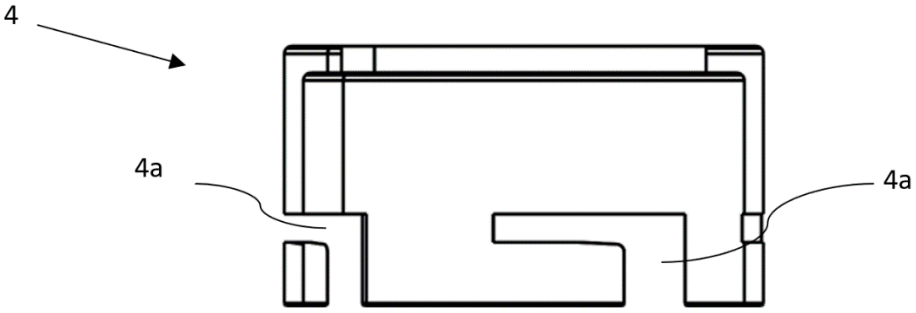

Figure 5b

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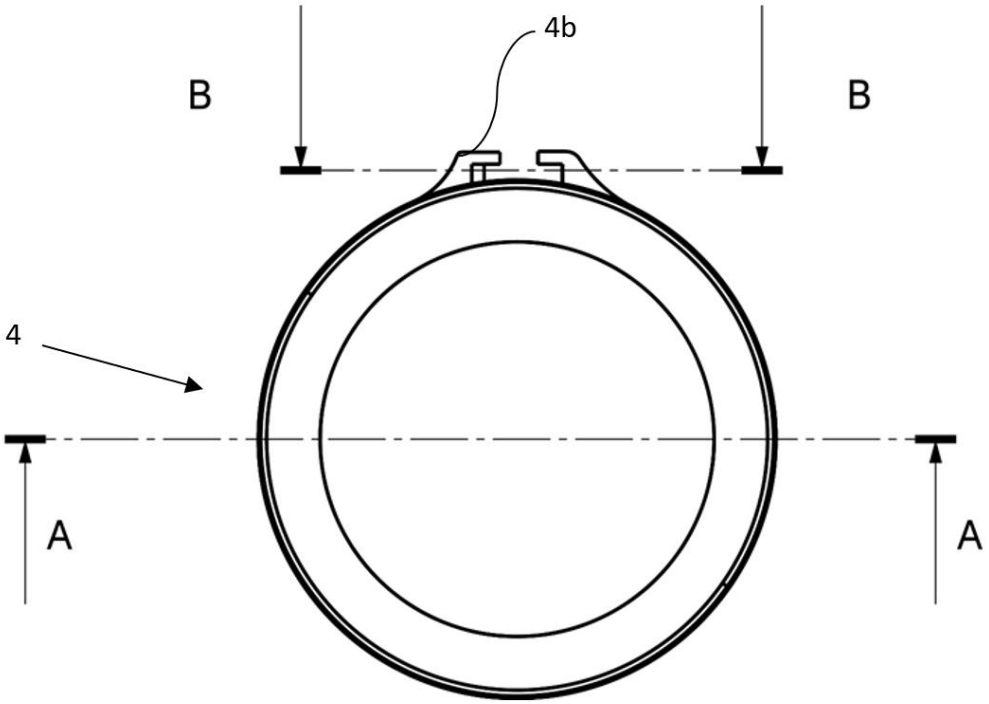
Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.



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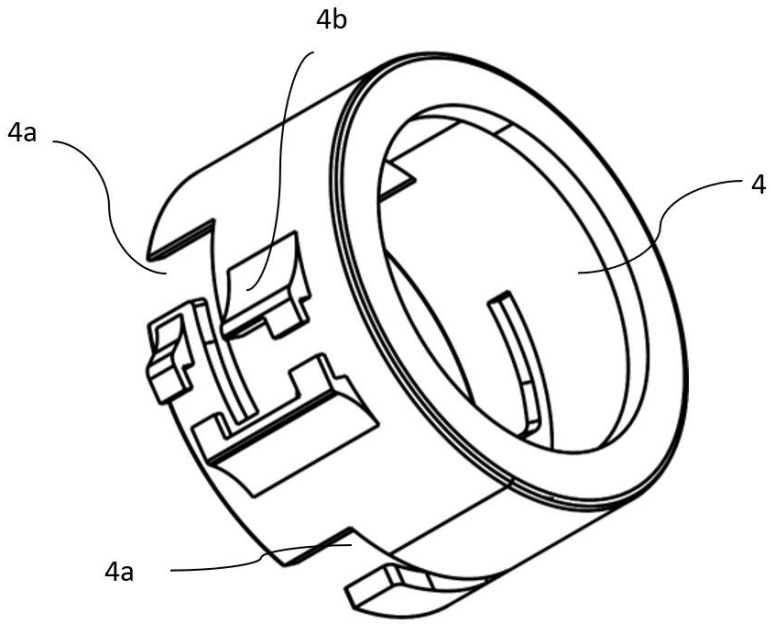

Figure 5d

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

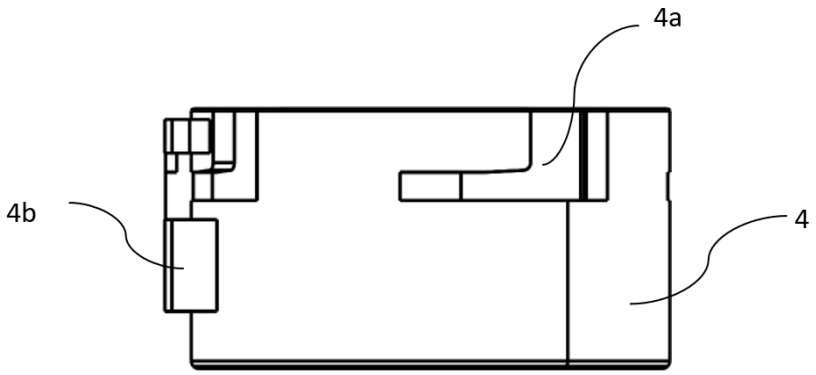

Figure 5e

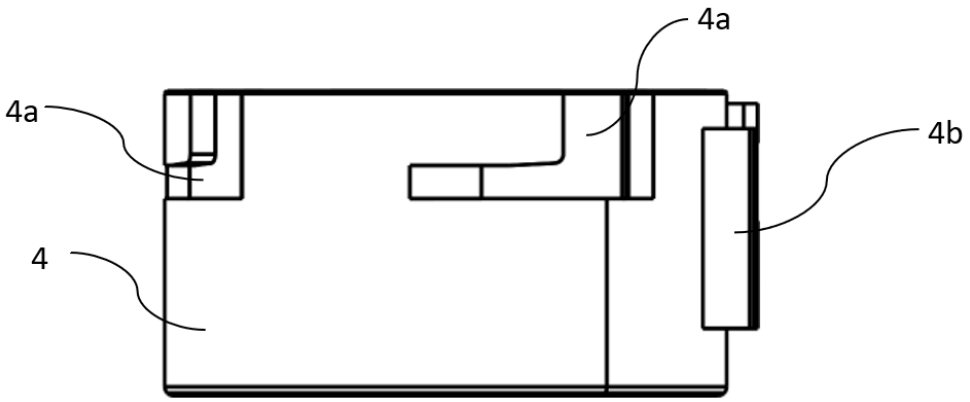

Figure 5f

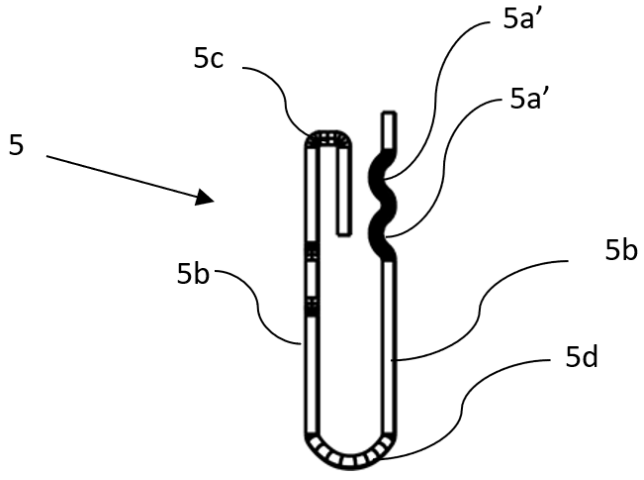

Figure 6a

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

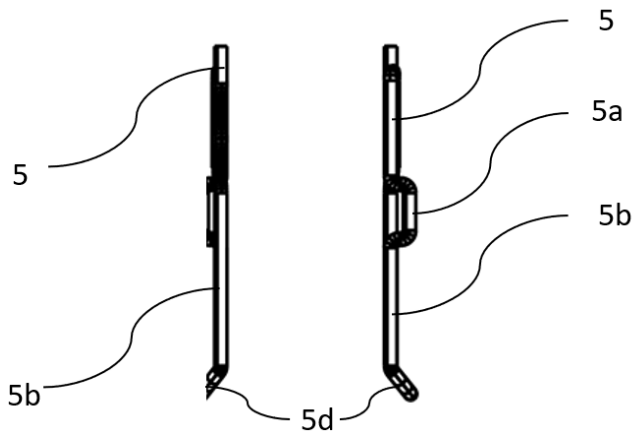

Figure 6b

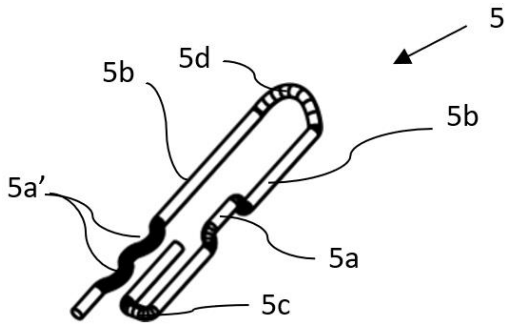

Figure 6c

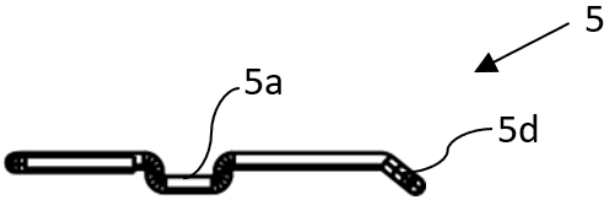

Figure 6d

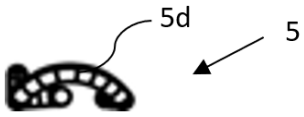

Figure 6e

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

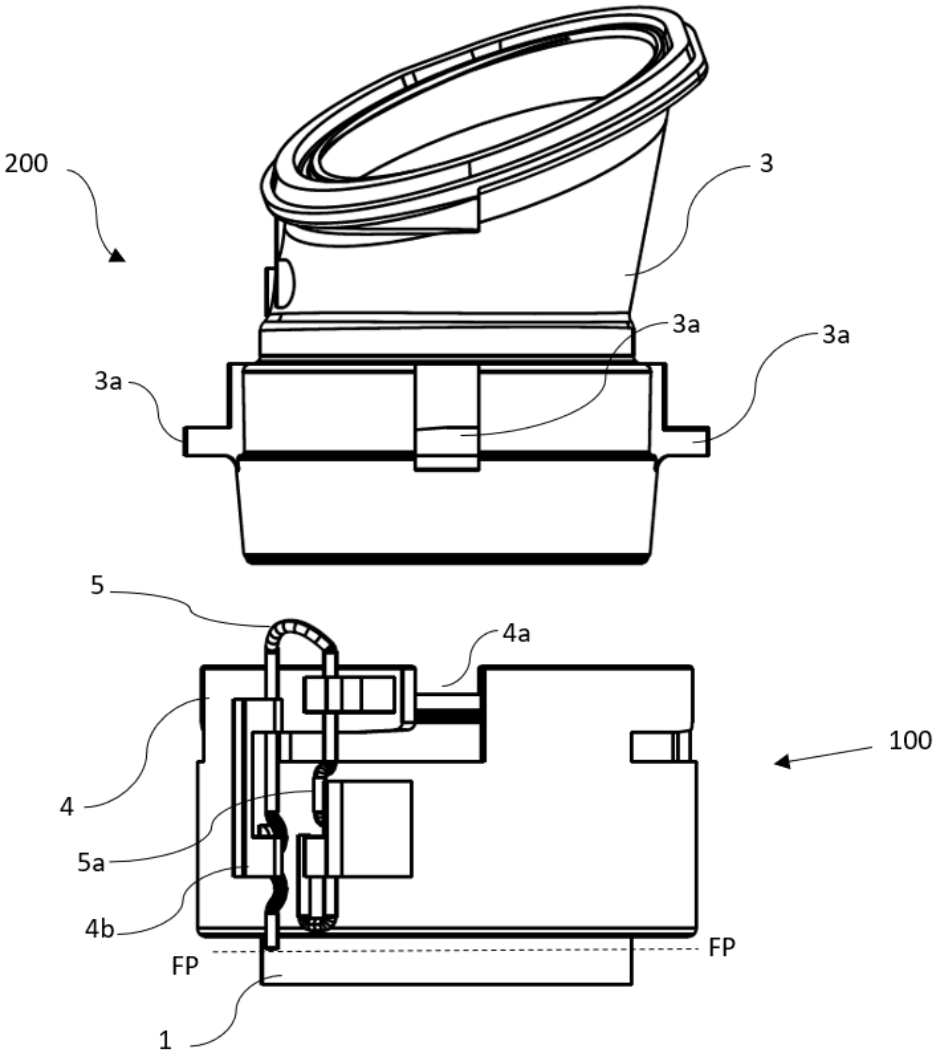

Figure 7a

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

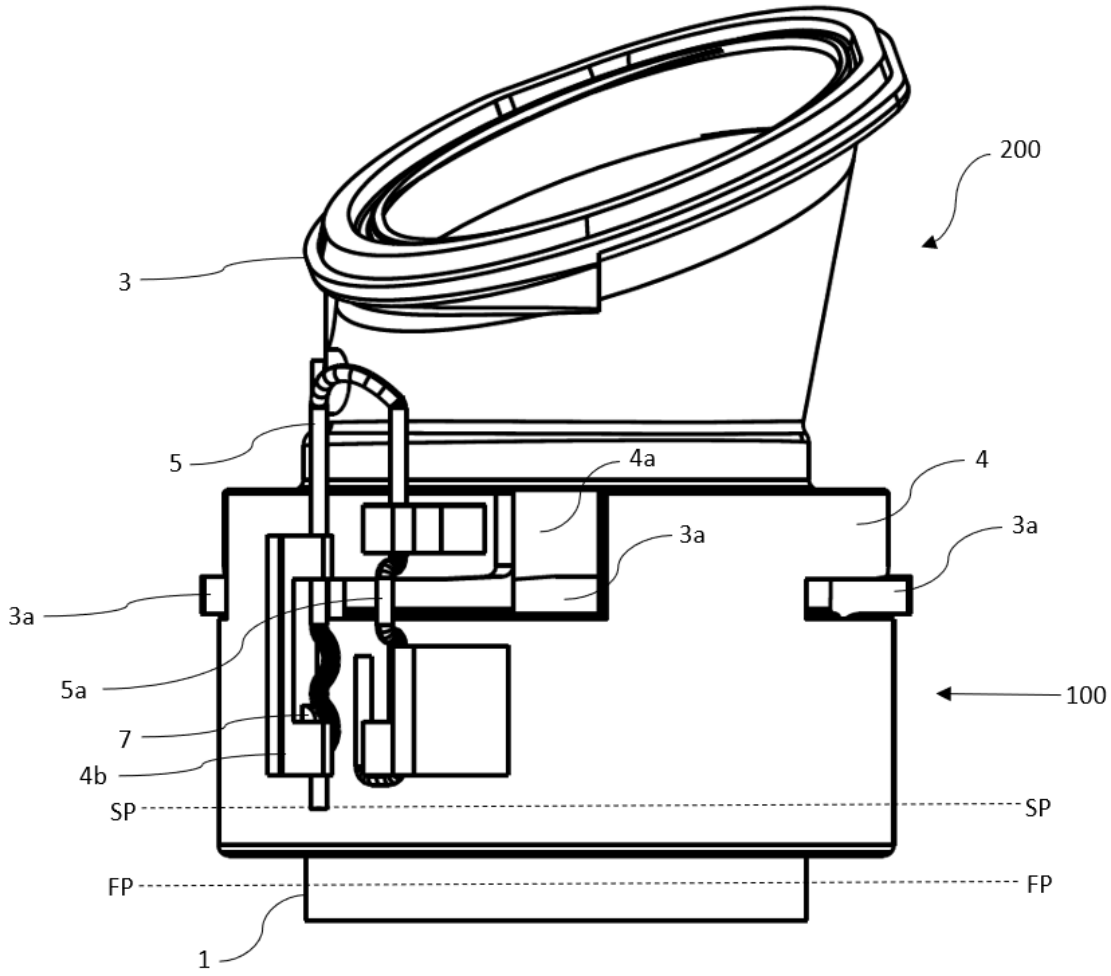

Figure 7b

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

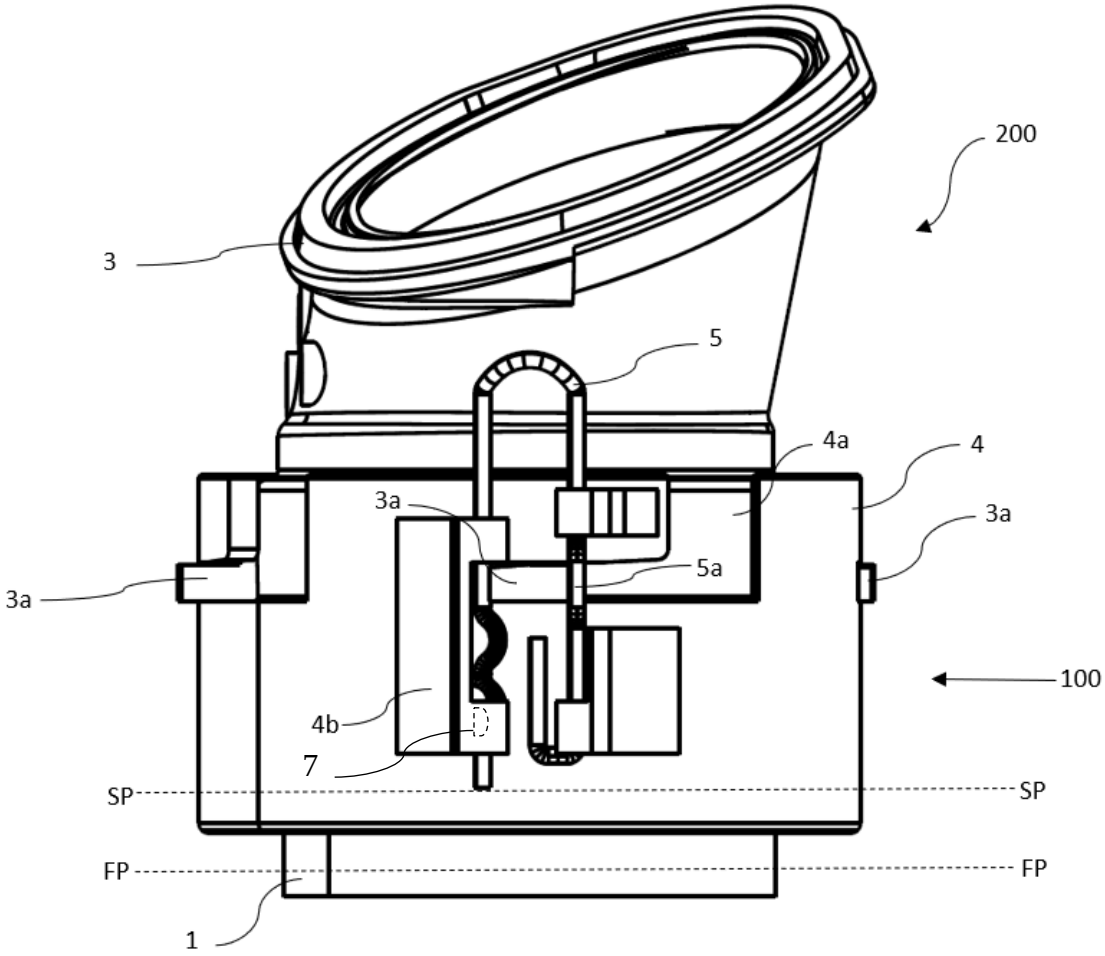

Figure 7c

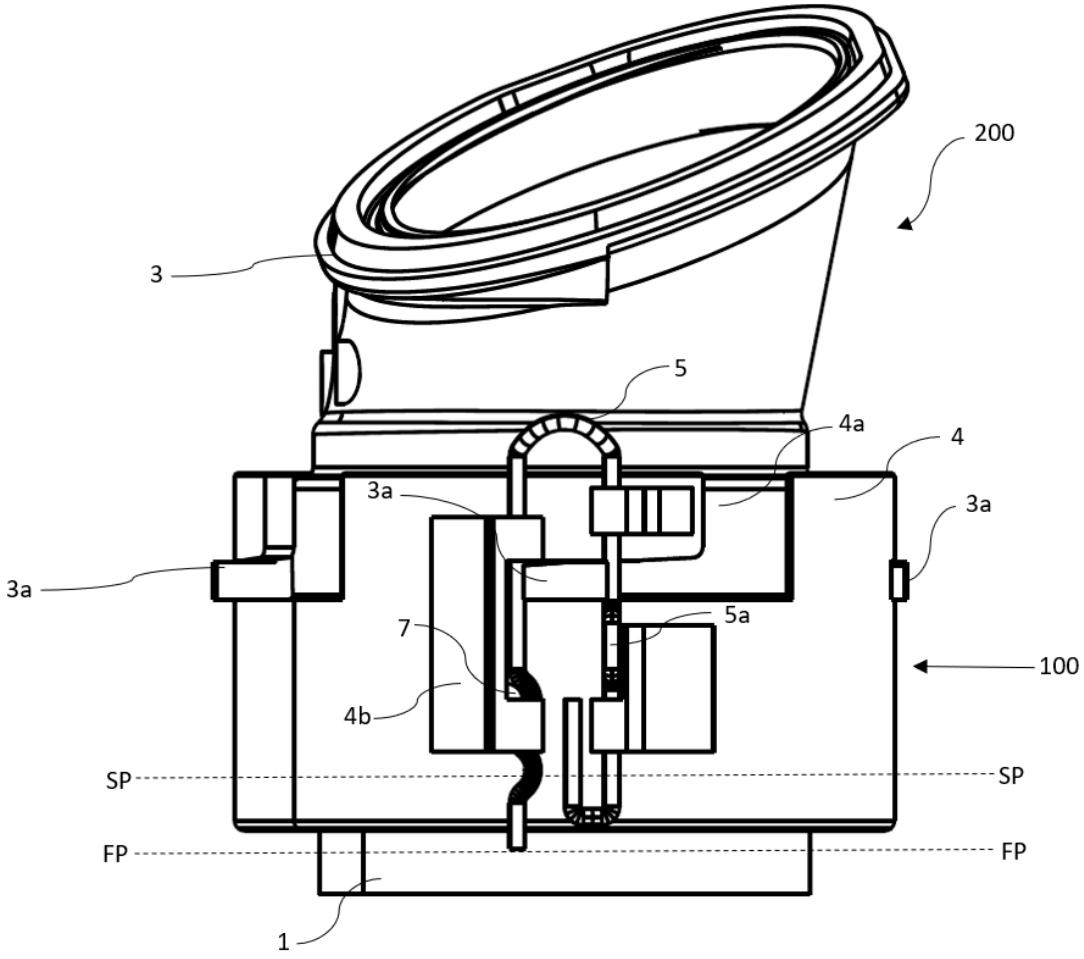

Figure 7d

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

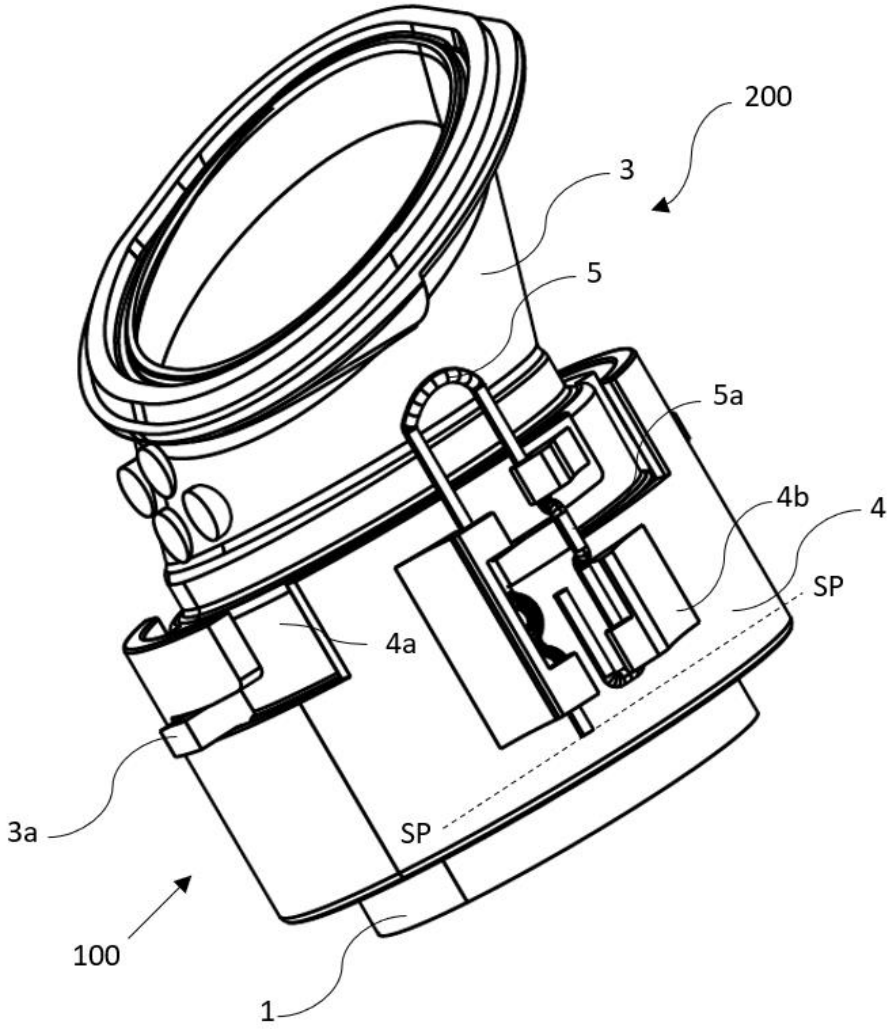

Figure 7e

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

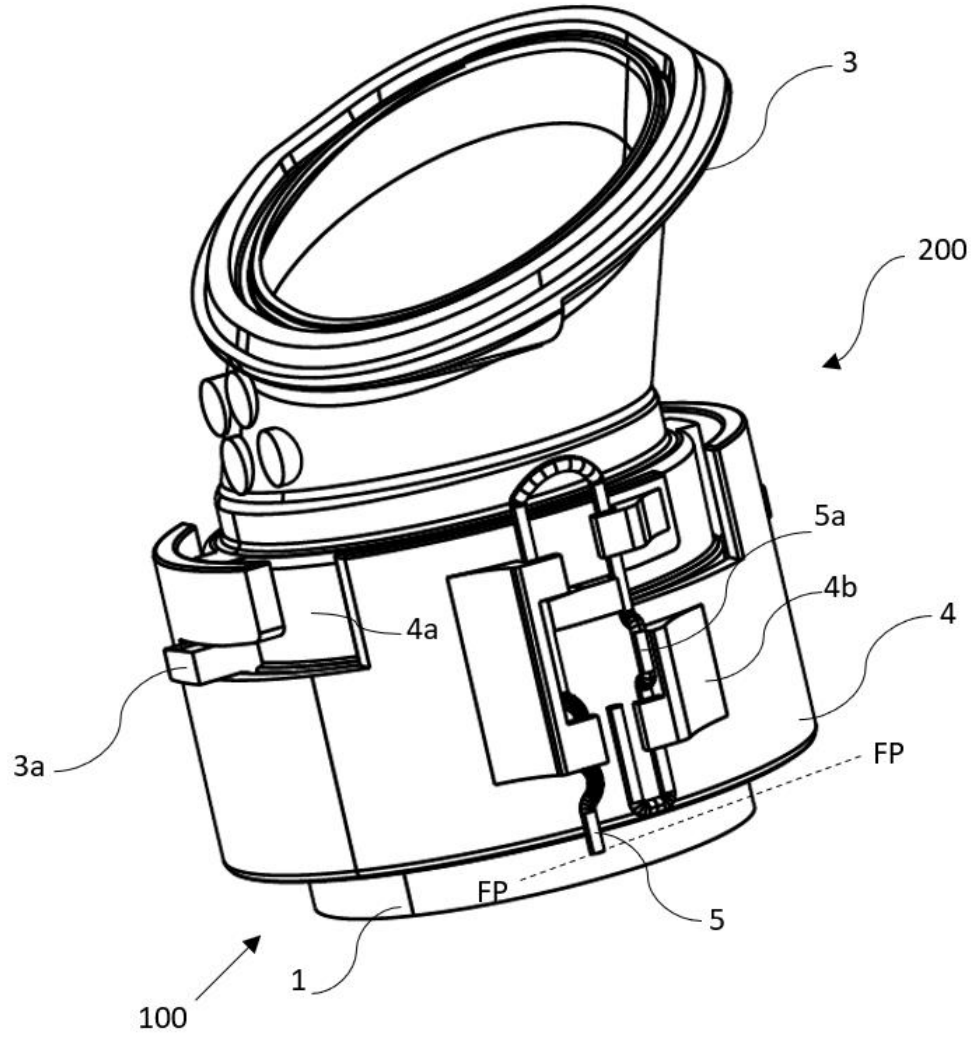

Figure 7f

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Bhanu Prasad
(INPA No: 3253)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.