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(54) HYDRAULIC LASH ADJUSTER

HYDRAULIKSPIELAUSGLEICHSELEMENT

RÉGULATEUR HYDRAULIQUE DE JEU

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(73) Proprietor: **Eaton Intelligent Power Limited Dublin 4 (IE)**

(72) Inventors:
• **AIMASSO, Alberto**
10098 Rivoli (IT)
• **AIMO BOOT, Marco**
10076 Nole (IT)

• **LIA, Luigi**
10141 Torino (IT)
• **MYSAK, Yuriy**
10141 Torino (IT)

(74) Representative: **Eaton IP Group**
EMEA
c/o Eaton Industries Manufacturing GmbH
Route de la Longeraie 7
1110 Morges (CH)

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EP 3 181 840 B1

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DescriptionTechnical Field

[0001] The present invention relates to lash adjustment, and more specifically to hydraulic lash adjustment in valve train assemblies.

Background

[0002] A typical valve train assembly of an internal combustion engine comprises a hydraulic lash adjuster (HLA). A typical HLA comprises an oil-containing chamber defined between an outer body and a plunger assembly slidably mounted within the outer body. The plunger assembly contacts, for example, a finger follower (rocker arm) of the valve train assembly. The typical HLA comprises a spring arranged to enlarge the chamber by pushing the plunger assembly outwardly from the outer body to extend the HLA. Oil flows into the chamber via a one way valve, but can escape the chamber only slowly, for example, via closely spaced leak down surfaces. Accordingly, a HLA can extend to accommodate any slack in a valve train assembly, such as between a cam and a roller of a valve train assembly, but after it is extended, the incompressible oil in the chamber provides rigid support for the finger follower (i.e. the incompressible oil prevents the plunger assembly being pushed back inwardly of the outer body so that the HLA acts as a solid body). Typically, the HLA has a second chamber, defined by the plunger assembly, on the other side of the one way valve from the first chamber and which is in fluid communication with the engine's oil supply. Oil supplied from the engine's oil supply is retained within the second chamber and flows into the first chamber through the one way valve when the HLA extends. Examples of typical HLA configurations are disclosed in DE 10 2008 059192 A1, US 4 607 599 A and EP 1 568 851 A1.

[0003] Typical HLAs operate in a vertical or near vertical orientation, i.e. the axis of extension of the HLA is typically in a vertical direction, with the outer body sitting relatively below the plunger assembly.

[0004] However, in some types of engines, for example Boxer engines, or some V engines, there is a need for HLAs that can work in other orientations, for example in near horizontal orientations, or even up-side-down with respect to the orientation of the typical HLAs described above.

Summary

[0005] According to a first aspect of the invention there is provided the hydraulic lash adjuster of claim 1.

[0006] According to a second aspect of the invention, there is provided the arrangement for a valve train assembly of claim 10.

[0007] Further features and advantages of the invention will now be described, by way of example only, with

reference to the accompanying drawings of which:

Brief Description of the Drawings**[0008]**

Figures 1a to 1c illustrate schematically side views of an exemplary hydraulic lash adjuster (HLA) in different orientations;

Figure 2 illustrates schematically a cross-sectional of an exemplary HLA mounted in an ECH;

Figure 3 illustrates a cross sectional view of an exemplary ball body;

Figure 4 illustrates a cross sectional view of an exemplary clip in a ball body;

Figure 5 shows a schematic perspective view of a portion of an exemplary ball body;

Figure 6 illustrates schematically a cross sectional view of an exemplary shim; and

Figure 7 illustrates schematically a cross sectional view of an exemplary shim.

Detailed Description

[0009] Figures 1a to 1c illustrate schematically side views of an exemplary hydraulic lash adjuster (HLA) 100 in different orientations with respect to a horizontal line (solid horizontal line in the figures) in which the exemplary HLA 100 may be used. The horizontal line may be, for example, horizontal in the sense that it is perpendicular to the direction of gravity. The HLA 100 comprises a ball body or body 102 towards a first end 100a of the HLA 100 and a shim 108 housed within the ball body 102 and that is towards an opposite, second end 100b of the HLA 100.

[0010] Figure 1a shows the HLA 100 in an orientation in which the principal axis of the HLA 100 (indicated by a dot-dashed line in the figures) is nearly parallel to the horizontal line (i.e. where the HLA 100 is orientated nearly horizontal). In the example of Figure 1a, the principal axis of the HLA 100 is rotated slightly with respect to the horizontal line such that the first end 100a of the HLA 100 is slightly lower than the second end 100b of the HLA 100.

[0011] Figure 1b shows the HLA 100 in an exemplary orientation in which the principal axis of the HLA 100 is perpendicular to the Horizontal line (i.e. where the HLA 100 is orientated vertically), with the first end 100a of the HLA 100 being below the second end 100b of the HLA 100.

[0012] Figure 1c shows the HLA 100 in two orientations intermediate to the orientations shown in Figure 1a and Figure 1b.

[0013] In some examples, the HLA 100 may operate in a near horizontal orientation for example as shown in Figure 1a, the vertical orientation for example as shown in Figure 1b, or in any orientation intermediate to the near horizontal and vertical orientations, for example as shown in Figure 1c. These orientations may be those

required, for example, in a so called Boxer type engine, or a V type engine. The orientation of the HLA 100 may change during operation of the engine.

[0014] An exemplary HLA 100 and its operation in an exemplary valve train assembly will now be described in more detail with reference to Figures 2 to 6.

[0015] As mentioned above, the HLA 100 comprises a body 102, a leak down plunger (or "plunger") 114, a spring 121, a check ball valve 116, a shim 108, and a clip 110.

[0016] At the first end 102a of the body 102, the body 102 comprises a partly spherical part (or "ball") 146 for engaging with a reciprocally shaped foot 148 of a finger follower (rocker arm) 104 of a valve train assembly (not shown in the figures).

[0017] The function of rocker arms such as rocker arm 104, for example in the operation of an exhaust valve or an intake valve of an internal combustion engine, is known per se and will not be described in detail. Briefly, in one example, a valve stem (not shown) of a valve (not shown) may be mechanically coupled to an end 104a of the rocker arm 104 opposite to the end 104b of the rocker arm 104 with which the HLA 100 is engaged. A lobed cam (not shown) driven by a cam shaft (not shown) contacts a roller 105 of the rocker arm 104 located in between the end 104a, 104b of the rocker arm 104. When a lobe (not shown) of the cam (not shown) engages with the roller 105, the rocker arm 104 is caused to pivot about the ball 146 of the HLA 100, thereby causing a valve event via the valve stem (not shown). When the lobe (not shown) of the cam (not shown) is no longer engaged with the roller 105, a valve spring (not shown) causes the rocker arm 104 to pivot back about the ball 146 of the HLA 100, thereby ending the valve event. As described above, a function of the HLA 100 is to take up any slack that may occur in the valve train assembly, and hence reduce mechanical lash in the valve train assembly, for example between the cam (not shown) and the roller 105.

[0018] The body 102 of the HLA 100 comprises a hollow bore 140 extending from an open end 102b of the body 102 towards an opposing closed end 102a of the body 102 (best seen in Figure 3).

[0019] The bore 140 of the body 102 is generally cylindrical and has received therein the plunger 114. The plunger 114 is generally cylindrical in shape and is received in the bore 140 for reciprocal sliding movement with respect to the body 102. The body 102 and the plunger 114 define between them a chamber 112, which performs the function of a so called "high pressure" chamber 112 as known per se in HLAs. Side walls of the plunger 114 and the body 102 define closely spaced leak-down surfaces 117 that maintain a low leakage rate of oil out of the high pressure chamber 112. The plunger 114 comprises an opening 115 used for HLA recharging controlled by a check ball valve 116 as is known per se in HLAs.

[0020] The bore 140 of the body 102 also has partly received therein the shim 108. The shim 108 is located in the bore 140 behind the plunger 114. The shim 108

defines a bore 108c extending from an open end 108a of the shim 108 towards the plunger 114 to a closed end 108b of the shim 108 away from the plunger 114. The shim 108 and the plunger 114 define between them, in the shim bore 108c, a second chamber 118, which performs the function of a so called "low pressure" chamber 118 (reservoir) as known per se in HLAs.

[0021] The high pressure chamber 112 and the low pressure chamber 118 are separated by the check ball valve 116 as is known per se in HLAs. The check ball valve 116 allows oil to flow from the low pressure chamber 118 to the high pressure chamber 112 via the opening 130, and hence for recharging of the high pressure chamber 112 with oil.

[0022] The HLA 100 comprises a spring 121 in the high pressure chamber 112, arranged to enlarge the high pressure chamber 112 by pushing the plunger 114 (and hence the shim 108) outwardly from the body 102 to extend the length of the HLA 100. Oil flows into the high pressure chamber 112 from the low pressure chamber 118 via the check ball (one way) valve 116, but can escape the high pressure chamber 112 only slowly via the closely spaced leak down surfaces 117. Accordingly, the HLA 100 can extend to accommodate any slack in the valve train assembly, such as between the cam (not shown) and the roller 105, but after it is extended, the incompressible oil in the high pressure chamber 112 provides rigid support for the rocker arm 104 (i.e. the incompressible oil prevents the plunger 114 being pushed back inwardly of the outer body 102 so that the HLA 100 acts as a solid body).

[0023] The HLA 100 is mounted in a retention socket (bore) 150 of an Engine Cylinder Head (ECH) 106 such that the ball 146 of the body 102 extends out and beyond the retention socket 150 of the ECH 106. The closed end 108b of the shim 108 abuts against a closed end 150a of the retention socket 150 to provide support for the HLA 100. The ECH 106 may be that of, for example, a Boxer engine, or a V engine.

[0024] The ECH 106 comprises an oil gallery (channel) 120 that supplies oil from the engine's oil supply (not shown in the figures) to the retention socket (bore) 150. The ECH 106 comprises an air purge gallery (channel) 160 out of which air can be purged.

[0025] The bore 150 of the ECH 106 may be generally cylindrical and dimensioned for a tight fit of the body 102 of the HLA 100 therein. The fit of the body 102 of the HLA 100 on insertion into the bore 150 of the ECH 106 may be such that portions of the outer surface of the body 102 contacting the surfaces of the ECH defining the bore 150 form a seal, such as an oil tight seal, there between. This allows for a simple and clean installation of the HLA 100 into the ECH 106.

[0026] The body 102 of the HLA 100 comprises a first oil flow path 137 for allowing oil from the oil gallery 120 of the ECH 106 to flow, via the HLA 100, to the rocker arm 104, for example to lubricate the foot 148 of the rocker arm 104 in which the ball 146 of the HLA is engaged.

[0027] A first part of the first oil flow path 137 is defined by an annular recess 126 in the outer diameter of the body 102. The body 102 and the retention socket 150 define between them (i.e. in the recess 126) a channel into which oil provided by the oil channel 120 of the ECH 106 can flow.

[0028] A second part of the first oil flow path 137 comprises an oil gallery (conduit) 136 running through the body 102 from a first open end 136b at an outer surface of a side wall of the body 102 to a second open end 136a at the ball 146 at the first end 102a of the body 102.

[0029] A third part of the first oil flow path 137 is defined by a portion 130 of the outer surface of a side wall of the body 102. The portion 130 is substantially flat (best seen in Figure 5), and hence is recessed from the cylindrical shape of the bore 150 of the ECH 106. The flat portion 130 extends from the annular recess 126 in the outer diameter of the body 102 to the first open end 136b of the conduit 136 of the body 102.

[0030] The outer body 102 and the retention socket 150 define between them (i.e. in the flat portion 130) a channel 130a into which oil provided by the oil channel 120 of the ECH 106 (via the annular recess 126) can flow. The body 102 being directly mounted in the retention socket 150 and being slid into the retention socket 150 along its axis enables sealing of the first oil flow path 137. Oil may thereby flow from the engine's oil supply, through the oil channel 120 of the ECH 106, through the annular recess 126 defined in the body 102, through the channel 130a defined between the flat portion 130 of the body 102 of the HLA 100 and the ECH 106, into the conduit 136 defined in the body 102 of the HLA 100, and out of the ball 148 at the first end 102a of the body 102. Oil flowing out of the ball 148 then lubricates the rocker arm 104 with which it is engaged, and hence other components of the valve train, such as the cam (not shown).

[0031] Accordingly, the valve train can be lubricated via the HLA 100, which reduces the need to lubricate the valve train by separate means. Moreover the valve train can be lubricated via the first oil flow path 137 even when the HLA 100 is orientated near horizontally (as per Figure 1a), "up-side-down" (as per Figure 1b) or any orientation in between (e.g. as per Figure 1c).

[0032] The HLA 100 defines a second oil flow path 122 for allowing oil from the oil supply 120 of the engine cylinder head 106 to flow to the low pressure chamber 118 of the HLA 100.

[0033] A first part of the second oil flow path 122 comprises an annular recess 126 in the outer diameter of the body 102 of the HLA 100. The body 102 and the retention socket 150 define between them (i.e. in the recess 126) a channel into which oil provided by the oil channel 120 of the ECH 106 can flow.

[0034] A second part of the second oil flow path comprises a hole (aperture) 122 in the body 102 extending from the recess 126 of the body 102 into the bore 140 of the body 102. Oil may therefore flow from the recess 114 into the bore 140 of the body 102.

[0035] The shim 108 comprises two annular protrusions 128a, 128b in its outer diameter which form an annular channel 128 there between (best seen in Figure 6).

[0036] A third part of the second oil flow path 122 comprises a hole 124 defined by the shim 108, located between the annular protrusions 128a, 128b, extending from the outer diameter of the shim 108 to the inner chamber 118 of the shim 108. Oil may therefore flow, in the second oil flow path 102, from the engine's oil supply, via the channel 120 of the ECH, via the hole 122 in the body, via the hole 124 in the shim 108, and into the "low pressure" chamber 118 formed between the shim 108 and the plunger 114. The "low pressure" chamber 118 may therefore be kept topped up (fed) with oil.

[0037] The second oil flow path 122 is in fluidic communication with the first oil flow path 137 (the first oil flow path 137 and the second oil flow path both comprise the recess 126 in the body 102 of the HLA 100), and hence the second oil flow path 102 and the first oil flow path 137 are both fed by the same oil supply channel 120 in the ECH 106. Hence only one channel 120 need be provided in the ECH 106 in order to both supply oil to top up the low pressure chamber 118 and to lubricate the rocker arm 104. This reduces the complexity of the oil supply.

[0038] The shim 108 is arranged to allow air to purge from the low pressure chamber 118. This may be advantageous to ensure the oil reaching the high pressure chamber 112 is free from air. The side wall of the shim 108 comprises small holes 144 on opposite sides of the shim 108 towards the closed end 108b of the shim 108 that extend from the outer diameter of the shim 108 to the low pressure chamber 118. The holes 144 are small (e.g. < 1 mm) so as to allow air to purge from the low pressure chamber 118, whilst hindering oil from escaping there through, and not allowing the pressure in the low pressure chamber 118 to drop too low. In some examples, there may be a plurality, for example two, three, four or more holes 144 spaced around the outer circumference of the shim 108. In some examples, there may be only one hole 144 defined in a side wall of the shim 108. The air purged through holes 144 may exit through the air purge channel 160 in the ECH 106.

[0039] Accordingly, even when the HLA 100 is orientated near horizontally (as per Figure 1a), "up-side-down" (as per Figure 1b) or any orientation in between (e.g. as per Figure 1c) air can be purged from the low pressure chamber 118 through (at least one) of the holes 144 in the shim 108.

[0040] The HLA 100 may be provided as a single body, assembled as a single engine component. The HLA comprises an annular clip 110 partially retained in a recess 138 in the inner diameter of the body 102 at the open end 102b of the body 102 (best seen in Figure 4). The clip 110 extends partially into the bore 140 of the body 102. The clip 110 abuts against the annular protrusion 128b of the shim 108, hence preventing the components of the HLA 100 received in the bore 140 of the body 102 from falling out of the bore 140, for example during in-

stallation of the HLA 100. The clip 110 may be mounted either internally or externally.

[0041] Accordingly, the HLA 100 can be easily installed into the ECH retention socket 150.

[0042] Figure 7 illustrates schematically a cross section of an example of an alternative shim 208 for an HLA 100. In this example, air purge from a bore 218 of the shim 208 is provided by air purge grooves 244 in a side wall of the shim 208 at an open end 208a of the shim 208. There may be multiple, for example, two, three, or four or more grooves 244 spaced around the circumference of the shim 208 such that air can be purged from the oil in a low pressure chamber 118 at least partly defined by the shim 208. In some examples, there may be only one air purge groove 244.

[0043] For a distance from the closed end of the shim 208, that is the internal diameter of the bore 218 decreases (tapers) with increasing distance from the air purge groove 244. This helps the oil to sit within the low pressure chamber 118 such that air can be purged from (at least one) of the grooves 244. For example, when the HLA

[0044] 100 is in a near horizontal orientation, the increased diameter of the bore 218 in the vicinity of the air purge groove 244 provides a greater opportunity for (at least one of) the air purge grooves 244 to be above the level of the oil in the low pressure chamber 218, and hence for air to be readily purged. It will be appreciated that the above described taper may also apply to the shim 108 with air purge holes 144.

[0045] Although the bore 118, 218 of the shim 108, 208 was described above as being cylindrical, this need not necessarily be the case, and other shapes may be used. It will therefore be appreciated that in these cases the internal diameter of the bore 118, 218 of the shim 108, 208 may taper from the one or more air purge holes 144 or air purge grooves 244.

[0046] It will be appreciated that although oil is referred to herein, any hydraulic fluid may be used.

[0047] Although in the above examples the plunger 114 and the shim 108 were described as separate, this need not necessarily be the case, and in other examples the plunger 114 and the shim 108 may form a single piece, that is, integral to one another. The plunger 114 and the shim 108 as a single piece may be formed, for example, using cold forming and roll forming.

[0048] It will be appreciated that although in the above examples the air purge holes 114 or air purge grooves 244 were described as being defined in a side wall of a shim 108, this need not necessarily be the case, and the air purge holes 144 or air purge grooves 244 may alternatively or additionally be in any side wall of the HLA 100 provided air is allowed to purge from a low pressure chamber 118 of the hydraulic lash adjuster 100.

[0049] Although in the above examples the body 102 of the HLA 100 was for contacting and lubricating a finger follower (rocker arm) 104 of a valve train assembly, this need not necessarily be the case, and in other examples the HLA 100 may be for contacting and hence delivering oil to any valve train component of an internal combustion

engine.

[0050] The above embodiments are to be understood as illustrative examples of the invention. It is to be understood that any feature described in relation to any one embodiment may be used alone, or in combination with other features described, and may also be used in combination with one or more features of any other of the embodiments, or any combination of any other of the embodiments. Furthermore, equivalents and modifications not described above may also be employed without departing from the scope of the invention, which is defined in the accompanying claims.

Claims

1. A hydraulic lash adjuster (100) for insertion into a bore (150) of an engine cylinder head (106) of an internal combustion engine, the hydraulic lash adjuster (100) comprising:

a body (102) for insertion into the bore (150), wherein the body (102) is arranged for contacting a

valve train component (104) of the internal combustion engine, and wherein the body (102) comprises a first hydraulic fluid flow path (137) for allowing hydraulic fluid from a hydraulic fluid supply of the engine cylinder head (106) to flow to the valve train component (104) of the internal combustion engine, wherein at least part of the hydraulic fluid flow path is defined by a portion of the outer surface of a side wall of the body (102), and wherein the portion of the outer surface is substantially flat.

2. The hydraulic lash adjuster (100) according to claim 1, wherein the first hydraulic fluid flow path (137) comprises a conduit (136) defined by the body (102), the conduit (136) extending from the portion of the outer surface to a first end (102a) of the body (102), the first end (102a) of the body being for contacting with the valve train component (104), thereby to allow hydraulic fluid to flow from the outer surface, via the conduit, to the valve train component (104).
3. The hydraulic lash adjuster (100) according to any preceding claim, wherein the body (102) comprises a second hydraulic fluid flow path (122) for allowing hydraulic fluid from the hydraulic fluid supply (120) of the engine cylinder head (106) to flow to a low pressure chamber (118) of the hydraulic lash adjuster.
4. The hydraulic lash adjuster (100) according to claim 3, wherein the second hydraulic fluid flow path (122) is in fluidic communication with the first hydraulic fluid flow path (137).

5. The hydraulic lash adjuster (100) according to claim 1 further comprising one or more air purge holes (144) or air purge grooves (244) in a side wall of the hydraulic lash adjuster (100), for allowing air to purge from a low pressure chamber (118) of the hydraulic lash adjuster (100).
6. The hydraulic lash adjuster according to claim 5, wherein the one or more air purge holes (144) or air purge grooves (244) are defined in a side wall of a shim (108), the shim (108) being received in the body (102) of the hydraulic lash adjuster (100), the shim (108) at least partly defining the low pressure chamber (118) of the hydraulic lash adjuster (100).
7. The hydraulic lash adjuster (100) according to claim 5 or claim 6, wherein an internal dimension of the low pressure chamber (118) tapers from the one or more air purge holes (144) or air purge grooves (244).
8. The hydraulic lash adjuster (100) according to any one of claim 5 to claim 7, the hydraulic lash adjuster (100) comprising a plurality of said air purge grooves (244) or air purge holes (144) spaced around a circumference of the hydraulic lash adjuster (100).
9. The hydraulic lash adjuster (100) according to any one of claim 5 to claim 8, the hydraulic lash adjuster (100) comprising at least two of said air purge grooves (244) or air purge holes (144), wherein the at least two of said air purge grooves (244) or air purge holes (144) are located opposite of one another.
10. An arrangement for a valve train assembly in an internal combustion engine, the arrangement comprising:
 - an engine cylinder head (106) comprising a bore (150); and
 - the hydraulic lash adjuster (100) according to any one of claim 1 to claim 9 received in the bore (150), wherein the hydraulic lash adjuster (100) and the engine cylinder head (106) define between them at least a portion of the first hydraulic fluid flow path (137) for allowing hydraulic fluid to flow from a hydraulic fluid supply channel to the valve train component (104).
11. The arrangement according to claim 10, wherein the hydraulic lash adjuster (100) is according to any one of claim 1 to claim 4, and wherein the engine cylinder head (106) comprises the hydraulic fluid supply channel for supplying hydraulic fluid to the bore (150).
12. The arrangement according to claim 10, wherein the engine cylinder head (106) is of a Boxer engine or

V engine.

Patentansprüche

1. Hydraulischer Spieleinsteller (100) zum Einsetzen in eine Bohrung (150) eines Motorzylinderkopfs (106) eines Verbrennungsmotors, wobei der hydraulische Spieleinsteller (100) Folgendes umfasst: einen Körper (102) zum Einsetzen in die Bohrung (150), wobei der Körper (102) zum Berühren einer Ventiltriebkomponente (104) des Verbrennungsmotors angeordnet ist, und wobei der Körper (102) einen ersten Hydraulikfluidströmungsweg (137) umfasst, um zu ermöglichen, dass Hydraulikfluid von einer Hydraulikfluidversorgung des Motorzylinderkopfs (106) zu der Ventiltriebkomponente (104) des Verbrennungsmotors strömt, wobei wenigstens ein Teil des Hydraulikfluidströmungswegs durch einen Abschnitt der Außenoberfläche einer Seitenwand des Körpers (102) definiert ist, und wobei der Abschnitt der Außenoberfläche im Wesentlichen flach ist.
2. Hydraulischer Spieleinsteller (100) nach Anspruch 1, wobei der erste Hydraulikfluidströmungsweg (137) eine durch den Körper (102) definierte Leitung (136) umfasst, wobei sich die Leitung (136) von dem Abschnitt der Außenoberfläche zu einem ersten Ende (102a) des Körpers (102) erstreckt, wobei das erste Ende (102a) des Körpers (102) zum Berühren der Ventiltriebkomponente (104) dient, um dadurch zu ermöglichen, dass Hydraulikfluid von der Außenoberfläche über die Leitung zu der Ventiltriebkomponente (104) strömt.
3. Hydraulischer Spieleinsteller (100) nach einem der vorhergehenden Ansprüche, wobei der Körper (102) einen zweiten Hydraulikfluidströmungsweg (122) umfasst, um zu ermöglichen, dass Hydraulikfluid von der Hydraulikfluidversorgung (120) des Motorzylinderkopfs (106) zu einer Niederdruckkammer (118) des hydraulischen Spieleinstellers strömt.
4. Hydraulischer Spieleinsteller (100) nach Anspruch 3, wobei der zweite Hydraulikfluidströmungsweg (122) in Fluidverbindung mit dem ersten Hydraulikfluidströmungsweg (137) steht.
5. Hydraulischer Spieleinsteller (100) nach Anspruch 1, der ferner ein oder mehrere Luftspülungslöcher (144) oder Luftspülungsnuten (244) in einer Seitenwand des hydraulischen Spieleinstellers (100) umfasst, um zu ermöglichen, dass Luft von einer Niederdruckkammer (118) des hydraulischen Spieleinstellers (100) abgespült wird.
6. Hydraulischer Spieleinsteller nach Anspruch 5, wo-

bei das eine oder die mehreren Luftspülungslöcher (144) oder Luftspülungsnuten (244) in einer Seitenwand einer Unterlegscheibe (108) definiert sind, wobei die Unterlegscheibe (108) in dem Körper (102) des hydraulischen Spieleinstellers (100) aufgenommen ist, wobei die Unterlegscheibe (108) wenigstens teilweise die Niederdruckkammer (118) des hydraulischen Spieleinstellers (100) definiert.

7. Hydraulischer Spieleinsteller (100) nach Anspruch 5 oder 6, wobei sich eine Innenabmessung der Niederdruckkammer (118) von dem einen oder den mehreren Luftspülungslöchern (144) oder Luftspülungsnuten (244) verjüngt. 10
8. Hydraulischer Spieleinsteller (100) nach einem der Ansprüche 5 bis 7, wobei der hydraulische Spieleinsteller (100) mehrere der Luftspülungsnuten (244) oder Luftspülungslöcher (144) umfasst, die um einen Umfang des hydraulischen Spieleinstellers (100) herum beabstandet sind. 15
9. Hydraulischer Spieleinsteller (100) nach einem der Ansprüche 5 bis 8, wobei der hydraulische Spieleinsteller (100) wenigstens zwei der Luftspülungsnuten (244) oder Luftspülungslöcher (144) umfasst, wobei die wenigstens zwei der Luftspülungsnuten (244) oder Luftspülungslöcher (144) sich gegenüberliegend zueinander befinden. 20
10. Anordnung für eine Ventiltriebbaugruppe in einem Verbrennungsmotor, wobei die Anordnung Folgendes umfasst: 25

einen Motorzylinderkopf (106), der eine Bohrung (150) umfasst; und 30

den hydraulischen Spieleinsteller (100) nach einem der Ansprüche 1 bis 9, der in der Bohrung (150) aufgenommen ist, 35

wobei der hydraulische Spieleinsteller (100) und der Motorzylinderkopf (106) zwischen sich wenigstens einen Abschnitt des ersten Hydraulikfluidströmungswegs (137) definieren, um zu ermöglichen, dass Hydraulikfluid von einem Hydraulikfluidversorgungs kanal zu der Ventiltriebkomponente (104) strömt. 40
11. Anordnung nach Anspruch 10, wobei der hydraulische Spieleinsteller (100) einem der Ansprüche 1 bis 4 entspricht und wobei der Motorzylinderkopf (106) den Hydraulikfluidversorgungs kanal zum Versorgen der Bohrung (150) mit Hydraulikfluid umfasst. 45
12. Anordnung nach Anspruch 10, wobei der Motorzylinderkopf (106) von einem Boxermotor oder V-Motor stammt. 50

Revendications

1. Régleur de jeu hydraulique (100) destiné à être inséré dans un alésage (150) d'une culasse de moteur (106) d'un moteur à combustion interne, le régleur de jeu hydraulique (100) comprenant : 5

un corps (102) à insérer dans l'alésage (150), le corps (102) étant disposé pour entrer en contact avec un composant de dispositif de commande des soupapes (104) du moteur à combustion interne, et le corps (102) comprenant un premier trajet d'écoulement de fluide hydraulique (137) pour permettre au fluide hydraulique provenant d'un approvisionnement en fluide hydraulique de la culasse de moteur (106) de s'écouler vers le composant de dispositif de commande des soupapes (104) du moteur à combustion interne, au moins une partie du trajet d'écoulement de fluide hydraulique étant définie par une partie de la surface externe d'une paroi latérale du corps (102), et la partie de la surface externe étant sensiblement plate. 10
2. Régleur de jeu hydraulique (100) selon la revendication 1, le premier trajet d'écoulement de fluide hydraulique (137) comprenant un conduit (136) défini par le corps (102), le conduit (136) s'étendant de la partie de la surface externe à une première extrémité (102a) du corps (102), la première extrémité (102a) du corps étant destinée à entrer en contact avec le composant de dispositif de commande des soupapes (104), pour ainsi permettre au fluide hydraulique de s'écouler depuis la surface externe, par l'intermédiaire du conduit, vers le composant de dispositif de commande des soupapes (104). 15
3. Régleur de jeu hydraulique (100) selon l'une quelconque des revendications précédentes, le corps (102) comprenant un second trajet d'écoulement de fluide hydraulique (122) pour permettre au fluide hydraulique provenant de l'approvisionnement en fluide hydraulique (120) de la culasse de moteur (106) de s'écouler vers une chambre basse pression (118) du régleur de jeu hydraulique. 20
4. Régleur de jeu hydraulique (100) selon la revendication 3, le second trajet d'écoulement de fluide hydraulique (122) étant en communication fluide avec le premier trajet d'écoulement de fluide hydraulique (137). 25
5. Régleur de jeu hydraulique (100) selon la revendication 1, comprenant en outre un ou plusieurs trous de purge d'air (144) ou une ou plusieurs rainures de purge d'air (244) dans une paroi latérale du régleur de jeu hydraulique (100), pour permettre à l'air de s'évacuer d'une chambre basse pression (118) du régleur de jeu hydraulique (100). 30

6. Régleur de jeu hydraulique selon la revendication 5, le ou les trous de purge d'air (144) ou la ou les rainures de purge d'air (244) étant définis dans une paroi latérale d'une cale (108), la cale (108) étant reçue dans le corps (102) du régleur de jeu hydraulique (100), la cale (108) définissant au moins en partie la chambre basse pression (118) du régleur de jeu hydraulique (100). 5
7. Régleur de jeu hydraulique (100) selon la revendication 5 ou la revendication 6, une dimension interne de la chambre basse pression (118) se rétrécissant à partir du ou des trous de purge d'air (144) ou de la ou des rainures de purge d'air (244). 10
15
8. Régleur de jeu hydraulique (100) selon l'une quelconque des revendications 5 à 7, le régleur de jeu hydraulique (100) comprenant une pluralité desdites rainures de purge d'air (244) ou desdits trous de purge d'air (144) espacés autour d'une circonférence du régleur de jeu hydraulique (100). 20
9. Régleur de jeu hydraulique (100) selon l'une quelconque des revendications 5 à 8, le régleur de jeu hydraulique (100) comprenant au moins deux desdites rainures de purge d'air (244) ou desdits trous de purge d'air (144), les au moins deux desdites rainures de purge d'air (244) ou desdits trous de purge d'air (144) étant situés à l'opposé l'un de l'autre. 25
30
10. Disposition pour un ensemble de dispositif de commande des soupapes dans un moteur à combustion interne, la disposition comprenant :

une culasse de moteur (106) comprenant un alésage (150) ; et 35
le régleur de jeu hydraulique (100) selon l'une quelconque des revendications 1 à 9 reçu dans l'alésage (150), 40

le régleur de jeu hydraulique (100) et la culasse du moteur (106) définissant entre eux au moins une partie du premier trajet d'écoulement de fluide hydraulique (137) pour permettre au fluide hydraulique de s'écouler depuis un canal d'approvisionnement en fluide hydraulique vers le composant de dispositif de commande des soupapes (104). 45
11. Disposition selon la revendication 10, le régleur de jeu hydraulique (100) étant selon l'une quelconque des revendications 1 à 4, et la culasse de moteur (106) comprenant le canal d'approvisionnement en fluide hydraulique pour approvisionner du fluide hydraulique à l'alésage (150). 50
55
12. Disposition selon la revendication 10, la culasse de moteur (106) étant celle d'un moteur Boxer ou d'un moteur en V.

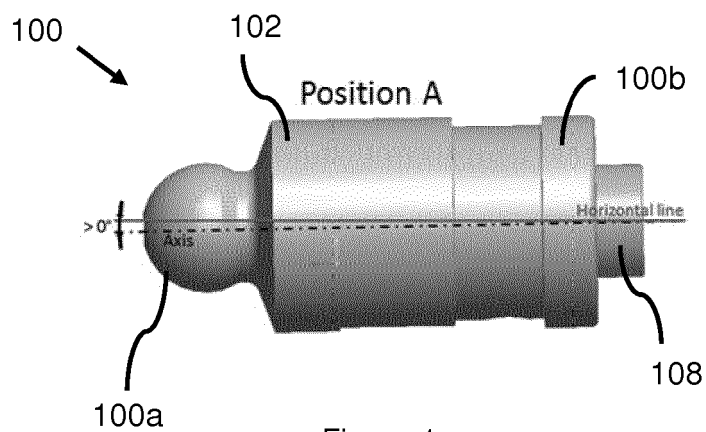


Figure 1a

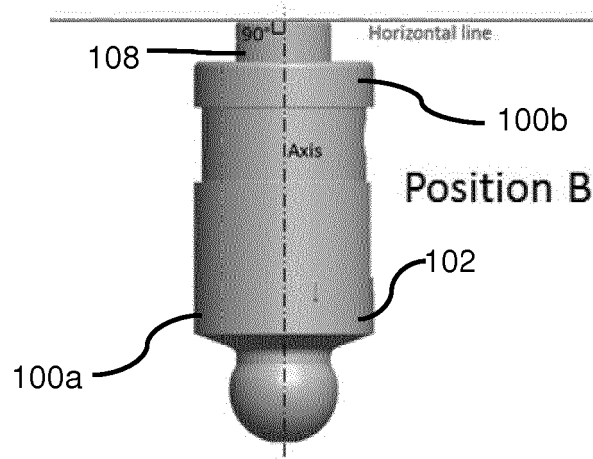


Figure 1b

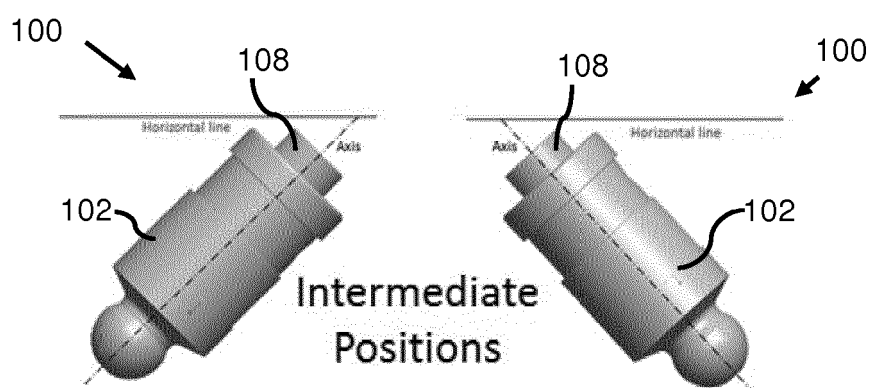


Figure 1c

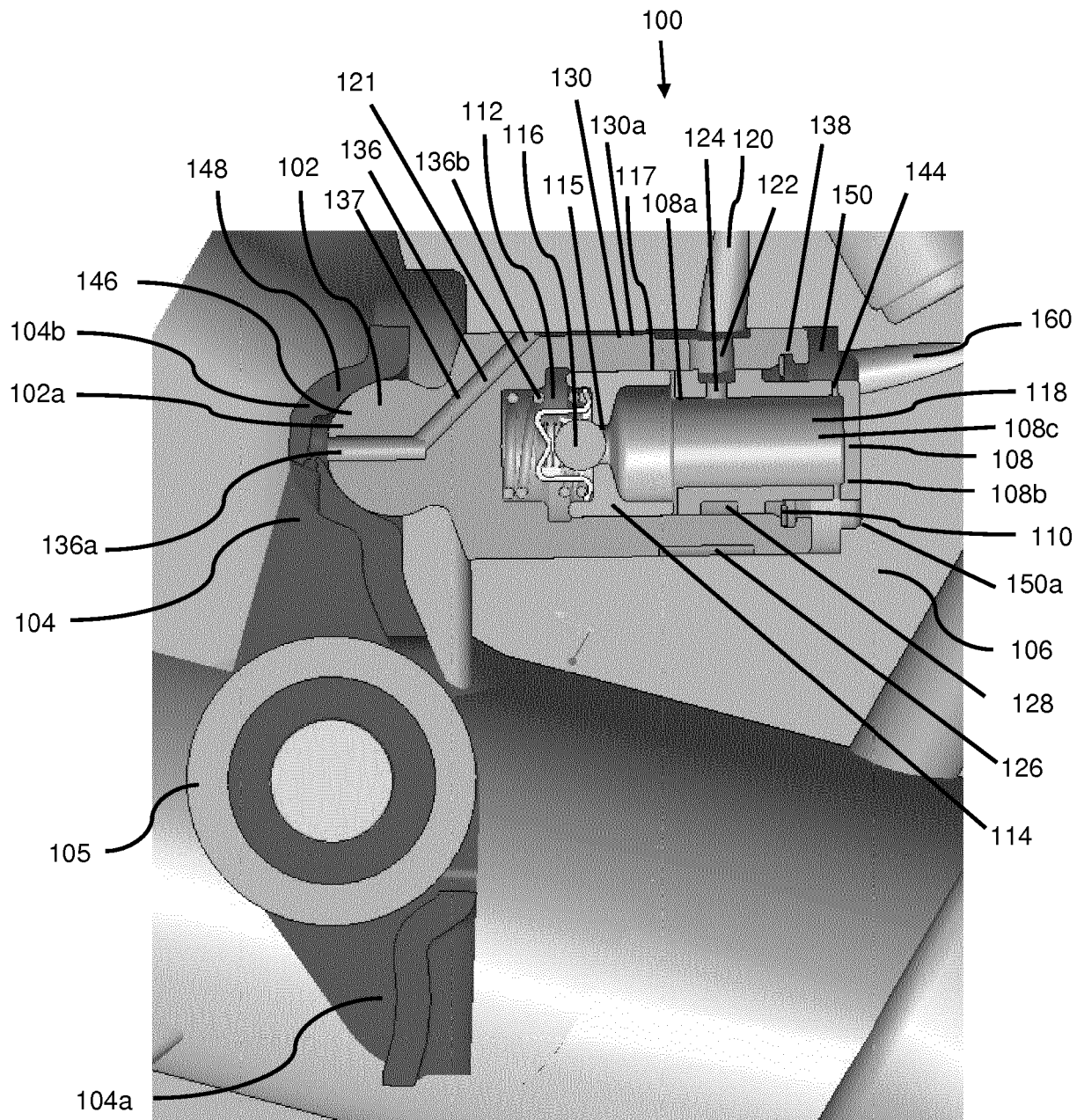


Figure 2

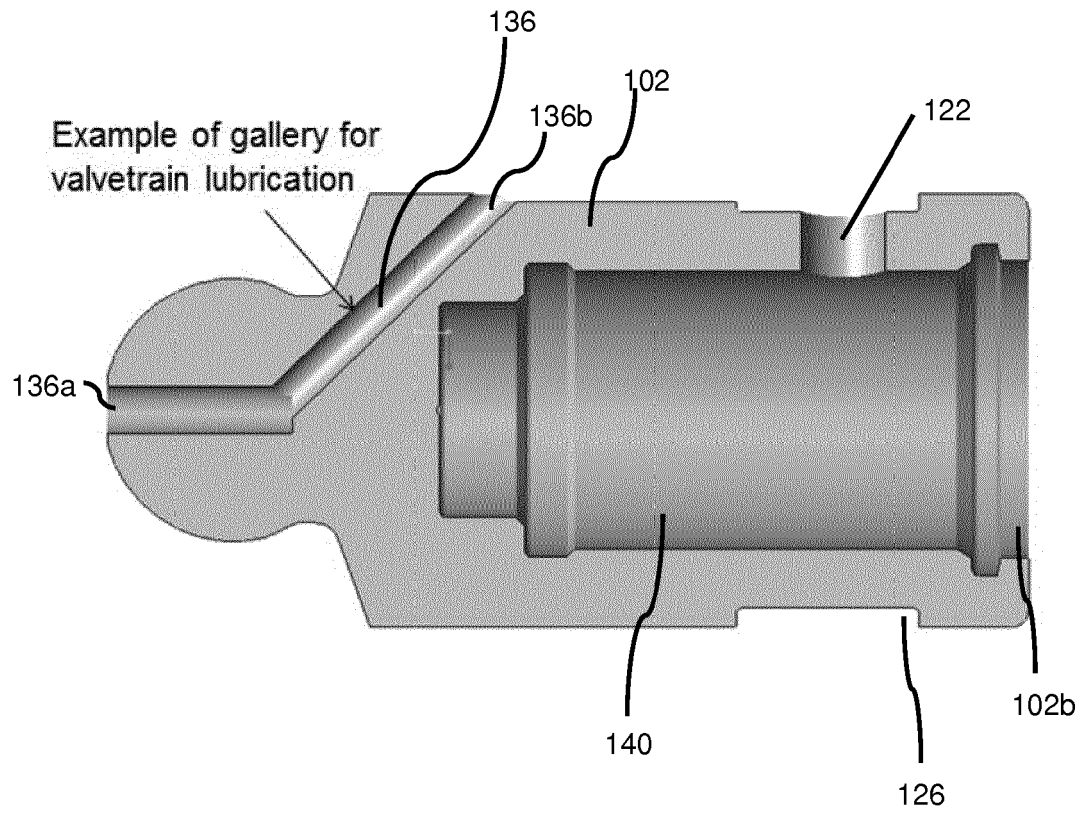


Figure 3

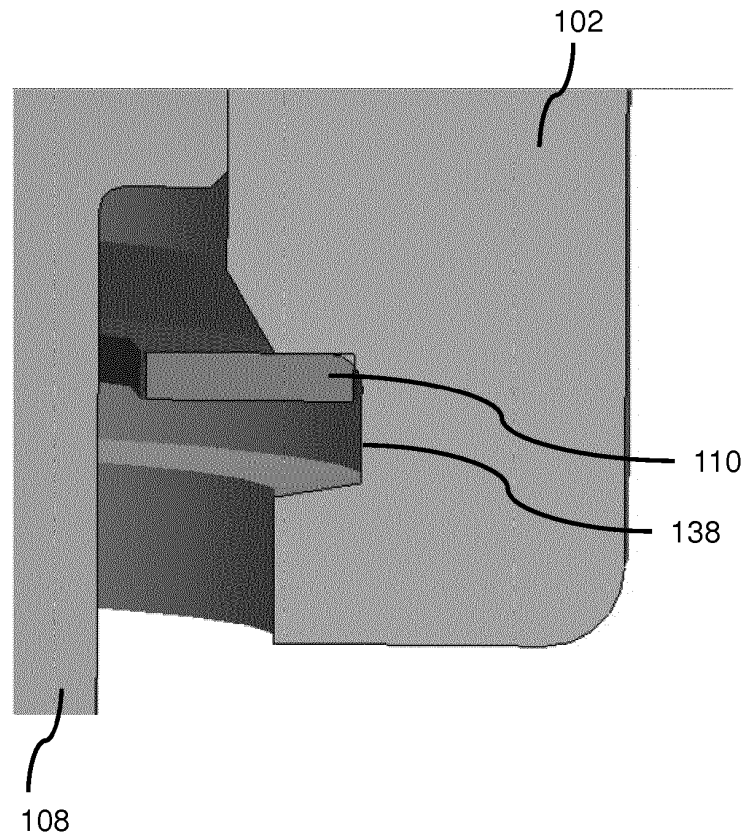


Figure 4

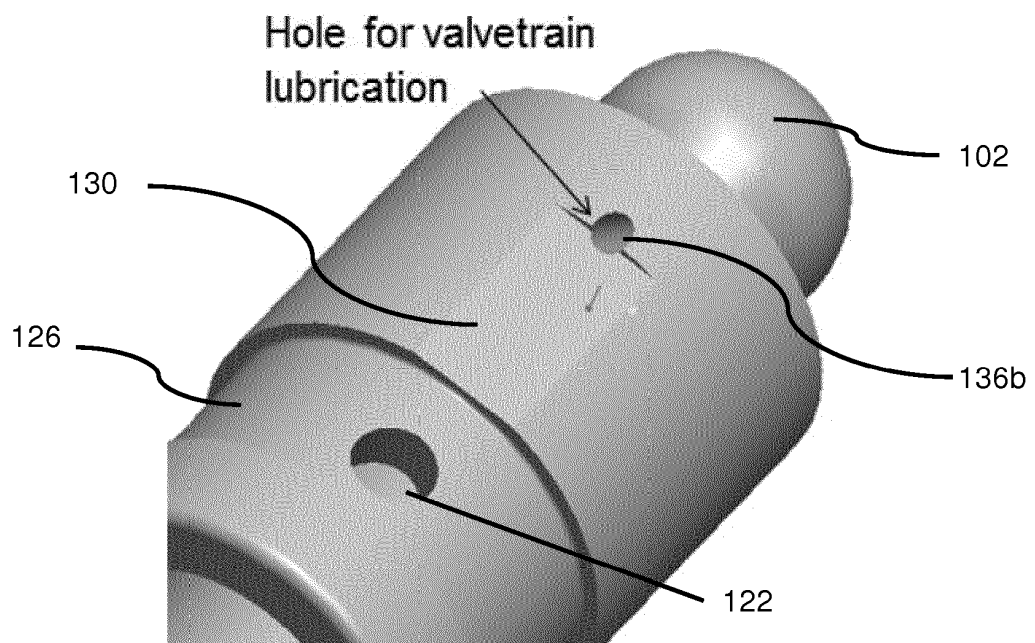


Figure 5

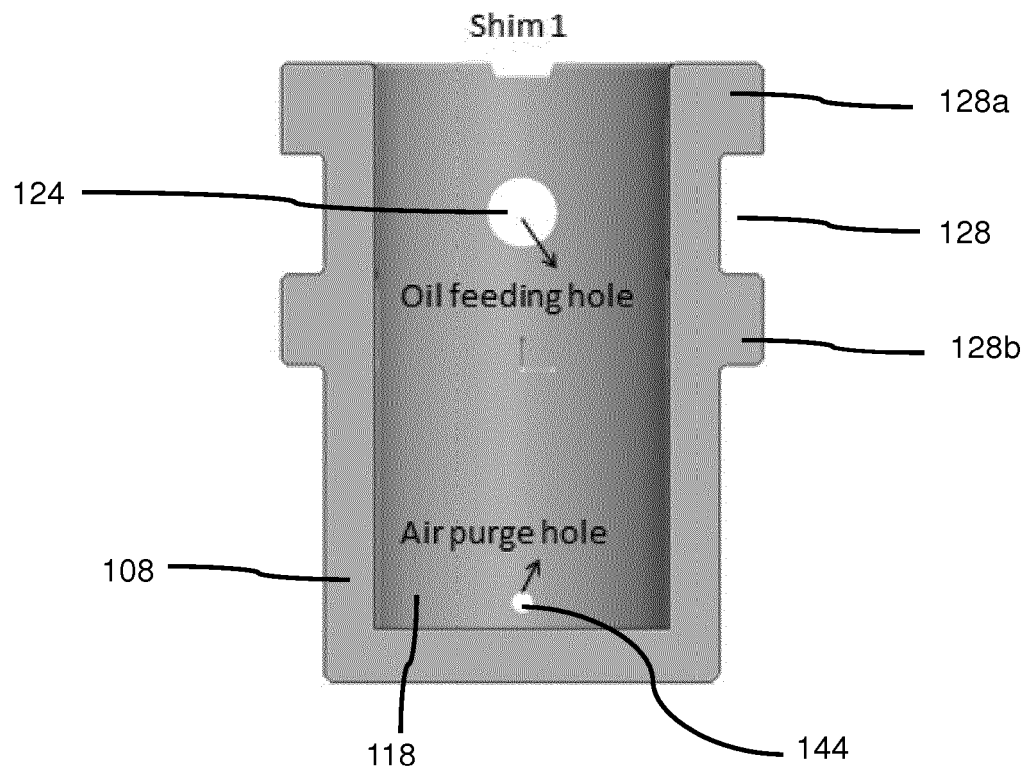


Figure 6

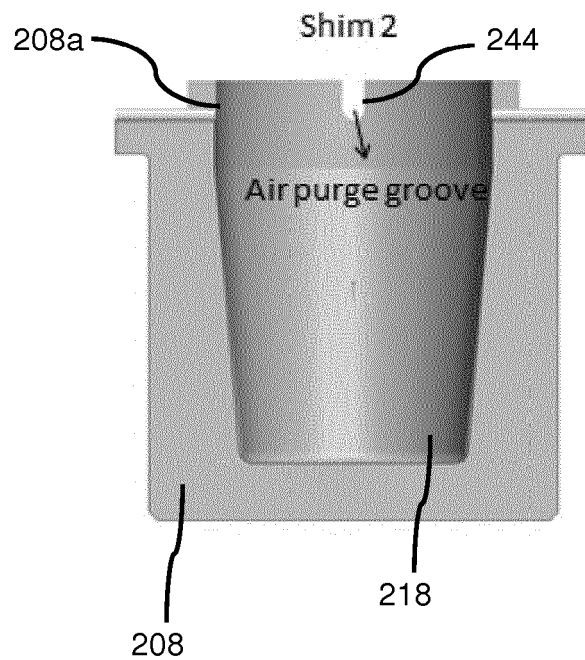


Figure 7

REFERENCES CITED IN THE DESCRIPTION

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