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(54) **A GUIDE MEMBER FOR GUIDING LUBRICATING FLUID IN AN ENGINE**

(57) A guide member (134) for guiding lubricating fluid in an engine (100) having a cylinder member (108) is provided. The guide member (134) is coupled to the cylinder member (108) and is disposed outside the cylinder member (108).

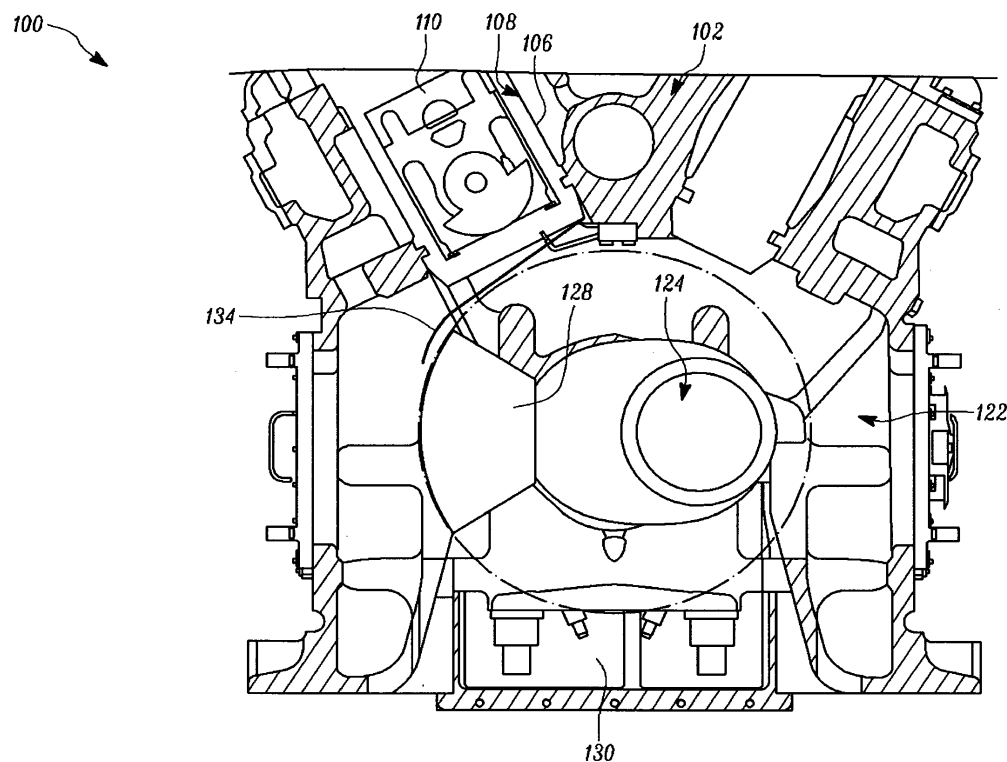


FIG. 1

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Description**Brief Description of the Drawings**Technical Field**[0007]**

[0001] The present disclosure relates to an engine, and particularly to guiding a lubricating fluid from a cylinder of the engine.

5 FIG. 1 illustrates a side view of an exemplary engine, in accordance with an embodiment of the present disclosure;

Background

[0002] A typical engine system includes an engine body having one or more casted components, such as a cylinder block, a cylinder head etc. One or more fluid passages are formed in the engine body for receiving and transporting lubricating oil and/or a coolant to relevant portions of the engine. The lubricating oil may be supplied to different bearing components and other moving components, such as a crankshaft, a connecting rod and the like. In some cases, a surface of the piston or piston rings may deflect the oil from the cylinder to counterweights of the crankshaft that are located below the cylinder. However, due to contact of the oil falling from the cylinder onto the counterweights and/or presence of oil mist in the crank case provides resistance to a movement of counterweights and thereby the crankshaft in the mist, which may decrease the efficiency of the engine.

10 FIG. 2 illustrates a bottom view of the engine showing a guide member, according to one embodiment of the present disclosure;

15 FIG. 3 illustrates a side view of the engine showing the guide member, according to another embodiment of the present disclosure;

FIG. 4 illustrates a top view of the guide member of FIG. 3;

20 FIG. 5 illustrates a side view of the engine showing the guide member, according to yet another embodiment of the present disclosure;

25 FIG. 6 illustrates a top view of the guide member of FIG. 5;

[0003] For reference, U.S. patent 7,617,810 discloses a casing that is provided to be disposed around at least a portion of a counterweight of a balance shaft in order to define a circumferential surface surrounding the counterweight which has a generally constant radius relative to the axis of rotation. The function of the casing is to reduce or eliminate aeration of oil in which the balance shaft is disposed.

FIG. 7 illustrates a front view of the guide member of FIG. 5;

30 FIG. 8 illustrates a side view of the engine showing the guide member having a first portion and second portion inclined to the first portion, according to another embodiment of the present disclosure; and

35 FIG. 9 illustrates a side view of the engine showing the guide member disposed below the cylinder member, according to yet another embodiment of the present disclosure.

Summary of the Disclosure

[0004] In an aspect of the present disclosure, a guide member for guiding lubricating fluid in an engine having a cylinder member is provided. The guide member is coupled to the cylinder member and is disposed outside the cylinder member.

40 Detailed Description

[0005] In another aspect of the present disclosure, an engine is provided. The engine includes a cylinder member and a piston slidably disposed in the cylinder member. The engine also includes a crankshaft operatively coupled to the piston. The crankshaft has at least one counterweight located adjacent to the cylinder member. The engine also includes a guide member coupled to the cylinder member and disposed outside the cylinder member. The guide member is configured to at least partially direct a flow of the lubricating fluid away from the counterweight adjacent to the cylinder member.

45 **[0008]** FIG. 1 is a side view of an engine 100, according to an embodiment of the present disclosure. The engine 100 may be any type of engine, such as internal combustion engine run by gasoline, diesel, gaseous fuel, or a combination thereof. The engine 100 may be used as a source of power for any machine (not shown), such as, on-highway trucks or vehicles, off-highway trucks or machines, earth moving equipment, pumps, stationary equipment, generators, and the like. Accordingly, the engine 100 may also be used to power machines or devices used in construction, transportation, power generation, aerospace applications, locomotive applications, marine applications, and other engine powered applications.

[0006] Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

55 **[0009]** The engine 100 is illustrated as a V-Type internal combustion engine 100, having a plurality of cylinder members 108. However, various embodiments and aspects of the present disclosure may be suitably applica-

ble to any type of engine 100 having a single cylinder or multiple cylinder members in any other alternative configurations, such as in-line, radial and the like.

[0010] Referring to FIGS. 1 and 2, the engine 100 includes a cylinder block 102 having the cylinder members 108, one of which is labeled via reference numeral 108. It may be apparent to a person ordinarily skilled in the art that certain components of the engine 100, such as camshafts, fuel injectors, valves, etc., are omitted from FIG. 1. Each of the cylinder members 108 includes a piston 110 slidably received therein. The engine 100 also includes a connecting rod 114 having a first end 116 and a second end 118. The first end 116 is coupled to a free end of the piston 110.

[0011] The engine 100 also includes a crank case 122 coupled to the cylinder block 102. The crank case 122 may be configured to rotatably support a crankshaft 124. The crankshaft 124 is coupled to the second end 118 of the connecting rod 114. In an embodiment, the crankshaft 124 includes crankpins (not shown) configured to couple each of the connecting rods 114 to the crankshaft 124. With such an implementation, a rotational movement of the crankshaft 124 causes a sliding movement of one or more of the pistons 110 inside the corresponding cylinder members 108.

[0012] The crankshaft 124 may include at least one counterweight 128 located adjacent to the second end 118 of the connecting rod 114. The counterweights 128 may be configured to rotate along with the crankshaft 124. In an embodiment, the crankshaft 124 includes multiple bearing journals that are aligned longitudinally along the crankshaft 124. Each of the pairs of counterweights 128 may be secured to the crankshaft 124 on each side of the bearing journals. Each of the counterweights 128 has a center of gravity at an offset from an axis of rotation of the crankshaft 124. The counterweights 128 may be configured to counteract unbalanced forces acting during operation of the engine 100. In the illustrated embodiment, the connecting rods 114 for the corresponding pair of cylinder members 108 on both the cylinder banks may be coupled between the two counterweights 128.

[0013] The engine 100 may also include an oil pan 130 configured to store the lubricating fluid therein. In an example, the lubricating fluid may be oil. In an embodiment, the oil pan 130 may be disposed below the crankshaft 124. The engine 100 may define one or more fluid passages configured to allow a passage of a lubricating oil therethrough. The fluid passage may be configured to receive a lubricating oil therethrough and allow it to reach bearing components or other moving components, such as the pistons 110, a camshaft, the crankshaft 124 and the like.

[0014] The fluid passages may be configured to communicate with the bearing components and other engine moving components in such a manner to communicate the fluid, for example, lubrication oil from the oil pan 130. The oil pan 130 collects the lubricating fluid necessary for lubricating engine moving components. The lubricat-

ing fluid in the oil pan 130 may be pumped and allowed to pass through the fluid passages. It should be understood that there may be any number of the fluid passages that are formed at least partly in various portions of the engine 100, such as, the cylinder block 102, the cylinder head and the like.

[0015] The engine 100 includes a guide member 134 configured for guiding lubricating fluid in the engine 100, according to various embodiments of the present disclosure. In an embodiment, the guide member 134 is coupled to an outer wall 106 of the cylinder member 108 defining an axis MM' (shown in FIG. 3). In another embodiment, the guide member 134 may be coupled to a bottom wall 107 of the cylinder member 108. Additionally or optionally, the guide member 134 may be coupled indirectly to the cylinder member 108 by way of coupling to the crank case 122.

[0016] In an embodiment, the guide member 134 may be coupled to the cylinder member 108 using fasteners, such as, but not limited to, bolts, screws and the like. Additionally or optionally, various adhesives may also be used to couple the guide members 134 with the cylinder member 108.

[0017] In the illustrated embodiment of FIG. 2, the guide member 134 is disposed outside and on one side of the cylinder member 108. The guide member 134 is shown to extend from the outer wall 106 of the cylinder member 108. Further, a length of the guide member 134 may be chosen to avoid contact with the counterweights 128 and the crankshaft 124. In an example, multiple guide members 134 may be disposed on other sides of the cylinder member 108.

[0018] Referring to FIGS. 5 to 7, the guide member 134 according to an embodiment is illustrated. The guide member 134 has a planar shape coupled to the outer wall 106 of the cylinder member 108. Further, an end 135 of the guide member 134 may be configured to be attached to the cylinder member 108. Accordingly, the end 135 may have an arc shape with a radius of curvature 'B' that is substantially greater than a radius of curvature (not shown) of the cylinder member 108. Referring to FIGS. 5 to 7, the guide member 134 according to another embodiment is illustrated. As shown, the guide member 134 has a boat configuration.

[0019] Referring to FIG. 8, the guide member 134 according to yet another embodiment of the present disclosure is illustrated. The guide member 134 includes a first portion 142 and a second portion 144 extending from the first portion 142. Further, the first portion 142 may be coupled to the cylinder member 108. The second portion 144 is angularly inclined with respect the first portion 142. The second portion 144 may be inclined at a suitable angle with the first portion 142 so as to guide the lubricant around the counterweight.

[0020] In an embodiment, the first portion 142 and the second portion 144 may be separate from each other and may be coupled each other to form the guide member 134 using methods such as, but not limited to, fasteners,

adhesives and the like. Alternatively, the first portion 142 and the second portion 144 may be integral to each other to form a unitary construction. For example, the first portion 142 may be the guide member 134 having a curvilinear shape, while the second portion 144 may be an extension member coupled to the first portion 142. The second portion 144 may also be curvilinear so as to form a rail or drain pipe configuration. In another example, at least one of the first portion 142 and the second portion 144 may have a planar shape.

[0021] Referring to FIG. 9, the guide member 134, according to yet another embodiment is illustrated. As shown, the guide member 134 is disposed below the cylinder member 108. Further, the guide member 134 may be indirectly coupled to the cylinder member 108 by coupling to the crank case 122. As shown, the guide member 134 has a curvilinear shape. Further, the axis of curvature (not shown) of the guide member 134 is substantially perpendicular to the axis MM' of the cylinder member 108. With such a configuration, spilling of the lubricant from sides of the cylinder member 108 onto the counterweights 128 may be avoided.

[0022] An outer surface (not shown) of the guide member 134, according to various embodiments may be configured to at least partly direct the lubricating fluid away from an adjacent counterweight 128 of the crankshaft 124 of the engine 100. In an embodiment, at least a portion of the guide member 134 may be parallel to the adjacent counterweight 128 (best shown in FIG. 1). Accordingly, at least a portion of the guide member 134 that is extending from the cylinder member 108 may act as a ramp over the adjacent counterweight 128 to direct the lubricating fluid away from the adjacent counterweight 128. Further, the outer surface of the guide member 134 may also be configured to direct the lubricating fluid from the cylinder member 108 into the oil pan 130 of the engine 100.

[0023] In various other embodiments, the guide member 134 may embody any other shapes based on other parameters, such as tolerances between different components of the engine 100 and the like. For example, the guide member 134 may be designed to conform to the dimensions and shape of the corresponding counterweights 128. Moreover, additionally, a shape of the corresponding counterweights 128 and/or other components may be modified so as to accommodate the guide member 134.

[0024] In an embodiment, multiple guide members 134 may be coupled to the cylinder member 108. Further, the guide members 134 may be disposed so as to allow general movement of other components of the engine 100.

[0025] In one embodiment, the guide member 134 is made of one of a sheet metal. In another embodiment, the guide member 134 is made of plastic. In various other embodiments, the guide member 134 may be made of any other light weight materials including, but not limited to, polymers, composites and the like. For example, the guide member 134 may be implemented as a coating on

the cylinder member 108.

Industrial Applicability

[0026] The present disclosure relates to the guide member 134 for guiding the lubricating fluid. The guide member 134 is coupled to the cylinder member 108 and is disposed outside the cylinder member 108. Further, the guide member 134 may be configured to direct a flow of the lubricating fluid from the corresponding cylinder member 108 away from the adjacent counterweight 128. With such an implementation in all the cylinder members 108 of the engine 100, the counterweights 128 of the crankshaft 124 may be shielded from contacting with the lubricating fluid falling from the cylinder member 108.

[0027] As such, various aerodynamic forces such as, lift force, drag force and the like due to a flow of the lubricating fluid or a mist of the fluid on the counterweight 128 may be reduced. Further, a resistance to a movement of the counterweight 128 and thereby a rotation of the crankshaft 124 due to the lubricating fluid may be reduced.

[0028] Further, the guide member 134 may be made of light weight materials such as, plastic, sheet metal, polymers and the like. Additionally, the guide member 134 may be implemented on the existing engines with little or no modification to other components of the engine 100. Moreover, dimensions and a shape of the guide member 134 may be customized to suit different applications.

[0029] While aspects of the present disclosure have been particularly shown and described with reference to the embodiments above, it will be understood by those skilled in the art that various additional embodiments may be contemplated by the modification of the disclosed machines, systems and methods without departing from the spirit and scope of what is disclosed. Such embodiments should be understood to fall within the scope of the present disclosure as determined based upon the claims and any equivalents thereof.

Claims

1. A guide member (134) for guiding lubricating fluid in an engine (100) having a cylinder member (108), the guide member (134) coupled to the cylinder member (108) and is disposed outside the cylinder member (108).
2. The guide member (134) of claim 1 made of one of a sheet metal and a plastic.
3. The guide member (134) of claim 1, wherein an outer surface of the guide member (134) is configured to at least partially direct the lubricating fluid away from an adjacent counterweight (128) of a crankshaft (124) of the engine (100), the crankshaft (124) op-

eratively coupled to a piston (110) slidably disposed in the cylinder member (108).

at least one of an adhesive and a fastener.

4. The guide member (134) of claim 1 having a curvilinear shape. 5
5. The guide member (134) of claim 1 having a planar configuration.
6. The guide member (134) of claim 1 comprising a first portion (142) and a second portion (144) angularly extending from the first portion (142), wherein the first portion (142) is coupled to the cylinder member (108). 10
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7. The guide member (134) of claim 1 coupled to one of an outer wall (106) of the cylinder member (108) and a bottom wall (107) of the cylinder member (108).
8. The guide member (134) of claim 1 coupled to the cylinder member (108) using at least one of an adhesive and a fastener. 20
9. An engine (100) comprising: 25
 - a cylinder member (108);
 - a piston (110) slidably disposed in the cylinder member (108);
 - a crankshaft (124) operatively coupled to the piston (110), the crankshaft (124) having at least one counterweight (128) located adjacent to the cylinder member (108); and
 - a guide member (134) coupled to the cylinder member (108) and is disposed outside the cylinder member (108), the guide member (134) configured to at least partially direct a flow of the lubricating fluid away from the counterweight (128) adjacent to the cylinder member (108). 30
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10. The engine (100) of claim 9, wherein the guide member (134) is made of one of a sheet metal and a plastic. 40
11. The engine (100) of claim 9, wherein the guide member (134) has a curvilinear shape. 45
12. The engine (100) of claim 9, wherein the guide member (134) comprises a first portion (142) coupled to the cylinder member (108) and a second portion (144) angularly extending from the first portion (142). 50
13. The engine (100) of claim 9, wherein the guide member (134) is coupled to one of an outer wall (106) of the cylinder member (108) and a bottom wall (107) of the cylinder member (108). 55
14. The engine (100) claim 9, wherein the guide member (134) is coupled to the cylinder member (108) using

15. A machine comprising the engine (100) of claim 9.

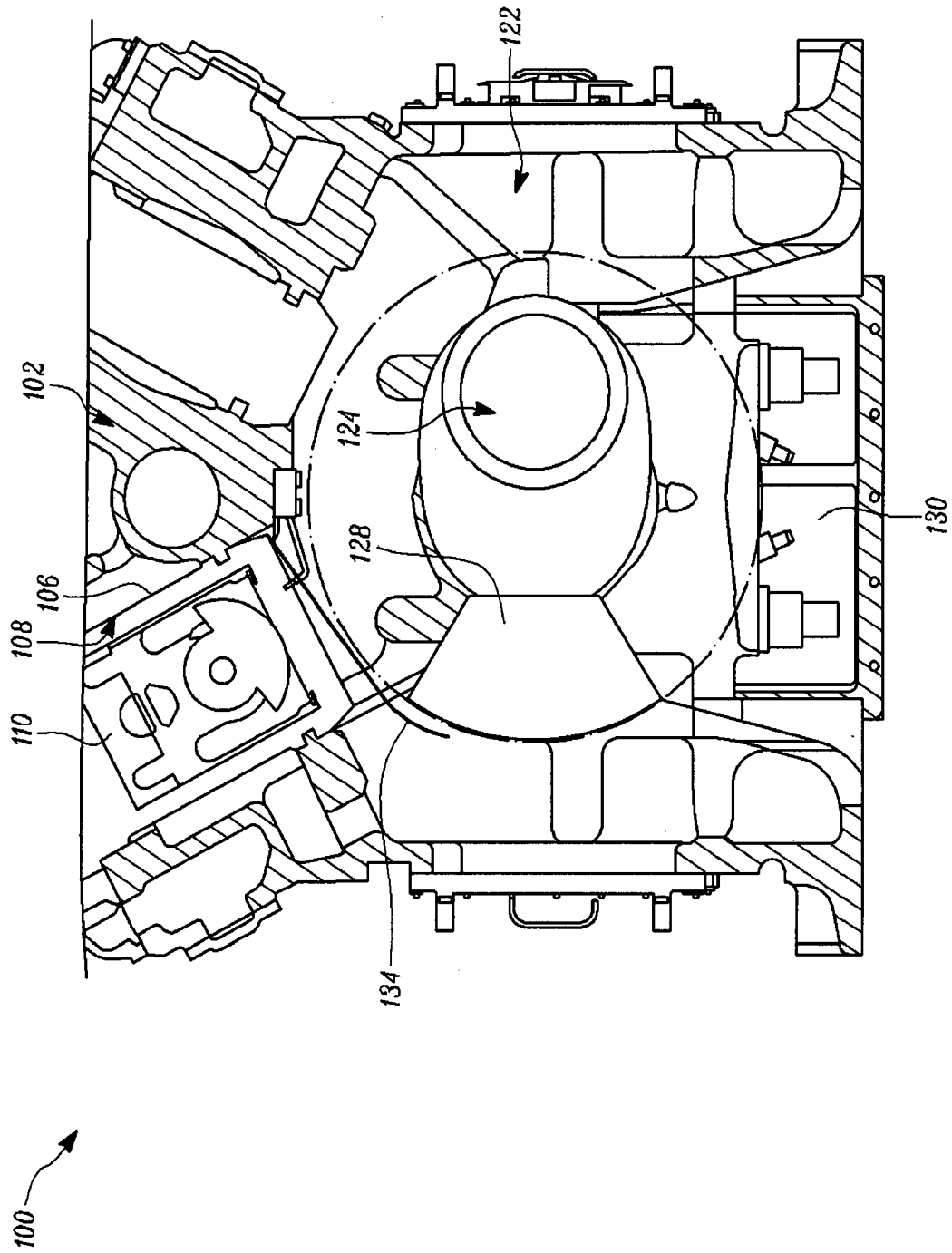


FIG. 1

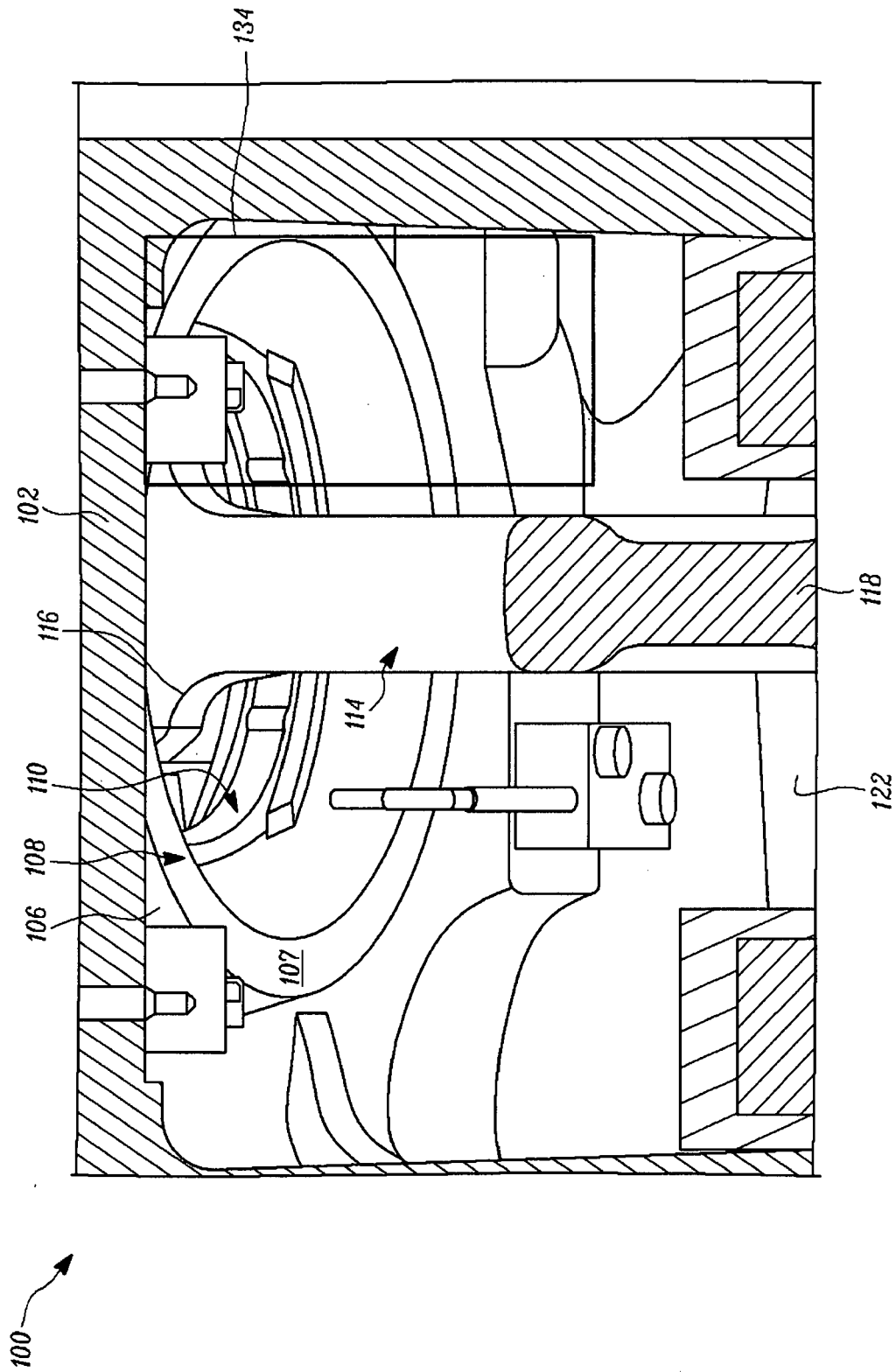


FIG. 2

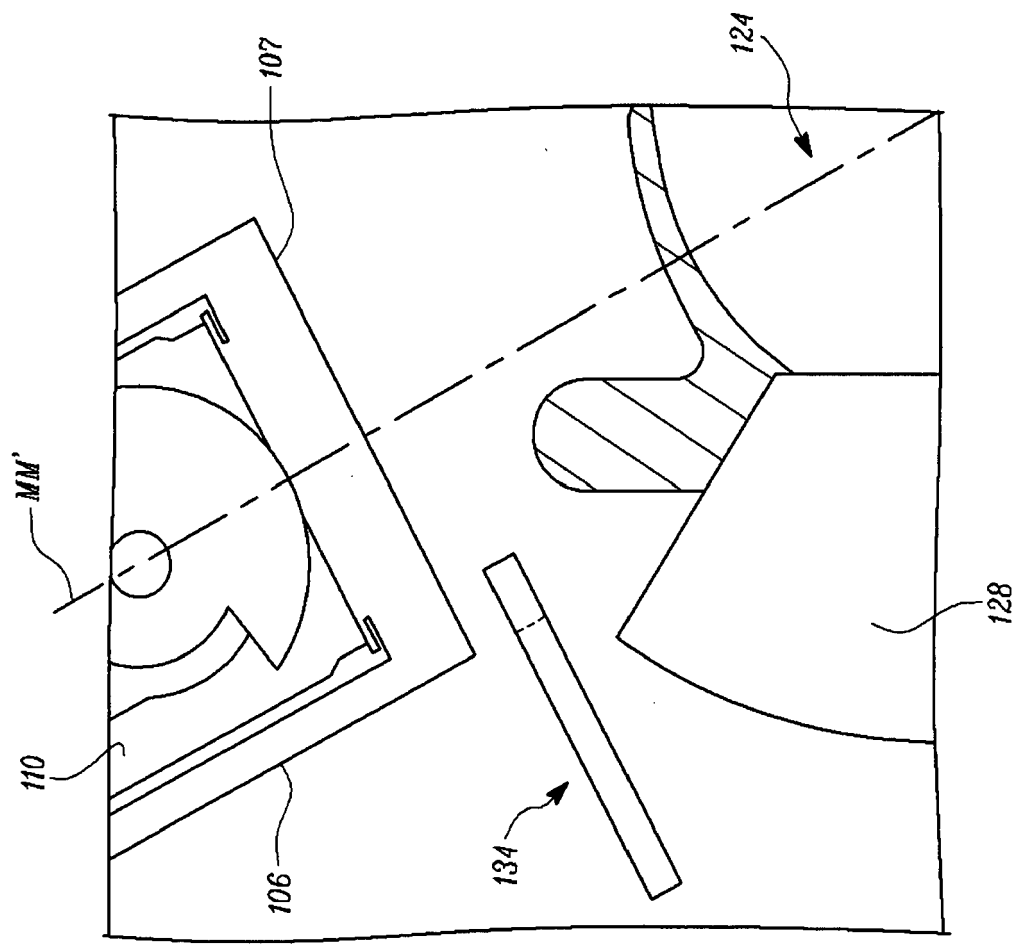


FIG. 3

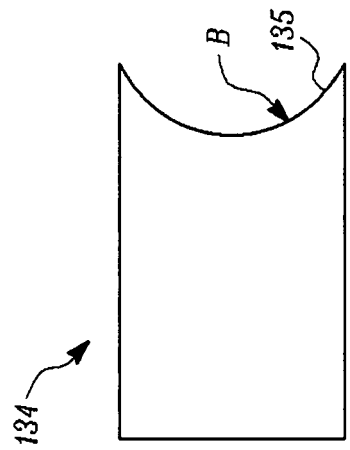


FIG. 4

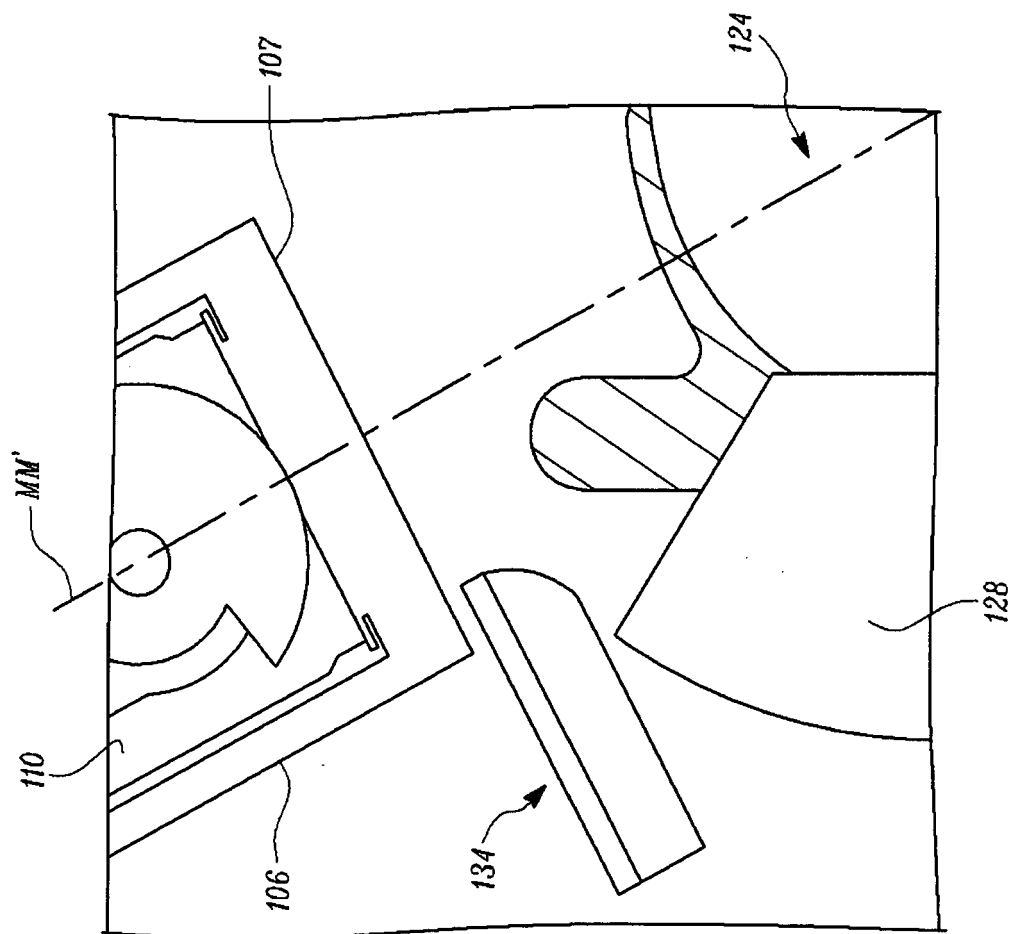


FIG. 5

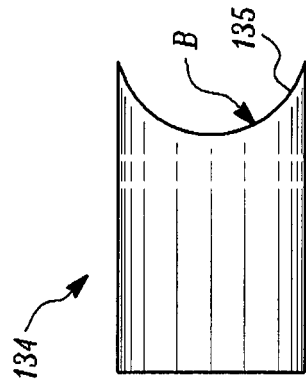


FIG. 6

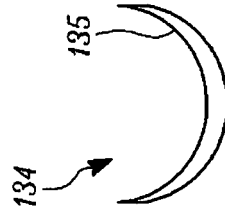


FIG. 7

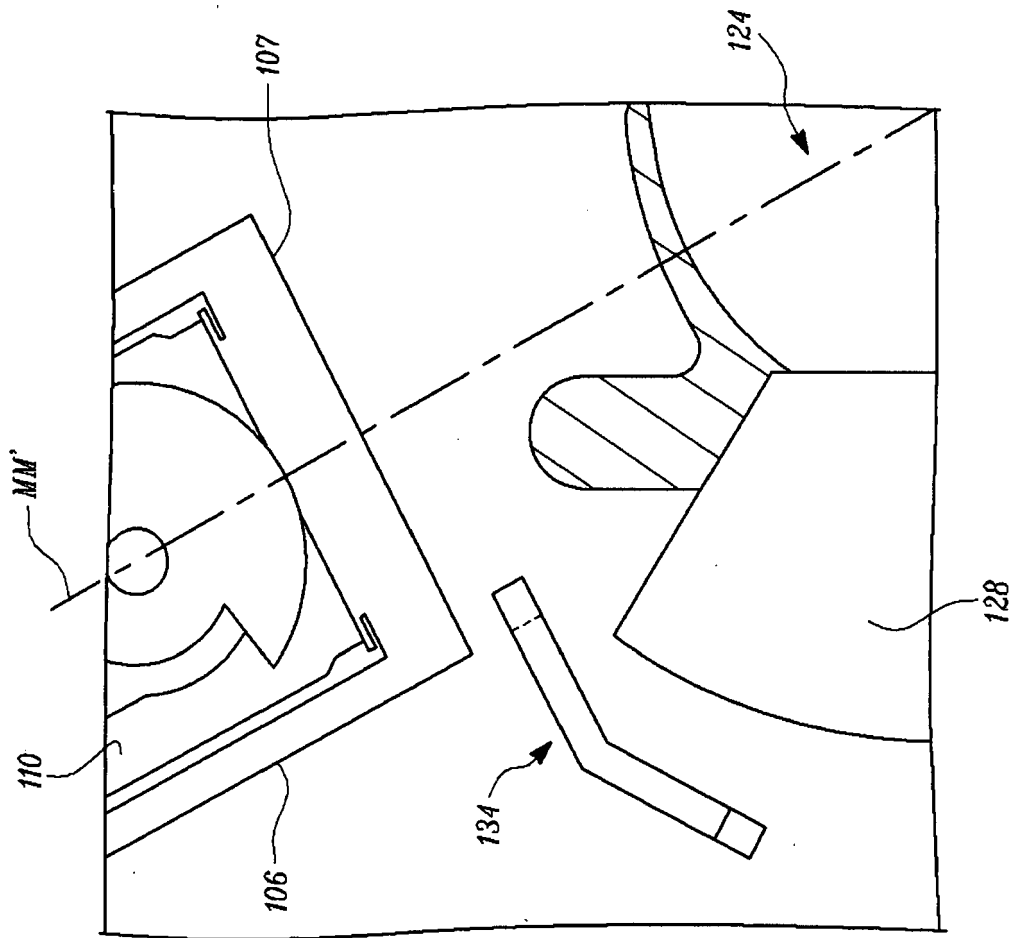


FIG. 8

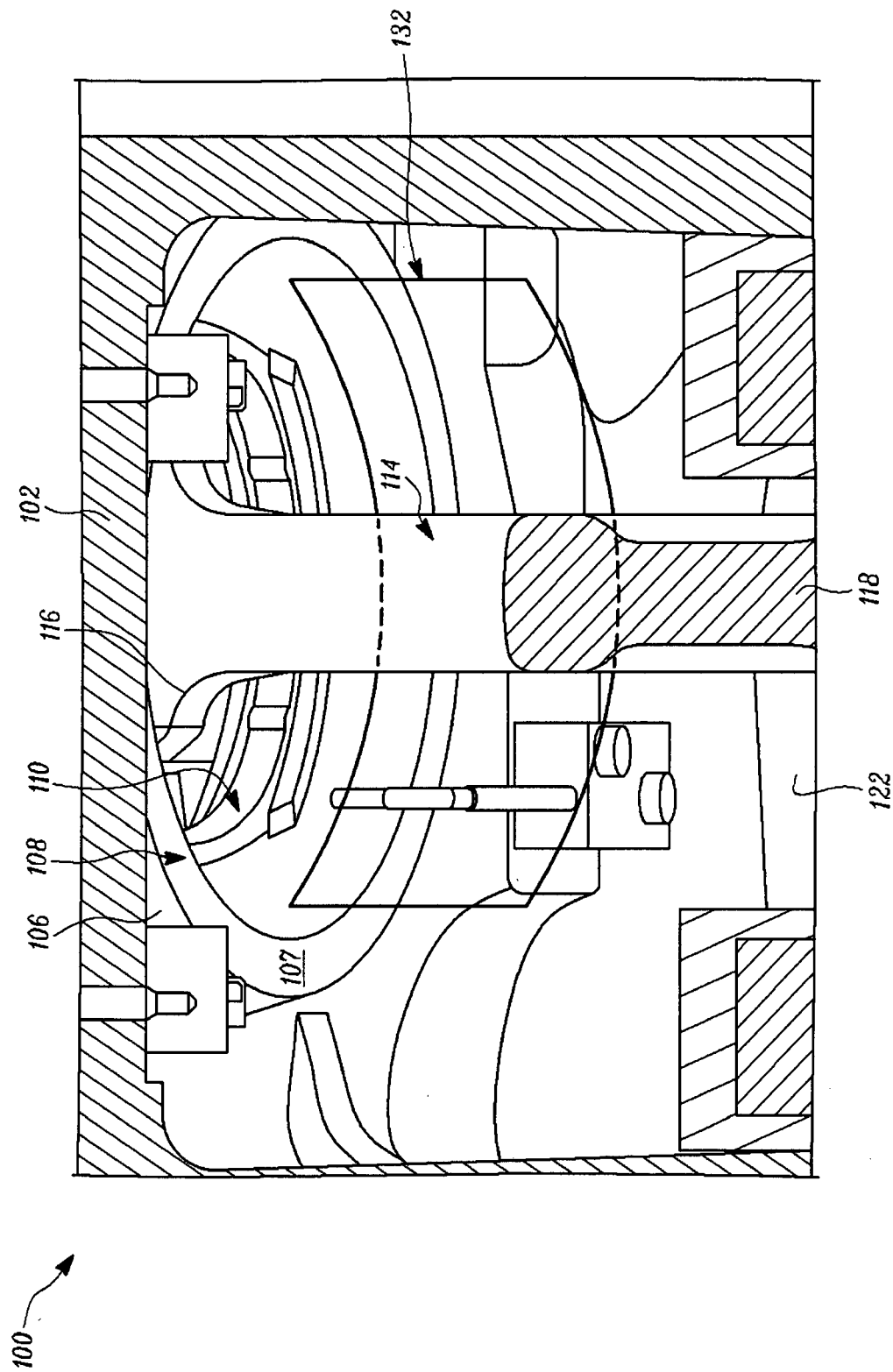


FIG. 9



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Application Number
EP 15 00 2358

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Place of search The Hague		Date of completion of the search 19 January 2016	Examiner Flamme, Emmanuel
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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