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(54) **A COVER MEMBER FOR A CRANKCASE OF AN ENGINE**

(57) A cover member (140) for a main bearing (132) for a crankshaft (124) of an engine (100) is provided. The main bearing (132) is configured to rotatably support the crankshaft (124) in a crankcase (122) of the engine (100).

The cover member (140) is disposed between the main bearing (132) and the crankcase (122). The cover member (140) is configured to at least partially enclose the main bearing (132).

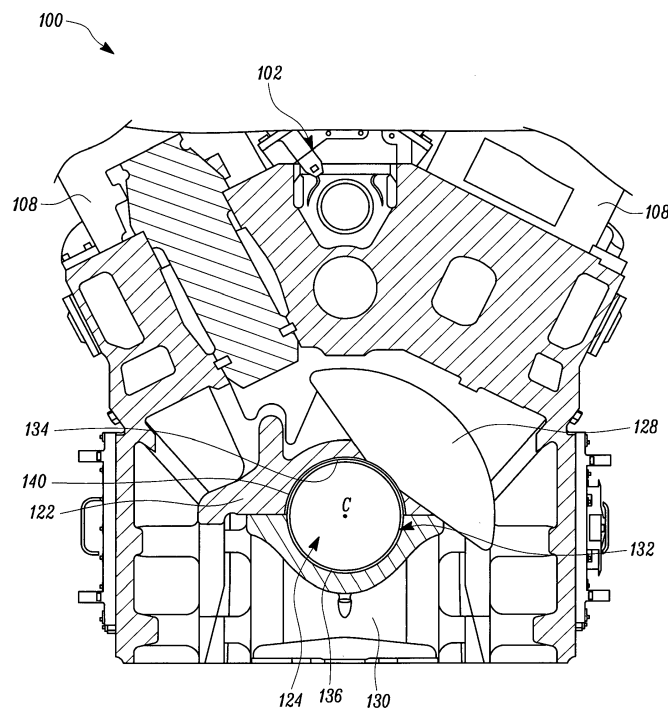


FIG. 1

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DescriptionTechnical Field

[0001] The present disclosure relates to an engine, and particularly to a cover member for directing a lubricating fluid away from a crankcase of the engine.

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 a crankcase and/or counterweights of the crankshaft that are located below the cylinder. Moreover, the oil may fall from the cylinder through a gap between the crankcase and the crankshaft onto the counterweights. However, a contact of the oil with the counterweight and/or a presence of oil mist in the crankcase provides resistance to a movement of counterweights and thereby the crankshaft in the mist, which may decrease the efficiency of the engine.

[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.

Summary of the Disclosure

[0004] In an aspect of the present disclosure, a cover member for a main bearing for a crankshaft of an engine is provided. The main bearing is configured to rotatably support the crankshaft in a crankcase of the engine. The cover member is disposed between the main bearing and the crankcase. The cover member configured to at least partially enclose the main bearing.

[0005] In another aspect of the present disclosure, an engine is provided. The engine includes a crankcase and a crankshaft rotatably disposed in the crankcase. The engine includes a main bearing configured to rotatably support the crankshaft in the crankcase. The engine also includes a cover member disposed between the main bearing and the crankcase. The cover member is configured to at least partially enclose the main bearing.

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

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

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

FIG. 2 illustrates a bottom view of a crankcase of the engine showing a cover member, in accordance with one embodiment of the present disclosure; and
FIG. 3 illustrates an enlarged view of section AA' showing the cover member disposed in the crankcase.

Detailed Description

[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 an 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.

[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 applicable to any type of engine 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 (shown in FIG. 2) slidably received therein. The engine 100 also includes a connecting rod 114 (shown in FIG. 2) 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 crankcase 122 coupled to the cylinder block 102. The crankcase 122 may be configured to rotatably support a crankshaft 124. Referring to FIGS. 2 and 3, the crankshaft 124 further includes a main bearing 132 configured to rotatably support the crankshaft 124 in the crankcase 122. The main bearing 132 may include an inner portion configured to interface with the crankshaft 124. The main bearing 132 may also include an outer portion configured to interface with the crankcase 122. Further, the outer portion of the

main bearing 132 may also include an upper portion 134 and a lower portion 136 opposite to the upper portion 134. The upper portion 134 faces the cylinder member 108 extending from the crankcase 122.

[0012] 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.

[0013] The crankshaft 124 may include at least one counterweight 128 (shown in FIG. 1) 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 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.

[0014] The engine 100 may also include an oil pan 130 (shown in FIG. 1) 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.

[0015] 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 lubricating 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 crankcase 122 and the like.

[0016] In the illustrated embodiments of FIGS. 2 and 3, the engine 100 includes a cover member 140 for the main bearing 132 of the crankshaft 124. The cover member 140 is disposed between the main bearing 132 and the crankcase 122. Further, the cover member 140 is configured to at least partially enclose the main bearing

132. Specifically, the cover member 140 is disposed between the outer portion of the main bearing 132 and the crankcase 122.

[0017] In the illustrated embodiment, the cover member 140 is disposed on the upper portion 134 of the main bearing 132. Further, the cover member 140 has a semi-circular shape. In another embodiment, the cover member 140 disposed on the upper portion 134 may have an arcuate shape subtending an angle less than 180 degrees with a center 'C' of the main bearing 132.

[0018] Alternatively, the cover member 140 may also extend towards the lower portion 136 of the main bearing 132. Accordingly, the cover member 140 may have any arcuate shape subtending an angle between 0 to 360 degrees with the center 'C' of the main bearing 132. In various other embodiments, the cover member 140 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 cover member 140 may be designed to conform to the dimensions and shape of the corresponding main bearings 132 and the crankcase 122.

[0019] In an embodiment, the engine 100 may include multiple cover members 140 or multiple segments of the cover members 140 that may be coupled to the main bearing 132 and the crankcase 122.

[0020] In an embodiment, the cover member 140 may be coupled to the main bearing 132 and the crankcase 122 by an interference fit. For example, the cover member 140 may be press-fitted into the crankcase 122 and further, the crankshaft 124 may be assembled in the crankcase 122. In another embodiment, the cover member 140 may be coupled to at least one of the main bearing 132 and the crankcase 122 by other suitable methods such as, but not limited to, using mechanical fasteners, adhesives and the like. In an example, the cover member 140 may be coupled to the outer portion of the main bearing 132 using fasteners, such as, but not limited to, bolts, screws and the like.

[0021] In an embodiment, an outer surface of the cover member 140 is configured to at least partly direct the lubricating fluid away from the counterweights 128 of the engine 100. Additionally, the outer surface of the cover member 140 may also be configured to direct the lubricating fluid from the cylinder member 108 into the oil pan 130 of the engine 100.

[0022] In an example, the main bearing 132 may be a roller bearing for example, a taper roller bearing. However, it may be envisioned to implement the cover member 140 for any other types of main bearings 132 and/or crankshafts 124.

[0023] In one embodiment, the cover member 140 is made of one of a sheet metal. In another embodiment, the cover member 140 is made of plastic. In various other embodiments, the cover member 140 may be made of any other light weight materials including, but not limited to, polymers, composites and the like.

Industrial Applicability

[0024] The present disclosure relates to the cover member 140 for guiding the lubricating fluid. The cover member 140 may be configured to at least partially enclose the main bearing 132. The cover member 140 may be coupled to the crankcase 122 and the main bearing 132 and thereby seal a gap therebetween. With such an implementation in or more of the main bearings 132 of the crankshaft 124, the counterweights 128 of the crankshaft 124 may be shielded from contacting with the lubricating fluid falling from the cylinder member 108. Further, the cover member 140 may be configured to direct a flow of the lubricating fluid from the corresponding cylinder member 108 away from the crankshaft 124.

[0025] 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 crankshaft 124 and /or 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.

[0026] Further, the cover member 140 may be made of light weight materials such as, plastic, sheet metal, polymers and the like. Additionally, the cover member 140 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 cover member 140 may be customized to suit different applications.

[0027] 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 cover member (140) for a main bearing (132) for a crankshaft (124) of an engine (100), the main bearing (132) configured to rotatably support the crankshaft (124) in a crankcase (122) of the engine (100), the cover member (140) disposed between the main bearing (132) and the crankcase (122), the cover member (140) configured to at least partially enclose the main bearing (132).
2. The cover member (140) of claim 1, wherein the main bearing (132) comprises an inner portion configured to interface with the crankshaft (124) and an outer portion configured to interface with the crankcase (122), and wherein the cover member (140) is dis-

posed between the outer portion of the main bearing (132) and the crankcase (122).

3. The cover member (140) of claim 1 made of one of a sheet metal and a plastic.
4. The cover member (140) of claim 1 coupled to the main bearing (132) and the crankcase (122) by an interference fit.
5. The cover member (140) of claim 1 coupled to the main bearing (132) by at least one of adhesives and fasteners.
6. The cover member (140) of claim 1 having an arcuate shape.
7. The cover member (140) of claim 1 having a semi-circular shape.
8. The cover member (140) of claim 7, wherein the main bearing (132) includes an upper portion (134) facing a cylinder member extending from the crankcase (122) and a lower portion (136) opposite to the upper portion (134), and wherein the cover member (140) is disposed on the upper portion (134).
9. An engine (100) comprising:
 - a crankcase (122);
 - a crankshaft (124) rotatably disposed in the crankcase (122);
 - a main bearing (132) configured to rotatably support the crankshaft (124) in the crankcase (122); and
 - a cover member (140) disposed between the main bearing (132) and the crankcase (122), the cover member (140) configured to at least partially enclose the main bearing (132).
10. The engine (100) of claim 9, wherein the main bearing (132) comprises an inner portion configured to interface with the crankshaft (124) and an outer portion configured to interface with the crankcase (122), and wherein the cover member (140) is disposed between the outer portion of the main bearing (132) and the crankcase (122).
11. The engine (100) of claim 9 made of one of a sheet metal and a plastic.
12. The engine (100) of claim 9 coupled to the main bearing (132) and the crankcase (122) by an interference fit.
13. The engine (100) of claim 8 coupled to the main bearing (132) by at least one of adhesives and fasteners.

14. The engine (100) of claim 9 having a semi-circular shape.

15. The engine (100) of claim 14, wherein the main bearing (132) includes an upper portion (134) facing a cylinder member extending from the crankcase (122) and a lower portion (136) opposite to the upper portion (134), and wherein the cover member (140) is disposed on the upper portion (134).

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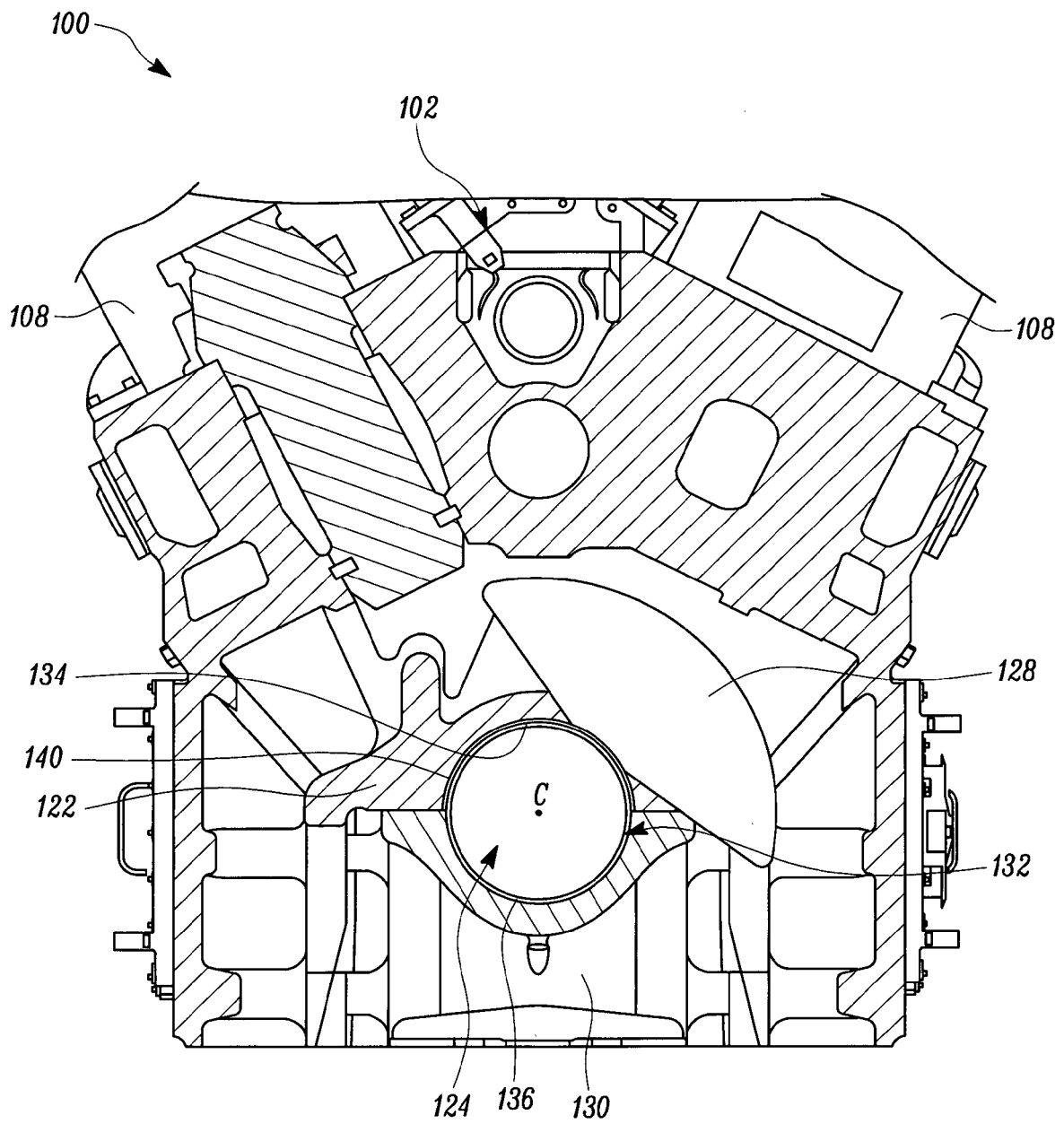


FIG. 1

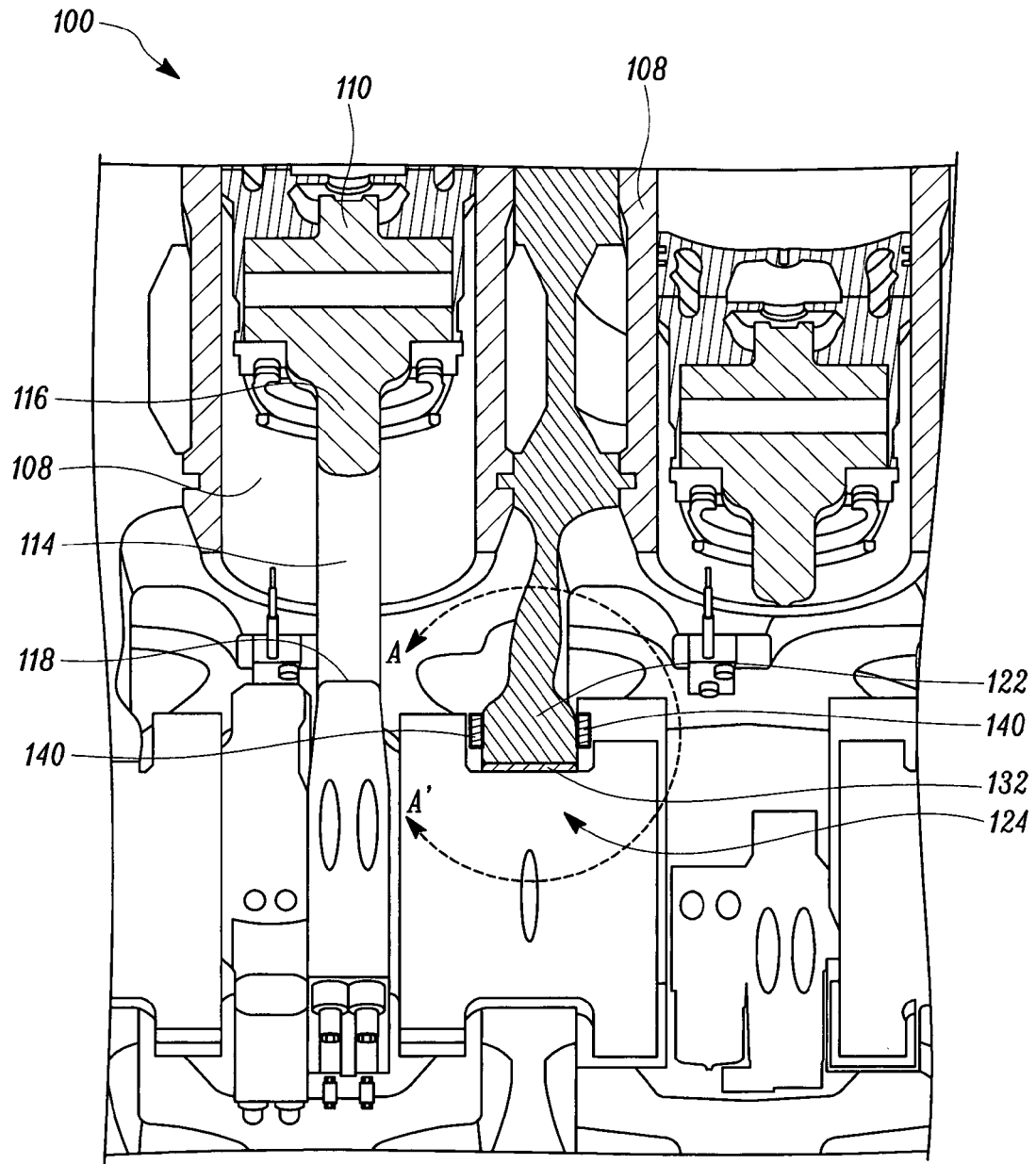


FIG. 2

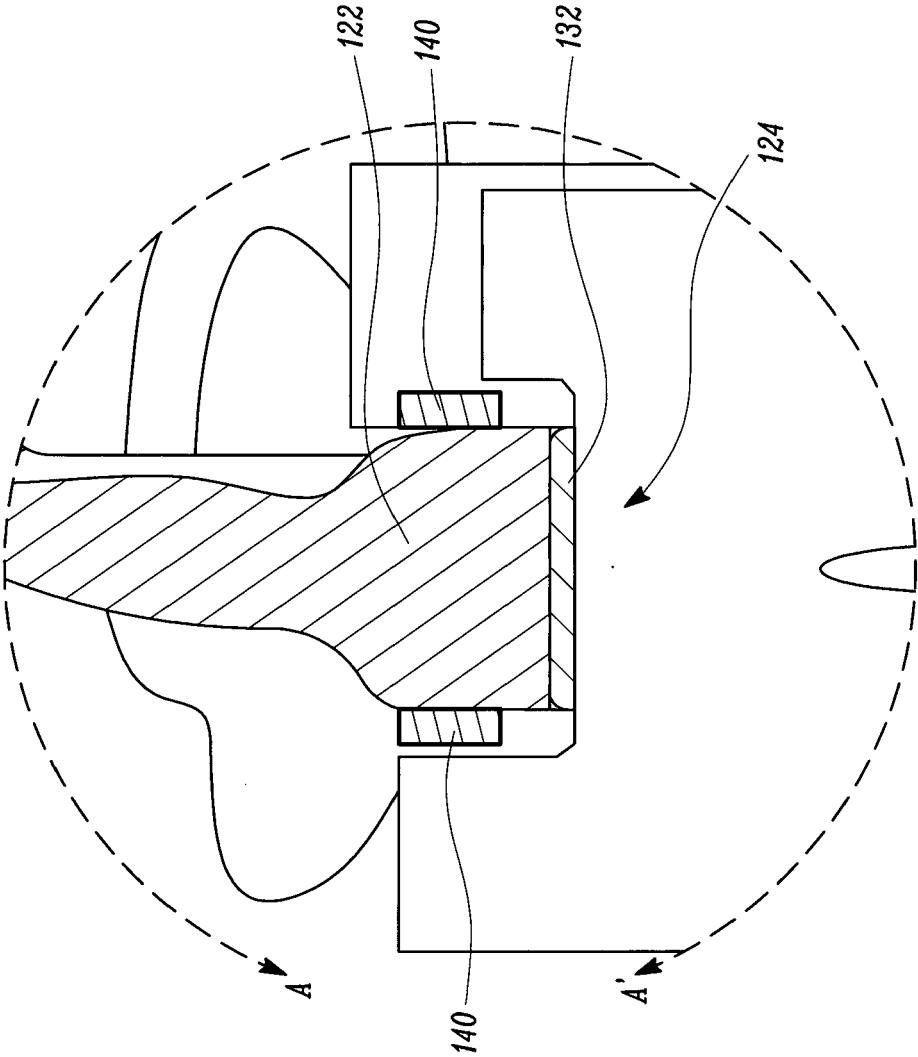


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
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Place of search Munich		Date of completion of the search 14 October 2015	Examiner Coniglio, Carlo
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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