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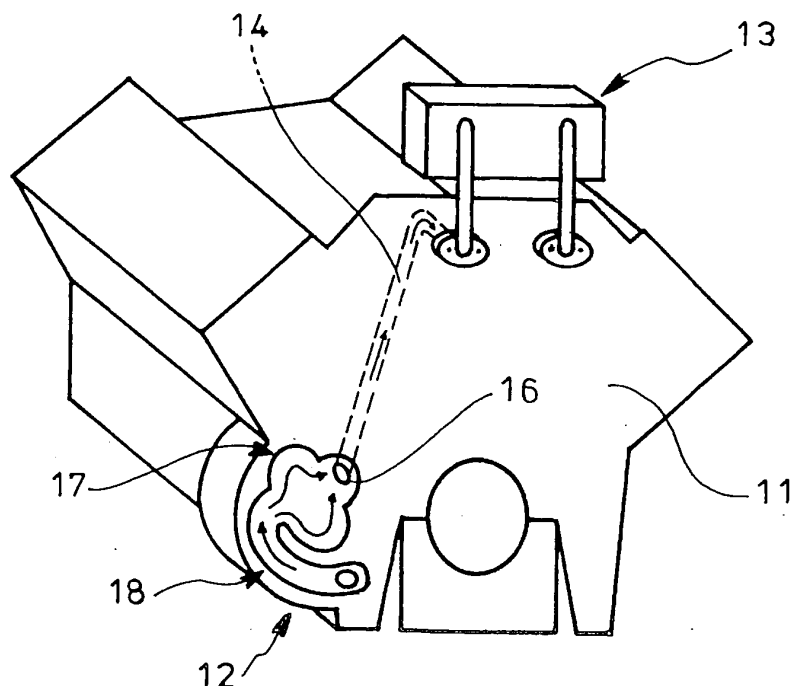
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(54) **OIL FLOW PASSAGE FORMATION IN CYLINDER BLOCK**

(57) Disclosed is oil flow passage formation in a cylinder block 11 from an oil pump 12 to an oil cooler 13, having a side surface of the cylinder block 11 on which the oil pump 12 is formed, and an oil flow passage 14

formed in and along the side surface of the cylinder block 11 on which the oil pump 12 is formed. This makes it unnecessary to change the flow direction of the engine oil and suppresses increase in resistance of the engine oil to cause the engine oil to flow smoothly.

Fig. 3



Description

Technical Field

[0001] The present invention relates to oil flow passage formation in a cylinder block with an oil flow passage.

Background Art

[0002] An engine in general is provided, as shown in Figs. 1 and 2, with a cylinder block 1 having on its one side an oil pump 2 for discharge of engine oil from an oil pan (not shown) and having on the other side an oil cooler (not shown) for cooling of the engine oil, the cylinder block 1 being formed with an oil flow passage 3 extending from the one side to the other side for delivery of the engine oil from the oil pump 2 to the oil cooler.

[0003] The oil pump 2 comprises a plurality of (two in Fig. 2) gears 4, a pump chamber 6 having the gears 4 arranged therein and formed with a discharge port 5 and a delivery flow passage 7 for delivery of the engine oil from the oil pan to the pump chamber 6, the pump chamber 6 and delivery flow passage 7 being provided by openings 8 and 9 for the pump chamber and delivery flow passage, respectively, formed on a side surface of the cylinder block 1 and cover bodies 10 fitted into the openings 8 and 9, respectively. The discharge port 5 of the pump chamber 6 is formed on a bottom surface 8a of the opening 8 for the pump chamber at its side edge. In Fig. 2, only the cover body 10 for the pump chamber is shown.

[0004] The oil cooler may be of water-cooled type using cooling water for the engine or may be of air-cooled type using ambient air just like a radiator.

[0005] When the engine oil is to be delivered from the oil pump 2 to the oil cooler, the gears 4 in the pump 2 are rotated to discharge the engine oil via the discharge port 5 and deliver the same into the oil cooler via the oil flow passage 3 in the cylinder block 1. The discharge of the engine oil from the oil pump 2 is such that the gears 4 are rotated to cause the engine oil to flow along the peripheral surface 8b of the opening 8 for the pump chamber; the engine oil changes its flow direction at a tip of the pump chamber 6 from toward the peripheral surface 8b of the opening 8 substantially perpendicularly to the bottom surface 8a and is discharged via the discharge port 5.

[0006] Prior art references in the field of oil cooler, oil pump and oil flow passage formation are, for example, the following references 1 and 2.

[Reference 1] Japanese Utility Model publication No. 2-43406

[Reference 2] JP 11-125105 A

Summary of the Invention

Problems to be Solved by the Invention

[0007] However, in such oil flow passage formation, the flow direction of the engine oil changes from that coplanar with the cylinder block 1 to that substantially perpendicular thereto when the engine oil is discharged from the oil pump 2 to the oil flow passage 3, which disadvantageously increases resistance of the engine oil, disabling the engine oil to flow smoothly.

[0008] The invention was made in view of the above and has its object to provide oil flow passage formation of a cylinder block which enables the engine oil to flow smoothly.

Means or Measures for Solving the Problems

[0009] In order to attain the above-mentioned object, the invention provides oil flow passage formation in a cylinder block from an oil pump to an oil cooler, comprising a side surface of the cylinder block on which the oil pump is formed, and an oil flow passage formed in and along the side surface of the cylinder block on which the oil pump is formed.

[0010] In the invention, the oil cooler may be arranged at an upper portion of the cylinder block.

[0011] In the invention, a discharge port from the oil pump to the oil flow passage may be oriented to a discharge direction by the drive means of the oil pump.

[0012] According to the invention, the oil flow passage is formed in and along the side surface of the cylinder block on which the oil pump is formed, which can make it unnecessary to change the flow direction of the engine oil from that coplanar with the cylinder block to that substantially perpendicular thereto, and can suppress increase in resistance of the engine oil to cause the engine oil to flow smoothly.

[0013] When the oil cooler is arranged at the upper portion of the cylinder block, the oil flow passage for delivery of the engine oil to the oil cooler may be formed in the side surface on which the oil pump is formed, which can make it unnecessary to change the flow direction of the engine oil and can further suppress increase in resistance of the engine oil to cause the engine oil to flow smoothly.

[0014] When the discharge port from the oil pump to the oil flow passage is oriented to the discharge direction by the drive means of the oil pump, this can make it unnecessary to change the flow direction of the engine oil and can still further suppress increase in resistance of the engine oil to cause the engine oil to flow smoothly.

Effects of the Invention

[0015] The invention as mentioned in the above can exhibit various excellent effects and advantages of making it unnecessary to change the flow direction of the

engine oil and suppressing increase in resistance of the engine oil to cause the engine oil to flow smoothly.

Brief Description of the Drawings

[0016]

Fig. 1 is a schematic view showing conventional oil flow passage formation in a cylinder block;
Fig. 2 is an enlarged schematic view showing an oil pump in the conventional oil flow passage formation in the cylinder block;
Fig. 3 is a schematic view showing oil flow passage formation in a cylinder block according to an embodiment of the invention; and
Fig. 4 is an enlarged schematic view showing an oil pump in the oil flow passage formation in the cylinder block according to the embodiment of the invention.

Explanation of the Reference Numerals

[0017]

- 11 cylinder block
- 12 oil pump
- 13 oil cooler
- 14 oil flow passage
- 15 gear (drive means)
- 16 discharge port

Best Mode for Carrying Out the Invention

[0018] Next, an embodiment of the invention will be described in conjunction with the drawings.

[0019] Figs. 3 and 4 illustrate the embodiment of the invention.

[0020] In the embodiment of the invention, an engine has a cylinder block 11 having on its one side an oil pump 12 for discharge of engine oil from an oil pan (now shown) and an oil cooler 13 arranged at an upper portion of the cylinder block 11 on the side of the oil pump for cooling of the engine oil, the cylinder block 11 being formed with an oil flow passage 14 extending in and along a side surface of the cylinder block 11 from the oil pump 12 to the oil cooler 13.

[0021] The oil pump 12 comprises drive means or a plurality of (two in Fig. 3) gears 15, a pump chamber 17 having the gears 15 arranged therein and formed with a discharge port 16 of the engine oil and a delivery flow passage 18 for delivery of the engine oil from the oil pan to the pump chamber 17, the pump chamber 17 and delivery flow passage 18 being provided by openings 19 and 20 for the pump chamber and the delivery flow passage, respectively, formed on a side surface of the cylinder block 11 and cover bodies 21 fitted into the openings 19 and 20, respectively. The discharge port 16 of the pump chamber 17 is formed on the peripheral surface 19a of the opening 19 for the pump chamber at a side

edge thereof to be oriented to the discharge direction of the engine oil 15 by the gears 15 of the oil pump 12 so as to make the flow direction of the engine oil in the oil pump 12 coplanar with that in the oil flow passage 14. In Fig. 4, only the cover body 21 fitted to the opening 19 for the pump chamber is shown.

[0022] The oil cooler 13 may be of water-cooled type using cooling water for engine or may be of air-cooled type using ambient air just like a radiator.

10 [0023] Next, a mode of operation of the embodiment according to the invention will be described.

[0024] When engine oil is to be delivered from the oil pump 12 to the oil cooler 13, the gears 15 in the oil pump 12 are rotated to discharge the engine oil via the delivery port 16 and deliver the same to the oil cooler 13 via the oil flow passage 14 in the cylinder block 11.

15 [0025] The discharge of the engine oil from the oil pump 12 is such that the gears 15 are rotated to cause the engine oil to flow along the peripheral surface 19a of the opening 19 for the pump chamber, the engine oil being discharged via the discharge port 16 formed on the peripheral surface 19a of the opening 19 for the pump chamber so as to continue to flow coplanar at the tip of the pump chamber 17 without change of the flow direction.

20 [0026] Thus, according to the embodiment, the oil flow passage 14 from the oil pump 12 to the oil cooler 13 is formed in and along the side surface of the cylinder block 11 on which the oil pump 12 is formed, which can make it unnecessary to change the flow direction of the engine oil from that coplanar with the cylinder block 11 to that substantially perpendicular thereto and can suppress increase in resistance of the engine oil to cause the engine oil to flow smoothly.

25 [0027] When the oil cooler 13 is arranged at the upper portion of the cylinder block 11, the oil flow passage 14 for delivery of the engine oil to the oil cooler 13 can be formed in the side surface on which the oil pump 12 is formed, which fact can make it unnecessary to change the flow direction of the engine oil and can further suppress increase in resistance of the engine oil to cause the engine oil to flow smoothly.

30 [0028] When the discharge port 16 from the oil pump 12 to the oil flow passage 14 is oriented to the discharge direction by the drive means of the oil pump 12, this can make it unnecessary to change the flow direction of the engine oil and can further suppress increase in resistance of the engine oil to cause the engine oil to flow smoothly.

35 [0029] It is to be understood that oil flow passage formation of a cylinder block according to the invention is not limited to the above-mentioned embodiment and that various changes and modifications may be made without leaving the spirit of the invention.

55 Industrial Applicability

[0030] Oil flow passage formation in a cylinder block

according to the invention is applicable to various engines.

Claims

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1. Oil flow passage formation in a cylinder block (11) from an oil pump (12) to an oil cooler (13), comprising an side surface of the cylinder block(11) on which the oil pump (12) is formed, and an oil flow passage (14) formed in and along the side surface of the cylinder block (11) on which the oil pump (12) is formed. 10
2. Oil flow passage formation in a cylinder block as claimed in claim 1, wherein the oil cooler (13) is arranged at an upper portion of the cylinder block (11). 15
3. Oil flow passage formation in a cylinder block as claimed in claim 1, wherein a discharge port (16) from the oil pump (12) to the oil flow passage (14) is oriented to a discharge direction by drive means (15) of the oil pump (12). 20
4. Oil flow passage formation in a cylinder block as claimed in claim 2, wherein a discharge port (16) from the oil pump (12) to the oil flow passage (14) is oriented to a discharge direction by drive means (15) of the oil pump (12). 25

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Fig. 1

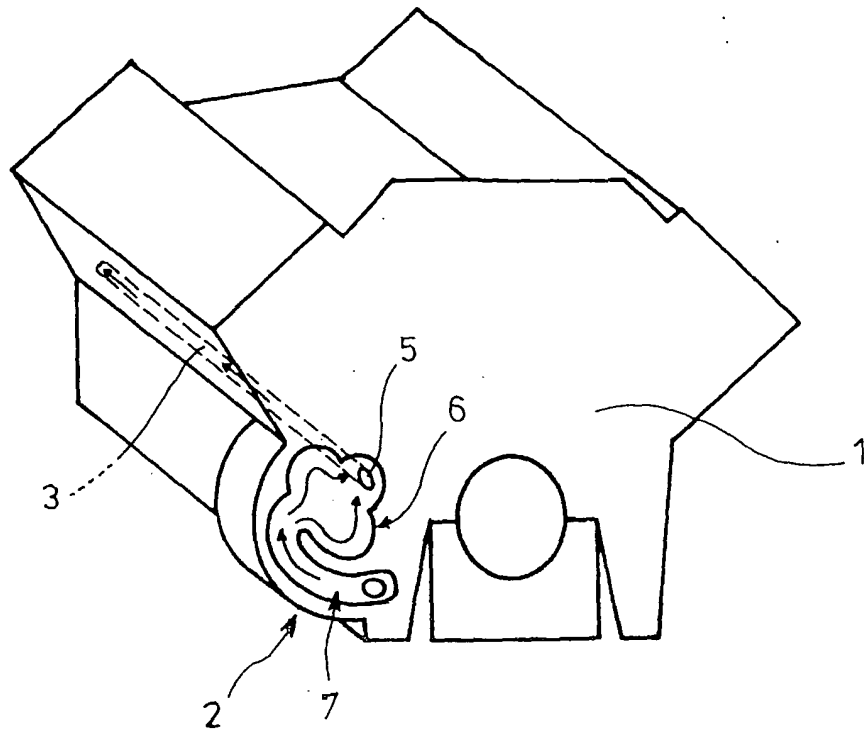


Fig. 2

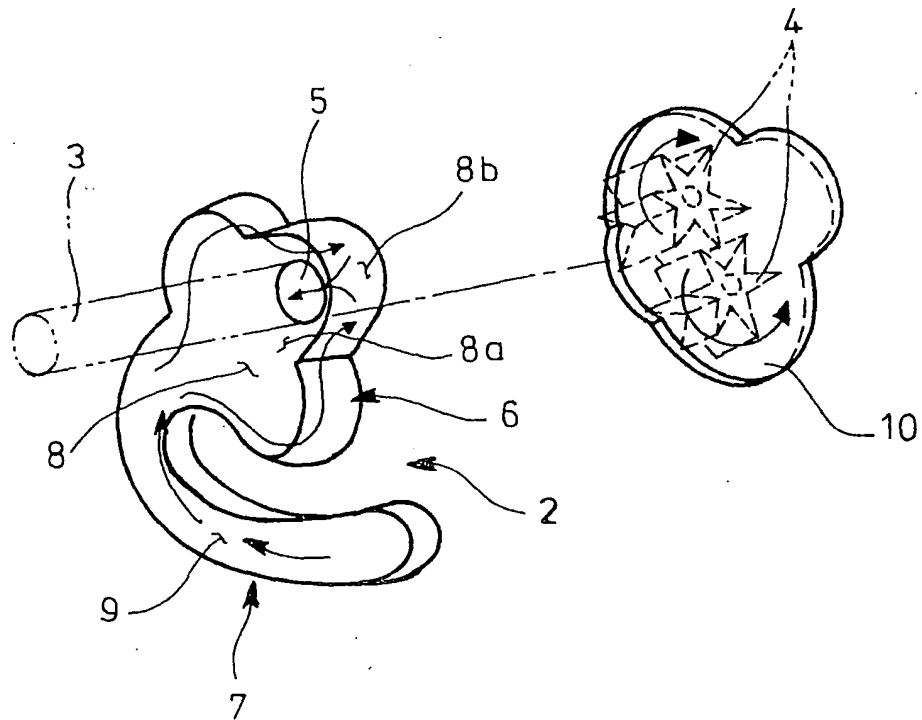


Fig. 3

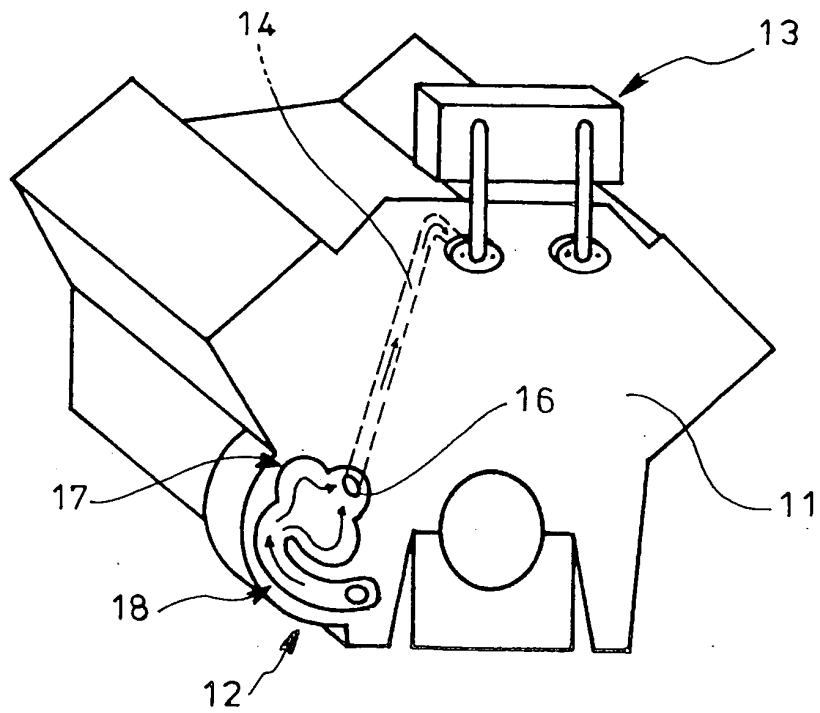
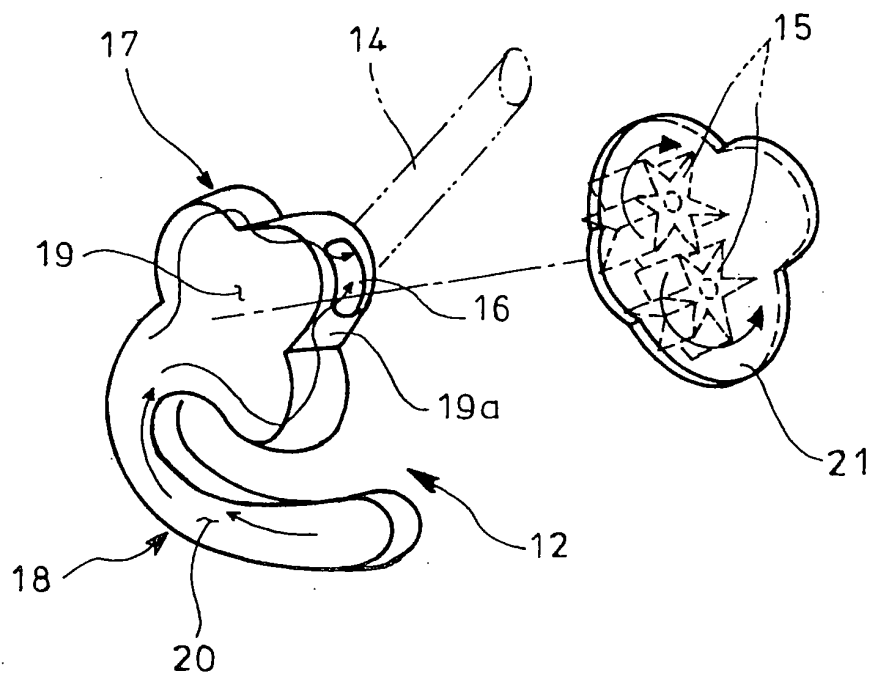


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/316565

A. CLASSIFICATION OF SUBJECT MATTER

F01M1/06(2006.01) i, F01M5/00(2006.01) i, F01P11/08(2006.01) i, F02F1/20(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F01M1/06, F01M5/00, F01P11/08, F02F1/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 171621/1980 (Laid-open No. 92812/1982) (Toyo Kogyo Kabushiki Kaisha), 08 June, 1982 (08.06.82), Full text; all drawings (Family: none)	1-4
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 30933/1980 (Laid-open No. 132304/1981) (Nissan Motor Co., Ltd.), 07 October, 1981 (07.10.81), Claims; Fig. 2 (Family: none)	1-4

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search
30 October, 2006 (30.10.06)

Date of mailing of the international search report
07 November, 2006 (07.11.06)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/316565

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 46-3371 Y1 (Klockner-Humboldt-Deutz AG.), 05 February, 1971 (05.02.71), Full text; Figs. 1, 2 (Family: none)	3, 4

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2043406 U [0006]
- JP 11125105 A [0006]