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(54) Cooling water passage in engine cylinder head

Kühlwasserkanal in einem Zylinderkopf

Passage pour l'eau de refroidissement dans une culasse

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- **PATENT ABSTRACTS OF JAPAN vol. 1999, no. 13, 30 November 1999 (1999-11-30) & JP 11 229955 A (DAIHATSU MOTOR CO LTD; TOYOTA MOTOR CORP), 24 August 1999 (1999-08-24)**
- **PATENT ABSTRACTS OF JAPAN vol. 017, no. 034 (M-1357), 22 January 1993 (1993-01-22) & JP 04 255554 A (SUZUKI MOTOR CORP), 10 September 1992 (1992-09-10)**

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Description

BACKGROUND OF THE INVENTION

(a) Technical Field of the Invention

[0001] The present invention is related to a cooling water passage, and more particularly, to a construction of a cooling water passage applied to the cylinder head of an engine.

(b) Description of the Prior Art

[0002] Motor vehicles including motorcycles and all-terrain vehicles among others operate by introducing fresh air to mix with fuel. The air-fuel mixture is then injected into engine to be ignited and exploded to produce motive power to push piston to engage in reciprocal motion for the crankshaft to drive belt gearshift mechanism to transmit the motive power.

[0003] Air-cooling engine and water-cooling engine are available depending on the way of heat dissipation. A water-cooling engine is usually selected for a larger vehicle. A water-cooling engine 1 of the prior art as illustrated in Fig. 1 of the accompanying drawings is essentially comprised of a cylinder 11, a cylinder head 12, a piston 13, and a valve mechanism 14. The cylinder head 12 is provided on the top of the cylinder and contains an air inlet passage 121 and an exhaust passage 122. The cylinder 11 containing a cooling water passage 111 and a cooling water outlet 123 is provided to the cylinder head 12. The cylinder head 12 contains a combustion chamber 15 wherein the air-fuel mixture undergoes instantaneous combustion in the course of compression travel. The valve mechanism 14 is provided with an air inlet valve 141 and an exhaust valve 142, and the diameter of the air inlet valve 141 is usually made slightly greater than that of the exhaust valve 142.

[0004] The air-fuel mixture upon entering into the combustion chamber 15 is ignited by an ignition member, i.e. the spark plug, and exploded. The gas pressure of the expansion pushes the piston 13 to engage in vertically reciprocal motion. When the piston 13 descends, the air inlet valve 141 is opened up to introduce the air-fuel mixture into the combustion chamber 15 for combustion and the resultant waste gas is fast discharge out of the exhaust valve 142 while the crankshaft drives the belt gearshift mechanism to operate (not illustrated), thus driving the rear wheels for the vehicle to move forward.

[0005] As the vehicle is driven along, the temperature of the running engine 1 rises and must be cooled down to avoid damages to the mechanical parts. The way of cooling in the cylinder head 12 of the water-cooling engine 1 of the prior art works by having the cooling water to flow from the cooling water passage 111 into the cylinder head 12 when the engine 1 is running. The cylinder head 12 is provided with a cooling water passage A around the valve mechanism as indicated by the arrow. When the cooling water flows from both sides of the cooling water passage 111 in the cylinder 11 into the cooling water passage A in the cylinder head 12, the cooling water flows upward from the cooling water passage A; and the cooling water passes through the cooling water passage A between the air inlet valve 141 and the exhaust valve 142 to exit from a cooling water outlet 123 provided to the cylinder head 12 to complete a cooling cycle in the cylinder head 12 to absorb heat at high temperature produced as the engine runs for achieving the cooling effects.

[0006] As the engine runs, it is not necessary that various parts of the engine are at the same temperature. For example, the newly introduced air-fuel mixture constantly cools down the temperature of the air inlet valve 141 while the exhaust valve 142 is continuously exposed to the waste gas at higher temperature. Therefore, the temperature readings respectively measured at both valves 141 and 142 are not the same. Furthermore, the cooling water passage A of a water-cooling engine of the prior art enters at the same time where it surrounds the valve mechanism 14 of the cylinder head 12. Once the cooling water flows up to exit from the cooling water passage A, the heat absorption results of the cooling water passage A located on the side air inlet passage 121 and that on the side of an exhaust passage 122 are not consistent, resulting in poor cooling consistency due to the excessive temperature difference existing between the air inlet valve 141 and the exhaust valve 142. Consequently, the mechanism parts of the engine are vulnerable to deformation due to the inconsistent heat dissipation.

[0007] As described above, the water-cooling construction of the water-cooling engine 1 of the prior art is essentially comprised of having the cooling water passage entering from both sides into the cylinder head 12 and dispersing around the valve mechanism 14, resulting in inconsistent heat absorption of the cooling water between the cooling water passage A located on the side of the air inlet passage 121 and that on the side of the exhaust passage 122 when the cooling water flows up to exit from the cooling water passage A. As a result, the poor cooling consistency due to the excessive temperature difference between the air inlet valve 141 and the exhaust valve 142 subjects the mechanical parts of the engine to deformation.

[0008] US-A-3 115 125 discloses an internal combustion engine cooling system for more efficiently cooling certain areas of the combustion chambers thereof. However, the US-A-3 115 125 reference fails to teach or disclose using a retainer to make the cooling water first cool the exhaust passage side at a higher temperature before cooling the air inlet passage side at a lower temperature.

SUMMARY OF THE INVENTION

[0009] The primary purpose of the present invention is to provide a construction of cooling water passage in

the cylinder head of an engine to upgrade the cooling effects for the cylinder head as a whole to avoid deformed mechanical parts due to inconsistent heat dissipation. To achieve the purpose, a spacer is provided between the cylinder and the cylinder head. The spacer has a port connecting through the cooling water disposed on the side of the exhaust passage. The cooling water flowing from the cooling water connection port into the cylinder head is limited by a retainer thus to extend the flow route for the cooling water. The cooling water first cools the exhaust passage side at a higher temperature before cooling the air inlet passage side at a lower temperature thus evenly absorbing the heat at high temperature produced on the cylinder head as the engine runs.

[0010] The foregoing object and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

[0011] Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a sectional view showing a local part of a water-cooling engine of the prior art.

Fig. 2 is a bird's eye view of a body of the cylinder of the present invention.

Fig. 3 is a sectional view showing a local part of an engine of the present invention.

Fig. 4 is an exploded view of a retainer and the spatial configuration of the cooling water passage in the cylinder head of the present invention.

Fig. 5 is a schematic view showing an assembly of the retainer and the spatial configuration of the cooling water passage in the cylinder head of the present invention.

Fig. 6 is an elevation view of the cylinder head of the present invention.

Fig. 7 is a schematic view showing an assembly of a spacer and the cylinder as taken from Section A-A from Fig. 6.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] The following descriptions are of exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

[0014] Referring to Fig. 2 for an elevation view of a cylinder 21 of a water-cooling engine of the present invention, a cooling water inlet 211 and a waterway 212 for circulation of the cooling water are provided to the cylinder 21. Now referring to Fig. 3 for a sectional view of an engine 2 of the present invention, the engine 2 includes the cylinder 21, and a cylinder head 22 on top of the cylinder 21. The cylinder head 22 contains an air inlet passage 221, an exhaust passage 222 to discharge the exhaust, a combustion chamber 23 where the air-fuel mixture is combusted, a piston 24 to engage in reciprocal motion inside the cylinder 21, and a valve mechanism seat 25 to accommodate multiple valves. A spacer 26 is provided between the cylinder 21 and the cylinder head of the engine 2, wherein a cooling-water outlet 223 (as illustrated in Fig. 7) to discharge the cooling water is provided to the cylinder head 22. The valve mechanism seat 25 is comprised of an air inlet valve seat 251 and an exhaust valve seat 252. A port 261 connecting through the cooling water is provided to the spacer 26 on the side of the exhaust passage 222.

[0015] Fig. 5 is a schematic view showing the spatial configuration of a cooling water passage B in the cylinder head 22 of the present invention. A retainer 224 which is a hollow pipe is provided to the cooling water outlet 223 and has one end provided with a gap a, and a limitation piece b in relation to the gap a.

[0016] As illustrated in Figs. 2 and 3, the cooling water flows from the cooling water inlet 211 in the cylinder 21 into the waterway of the cylinder 21 when the engine 2 runs. The cooling water flowing into the waterway 212 flows upward to arrive at the spacer 26 where the cooling water will flow into the cylinder head 22 through the port 261 provided on the side of the exhaust passage 222 due to the packing status created between the cylinder 21 and the cylinder head 22 by the spacer 26. As illustrated in Fig. 5, whereas the retainer 224 is inserted to the cooling water outlet 223 of the cylinder head 22, the cooling water is frustrated by the limitation piece b extending from the retainer 224 when the cooling water flows from the port 261 into the cylinder head 22. Accordingly, the cooling water is forced to first pass through an exhaust passage side C at higher temperature before flowing through an air inlet passage side D to finally exit from the cooling water outlet 223.

[0017] As illustrated in Figs. 5, 6, and 7, the cooling water as separated by the retainer 224 upon flowing into the cylinder head 22 through the cooling water connection port 261 of the spacer 26 passes by the exhaust

valve seat 252 on the exhaust passage side C at higher temperature before passing by the air inlet valve 251 on the air inlet passage side D at lower temperature before exiting from the retainer 224 inserted to the cooling water outlet 223 to complete the cooling cycle. The cooling water by cooling first the exhaust passage side C at higher temperature before cooling the air inlet passage side D at lower temperature consistently absorbs the heat at high temperature produced on the cylinder head 22 while the engine 2 is running to achieve the results of reducing the temperature of the cylinder head 22, thus the engine 2.

[0018] Furthermore, the retainer 224 may be forthwith casted to the cylinder head 22 during the casting process of the cylinder head 22 as illustrated in Fig. 7; or alternatively, the retainer 224 is fixed in the cooling water outlet 223 upon the completion of the casting process of the cylinder head 22.

[0019] The construction of a cooling water passage for the cylinder head of engine disclosed in the present invention corrects the flaw of failing to provide consistent temperature reduction of the prior art by providing the retainer 224 at the cooling water outlet 223 of the cylinder head 22, extending the flow route for the cooling water and for the cooling water to cool first the exhaust passage side C at a higher temperature before cooling the air inlet passage side D at a lower temperature to consistently absorb the heat at high temperature produced to the cylinder head while the engine is running, thus upgrading heat dissipation results for the cylinder head as a whole and avoiding deformation to mechanical parts due to inconsistent heat absorption.

Claims

1. A cooling water passage in an engine (2), the engine (2) comprising a cylinder (21), a cylinder head (22) on a top of the cylinder (21), a spacer (26) disposed between the cylinder (21) and the cylinder head (22), the cylinder head (22) including an air inlet passage (221), an exhaust passage (222), a combustion chamber (23), wherein the cooling water passage is provided with a port (261) to connect cooling water on the side of the exhaust passage (222), cooling water flowing into the cylinder head (22) through the port (261) is frustrated by a retainer (224) thereby forcing the cooling water to first pass through an exhaust passage side (C) at higher temperature before passing through an air inlet passage side (D) to finally exit from the cooling water outlet (223), **characterized in that** the retainer is a hollow pipe with one end formed with a gap (a) and a limitation piece (b) in relation to the gap (a).

2. The cooling water passage in an engine (2) of Claim 1, wherein, the retainer (224) is directly casted in the cylinder head (22).

3. The cooling water passage in an engine (2) of Claim 1, wherein, the retainer (224) is fixed in the cooling water outlet (223) upon completion of casting process of the cylinder hear (22).

4. The cooling water passage in an engine (2) of Claim 1, wherein, the cooling water first passes by an exhaust valve seat (25) located on the side of the exhaust passage (222) before flowing to an air inlet valve seat (251) located on the air inlet passage side (D).

Patentansprüche

1. Ein Kühlwasserkanal in einem Motor (2), mit dem Motor bestehend aus einem Zylinder (21), einem Zylinderkopf (22) auf der Oberseite des Zylinders (21), einer Distanzscheibe (26) befindlich zwischen Zylinder (21) und Zylinderkopf (22), einem Lufteinlaßkanal (221) im Zylinderkopf (22), einem Abluftkanal (222), einem Verbrennungsraum (23) worin der Kühlwasserkanal mit einem Anschluß (261) versehen ist, um eine Kühlwasserzufuhr auf der Seite des Abluftkanals (222) anzuschließen, Kühlwasser das durch den Anschluß (261) in den Zylinderkopf (22) fließt wird behindert durch eine Führung (224), wodurch das Kühlwasser gezwungen wird, erst durch die Abluftseite (C) mit einer höhere Temperatur zu fließen bevor es durch die Lufteinlaßseite (D) fließt und schließlich aus dem Kühlwasserabfluß austritt, wobei die Führung (224) gebildet wird aus einem hohlen Rohr, dessen eine Seite aus einer Aussparung (a) und einem Begrenz-Lingsstück (b) in Bezug zur Aussparung (a) besteht.

2. Der Kühlwasserkanal in einem Motor (2) aus Anspruch 1, wobei die Führung (224) direkt in den Zylinderkopf (22) gegossen ist.

3. Der Kühlwasserkanal in einem Motor (2) aus Anspruch 1, wobei die Führung (224) im Kühlwasseraustritt (223) fest verankert ist als Ergebnis des Gießprozesses des Zylinderkopfs (22).

4. Der Kühlwasserkanal in einem Motor (2) aus Anspruch 1, wobei das Kühlwasser zuerst ein en Abluftventilsitz (25) passiert, der sich auf der Seite des Abluftkanals befindet, bevor es zu einem Lufteinlaßventilsitz fließt, der sich auf der Seite des Lufteinlaßkanals befindet.

Revendications

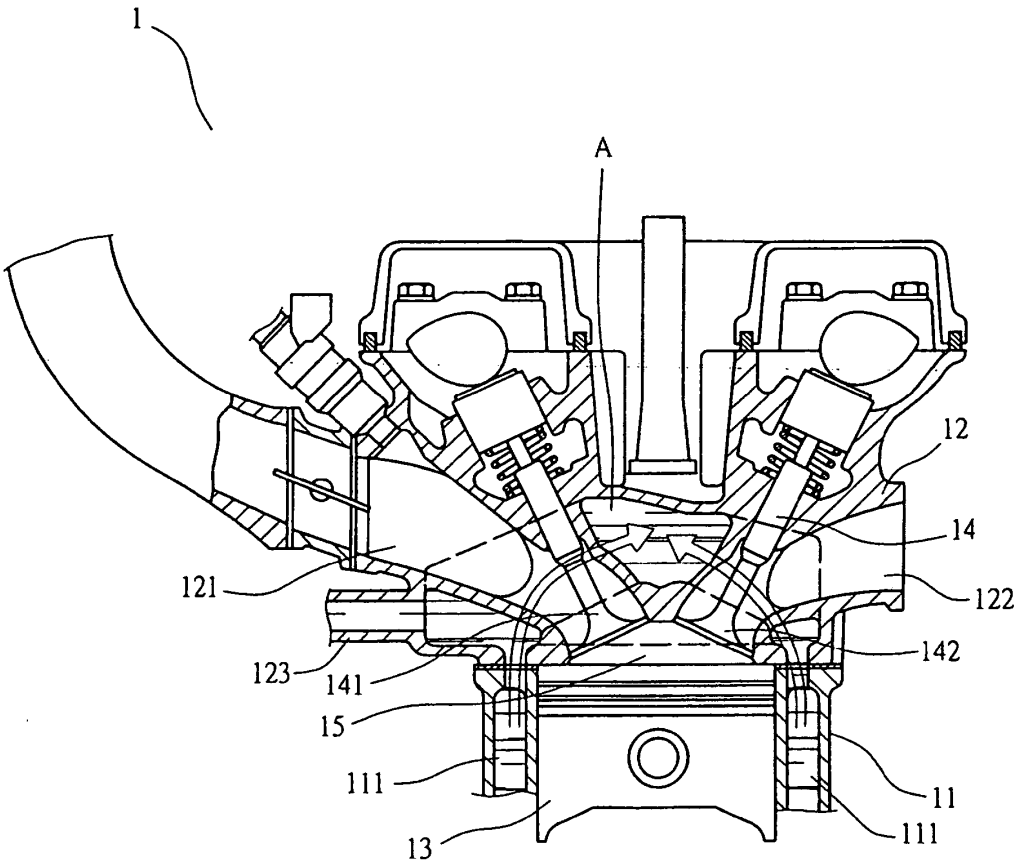
1. Passage pour l'eau de refroidissement dans un moteur, le moteur (2) comprenant un cylindre (21), une culasse (22) sur un top du cylindre (21), une entre-

toise (26) disposée entre le cylindre (21) et la culasse (22), la culasse (22) comprenant un passage d'entrée d'air (221), un passage d'échappement (222), une chambre de combustion (23), où le passage pour l'eau de refroidissement est muni d'un port (26) pour connecter l'eau de refroidissement sur le côté du passage d'échappement (222), l'eau de refroidissement qui s'écoule dans la culasse (22) par le port (261) est frustré par une agrafe de retenue, de cette façon, l'eau de refroidissement est forcée de passer par un côté du passage d'échappement (C) à une température plus élevée avant de passer par un côté du passage d'entrée d'air (D) pour quitter finalement de la sortie d'eau de refroidissement (223), **caractérisé en ce que** l'agrafe de retenue est un tube creux avec un bout formé avec une ouverture (a) et une pièce limitation (b) relative à l'ouverture (a).

2. Passage pour l'eau de refroidissement dans une culasse (2) selon la revendication 1, **caractérisé en que** l'agrafe de retenue (224) est installée directement dans la culasse (22).

3. Passage pour l'eau de refroidissement dans une culasse (2) selon la revendication 1, **caractérisé en ce que** l'agrafe de retenu (224) est fixée dans la sortie d'eau de refroidissement (223) après de terminer la procédure de l'assemblage de la culasse (22).

4. Passage pour l'eau de refroidissement dans une culasse (2) selon la revendication 1, **caractérisé en ce que** l'eau de refroidissement passe par un siège de vanne d'échappement (25) sur le côté du passage d'échappement (222) avant de s'écouler à une siège de vanne d'entrée d'air (251) sur le côté du passage d'entrée d'air (D).



PRIOR ART

FIG.1

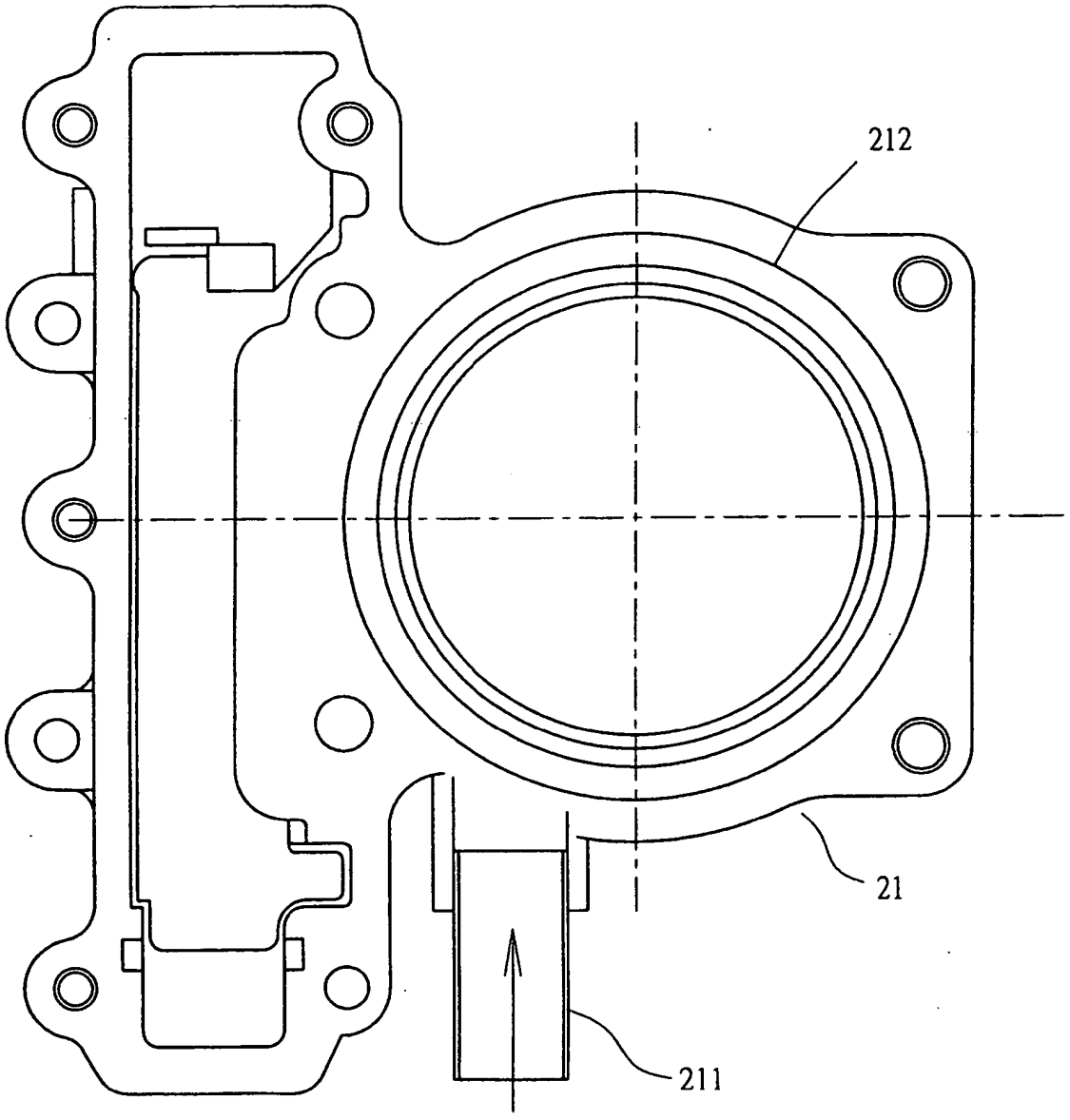


FIG.2

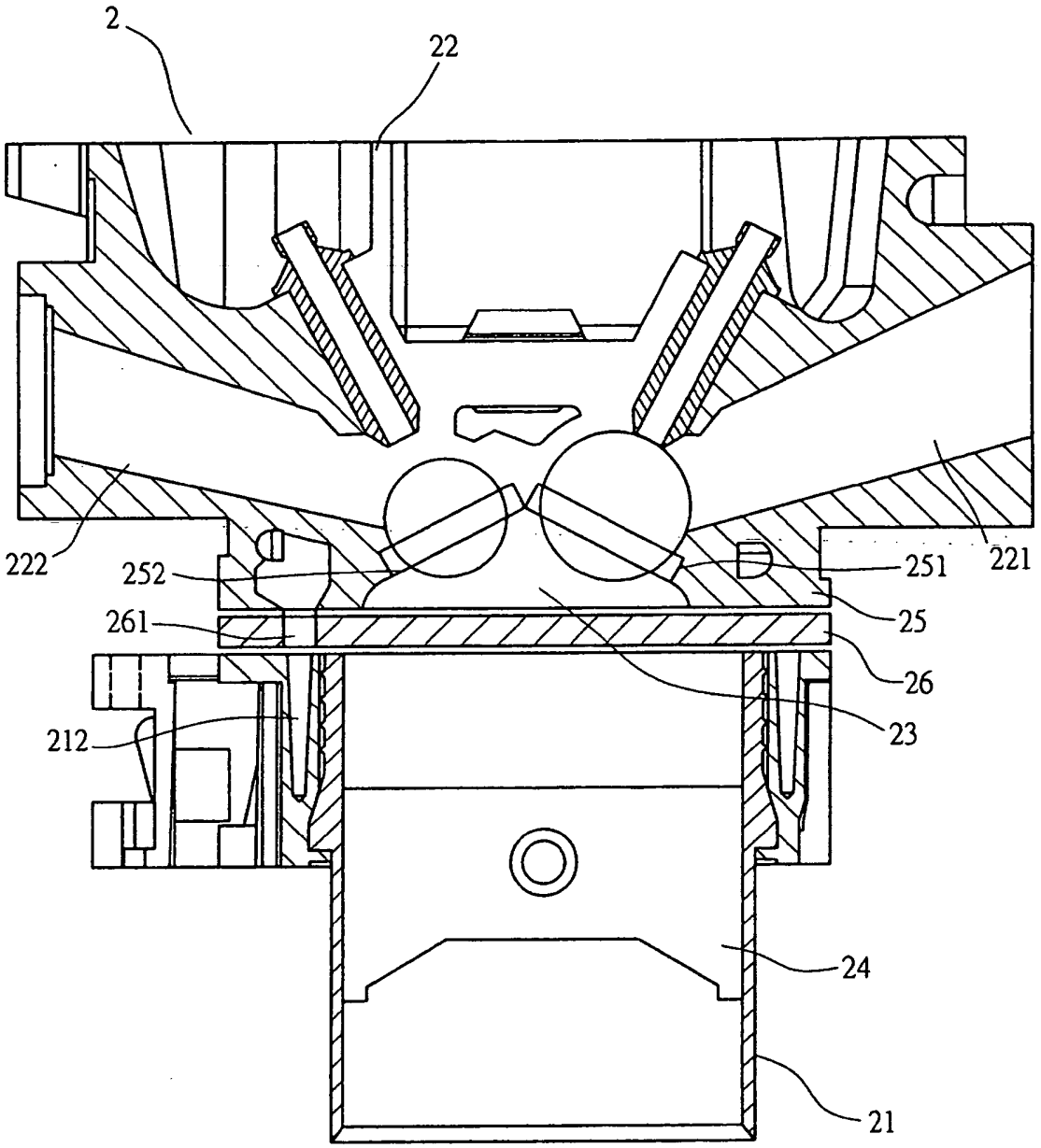


FIG.3

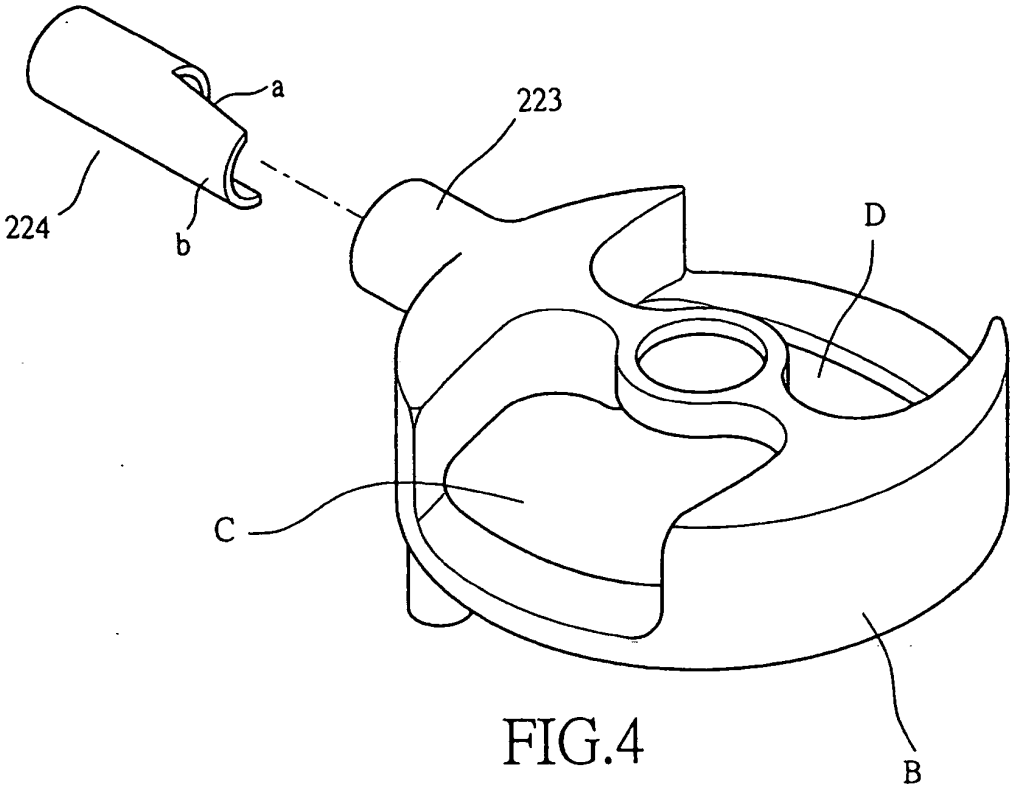


FIG.4

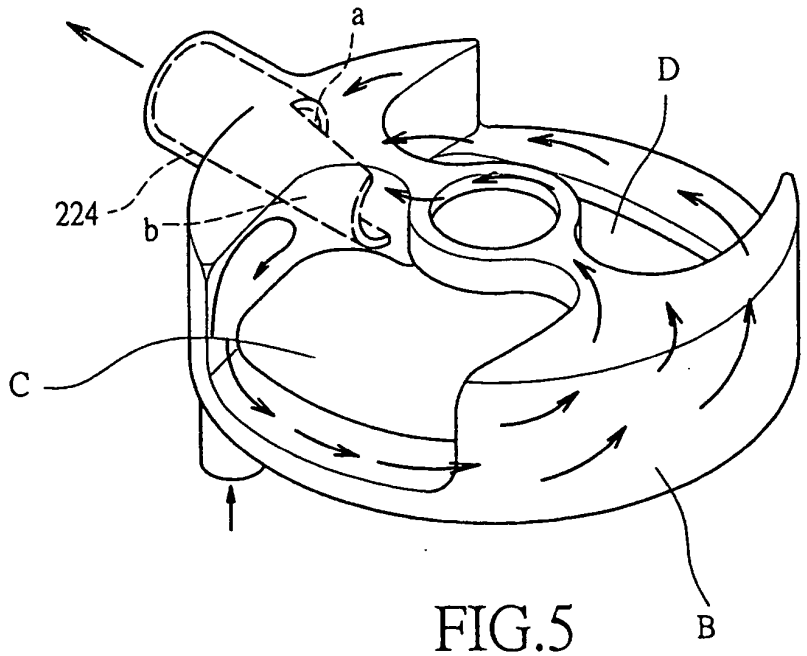


FIG.5

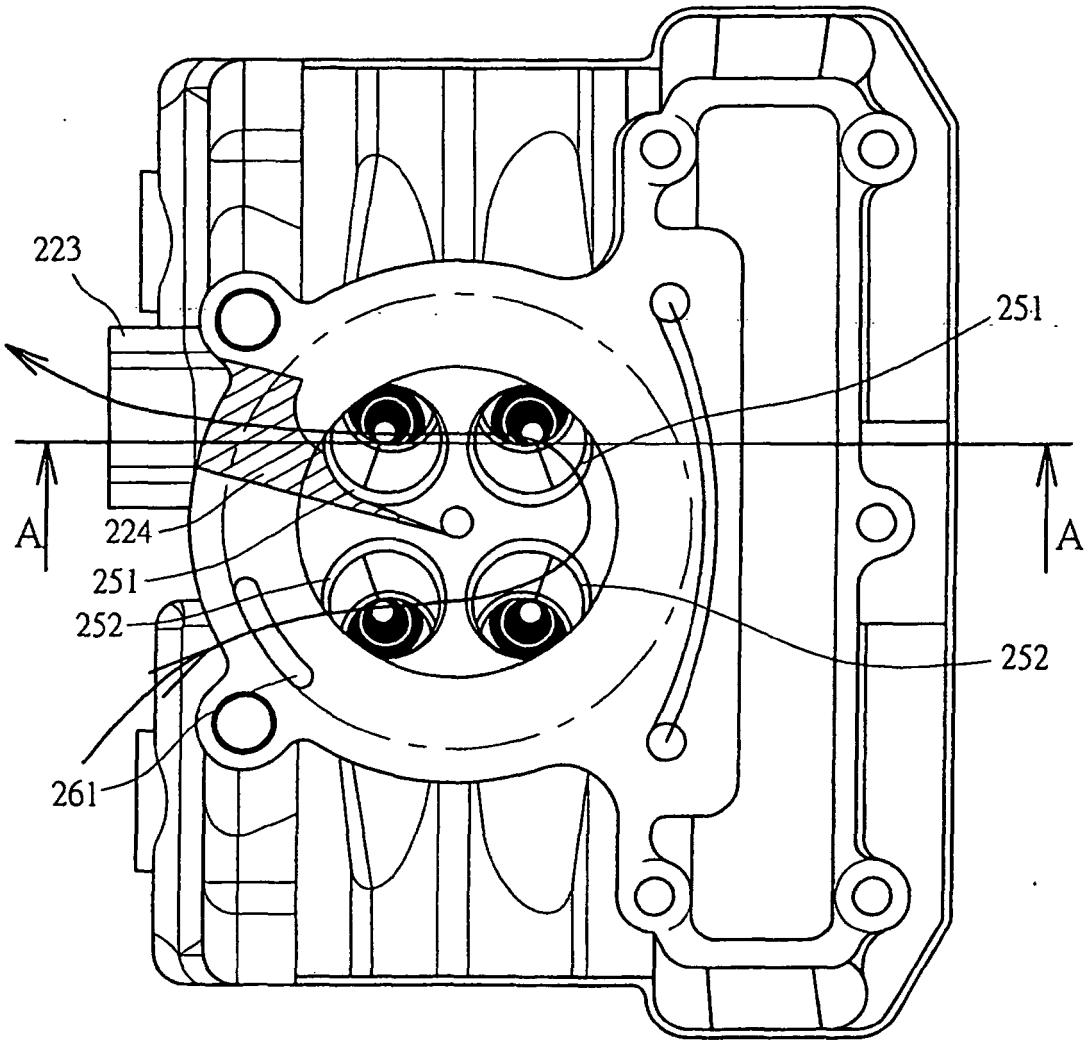
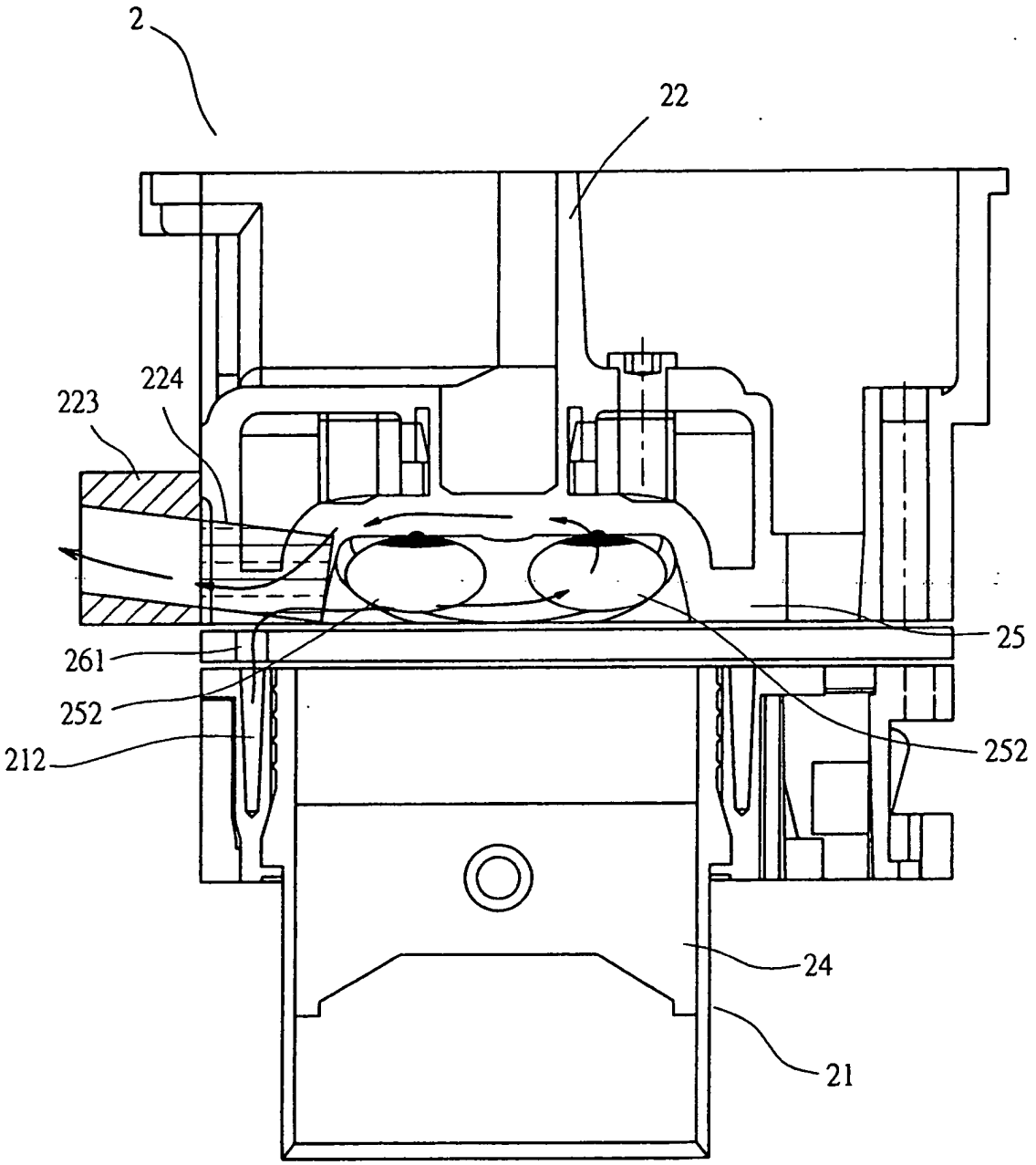


FIG.6



A-A

FIG.7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 3115125 A **[0008]**