The invention discloses an air-cooling cylinder head of a gasoline engine and a gasoline engine. The air-cooling cylinder head of a gasoline engine comprises a cylinder head main body (1), an intake passage (3), an exhaust passage (2) and a spark plug mounting hole (6) arranged in the cylinder head main body (1), a plurality of cooling fins (4) is arranged on the outer surface of the cylinder head main body (1), a combustion chamber surface (5) is formed on the inner side of the cylinder head main body (1), a longitudinally through air-cooling passage I (8) is arranged on the same side of the cylinder head main body (1) as the intake passage (3) and the exhaust passage (2), a transversely through air-cooling passage II (7) is arranged between the intake passage (3) and the exhaust passage (2), and both the longitudinally through air-cooling passage I (8) and the transversely through air-cooling passage II (7) are kept away from function holes on the cylinder head main body (1). In the technical solution of the invention, cooling air flows through the outer surface of the combustion chamber wall from different directions to sufficiently decrease the temperature of the combustion chamber, so that the cylinder head has excellent cooling efficiency, and the power of the gasoline engine is increased.

ABSTRACT

The invention discloses an air-cooling cylinder head of a gasoline engine and a gasoline engine. The air-cooling cylinder head of a gasoline engine comprises a cylinder head main body (1), and an intake passage (3), an exhaust passage (2) and a spark plug mounting hole (6) arranged in the cylinder head main body (1), a plurality of cooling fins (4) is arranged on the outer surface of the cylinder head main body (1), a combustion chamber surface (5) is formed on the inner side of the cylinder head main body (1), a longitudinally through air-cooling passage I (8) is arranged on the same side of the cylinder head main body (1) as the intake passage (3) and the exhaust passage (2), a transversely through air-cooling passage II (7) is arranged between the intake passage (3) and the exhaust passage (2), and both the longitudinally through air-cooling passage I (8) and the transversely through air-cooling passage II (7) are kept away from function holes on the cylinder head main body (1). In the technical solution of the invention, cooling air flows through the outer surface of the combustion chamber wall from different directions to sufficiently decrease the temperature of the combustion chamber, so that the cylinder head has excellent cooling efficiency, and the power of the gasoline engine is increased.
AIR-COOLED CYLINDER HEAD OF GASOLINE ENGINE AND GASOLINE ENGINE HAVING THE SAME

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to the field of power machinery, in particular to an air-cooling cylinder head of a gasoline engine and a gasoline engine having the same.

BACKGROUND OF THE INVENTION

[0002] General-purpose gasoline engines are reciprocating piston gasoline engines with broad applications, except applications in vehicle and aeroplane. Generally, those with a power within 20 kW are called as small general-purpose gasoline engines; and they have high generality and advantages of small volume, small mass, simple and convenient use and operation, and low price. As one of power sources, the general-purpose gasoline engine is used for driving general-purpose machinery, including agriculture and forestry plant protection machinery, garden machinery, power generation sets and construction machinery and the like. As a kind of power machinery using gasoline as fuel, the gasoline engine consists of a cylinder, a crank and connecting rod mechanism, a distribution system, an fuel supply system, a lubrication system and an ignition system and the like. The cylinder head is provided with an intake passage and an exhaust passage and forms a combustion chamber together with the cylinder; therefore it is a very important component of the gasoline engine. The mixture of gasoline and air combusts in the combustion chamber, a lot of heat is generated and used as driving energy. The heat has to be inevitably transferred through the heat conduction of the cylinder body and the cylinder head to the outer surface and then transferred to the outside through other cooling manners, and quick cooling is required to maintain the normal working of the combustion chamber surface; otherwise, limitless rise of the temperature of the combustion chamber wall surface may be caused, finally the tail gas emission may be influenced and the use of the cylinder head may be influenced, even piston sticking and scuffing of cylinder may be caused.

[0003] In the prior art, as a cooling measure for the cylinder head, arrangement of cooling fins on the outer surface is generally adopted, the heat inside the combustion chamber is conducted to the cooling fins through the cylinder head, and taken away through air convection to achieve the purpose of cooling. Cooling fins have excellent cooling efficiency and small weight, so they can meet the cooling requirements. However, when the gasoline engine operates for a long time, as the heat conduction performance and the convection area of the cooling fins are limited, cooling is insufficient; the accumulation of heat may influence the physical performance of the cylinder head, further influence the operating performance of the gasoline engine, even cause accidents and make the gasoline engine scrapped.

[0004] Therefore, it is necessary to improve the air-cooling cylinder head of the gasoline engine, to make it have excellent cooling efficiency, guarantee the physical performance of the cylinder head, and decrease the temperature of the cylinder, so that the gasoline engine can operate stably for a long time, the hydrocarbon in the tail gas can be decreased effectively, and piston sticking and scuffing of cylinder due to the rise of temperature can be avoided.

SUMMARY OF THE INVENTION

[0005] Therefore, the invention provides an air-cooling cylinder head of a gasoline engine and a gasoline engine having the same, to make the cylinder head have excellent cooling efficiency, guarantee the physical performance of the cylinder head, and decrease the temperature of the cylinder, so that the gasoline engine can operate stably for a long time, the hydrocarbon in the tail gas can be decreased effectively, and piston sticking and scuffing of cylinder due to the rise of temperature can be avoided.

[0006] The air-cooling cylinder head of a gasoline engine comprises a cylinder head main body, and an intake passage, an exhaust passage and a spark plug mounting hole arranged in the cylinder head main body, a plurality of cooling fins is arranged on the outer surface of the cylinder head main body, a combustion chamber surface is formed on the inner side of the cylinder head main body, a longitudinally through air-cooling passage I is arranged on the same side of the cylinder head main body as the intake passage and the exhaust passage, a transversely through air-cooling passage II is arranged between the intake passage and the exhaust passage, and both the longitudinally through air-cooling passage I and the transversely through air-cooling passage II are kept away from function holes on the cylinder head main body.

[0007] Further, the axis of the intake passage and the axis of the exhaust passage are in a coplane, the air-cooling passage I is parallel to the coplane of the axis of the intake passage and the axis of the exhaust passage, the air-cooling passage I and the spark plug mounting hole are respectively located on two sides of the coplane of the axis of the intake passage and the axis of the exhaust passage, the air-cooling passage II is vertical to the coplane of the axis of the intake passage and the axis of the exhaust passage. The primary structure of the cylinder head can be utilized to achieve the design of the air-cooling passages, and the cooling passage I and the air-cooling passage II are vertical to each other, so that the cooling air can flow from all directions, the mounting of all components is not influenced, and the manufacturing cost is saved; simultaneously, the design of the air-cooling passages in the structure is beneficial to improve the bending moment resistant capability of the cylinder head, in conjunction with the enhancement of the cooling efficiency, the cylinder head is light in weight, and the overall economy of the machine is improved.

[0008] Further, the cooling fins extends into the air-cooling passage I to form a cooling bridge, and the air-cooling passage I is separated into a structure with a plurality of parallel and longitudinal passages by the cooling bridge. The cooling bridge structure is beneficial to guarantee the strength of the cylinder head after the air-cooling passage I is opened, simultaneously, through the cooling bridge, the heat radiation and conduction area during cooling is increased, which is further beneficial to the cooling.

[0009] Further, a through spark plug air-cooling passage is arranged on the same side of the cylinder head main body as the spark plug mounting hole. The spark plug can be cooled well by means of air cooling, and the problem that the service life of the spark plug is decreased due to high temperature in the prior art is avoided.

[0010] Further, the cooling fins on the cylinder head main body extends to the outer wall of the exhaust passage. This structure can decrease the exhaust temperature, which benefits to the protection of the tail gas treatment components.
inside the exhaust system, further reduce emission and benefit to the environmental protection.

[0011] Further, the combustion chamber surface is of a complexly spherical structure comprising a sphere I, a smooth curve and a sphere II in turn from the bottom to the top, and the radius of the sphere II is larger than that of the sphere I; and the sphere I and the sphere II are in smooth transition through the smooth curve. As the spherical combustion chamber surface has minimum surface to volume ratio, the working efficiency of the gasoline engine is improved; however, as global structure is not beneficial to the sufficient mixing of combustion gases, the mixing efficiency is decreased, and combustion and emission are influenced; the use of complex spherical structure not only further decreases the surface to volume ratio, but also more benefits to the combustion and reduction of emission as curve transition is beneficial to the mixing of combustion gases, so that the power of the gasoline engine is increased. Simultaneously, the included angles between the intake/exhaust valves and the intake/exhaust passages are smaller than those in combustion chamber surfaces of other structures, the resistance for intake and exhaust is reduced effectively, so that intake and exhaust are smoother, the power of the gasoline engine is increased effectively, fuel consumption and emission is further reduced. It is adapted to the complex spherical combustion chamber, the included angles between the intake/ exhaust valves and the intake/exhaust passages are smaller than those in the combustion chamber surface of the existing structure, so that intake is organized conveniently, the intake efficiency is improved, intake tumbler and intake swirl inside the cylinder are organized conveniently, current perturbation inside the cylinder is increased, and combustion is boosted. And the resistance for intake and exhaust is reduced, so that intake and exhaust are smoother, the power of the gasoline engine is increased effectively, the fuel consumption is reduced, the tail gas emission is reduced, and the environment is protected.

[0012] Further, an intake valve is arranged on the cylinder head main body correspondingly to the intake passage, an exhaust valve is arranged correspondingly to the exhaust passage, the intake valve is oblique to the intake passage side from the bottom to the top, and the exhaust valve is oblique to the exhaust passage side from the bottom to the top. As the valves are obliquely arranged, the nose bridge region between the intake passage and the exhaust passage is wider, cooling is benefitted and the resistance to deformation is improved. With the completely through air-cooling passage II, the cooling efficiency of the nose bridge region is greatly improved, the deformation of the cylinder head under high temperature is reduced, and the reliability is improved.

[0013] Further, the intake valve and the exhaust valve are respectively provided with rocker arms, rocker arm bases are respectively arranged on the cylinder head main body correspondingly to the corresponding rocker arms, the rocker arms are fixedly provided with corresponding rocker arm shafts, the rocker arm shafts are arranged on the corresponding rocker arm bases in single freedom in a manner of capable of rotating around respective axes, the rocker arm shafts are internally and obliquely arranged towards the top in the radial direction with respect to the mounting surface of the cylinder head main body, and the oblique angle of the corresponding rocker arm shafts with respect to the mounting surface of the cylinder head main body is respectively and correspondingly identical to the oblique angles of the intake valve and the exhaust valve with respect to the axis of the cylinder head main body; and the rocker arms forms a lever structure using the corresponding rocker arm shafts as the fulcrums. The obliquely arranged rocker arm shafts can be adapted to the structure of the obliquely arranged gas valves and also to the geometric shape of the complex spherical combustion chamber, to guarantee the harmony and tightness of the driving action of the valves by the rocker arms. The fixed rocker arms have small bouncing and rocking amount in all directions during the operating process, the failure rate of the rocker arms can be decreased effectively, and the maintenance cost is reduced. The rocker arms are disposed rationally to be adapted to the position of intake and exhaust, to guarantee the valve timing and the gas distribution phase, so that the performance is improved and the emission is reduced.

[0014] Further, the rocker arm bases are of structures with openings, the two ends of the rocker arm shafts are correspondingly inserted into the two sides of the openings of the corresponding rocker arm bases and the rocker arm shafts fit with the corresponding rocker arm bases in a manner of capable of rotating around respective axes, and the rocker arms are located inside the openings of the corresponding rocker arm bases and fixedly arranged on the corresponding rocker arm shafts; the outward side of the opening structure of the rocker arm bases is a split bearing base structure comprising a gland and a base body, and the gland and the base body are detachably and fixedly connected with each other. The use of the split bearing base structure is beneficial to the mounting of the rocker arm shafts, the decrease of the friction area, and to the increase of the motion flexibility of the rocker arms. The structure is simple and compact, and the space is saved.

[0015] Further, the axis of the intake valve and the axis of the exhaust valve are respectively vertical to the tangent plane of the intersections point of the combustion chamber surface with the axis of the intake valve and the axis of the exhaust valve. This structure is adapted to the intake and exhaust directions of the combustion chamber, so that the resistance is reduced, and the dynamic property of the gasoline engine is increased.

[0016] Further, the part of the combustion chamber surface located between the intake valve and the exhaust valve forms a nose bridge region, and the width of the nose bridge region is above 8mm on the combustion chamber surface. The distance between the intake valve and the exhaust valve is increased, the thickness of the nose bridge region is properly increased, the capability of resisting against heat deformation is increased, and the tightness of the valves is improved effectively so that gas leakage of the valves can be avoided effectively. Simultaneously, instant interference between intake and exhaust is avoided, sufficient combustion is guaranteed, and the power of the gasoline engine is increased.

[0017] Further, the outer circle of a seat retainer of the intake valve and the outer circle of a seat retainer of the exhaust valve are tangent to the edge of the bottom of the combustion chamber surface; and the internal end of the seat retainer of the intake valve and the internal end of the seat retainer of the exhaust valve are matched with the shape of the combustion chamber surface. As the internal end of the seat retainer of the intake valve and the internal end of the seat retainer of the exhaust valve are matched with the shape of the combustion chamber surface, interference to intake and exhaust can be decreased, the resistance is reduced, the dead angle and the sharp shape change are eliminated, the suffi-
cient combustion of the mixed gases is guaranteed, and the efficiency of the gasoline engine is improved. [0018] The invention also discloses a gasoline engine having the foregoing described air-cooling cylinder head of a gasoline engine, wherein the air-cooling cylinder head of a gasoline engine is mounted in the gasoline engine.

[0019] The invention has the following beneficial effects: in the air-cooling cylinder head of a gasoline engine and the gasoline engine, hollow air-cooling passages are respectively arranged in the intake and exhaust directions of the air-cooling cylinder head of a gasoline engine and also in the directions vertical to the intake and exhaust directions, so that cooling air can flow through the outer surface of the combustion chamber wall from different directions, simultaneously, heat is transferred outside by the walls of the passages by means of heat conduction, the conduction and convection area is increased to sufficiently decrease the temperature of the combustion chamber, so that the cylinder head has excellent cooling efficiency, the temperature of the cylinder is decreased, the hydrocarbon in the tail gas is reduced effectively, and the power of the gasoline engine is increased. Take a gasoline engine with a maximum power of 7.5 kW (revolving speed: 3600 rpm) for example, the power can be increased to 8.1 kW, the emission can be reduced to 6.0 g/kWh from 8.0 g/kWh, the standard of 8 g/kWh in EPA3 stage is satisfied and exceeded, therefore it can be seen that the increase of the power and the reduction of the emission of the gasoline engine are relatively obvious. No piston sticking and scuffing of cylinder occurs in the gasoline engine in the invention, at the same time that the performance of the gasoline engine is guaranteed, the gasoline engine also can operate stably for a long time. As air-cooling passages are provided, the capability of the cylinder head itself to resist against the bending moment can be improved, in conjunction with good cooling efficiency, physical performances of the cylinder head such as resistance to deformation are guaranteed effectively, and the weight of the cylinder head can be properly reduced to achieve small weight of the gasoline engine.

[0020] The cylinder head is used in a gasoline engine. When the cylinder head is used in general-purpose power equipment driven by gasoline engines, the flowing of air inside the air-cooling passages can be accelerated, to be more conducive to cooling; and when it is used in common general-purpose machinery, it is exposed in air, and cooling is conducted through externally forcible air convection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention will be further described below with reference to drawings and embodiments.

[0022] FIG. 1 shows a structure view of the invention;

[0023] FIG. 2 shows a view of FIG. 1 along the direction A;

[0024] FIG. 3 shows the view of FIG. 2 along the direction B-B;

[0025] FIG. 4 shows a front view of the spark plug air-cooling passage;

[0026] FIG. 5 shows a mounting structure view of rocker arms;

[0027] FIG. 6 shows a sectional view of the coordination between rocker arm shafts and rocker arm bases.

DETAILED DESCRIPTION OF THE INVENTION

[0028] FIG. 1 shows a structure view of the invention. FIG. 2 shows a view of FIG. 1 along the direction A. FIG. 3 shows the view of FIG. 2 along the direction B-B. FIG. 4 shows a front view of the spark plug air-cooling passage. FIG. 5 shows a mounting structure view of rocker arms, and FIG. 6 shows a sectional view of the coordination between rocker arm shafts and rocker arm bases. As shown in the drawings: the air-cooling cylinder head of a gasoline engine in the embodiment comprises a cylinder head main body 1, and an intake passage 3, an exhaust passage 2 and a spark plug mounting hole 6 arranged in the cylinder head main body 1. A plurality of cooling fins 4 is arranged around the outer surface of the cylinder head main body 1, a combustion chamber surface 5 is formed on the inner side of the cylinder head main body 1, a longitudinally through air-cooling passage 18 is arranged on the same side of the cylinder head main body 1 as the intake passage 3 and the exhaust passage 2, and transversely through air-cooling passage 11 7 is arranged between the intake passage 3 and the exhaust passage 2, and both the longitudinally through air-cooling passage 18 and the transversely through air-cooling passage 11 7 are kept away from function holes on the cylinder head main body 1, the function holes are holes which are used for mounting components and which include a spark plug hole, an intake valve hole, an exhaust valve hole and bolt holes and the like; the longitudinal direction means a direction substantially identical to the directions of intake and exhaust of the cylinder head main body; and the transversal direction means a direction substantially vertical to a cylinder head main body. The direction shown by the arrow in FIG. 3 is the flowing direction of air.

[0029] In the embodiment, the axis of the intake passage 3 and the axis of the exhaust passage 2 are arranged in coplanar, that is, the axis of the intake passage 3 and the axis of the exhaust passage 2 are in a same plane, in the invention, this plane is called coplane. The air-cooling passage 18 is parallel to the coplane of the axis of the intake passage 3 and the axis of the exhaust passage 2, the air-cooling passage 18 and the spark plug mounting hole 6 are respectively located on two sides of the coplane of the axis of the intake passage 3 and the axis of the exhaust passage 2, the air-cooling passage 11 7 is vertical to the coplane of the axis of the intake passage 3 and the axis of the exhaust passage 2. The primary structure of the cylinder head can be utilized to achieve the design of the air-cooling passages and the air-cooling passage 18 and the air-cooling passage 11 7 are vertically apart from each other, so that the cooling air can flow from all directions, the mounting of all components is not influenced, and the manufacturing cost is saved. Simultaneously, the design of the air-cooling passages in the structure is beneficial to improve the bending moment resistant capability of the cylinder head, in conjunction with the enhancement of the cooling efficiency, the cylinder head is light in weight, and the overall economy of the machine is improved.

[0030] In the embodiment, as shown in FIG. 2 and FIG. 3, the cooling fins 4 extends into the air-cooling passage 18 to form a cooling bridge 81, and the air-cooling passage 18 is separated into a structure with a plurality of parallel and longitudinal passages by the cooling bridge 81. The structure of cooling bridge 81 is beneficial to guarantee the strength of the cylinder head after the air-cooling passage 18 is opened. Simultaneously, through the cooling bridge 81, the heat radiation and conduction area during cooling is increased, which is further beneficial to the cooling.

[0031] In the embodiment, through spark plug air-cooling passage 9 is arranged on the same side of the cylinder head main body 1 as the spark plug mounting hole 6. The direction
shown by the arrow in FIG. 5 is the flowing direction of the spark plug cooling air. The spark plug can be cooled well by means of air cooling, and the problem that the service life of the spark plug is decreased due to high temperature in the prior art is avoided.

[0032] In the embodiment, the cooling fins 4 on the cylinder head main body extends to the outer wall of the exhaust passage 2. This structure can decrease the exhaust temperature, which benefits to the protection of the tail gas treatment components inside the exhaust system, further reduce emission and benefit to the environmental protection.

[0033] The combustion chamber surface 5 is of a complexly spherical structure comprising a sphere 1 a, a smooth curve b and a sphere II c in turn from the bottom to the top, and the radius of the sphere II c is larger than that of sphere I a; and the sphere I a and the sphere II c are in smooth transition through the smooth curve b. The smooth curve b may be a hyperboloid or paraboloid. As the spherical combustion chamber surface has minimum surface to volume ratio, the working efficiency of the gasoline engine is improved. However, as global structure is not beneficial to the sufficient mixing of combustion gases, the mixing efficiency is decreased, and combustion and emission are influenced. The use of complex spherical structure not only further decreases the surface to volume ratio, but also more benefits to the combustion and reduction of emission as curve transition is beneficial to the mixing of combustion gases, so that the power of the gasoline engine is increased. Simultaneously, the included angles between the intake/exhaust valves and the intake/exhaust passages are smaller than those in combustion chamber surfaces of other structures, the resistance for intake and exhaust is reduced effectively, so that intake and exhaust are smoother, the power of the gasoline engine is increased effectively, fuel consumption and emission are further reduced.

[0034] In the embodiment, an intake valve 31 is arranged on the cylinder head main body 1 corresponding to the intake passage 3, an exhaust valve 21 is arranged correspondingly to the exhaust passage 2, the intake valve 31 is oblique to the intake passage 3 side from the bottom to the top, and the exhaust valve 21 is oblique to the exhaust passage 2 side from the bottom to the top. It is adapted to the complex spherical combustion chamber, the included angles between the intake/exhaust valves and the intake/exhaust passages are smaller than those in the combustion chamber surface of the existing structure, so that intake is organized conveniently, the intake efficiency is improved, intake tumbling and intake swirl inside the cylinder are organized conveniently, current perturbation inside the cylinder is increased, and combustion is boosted. And the resistance for intake and exhaust is reduced, so that intake and exhaust are smoother, the power of the gasoline engine is increased effectively, the fuel consumption is reduced, the tail gas emission is reduced, and the environment is protected.

[0035] Simultaneously, as the valves are obliquely arranged, the nose bridge region between the intake passage and the exhaust passage is wider, cooling is benefited and the resistance to deformation is improved, with the completely through air-cooling passage II 7, the cooling efficiency of the nose bridge region is greatly improved, the deformation of the cylinder head under high temperature is reduced, and the reliability is improved.

[0036] The intake valve 31 and the exhaust valve 21 are respectively provided with rocker arms, as shown in FIG. 5; the rock arm of the intake valve 31 is represented by 11 and the rocker arm of the exhaust valve 21 is represented by 13; rocker arm bases (rocker arm base 15 and rocker arm base 12 in FIG. 5) are arranged on the cylinder head main body 1 correspondingly to the rocker arms (rocker arm 11 and rocker arm 13), the rocker arms (rocker arm 11 and rocker arm 13) are respectively and fixedly provided with rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14), the rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14) are correspondingly arranged on the rocker arm bases (rocker arm base 15 and rocker arm base 12) in single freedom in a manner of rotating around respective axes, the rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14) are internally and obliquely arranged towards the top in the radial direction with respect to the mounting surface of the cylinder head main body 1, and the radial direction means the radial direction of the cylinder head; the oblique angle of the corresponding rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14) with respect to the mounting surface of the cylinder head main body 1 is respectively and correspondingly identical to the oblique angles of the intake valve 31 and the exhaust valve 21 with respect to the axis of the cylinder head main body 1; and the rocker arms (rocker arm 11 and rocker arm 13) form a lever structure using the corresponding rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14) as the fulcrums, and the rocker arms form obliquely fixed rocker arms together with the rocker arm shafts.

[0037] The obliquely arranged rocker arm shafts can be adapted to the structure of the obliquely arranged gas valves and also to the geometric shape of the complex spherical combustion chamber, to guarantee the harmony and tightness of the driving action of the valves by the rocker arms, the fixed rocker arms have small bouncing and rocking amount in all directions during the operating process, the failure rate of the rocker arms can be decreased effectively, and the maintenance cost is reduced.

[0038] The rocker arms are disposed rationally to be adapted to the position of intake and exhaust, to guarantee the valve timing and the gas distribution phase, so that the performance is improved and the emission is reduced.

[0039] In the embodiment, the rocker arm bases (rocker arm base 15 and rocker arm base 12) are of structures with openings, the two ends of the rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14) are correspondingly inserted into the two sides of the openings of the corresponding rocker arm bases (rocker arm base 15 and rocker arm base 12) and the rocker arm shafts fit with the corresponding rocker arm bases in a manner of capable of rotating around respective axes. Single freedom means that the axial degree of freedom of the rocker arm shafts is limited, a structure in which shoulders are arranged on the rocker arm shafts to lean against two sides of the openings of the corresponding rocker arm bases may be adopted, or any manner which can limit axial movement and allow circumferential sliding in the prior art may be adopted. The rocker arms (rocker arm 11 and rocker arm 13) are located inside the openings of the corresponding rocker arm bases (rocker arm base 15 and rocker arm base 12) and fixedly arranged on the corresponding rocker arm shafts (rocker arm shaft 10 and rocker arm shaft 14); the outward side of the opening structure of the rocker arm base 15 (and rocker arm base 12) is a split bearing base structure. As shown in FIG. 6, the outward side of the opening structure of the rocker arm base 15 comprises a gland 151a and a base body 151, and the gland 151a and the base body 151 are detachably
and fixedly connected with each other, they are connected through bolts in the embodiment. Bearings bush 101 also can be arranged to reduce friction, the inward side of the opening structure of the rocker arm base 15 (and rocker arm base 12) is also provided with bearing bushes correspondingly. The outward side of the opening structure of the rocker arm base 12 is the same as the outward side of the opening structure of the rocker arm base 15. The use of the split bearing base structure is beneficial to the mounting of the rocker arm shafts, the decrease of the friction area and to the increase of the motion flexibility of the rocker arms; and, the structure is simple and compact, and the space is saved.

[0040] In the embodiment, the axis of the intake valve 31 and the axis of the exhaust valve 21 are respectively vertical to the tangent plane of the intersections point of the combustion chamber surface 5 with the axis of the intake valve 31 and the axis of the exhaust valve 21, that is, the axis of the intake valve 31 and the axis of the exhaust valve 21 are respectively intersected with the combustion chamber surface 5, and the intersection points are in the tangent plane of the combustion chamber surface 5. That is, the axes of the intake valve 31 and the exhaust valve 21 are intersected in the center of the combustion chamber, which is adapted to the intake and exhaust directions of the combustion chamber, so that the resistance is reduced, and the dynamic property of the gasoline engine is increased.

[0041] In the embodiment, the part of the combustion chamber surface 5 located between the intake valve 31 and the exhaust valve 21 forms a nose bridge region, as shown in FIG. 1, the width L of the nose bridge region is above 8mm on the combustion chamber surface 5. The outer circle of a seat retainer 31a of the intake valve 31 and the outer circle of a seat retainer 21a of the exhaust valve 21 are tangent to the edge of the bottom of the combustion chamber surface 5. The distance between the intake valve 31 and the exhaust valve 21 is increased, the thickness of the nose bridge region is properly increased, the capability of resisting against heat deformation is increased, and the tightness of the valves is improved effectively so that gas leakage of the valves can be avoided effectively. Simultaneously, instant interference between intake and exhaust is avoided, sufficient combustion is guaranteed, and the power of the gasoline engine is increased. The internal end of the outer circle of the intake valve 31 and the internal end of the seat retainer 31a of the exhaust valve 21 are matched with the shape of the combustion chamber surface 5. The end surface shapes of the internal end of the seat retainer 31a of the intake valve 31 and the internal end of the seat retainer 21a of the exhaust valve 21 are matched with the shape of the combustion chamber surface, stairs are removed, interference to intake and exhaust can be decreased, the resistance is reduced, the dead angle and the sharp shape change are eliminated, the sufficient combustion of the mixed gases is guaranteed, and the efficiency of the gasoline engine is improved.

[0042] The invention also discloses a gasoline engine having the foregoing described air-cooling cylinder head of a gasoline engine, wherein the air-cooling cylinder head of a gasoline engine is mounted in the gasoline engine.

[0043] The gasoline engine in the invention is mainly used in general-purpose machinery mainly including driving water pumps, fans and power generators and the like, with excellent cooling efficiency.

[0044] Finally, it should be noted that above embodiment is just used for explaining but not limiting the technical solution of the invention; although the invention has been described in details with reference to the preferred embodiment, it should be understood by common technicians in the field that the technical solution of the invention may have modifications or equivalent replacements within the principle and scope of the technical solution of the invention, and those modifications or equivalent replacements should be included in the protection scope of the invention.

1. An air-cooling cylinder head of a gasoline engine, comprising a cylinder head main body, and an intake passage, an exhaust passage and a spark plug mounting hole arranged in the cylinder head main body, a plurality of cooling fins is arranged on the outer surface of the cylinder head main body, and a combustion chamber surface is formed on the inner side of the cylinder head main body, wherein a longitudinally through air-cooling passage I is arranged on the same side of the cylinder head main body as the intake passage and the exhaust passage, a transversely through air-cooling passage II is arranged between the intake passage and the exhaust passage, and both the longitudinally through air-cooling passage I and the transversely through air-cooling passage II are kept away from function holes on the cylinder head main body.

2. The air-cooling cylinder head of a gasoline engine according to claim 1, wherein the axis of the intake passage and the axis of the exhaust passage are in a coplane, the air-cooling passage I is parallel to the coplane of the axis of the intake passage and the axis of the exhaust passage, the air-cooling passage I and the spark plug mounting hole are respectively located on two sides of the coplane of the axis of the intake passage and the axis of the exhaust passage, the air-cooling passage II is vertical to the coplane of the axis of the intake passage and the axis of the exhaust passage.

3. The air-cooling cylinder head of a gasoline engine according to claim 2, wherein the cooling fins extends into the air-cooling passage I to form a cooling bridge, and the air-cooling passage I is separated into a structure with a plurality of parallel and longitudinal passages by the cooling bridge.

4. The air-cooling cylinder head of a gasoline engine according to claim 3, wherein a through spark plug air-cooling passage is arranged on the same side of the cylinder head main body as the spark plug mounting hole.

5. The air-cooling cylinder head of a gasoline engine according to claim 4, wherein the cooling fins on the cylinder head main body extends to the outer wall of the exhaust passage.

6. The air-cooling cylinder head of a gasoline engine according to claim 1, wherein the combustion chamber surface is of a complexly spherical structure comprising a sphere I (a), a smooth curve (b) and a sphere II (c) in turn from the bottom to the top, and the radius of the sphere II (c) is larger than that of the sphere I (a); and the sphere I (a) and the sphere II (c) are in smooth transition through the smooth curve (b).

7. The air-cooling cylinder head of a gasoline engine according to claim 6, wherein an intake valve is arranged on the cylinder head main body corresponding to the intake passage, an exhaust valve is arranged correspondingly to the exhaust passage, the intake valve is oblique to the intake passage side from the bottom to the top, and the exhaust valve is oblique to the exhaust passage side from the bottom to the top.

8. The air-cooling cylinder head of a gasoline engine according to claim 7, wherein the intake valve and the exhaust valve are respectively provided with rocker arms, rocker arm
bases are respectively arranged on the cylinder head main body correspondingly to the corresponding rocker arms, the rocker arms are fixedly provided with corresponding rocker arm shafts, the rocker arm shafts are arranged on the corresponding rocker arm bases in single freedom in a manner of capable of rotating around respective axes, the rocker arm shafts are internally and obliquely arranged towards the top in the radial direction with respect to the mounting surface of the cylinder head main body, and the oblique angle of the corresponding rocker arm shafts with respect to the mounting surface of the cylinder head main body is respectively and correspondingly identical to the oblique angles of the intake valve and the exhaust valve with respect to the axis of the cylinder head main body; and the rocker arms form a lever structure using the corresponding rocker arm shafts as the fulcrums.

9. The air-cooling cylinder head of a gasoline engine according to claim 8, wherein the rocker arm bases are of structures with openings, the two ends of the rocker arm shafts are correspondingly inserted into the two sides of the openings of the corresponding rocker arm bases, and the rocker arm shafts fit with the corresponding rocker arm bases in a manner of capable of rotating around respective axes, and the rocker arms are located inside the openings of the corresponding rocker arm bases and fixedly arranged on the corresponding rocker arm shafts; the outward side of the opening structure of the rocker arm bases is a split bearing base structure comprising a gland and a base body, and the gland and the base body are detachably and fixedly connected with each other.

10. The air-cooling cylinder head of a gasoline engine according to claim 9, wherein the axis of the intake valve and the axis of the exhaust valve are respectively vertical to the tangent plane of the intersections point of the combustion chamber surface with the axis of the intake valve and the axis of the exhaust valve.

11. The air-cooling cylinder head of a gasoline engine according to claim 10, wherein the part of the combustion chamber surface located between the intake valve and the exhaust valve forms a nose bridge region, and the width of the nose bridge region is above 8mm on the combustion chamber surface.

12. The air-cooling cylinder head of a gasoline engine according to claim 11, wherein the outer circle of a seat retainer of the intake valve and the outer circle of a seat retainer of the exhaust valve are tangent to the edge of the bottom of the combustion chamber surface; and the internal end of the seat retainer of the intake valve and the internal end of the seat retainer of the exhaust valve are matched with the shape of the combustion chamber surface.

13. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 1, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

14. The air-cooling cylinder head of a gasoline engine according to claim 5, wherein the combustion chamber surface is of a complexly spherical structure comprising a sphere I (a), a smooth curve (b) and a sphere II (c) in turn from the bottom to the top, and the radius of the sphere II (c) is larger than that of the sphere I (a); and the sphere I (a) and the sphere II (c) are in smooth transition through the smooth curve (b).

15. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 2, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

16. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 3, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

17. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 4, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

18. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 5, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

19. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 6, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

20. A gasoline engine having the air-cooling cylinder head of a gasoline engine according to claim 8, wherein the air-cooling cylinder head of a gasoline engine is arranged in the gasoline engine.

* * * * *