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FUEL INDUCTION SYSTEM FOR GASOLINE ENGINE

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2 Sheets-Sheet 1

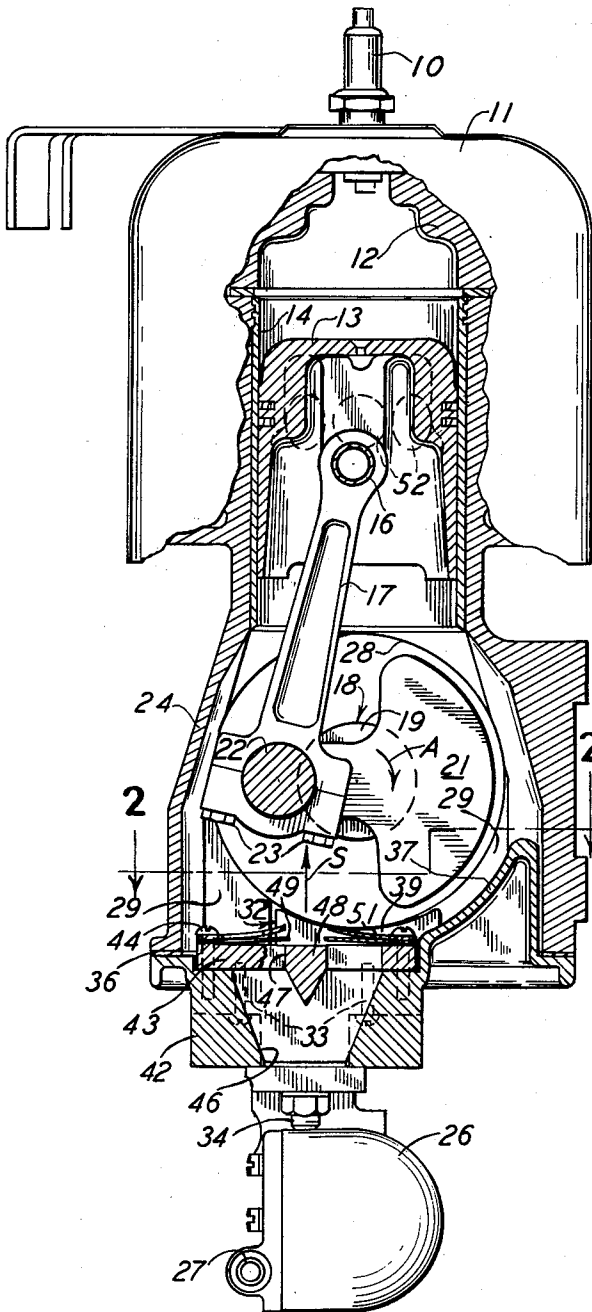


FIG. 1

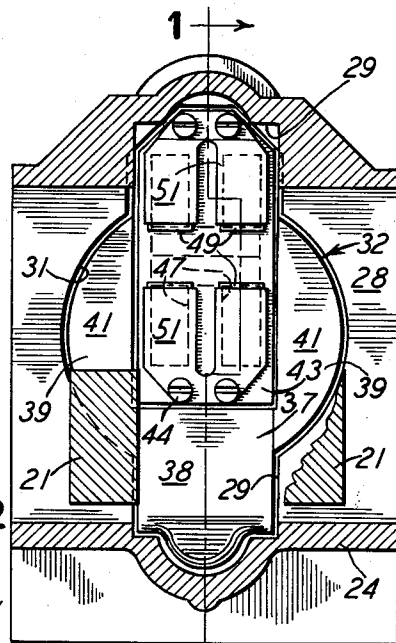


FIG. 2

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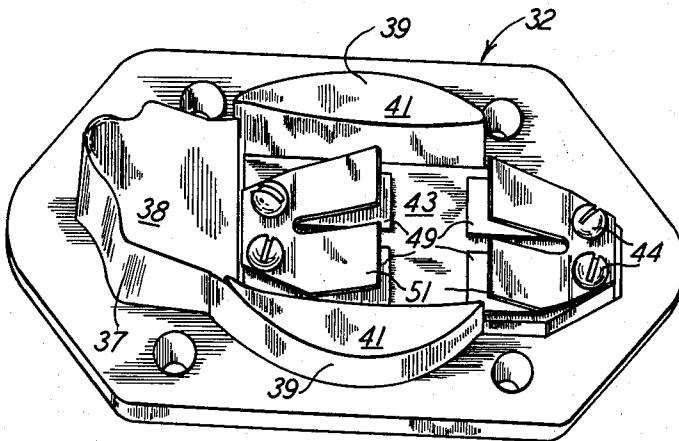


FIG. 3

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FUEL INDUCTION SYSTEM FOR
GASOLINE ENGINE

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12 Claims. (Cl. 123-73)

This invention relates to a gasoline engine, and, more particularly, it relates to a two-cycle gasoline engine including an improved fuel induction system and lubricating system for the gasoline engine.

Since this particular invention has found special application in the two-cycle gasoline engine art, it will accordingly be explained and described in connection with two-cycle engines. Thus it will be understood that the usual two-cycle engines should be considered and this of course includes the fuel induction or intake system which acts in response to the pressure variations created in the engine crankcase in response to the reciprocation of the engine piston. Generally, a pressure responsive type of intake valve closure is employed on the crankcase such that when the piston is moving to the top of the cylinder, the closure is automatically drawn open by virtue of the reduced pressure inside the crankcase, and conversely when the piston is moving to the bottom of the cylinder, the valve closure is moved to the closed position due to the increase in pressure in the crankcase. Of course during the open position of the closure, the usual fuel, air, and lubricating oil mixture is drawn into the crankcase. In this well-known action, the mixture is subsequently forced into the cylinder through the intake port in the side of the cylinder and which port is in communication with the crankcase, and this intake action occurs when the crankcase is pressurized and the valve closure is in the closed position to trap the mixture within the crankcase.

In this mixture, it is common practice to proportion the oil in the gasoline in one to sixteen parts in order that the internal parts of the engine can be lubricated during operation. However, it has now been discovered that the oil does not generally remain in suspension in the mixture, but instead a good portion of it falls from the mixture and accumulates in the bottom of the crankcase where it is agitated by the rotation of the crankshaft and the connecting rod, and it thus reduces itself to substantially a splash system of lubrication as employed in a four-cycle gasoline engine. This of course is not the intention of the designers of two-cycle engines, and the moving parts are not properly lubricated although a high quantity of oil is included in the mix as described. U.S. Patents 2,782,777 and 2,804,861 both refer to the accumulation or puddling of the oil in the crankcase and thus they also recognize this particular problem.

It is an object of this invention to provide an induction system for the fuel and oil and air mixture of a two-cycle engine and to do so in a manner which will overcome the problems referred to above.

More specifically, it is an object of this invention to provide a fuel induction system which will result in an improved lubrication of the internal parts of the engine and which will accomplish the result with a reduced quantity of oil to gasoline in the mixture. Consequently, there is improved lubrication of the engine, and there is a reduction in the customary accumulation of harmful oil products in the engine and particularly in the accumulation of the oil products on the electrodes of the spark plug to cause fouling of the plug.

Still another object of this invention is to provide an improved fuel induction system whereby the engine will operate at a lower temperature than that heretofore encountered, and it will also operate at a higher efficiency

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due to reduction of heat and the reduction of the oil deposits as mentioned, and still further it will result in a longer life for the engine.

Still a further object of this invention is to provide a fuel induction system wherein the valve is opened sooner than that heretofore possible and the valve is closed also at an earlier timing so that the best induction is achieved. Other objects and advantages will become apparent upon reading the following description in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a gasoline engine incorporating a preferred embodiment of this invention and with the view being in partial sections taken along the line 1-1 of FIG. 2.

FIG. 2 is an enlarged sectional view taken along the line 2-2 of FIG. 1.

FIG. 3 is an enlarged perspective view of the valve shown in FIG. 1.

The drawings show a two-cycle type of gasoline engine which includes the usual spark plug 10, engine shroud 11, and engine cylinder 12. The usual engine piston 13 is reciprocally disposed within the interior of the cylinder liner 14 and the usual wrist pin 16 and connecting rod 17 and crankshaft 18 are also included in the engine. Of course the crankshaft 18 includes the concentrically located axle portion 19 and the counter weights 21 and the eccentric portion 22. The latter is of course rotatably connected to the one end of the connecting rod 17 by means of the bolts 23 which clamp the connecting rod onto the eccentric 22 in the usual and well-known manner. Of course the engine also includes the crankcase 24 and the carburetor 26 which is connected with respect to the crankcase 24 and the usual fuel line 27 leads into the carburetor 26 in order that the required fuel can be introduced into the crankcase 24.

FIGS. 1 and 2 further show that the crankcase defines the usual cylindrical opening 28 radially outside of which is an opening 29, as more clearly shown in FIG. 2, and the opening 29 extends around the bottom half of the crankcase 24. Still another opening 31 is disposed radially beyond the crankcase central opening 28 and therebelow and this opening receives a valve body or crankcase mating portion generally designated 32. It will of course be noted that the member 32 is thus snugly disposed within the openings 29 and 31 as described. It will thus be understood that the member 32 is disposed between the crankcase 24 and the carburetor 26 and it is attached to the crankcase 24 by means of the bolts 33 and the stud 34 is shown to connect the carburetor 26 to the member 32. Also, of course a gasket 36 is disposed between the member 32 and the remainder of the crankcase 24 for fluid-tightly sealing therebetween, and the gasket 36 of course extends endlessly around the crankcase in the plane indicated by the gasket 36. At this time it should also again be noted that the member 32 is snugly disposed within the crankcase 24 to substantially occupy a portion of the opening 29 and the opening or recess 31. Thus, the portion 37 of the member 32 is disposed within the recess 29 and the upper face 38 of the portion 37 is shown to be concave to be disposed in close proximity to the sweep of the lower end of the connecting rod 17 so that a minimum of space is available in the lower end of the crankcase and at that portion. Likewise, two side walls or baffles 39 are included in the member 32 on opposite sides thereof to occupy the space included in the crankcase opening 31 and to of course substantially fill the space except of course for the inclusion of the remaining part of the member 32 as described hereinafter. At this time it should also be noted that the upper faces 41 of the baffles 39 are also arcuate to be, in this instance, in close proximity to the rotative path of the crankshaft eccentrics 21 as clearly

shown in both FIGS. 1 and 2. In this manner, the space available for the usual puddling or accumulation of oil in the crankcase is eliminated by the inclusion of the members 37 and 39.

With further description of the member 32, it will be noted that it includes the larger portion 42 on top of which is secured a valve outlet opening portion 43 and the latter is secured by means of the bolt 44. Thus, the parts or members 42 and 43 constitute a valve body having a fuel inlet opening 46 and a plurality of fuel outlet openings 47 so that of course the fuel passes through the carburetor 26 and the openings 46 and 47 and into the crankcase 24 as described. In this instance, it will be noted that four outlet openings 47 are provided and they are separated by portions of the member 43 including the central partition 48. Also note that the space between the baffles 39 presents a cavity in the crankcase 24, and the valve is disposed within the cavity and of course is flanked by the baffles 39. Also valve closures in the form of the usual flexible reed valves 49 are attached to the member 43 by means of the screws or bolts 44 to overlie the four openings 47 and thus close over the terminal ends of the outlet openings 47 and therefore seat on the valve seats surrounding said openings to thus selectively interrupt the flow of fuel through the outlet openings 47 as the reed 49 flexes in response to the pressure changes inside the crankcase 24 all in the usual manner. Further, the rigid limit stops 51 are also secured to the member 43 by means of the screws 44 to limit the maximum amount of opening of the valves 49.

In this arrangement, it will then be noted and understood that the fuel flowing through the valve body and from the outlets 47 will merge into one common stream as indicated by the arrow designated S, and in this action, the reed valves 49 and the partitions or baffles 39 restrict the fuel flowing through the valve to the direction of the stream S. It will further be now noted that the direction of the stream S is oriented with respect to the connecting rod 27 to be directed thereat when the connecting rod is on the side of the center line through the cylinder 14, as in the position shown, and with that side being the side the connecting rod 17 occupies when the piston 13 is rising to the top-dead-center position of the cylinder 12. Of course it is during this upstroke of the engine that the valve closures 49 are open, and thus the fuel and oil mixture coming through the valve is directed right onto the connecting rod 17 and of course onto the crucial and important bearing points on the inside of the engine 17 so that all of these points and areas are properly lubricated by the incoming mixture.

Further, since the direction of rotation of the crankshaft is as shown by the arrow A, the most efficient updraft of air for the purpose of the induction of the fuel is located on that side of the engine where the connecting rod 17 is shown. With this arrangement, it has been found that the quantity of oil to gasoline in a two-cycle engine can be as low as one part in thirty-two and even sixty-four, and still have the engine run at least as cool as heretofore, and of course with less oil and fouling deposits accumulating in the engine. Further, there has been an elimination of the usual bounce or flutter of the reed valves, and the valves now open at approximately 240 degrees after top-dead-center rather than the approximately 270 degrees to 300 degrees after top-dead-center on previous constructions. Also, the reed valve of the instant invention closes at 30 to 40 degrees after top-dead-center where heretofore the reed closed at 60 to 90 degrees after top-dead-center and it even did so after several bounces or flutters which hampered the desired induction and positive closing action required. Thus, as shown in FIG. 1, the closures 49 are partially open as the connecting rod 17 and the piston 13 are moving upwardly and are currently in the 270 degree position.

Also, the usual intake and exhaust ports are included in the cylinder 12 and its liner 14 and thus the exhaust

ports 52 are shown in dotted positions since they exist on the far side of the liner 14 and the usual intake ports would of course exist on the near side of the liner in the usual manner. Also, as customary the exhaust ports 52 would be uncovered by the piston 13 and therefore open at approximately 110 degrees after top-dead-center, and the intake ports would be open at approximately 120 degrees after top-dead-center.

It will thus be noted that the reeds or closures 49 are disposed to be directed at each other such that fuel flow therepast will merge into the one stream S, and, further, the side partitions or baffles 39 are disposed immediately adjacent the sides of the reeds 49 and extend to a height above the maximum opening which the reeds 49 can achieve so that the partitions 39 further direct the incoming fuel upwardly and onto the connecting rod 17 and the connecting rod bearings, including the wrist pin 16. While no invention is claimed in the provision of the plurality of valve outlet openings and a similar number of reed closures disposed thereover, there is believed to be novelty in the eccentric location of the fuel stream S and in the provision of the side partitions or baffles 39 and the filler member or portion 37, which further occupies the crankcase opening 29 on what may be termed the compression side thereof rather than the induction side which the connecting rod 17 is shown to occupy.

While a specific embodiment of this invention has been shown and described, it should be obvious that certain changes could be made in the embodiment and the invention should therefore be limited only by the scope of the appended claims.

What is claimed is:

1. In a gasoline engine of the type including an engine cylinder, and a piston reciprocally disposed in said cylinder, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and having a fuel inlet opening therein and a fuel outlet opening directed therefrom and into said crankcase and with said outlet opening being disposed immediately adjacent the path of said connecting rod; substantially diametrically opposite said cylinder, said valve body being disposed on said crankcase with said fuel outlet opening disposed parallel to and aligned axially offset with respect to said center line and oriented directly toward said connecting rod during the period that said piston is moving to the top of said cylinder all for directing fuel at and onto said connecting rod during said period, and a reed valve closure mounted on said valve body for selectively interrupting fuel flow through said body.

2. In a two-cycle gasoline engine of the type including an engine cylinder, and a piston disposed in said cylinder for reciprocation therein between top-dead-center and bottom-dead-center, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and having a fuel inlet opening therein and a plurality of fuel outlet openings co-planarily disposed and directed therefrom and into said crankcase and having axes in predetermined orientations on said valve body, a reed valve closure mounted on said valve body over each of said outlet openings and with the free ends of said closures disposed adjacent each other to open and close thereon for selectively interrupting fuel flow through said body and for the passage of fuel from said outlets into a single stream in a predetermined direction when said closures are in the open position, said valve body being disposed on said crankcase with said axes of said

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fuel outlet openings aligned offset with respect to said center line and to the side thereof to be oriented toward said connecting rod during the period when said piston is moving to said top-dead-center position and all for orienting said predetermined direction of fuel at and onto said connecting rod during said period, and said valve body extending into said crankcase to dispose said valve closures immediately adjacent the path of said connecting rod.

3. In a two-cycle gasoline engine of the type including an engine cylinder, and a piston disposed in said cylinder for reciprocation therein between top-dead-center and bottom-dead-center, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on an axis intersection the center line of said cylinder for rotation in a selected direction, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase on the bottom thereof opposite said cylinder and having a fuel inlet opening therein and a fuel outlet opening directed therefrom and into said crankcase and having an axis in a predetermined orientation on said valve body, a valve closure mounted on said valve body to open and close thereon for selectively interrupting fuel flow through said valve body and for the passage of fuel from said outlet in a predetermined direction when said closure is in the open position, said valve body being disposed on said crankcase with said axis of said fuel outlet opening disposed to one side of said axis of said cylinder with said side being the side occupied by said connecting rod during the period when said piston is moving to said top-dead-center position and all for orienting said predetermined direction of fuel at and onto said connecting rod during said period, and said valve body including a portion extending into said crankcase and occupying the other side thereof immediately adjacent the rotational path of said connecting rod for preventing accumulation of oil in said other side.

4. In a two-cycle gasoline engine of the type including an engine cylinder, and a piston disposed in said cylinder for reciprocation therein between top-dead-center and bottom-dead-center, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively for positioning on one side of said center line during movement of said piston toward said top-dead-center; the invention of said crankcase having a fuel passage therein terminating in a plurality of fuel outlet openings directed into said crankcase, a reed valve closure fixed with respect to said crankcase and overlying each said outlet opening and being secured and disposed for flexing open toward each other and directing the flow of fuel therethrough into one merged stream, said outlet openings being disposed on said crankcase to orient said merged stream to said one side of said center line to thereby orient said merged stream toward said connecting rod during the period when said piston is moving to said top-dead-center position.

5. In a two-cycle gasoline engine of the type including an engine cylinder and a piston reciprocally disposed in said cylinder and a wrist pin connected to said piston and a crankcase and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod respectively, the invention of a fuel valve body mounted on said crankcase and having a valve seat offset from said centerline to the side thereof of upward movement of said connecting rod, a valve closure mounted on said valve seat for selectively interrupting fuel flow through said body and overlying said valve seat and being movable to a full-open

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position away from said valve seat in response to fluid pressure changes in said crankcase according to reciprocation of said piston, and a baffle disposed in said crankcase immediately adjacent said valve closure and extending to a height substantially equal to said full-open position of said valve closure and having a baffle wall oriented for directing fuel flow from said valve seat and directly onto said connecting rod when the latter is moving upwardly.

6. In a gasoline engine of the type including an engine cylinder, and a piston reciprocally disposed in said cylinder, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and having a fuel inlet opening therein and a plurality of fuel outlet openings directed therefrom and into said crankcase, a plurality of reed valves mounted on said valve body and overlying each of said outlet openings and having the free ends of said reed valves disposed adjacent each other for directing the flow through said outlet openings and endwise toward the other of said outlet openings and into one common stream, and a baffle disposed in said crankcase and on each side of said reed valves and immediately adjacent the latter and including a wall oriented for directing said flow from said outlet openings and directly onto said connecting rod when the latter is in its position at the time said piston is moving upwardly in said cylinder.

7. In a two-cycle gasoline engine of the type including an engine cylinder and a piston reciprocally disposed in said cylinder and a wrist pin connected to said piston and a crankcase and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod respectively, the invention of said crankcase having a cavity formed thereon at the side thereof opposite said cylinder, a gasket disposed on said crankcase encircling said cavity and defining a plane thereon, a fuel valve mounted on said crankcase in abutment with said gasket and having a fuel inlet opening and a fuel outlet opening with the latter disposed within the walls defining said cavity, a valve closure mounted on said valve for selectively interrupting fuel flow through said outlet opening, projecting means disposed on said valve and extending into said crankcase beyond said plane and occupying approximately all of said cavity and extending therinto to a location immediately adjacent the rotational path of said connecting rod, said projecting means terminating in a concave surface immediately adjacent and with respect to the path of said connecting rod.

8. In a gasoline engine of the type including an engine cylinder, and a piston reciprocally disposed in said cylinder, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and with the valve seat being disposed immediately adjacent the path of the crankshaft end of said connecting rod and being substantially diametrically opposite said cylinder, a valve closure mounted on said valve body and being operable over said valve seat for selectively interrupting the flow of fuel mix through said valve body, said valve closure and said fuel outlet opening being disposed and oriented offset from said center line of said cylinder in the direction of travel of said crankshaft to direct said fuel mix in a stream from said fuel outlet opening and directly onto said connecting rod during the period that said piston is moving to the top of said cylinder.

9. In a gasoline engine of the type including an engine

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cylinder, and a piston reciprocally disposed in said cylinder, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and having a fuel outlet opening being disposed immediately adjacent the path of the crankshaft end of said connecting rod and being substantially diametrically opposite said cylinder, a valve closure mounted on said valve body for selectively seating over said outlet opening for interrupting the flow of fuel mix through said valve body, said valve closure and said fuel outlet opening being disposed and oriented asymmetrical with respect to said center line and offset therefrom in the direction of travel of said crankshaft to direct said fuel mix in a stream from said fuel outlet opening and directly onto said connecting rod during the period that said piston is moving to the top of said cylinder.

10. In a gasoline engine of the type including an engine cylinder, and a piston reciprocally disposed in said cylinder, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and having a fuel outlet opening with the terminal end thereof being disposed immediately adjacent the path of the crankshaft end of said connecting rod and being substantially diametrically opposite said cylinder, a valve closure mounted on said valve body and being operable over said terminal end for selectively interrupting the flow of fuel mix through said valve body, said valve closure and said fuel outlet opening being disposed and oriented to direct said fuel mix in a stream from said fuel outlet opening and directly onto said connecting rod during the period that said piston is moving to the top of said cylinder, and a baffle disposed in said crankcase adjacent said valve closure and said stream for guiding the latter toward said connecting rod and with said baffling occupying the space in said crankcase immediately adjacent the path of said connecting rod and thereby reducing the void space in said crankcase to render the valve closure more responsive to the movements of said piston.

11. In a gasoline engine of the type including an engine cylinder, and a piston reciprocally disposed in said cyl-

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inder, and a wrist pin connected to said piston, and a crankcase, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said crankcase and having a fuel outlet opening with the terminal end thereof being disposed immediately adjacent the path of the crankshaft end of said connecting rod and being substantially diametrically opposite said cylinder, a valve closure mounted on said valve body and being operable over said terminal end for selectively interrupting the flow of fuel mix through said valve body, said terminal end of said fuel outlet opening being disposed parallel to said center line of said cylinder and offset therefrom to be directed toward said connecting rod to direct the fuel mix onto the latter during the period that said piston is moving to the top of said cylinder.

12. In a gasoline engine of the type including an engine cylinder, and a piston reciprocally disposed in said cylinder, and a wrist pin connected to said piston, and a crankcase having a surface thereon extending around a crankcase opening for the mounting of a fuel valve, and a crankshaft rotatably mounted on said crankcase on the center line of said cylinder, and a connecting rod rotatably connected at opposite ends thereof to said wrist pin and to said connecting rod, respectively; the invention of a fuel valve body mounted on said surface of said crankcase and having a fuel outlet opening being disposed immediately adjacent the path of the crankshaft end of said connecting rod and being substantially diametrically opposite said cylinder and terminating beyond the plane of said surface and within said crankcase opening, a valve closure mounted on said valve body and being operable over said outlet opening for selectively interrupting the flow of fuel mix through said valve body, said valve closure and said fuel outlet opening being disposed and oriented to direct said fuel mix in a stream from said fuel outlet opening and directly onto said connecting rod during the period that said piston is moving to the top of said cylinder.

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