March 11, 1941. T. R. SMITH 2,234,455

FUEL GAS CARBURETOR AND LUBRICATOR

Filed Aug. 6, 1938 2 Sheets-Sheet 1

Fig. 1

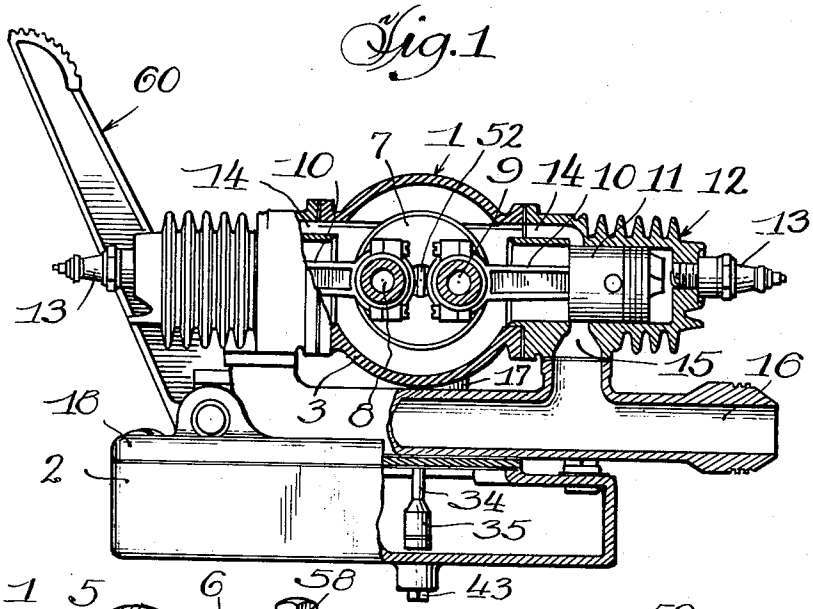
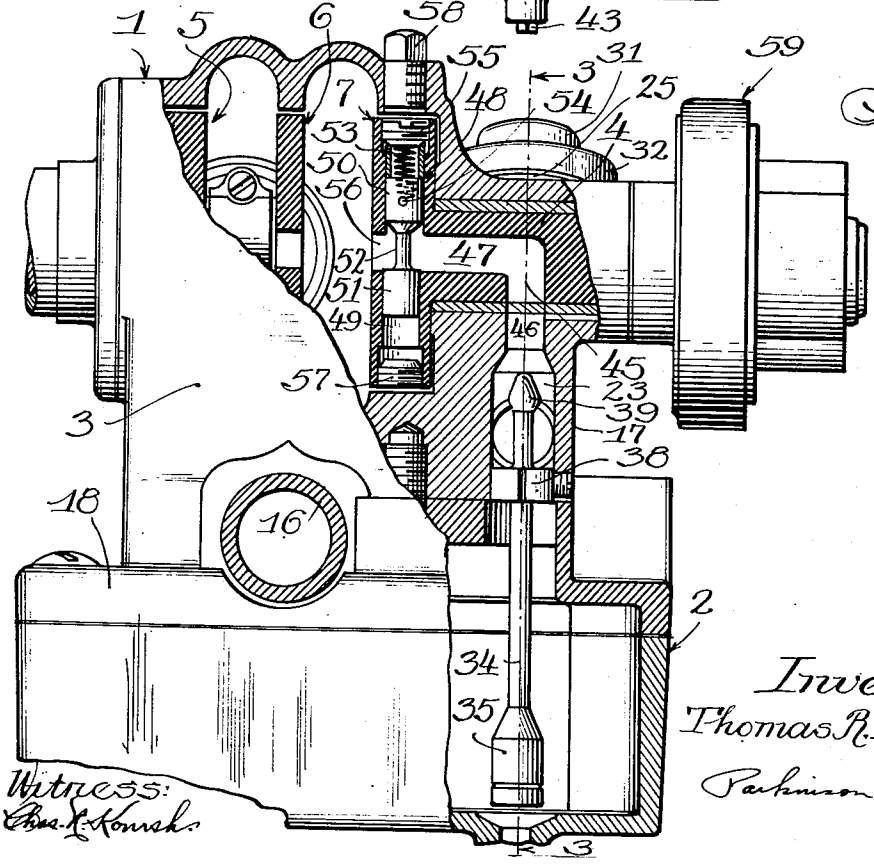


Fig. 2



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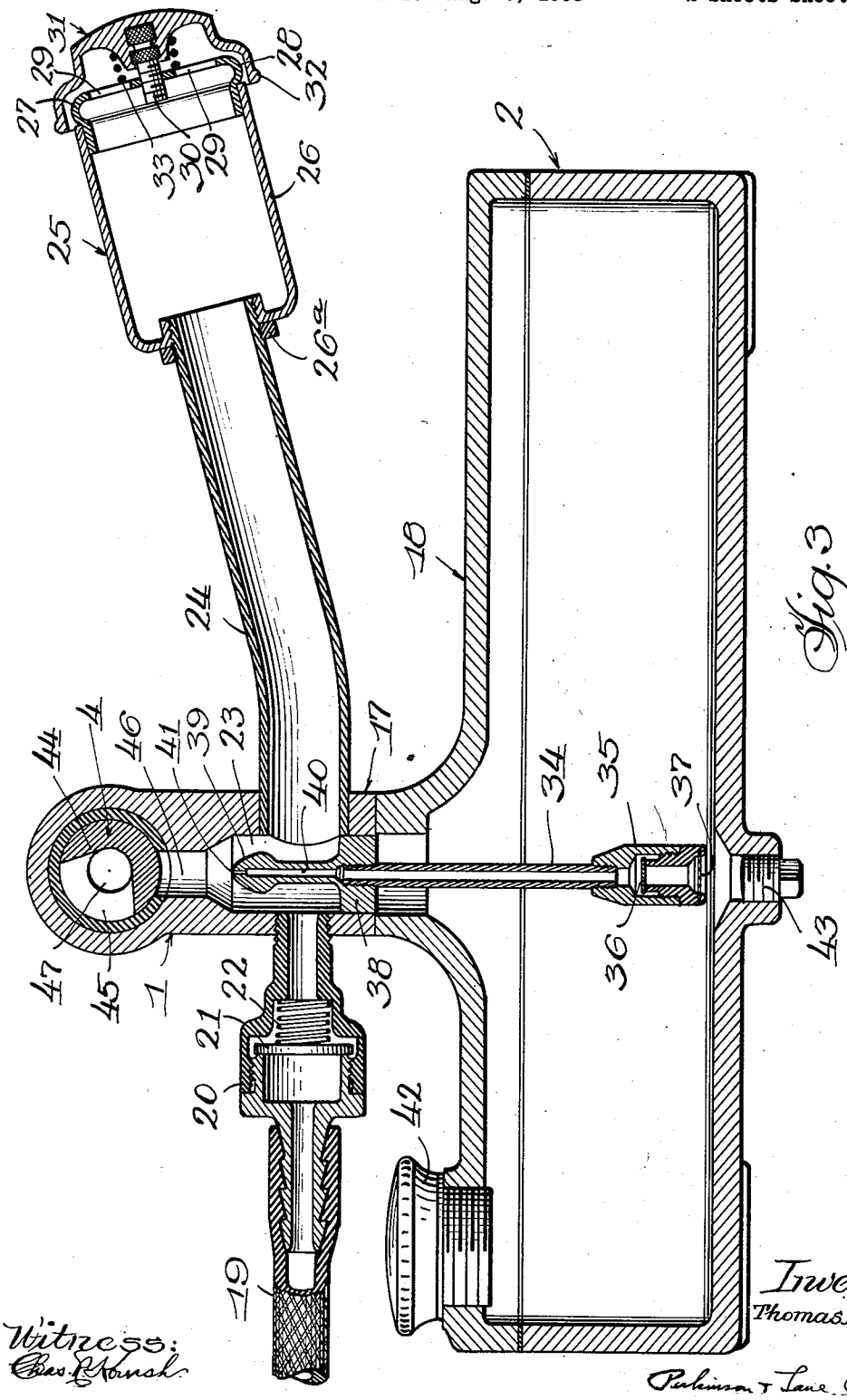


Fig. 3

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UNITED STATES PATENT OFFICE

2,234,455

FUEL GAS CARBURETOR AND LUBRICATOR

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Application August 6, 1938, Serial No. 223,459

2 Claims. (Cl. 123—73)

The present invention relates to a combustion engine and more particularly to a novel fuel gas carburetor and lubricator for a two-cycle engine.

Among the objects of the present invention is to provide a novel fuel gas carburetor and lubricator having separate intakes for the fuel gas, air and lubricant so related and arranged as to periodically discharge into a common mixing chamber from where the mixture is drawn into the crank case.

A further object is to provide a combined fuel gas carburetor and lubricator having controlled fuel gas, air and lubricant inlets arranged and combined to give the desired ratio of fuel gas to air for efficient combustion, and the proper amount of lubricant for efficient lubrication.

A still further object is to provide a novel carburetor for supplying the crank case and cylinders with the requisite combustible mixture and lubricant. In the novel construction and arrangement, the mixture of fuel gas, air and lubricant is drawn into and through the crank shaft and thence into the crank case and cylinders at predetermined periods in accordance with the reciprocating suction and compression action in the crank case. In the preferred form, the inlets for the fuel, air and lubricant are individually controlled and discharge the desired ratio of mix into a mixing chamber. The outlet from the mixing chamber is through a rotary valve opening into the crank case and this outlet is opened on every revolution of the crank shaft. The action of the pistons on the crank case volume at such time causes a reduced pressure at the outlet of the mixing chamber and this reduced pressure allows fuel gas, air and lubricant to flow in from their respective inlets.

In the drawings:

Figure 1 is a view, part in side elevation and part in vertical cross section, of a two-cycle engine equipped with the novel carburetor and lubricator.

Figure 2 is an enlarged fragmentary view, part in side elevation and part in vertical cross section taken through the crank shaft and showing the rotary outlet valve from the mixing chamber to the crank case.

Figure 3 is a view in vertical cross section taken on the line 3—3 of Figure 2.

Referring more particularly to the disclosure in the drawings, the novel fuel gas carburetor and lubricator is shown in connection with a two cylinder, two-cycle engine 1 having a lubricant supply tank 2 in its base. The engine comprises a crank case 3 in which is rotatably mounted a crank shaft 4 having spaced crank discs 5, 6 and 7 and connecting crank pins 8 and 9. Upon each crank pin is pivotally mounted a piston rod 10 carrying a piston 11 mounted for reciprocation in a cylinder 12. The cylinders are shown as mounted upon the crank case in opposed relation and at the end of each cylinder is mounted a spark plug 13 suitably connected by a lead to the ignition system (not shown).

The disclosed embodiment being of the two-cycle construction, the intake ports 14 and the exhaust ports 15 leading to the exhaust manifold 16 are opened by the position of the reciprocating piston 11 at the end of each rearward or suction stroke, the exhaust port being shown as so related as to open a fraction earlier than the intake port 14 whereby to permit an escape of the burned gases into the exhaust manifold 16 before a fresh charge of fuel mixture enters the cylinder. The novel construction of fuel gas carburetor and lubricator, which is adapted to supply the crank case with the fuel mixture and lubricant, comprises a carburetor housing 17 which may be suitably secured to the cover 18 of the lubricant supply tank 2. This carburetor is provided with a fuel gas intake 19 from a suitable fuel gas supply and including a valve housing 20 enclosing a disc check valve 21 actuated by a spring 22 for sealing the fuel gas under line pressure from leakage into the mixing chamber 23 of the carburetor until such time that the mixing chamber pressure is reduced below atmospheric, i. e. when the engine is rotating. Also leading into the carburetor housing and mixing chamber 23 is an air intake 24 for the air supply. Upon this air intake is secured an air cleaner 25. This air cleaner 25 comprises a cup-shaped casing 26 threadedly secured upon the intake and locked thereon by a suitable lock nut 26A.

Upon the outer end of the casing 26 is mounted an intake cup 27 crimped or enlarged at its outer end 28 to seat conformably in the casing and provided with a plurality of openings 29 for the entering air. The central portion of the cap 27 is tapped or threaded to adjustably receive the threaded shank 30 of a cover 31 forming a manually adjustable means for controlling the quantity of air permitted to enter the casing and carburetor. The cover or knob 31 has different settings for starting and running operation of the engine. During the starting or initial operation of the engine, the air intake control is set for starting speed and after the engine starts, is

manually opened until the engine governor takes control.

The knob or cover 31 is formed with a skirt portion 32 adapted to overlap or encompass the cap 27 but sufficiently spaced therefrom to provide a variable, annular orifice permitting the incoming air to pass therebetween and by a tortuous path, through the openings 29 and into the air intake 24 and mixing chamber 23 in the carburetor. If desired, a screen may be additionally provided in the cap for filtering the incoming air. Another function of the knob or cover is to provide a hood or shedding device for preventing the entrance of wash water where the engine is used for operating a washing machine, or the entrance of other foreign particles. This knob is preferably knurled around its gripping portion so that it may be more readily adjusted. By turning the knob or cover to the right or clockwise, the quantity of air permitted to enter the cleaner and carburetor is reduced and the mixture is choked or enriched. A compression spring 33 seating between the cover and cap 28 tends to maintain the desired adjustment.

To supply the crank case and associated parts with the requisite lubricant, the invention comprehends providing the carburetor with a lubricant inlet or oil feed tube 34 having its lower end projecting into the lubricant supply reservoir 2. At this lower end, the lubricant intake or feed tube is provided with a check valve 35 having a simple disc 36 for controlling the lubricant supply and assisting in maintaining a constant oil column in the feed tube. A filter screen 37 is preferably provided in the inlet to the check valve. The upper end of the feed tube is shown as threaded into a block 38 formed or provided with a jet 39 having aligned discharge openings 40 and 41, the latter having a reduced diameter or cross section. The lubricant supply tank is shown as provided with the usual inlet and drain plugs or closures 42 and 43.

In order to supply the crank case and cylinders with the combustible mixture and lubricant, there is provided a rotary valve 44 comprising a slot or sector 45 cut from the crank shaft 4 and communicating with the outlet 46 of the mixing chamber 23, and a centrally disposed and longitudinally extending opening or passage 47 in the crank shaft. So that the quantity of mixture entering or drawn into the crank case may be efficiently controlled, I provide a throttle governor or valve disposed in the crank disc 7. This engine governor comprises a plunger or valve member 48 slidable in a diametrically disposed opening 49 in the disc. The plunger or valve consists of spaced weights or weighted members 50 and 51 connected by a stem 52. The weight 50 is hollowed out to receive an end of a spring 53 and connected thereto by a pin 54, the other end of the spring being secured to and seating against an adjusting screw 55. During operation, the spring acts to pull the plunger back to an open position for free passage of the mixture through the opening or passage 47 in the crank shaft and the opening 56 in the disc 7 leading into the interior of the crank case. A screw 57 provides a stop for the governor, while a removable plug 58 provides access to the screw 55 which permits an accurate adjustment for correct position and governing speed. By screwing in this adjusting screw 55, the governing speed is lowered and by screwing it out, the governing speed is increased.

The construction and operation of the governor throttle and associated parts of the engine, including the foot starter 59 and foot lever 60, are more completely disclosed in my co-pending application Serial No. 101,185, filed September 17, 1936 and issued on September 5, 1939 as Patent No. 2,172,147.

In the operation of the novel fuel gas carburetor and lubricator, the fuel gas is held in the supply line 19 under pressure by a gas pressure regulator (approximately six ounces per square inch) until the rotary intake valve 44 opens and the suction of the pistons creates a low or reduced pressure in the mixing chamber 23, thereby allowing the fuel gas check valve 21 to be forced open by the fuel gas pressure and inject a quantity of fuel gas into the mixing chamber. The spring 22 normally retains the check valve in closed position and seals the gas under line pressure from leakage into the mixing chamber until the mixing chamber pressure is reduced below atmospheric, which is only possible when the engine is operating.

At the same time that fuel gas is drawn into the mixing chamber, air is drawn into the air intake 24 and lubricant or oil is drawn into the mixing chamber. The air intake is controlled by means of the adjustable cover or knob 31 which in turn adjusts and controls the annular orifice between the skirt 32 and cap 27. At the intervals when the pressure is below atmospheric in the mixing chamber, oil or lubricant is drawn into the jet 39. The simple disc check valve 36 in the oil feed tube assists in maintaining a constant oil column in this tube.

As the novel construction is essentially a constant speed carburetor, the air intake control is set for starting speed, but after the engine starts, is opened up until the engine governor takes control.

Having thus disclosed the invention, I claim:

1. A fuel gas carburetor for a two-cycle engine having a lubricant supply tank in its base, comprising a housing adapted to be mounted on the supply tank and having a mixing chamber, an air inlet having a variable orifice for controlling the quantity of air entering the mixing chamber, a lubricant inlet from the supply tank having a jet projecting into the mixing chamber and a check valve control, and a fuel gas inlet connected to a fuel gas supply line under pressure and provided with a spring seat check valve control, all so constructed, arranged and combined as to automatically control the desired fuel mixture and lubricant supply during the operation of the engine, and a rotary intake valve for drawing into the mixing chamber a requisite quantity of fuel gas, air and lubricant.

2. In an internal combustion engine of the two-cycle type having a crank case, a crank shaft rotatable therein and a lubricant supply, a fuel gas carburetor for supplying a combustible mixture and lubricant to the crank case and comprising a mixing chamber, an adjustable air inlet for controlling the quantity of air entering the mixing chamber, an inlet from the lubricant supply to the mixing chamber having a check valve control, a fuel gas inlet to the mixing chamber connected to a fuel gas supply under pressure and provided with a check valve control, and a rotary intake valve provided in and adapted to open at each revolution of the crank shaft for drawing into the mixing chamber a requisite quantity of fuel gas, air and lubricant.

THOMAS R. SMITH.