

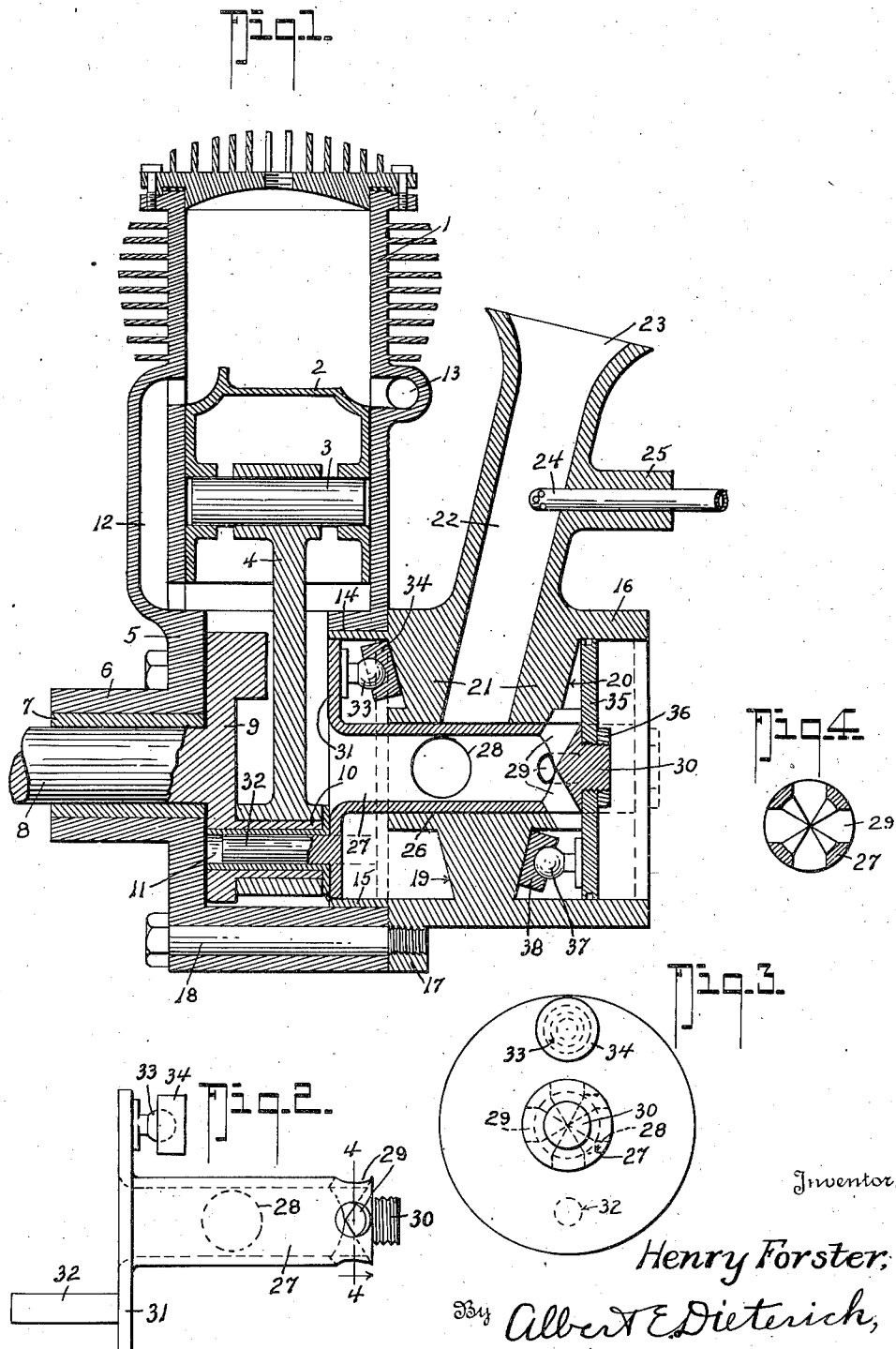
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TWO-CYCLE INTERNAL-COMBUSTION ENGINE

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TWO-CYCLE INTERNAL-COMBUSTION
ENGINE

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9 Claims. (Cl. 123-73).

1

My invention which relates to two-cycle engines primarily has for its object to provide improved means for supercharging the crank case with workable mixture.

Further it is an object to provide a simple, effective and inexpensive means which is especially adapted for use in model engines used on model airplanes, etc. Engines of the kind just referred to usually employ a rotary valve for controlling the fuel admission to the crank case and my invention involves the use of a combined rotary valve and compressor unit which not only controls the fuel admission but also assists the piston to compress a greater charge than that usually drawn into the crank case for compression by the piston.

Again it is an object to provide an improved means to increase the volume of the crank case while the piston is on its suction stroke and, after the crank case has been filled with working mixture by the suction of the piston, force the increased volume of fuel into the normal crank-case space to be compressed by the piston on its compression stroke.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends the invention also resides in those novel details of construction, combination and arrangement of parts all of which shall be first fully described hereinafter and then be specifically pointed out in the appended claims, reference being had to the accompanying drawing in which:

Fig. 1 is a central vertical longitudinal section of an engine embodying my invention.

Fig. 2 is a detail side elevation of the rotary valve with the piston disc omitted.

Fig. 3 is an end elevation of the same.

Fig. 4 is a detail cross section on the line 4-4 of Fig. 3.

In the drawing in which like numerals of reference indicate like parts in all the figures, 1 represents the cylinder of an engine of the type hereinbefore mentioned. The piston 2 carries a wrist pin 3 to which one end of a connecting rod 4 is pivoted, the other end of the rod 4 being pivoted to the crank 10.

The crank case 5 is preferably cast integrally with the cylinder 1 and has one end wall provided with a bore 14 for a purpose presently explained. The crank case has a shaft bearing 6, suitably bushed as at 7 to receive the crank shaft 8. The shaft 8 has a crank disc 9 and the crank 10. The crank 10 is hollow and is bushed at 11 to receive the crank 32 of the rotary valve.

2

A piston-controlled by-pass 12 conveys the compressed mixture from the crank case into the cylinder 1 above the piston. The exhaust port and duct is shown at 13.

The valve-compressor housing 16 has a reduced end 15 which fits tightly into the bore 14 and the cylinder 16 is secured to the crank case by cap screws 18 passing through bores in the crank case and tapped into ears 17 on the cylinder 16. The housing 16 is divided into two parts by a V-shaped-in-cross-section partition 21 the inner face 19 of which is a plane surface inclined upwardly-inwardly while the outer face 20 inclines upwardly-outwardly, the angles of inclination of the faces 19 and 20 are the same.

22 indicates the fuel intake duct whose flared end 23 admits air. A gasoline nozzle 24 held in a boss 25 supplies the combustible and with the air constitutes the fuel which passes down the duct to the valve sleeve 27.

The valve sleeve 27 has a port 28 to register with the lower end of the intake duct 22 at times. It also has ports 29 communicating with the space between the partition 21 and the piston disc 35 that is secured to the threaded end 30 of the closed end of the valve sleeve, a jamb nut 36 being provided to prevent the piston disc 35 coming loose.

At the open end the sleeve 27 is provided with a disc 31 that moves as a piston in the innermost bore of the cylinder 16 while the disc 35 acts as a piston in the outermost bore of the cylinder 16.

A ball 33 is mounted on the disc 31 and carries a shoe 34 that lies against the face 19 of the partition while a ball 37 is mounted on the disc 35 at the side diametrically opposite that where the ball 33 is located, and carries a shoe 38 that lies in contact with the face 20 of the partition 21.

As the crank shaft 8 rotates during its normal operation, it rotates and drives, by means of the crankpin 32, the rotary valve. The rotary valve, due to the two ball joints 33 and 37 and shoes 34 and 38, acting on the stationary cam (the V-shaped partition 21) is forced to move axially in a reciprocating manner. At a predetermined position of the crankshaft, port 28 in the rotary valve, communicates with the carburettor intake (tube 22) for admission of the fuel mixture. With the crankshaft rotation continuing, the rotary intake port 28 closes, whereupon the rotary valve, moving in an axial direction toward the crankshaft, decreases the volume of the crankshaft space 39.

The four ports or passages 29 in the rotary

3

valve communicate with the crank case through the hollow rotary valve shaft (sleeve 27), in consequence of which the resultant added volume of gases to the crank case per revolution for super-charging amount to two times the area of the greatest diameter of the rotary valve multiplied by its axial movement.

From the foregoing description taken in connection with the accompanying drawing it is thought the construction, operation and advantages of the invention will be clear to those skilled in the art.

What I claim is:

1. In a two-cycle internal combustion engine having a cylinder, a crankcase, a piston and a crank shaft employing crankcase compression and wherein the fuel mixture is admitted to the crankcase and through a rotary valve, the improvement which comprises: an extension to the crankcase, said extension being in communication with the crankcase at one end of the extension, a rotary valve in said one end and serving as a closure therefore; means to move said rotary valve axially in said one end to increase and decrease the effective capacity of said crankcase; and means to pass fuel into the crankcase via said valve at suitable times.

2. In a two-cycle internal combustion engine having a cylinder, a crankcase, a piston and a crank shaft and employing crankcase compression and wherein the fuel mixture is admitted to the crankcase by and through a rotary valve, the improvement which comprises: a combined rotary and reciprocating valve; a housing for said valve in which the valve is rotatably and reciprocatingly mounted, said housing being in part functionally an extension of said crankcase; means to pass fuel into the crankcase via said valve when said valve is in one position; and means to rotate and reciprocate said valve by virtue of which the effective crankcase volume will alternately be increased and diminished for purposes described.

3. In a two-cycle internal combustion engine having a cylinder, a crankcase, a crank shaft, a piston operatively connected with said crank shaft, and means for delivering fuel to the crankcase, the improvement which includes a body having a cylindrical passage divided into two chambers by a suitable partition that is in turn provided with a valve-sleeve bearing; a rotary valve in said body and comprising two end discs, one located in each chamber and connected by a sleeve open at its end adjacent the crankcase and closed at its other end against atmosphere, said sleeve adjacent said other end having ports communicating with the second of said chambers at places between said partition and the adjacent end disc; a fuel mixing and delivering duct in said partition communicating with said valve sleeve, said valve sleeve having a port to register with said fuel duct at times; and means to rotate and simultaneously reciprocate said valve.

4. In a two-cycle crankcase-compression engine having a cylinder, a crankcase, a piston, a crank shaft and a piston rod, said crankcase having a valve-controlled fuel inlet, the improvement which includes: a valve-compressor cylinder, said valve-compressor cylinder having a V-shaped partition with a valve-sleeve bearing and dividing said valve-compressor cylinder into two chambers, one of which chambers communicates directly with the interior of the crankcase and the other chamber is remote from the crankcase;

4

a combined valve and compressor-piston in said valve-compressor cylinder and including two end piston-discs connected by a sleeve one end of which communicates constantly with the crankcase and the other end of which communicates directly with the space between the piston disc that is in the remote chamber and said V-shaped partition; a fuel duct through said partition to said sleeve; said sleeve having a port for communication with said fuel duct at times; and means to rotate said combined valve and compressor-piston on its axis and reciprocate it along its axis to cause said port to register with said duct and to super-charge the crankcase with fuel at times.

5. The engine of claim 4 wherein the means to rotate said combined valve and compressor-piston on its axis and reciprocate it along its axis comprises shoes on said discs for engaging the respective faces of said V-shaped partition, and means to rotate said valve.

6. In a two-cycle crankcase-compression internal combustion engine having a cylinder, a piston, a crankcase, a crank shaft and a connecting rod; the combination with the aforesaid structure of means for admitting fuel to and supercharging the crankcase with fuel, said means including a fuel duct; an auxiliary cylinder connected to the crankcase; a combined fuel admitting and fuel charging valve in said auxiliary cylinder, said valve having a fuel passageway and a port for registering with said fuel duct; and means to turn said valve on its axis and move the valve along its axis for purposes described.

7. The engine of claim 6 wherein the means to turn said valve on its axis and move the same along its axis comprises a crank pin on said combined valve and operatively connected through said crank shaft for turning said valve and cam means to reciprocate said valve along its axis as the valve is being turned.

8. In a two-cycle crankcase-compression internal combustion engine having a cylinder, a piston, a crankcase, a crank shaft and a connecting rod; the combination with the aforesaid structure of means for admitting fuel to and supercharging the crankcase with fuel, said means including a fuel duct; an auxiliary cylinder connected to the crankcase; a combined fuel admitting and fuel charging valve in said auxiliary cylinder, said valve having a fuel passageway and a port for registering with said fuel duct; and means to turn said valve on its axis and move the valve along its axis for purposes described, said last named means comprising a crank pin on said combined valve, operatively connected to said crank shaft for turning said valve and cam means to reciprocate said combined valve along its axis as it is being turned, said cam means comprising a V-shaped member having a valve bearing in which said combined valve rotates, said combined valve including end discs and shoe-carrying elements swivelly mounted on each disc and engaging said V-shaped member at diametrically opposite points.

9. In a two-cycle crankcase compression engine; means to control the admission of fuel into the crankcase and supercharge the same, said means including a combined rotary valve and fuel charger unit and means to operate the same to charge additional fuel into the crankcase on the compression stroke of the engine.

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