Dec. 29, 1942. L. M. ROHM 2,306,981

TWO CYCLE INTERNAL COMBUSTION ENGINE

Filed May 9, 1941

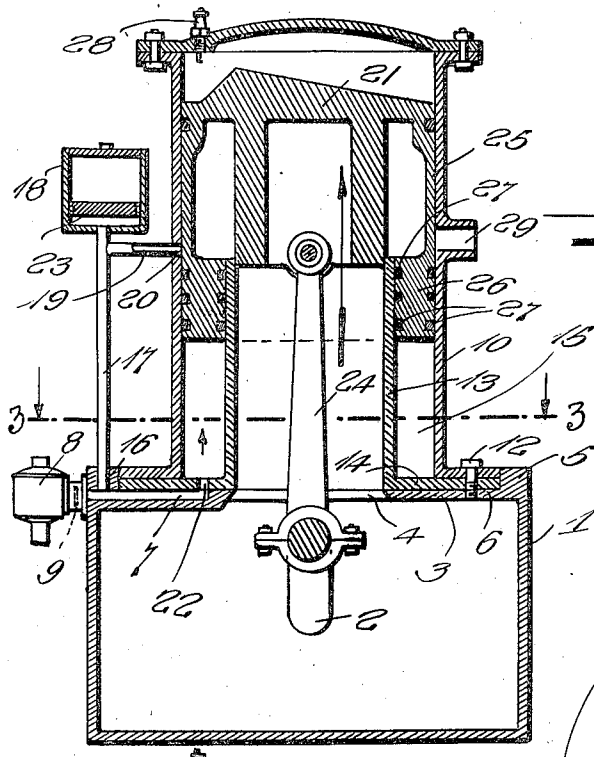


FIG. 1

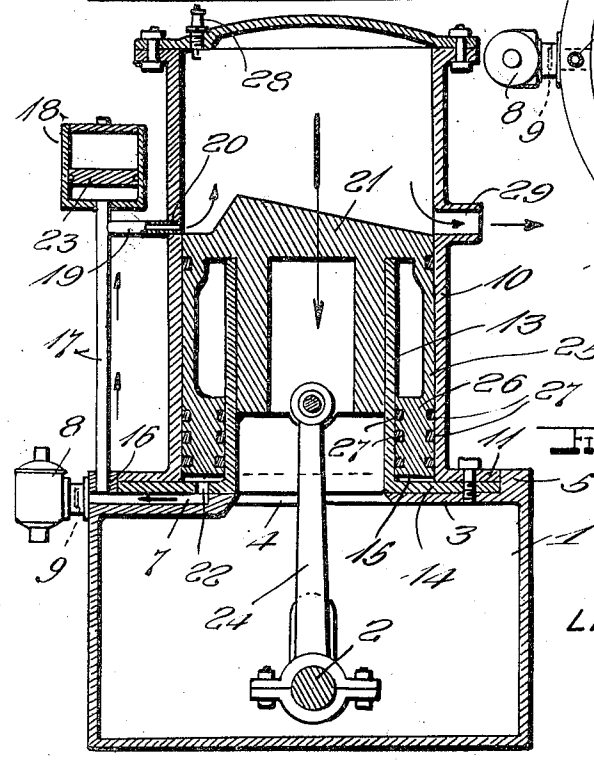


FIG. 2

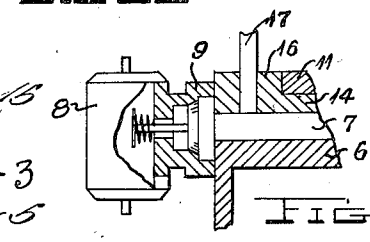


FIG. 4

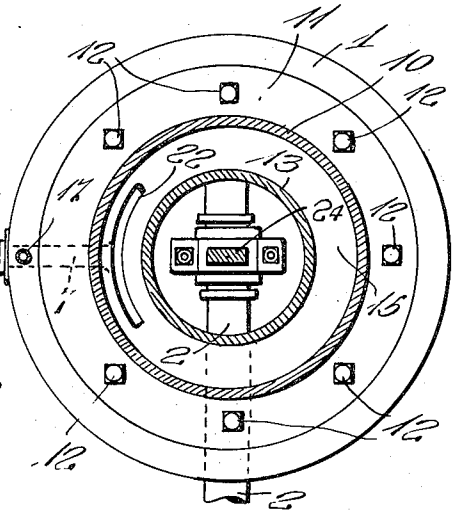


FIG. 3

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TWO-CYCLE INTERNAL COMBUSTION ENGINE

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Application May 9, 1941, Serial No. 392,752

1 Claim. (Cl. 123—74)

This invention relates to an internal combustion engine of the two cycle type and it is one object of the invention to provide an engine having such a construction that a charge of fuel, drawn from a carburetor or other source of supply as the piston moves in a compression stroke, will be forced under high pressure into the firing chamber as the piston is moved in a power stroke.

Another object of the invention is to so form the engine that the skirt of the piston moves in an annular chamber formed by the lower portion of the cylinder and an inner sleeve, the skirt of the piston constituting means for drawing fuel into the chamber during movement of the piston in a compression stroke and then forcing the fuel under pressure into the cylinder above the piston as the piston reaches the extremity of its movement in a power stroke.

Another object of the invention is to provide an engine having improved fuel delivering mechanism which is simple in construction and may be easily incorporated in an engine of substantially conventional formation.

With these and numerous other objects in view, my invention consists in the novel features of construction, combination and arrangement of parts as will be hereinafter referred to and more particularly pointed out in the specification and claim.

The invention is illustrated in the accompanying drawing wherein—

Figure 1 is a sectional view taken vertically through an engine with the piston moved upwardly to a compressing position.

Figure 2 is a similar sectional view showing the piston moved downwardly in a firing stroke to a lowered position allowing a charge of fuel to enter the cylinder above the piston.

Figure 3 is a sectional view taken transversely through the engine along the line 3—3 of Figure 1.

Figure 4 is a fragmentary sectional view upon an enlarged scale showing the check valve for the carburetor.

This improved internal combustion engine has a crank case 1 through which the crank shaft 2 is rotatably mounted. The upper wall 3 of the crank case 1 is formed with an opening 4 and the marginal portion of the upper wall is upwardly thickened to form an upstanding flange 5 defining a seat 6. A channel constituting a fuel passage 7 is formed in the upper surface of the top wall 3 radially of the seat 6, and this channel has its outer end portion passing through the flange 5 at a side of the crank case for communication with a carburetor 8. A conventional check valve 9 is provided between the carburetor and the outer end of the fuel passage 7 and permits flow of fuel from the carburetor into the fuel passage but prevents flow of the fuel from the passage to the carburetor.

The cylinder 10 is disposed vertically over the crank case and at its lower end is formed with an outstanding base flange 11 which fits into the seat 6 where it is secured by a suitable number of screws 12 with its marginal edge face in close contacting engagement with the inner side face of the flange or wall 5. An inner sleeve 13 is disposed vertically within the lower portion of the cylinder concentric thereto and is provided at its lower end with an outstanding flange 14 which rests flat upon the bottom of seat 6 and is formed with openings registering with the openings in the flange 11 so that this flange may be secured in place by the same bolts 12 which secure the cylinder 10 to the crank case. The sleeve 13 registers with the opening 4 and is spaced from walls of the cylinder 10 so that it cooperates with the lower portion of the cylinder to form an annular fuel chamber 15 which may be referred to as an auxiliary fuel receiving cylinder. An opening 16 extends vertically through the flange 5 with its lower end communicating with the fuel passage 7 and into this opening is mounted the lower end of a tube or pipe 17 which has its upper end communicating with a pressure equalizer 18. A branch pipe 19 extends from the pipe 17 adjacent the upper end thereof and is secured in an opening 20 formed through the wall of the cylinder 10 at a point slightly above the upper end of the sleeve 13. Therefore, fuel which is forced upwardly through pipe 17 may flow through the branch pipe and into the cylinder above the piston 21 when the piston is in the lowered position shown in Figure 2. An arcuate slot 22 which is formed in the portion of the flange 14 serving as a bottom for the auxiliary cylinder 15 establishes communication between the fuel passage 7 and the auxiliary cylinder so that fuel may be drawn from the carburetor through the fuel passage into the auxiliary cylinder and then forced from the auxiliary cylinder through the fuel passage and pipe 17 into the main cylinder above the piston. The weight 23 in the pressure equalizer is shifted upwardly during application of pressure to fuel forced through the fuel passage and the pipe 17 and then moves downwardly by gravity as pressure is reduced and serves as a follower

to complete transfer of fuel into the main cylinder. It will thus be seen that excessive pressure will be taken care of and a full charge of fuel forced into the cylinder during scavenging and charging of the main cylinder.

The piston 21 is formed of strong metal and is connected with the crank shaft 2 by a pitman rod 24 to impart rotary motion to the crank shaft during reciprocation of the piston. The skirt 25 of the piston has its depending portion inwardly thickened to form an auxiliary piston 26 for operating in the auxiliary cylinder 15 and this auxiliary piston is provided with rings 27 for bearing against walls of the auxiliary cylinder and providing a tight seal. It will be understood that during a compression stroke of the piston 21 fuel will be drawn into the auxiliary cylinder by the upwardly moving auxiliary piston. The fuel compressed in the upper portion of the cylinder 10 will then be exploded by the spark plug 28 and the piston moved downwardly in a power stroke to the position shown in Figure 2. During this downward movement fuel in the auxiliary cylinder is forced through the fuel passage and through pipe 17 and its branch 19 so that when the opening 20 is cleared by the descending piston the fuel which is under pressure may rush into the main cylinder above the piston and serve to drive burnt gases through theh exhaust 29 as well as fill the main cylinder with a fresh charge of fuel. The check valve 9 prevents fuel under pressure being forced back into the carburetor and the weight 23 accommodates excess pressure upon the fuel by moving upwardly and then moves downwardly by gravity to complete forcing of fuel into the main cylinder. The main piston 21 then moves upwardly to compress fuel in the upper portion of the main cylinder preliminary to firing of the fuel and during this upward movement of the piston the auxiliary piston acts to draw fuel from the carburetor into the auxiliary cylinder. This completes a cycle of operation and is continued as long as the engine is in operation.

From the foregoing description of the construction of my improved engine, the operation thereof will be readily understood and it will be seen that I have provided a comparatively simple, inexpensive and efficient means for carrying out the various objects of the invention. While I have particularly described the elements best adapted to perform the functions set forth, it will be understood that various changes in form, proportion and in the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the principles of the invention.

Having thus described the invention, what is claimed is:

In an internal combustion engine, a crank case having an upper wall formed with an opening, an upstanding flange about the periphery of the upper wall, a main cylinder disposed vertically over the crank case and having an outstanding horizontal flange about its lower end, a sleeve in the main cylinder registering with the opening and together with the lower portion of the main cylinder forming an annular auxiliary cylinder, said sleeve having an outstanding horizontal flange about its lower end resting upon the upper wall and extending under the flange of the main cylinder to support the main cylinder, removable fasteners passing through the flanges of the main cylinder and the sleeve and through the upper wall of the crank case to detachably hold the sleeve and the main cylinder in place with their marginal edges abutting the inner side face of the flange of the upper wall, a main piston operating in the main cylinder and having a depending skirt inwardly thickened and constituting an auxiliary piston operating in the auxiliary cylinder, the upper wall of the crank case being formed with a fuel passage communicating with the lower end of the auxiliary cylinder through an opening in the flange of the sleeve, a carburetor, a check valve controlling communication of the carburetor with the outer end of the fuel passage and opening towards the fuel passage, a tube leading upwardly from adjacent the outer end of the fuel passage and adjacent its upper end having a side branch communicating with the main cylinder at a point above the main piston when the main piston has moved downwardly to the lower end of its power stroke, a pressure equalizer at the upper end of the tube, and means for exploding fuel in the main cylinder.

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