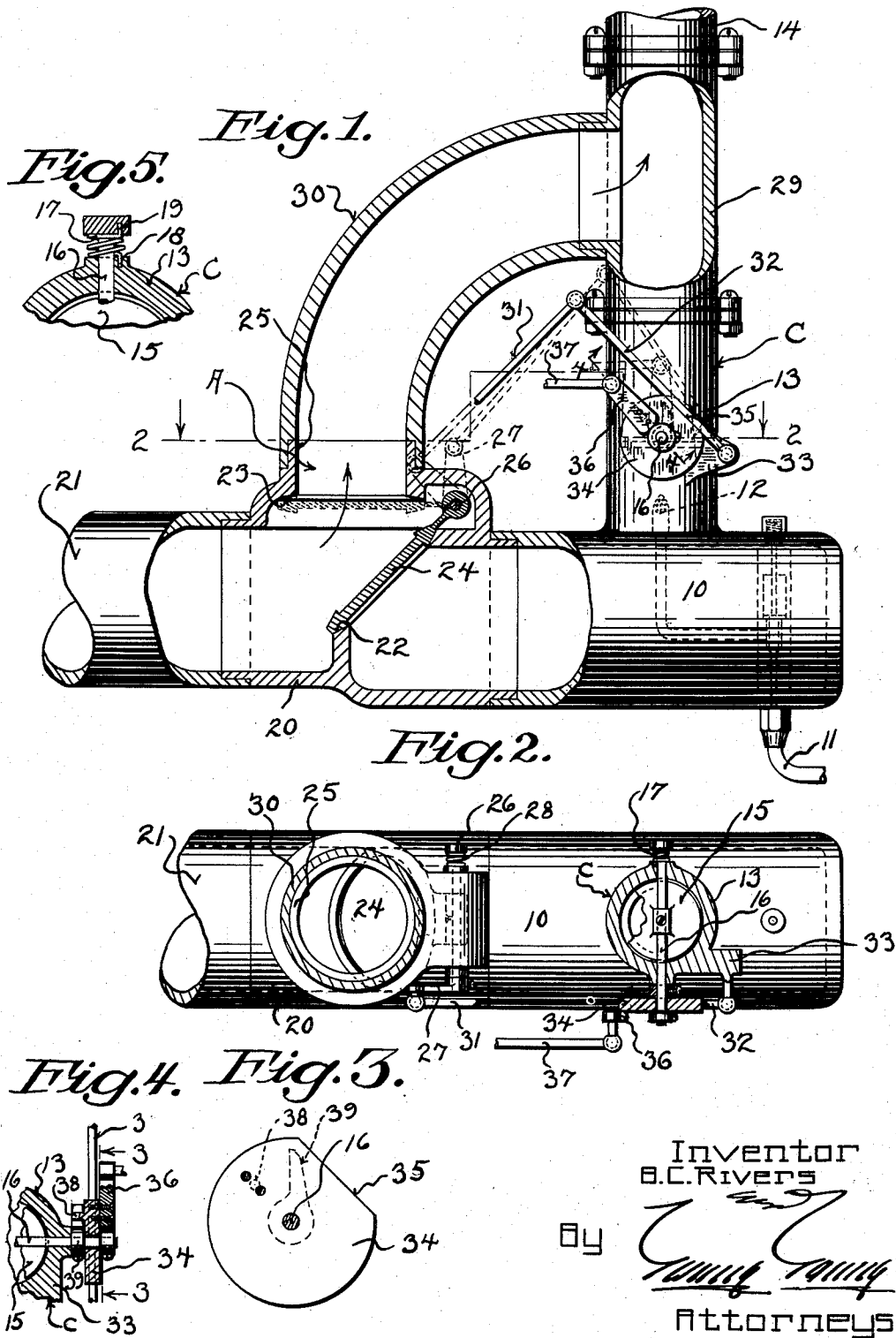


Dec. 31, 1940.

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CARBURETOR BY-PASS
Filed Jan. 3, 1939

2,227,107



UNITED STATES PATENT OFFICE

2,227,107

CARBURETOR BY-PASS

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Application January 3, 1939, Serial No. 248,965

2 Claims. (Cl. 261-47)

This invention appertains to internal combustion engines, and more particularly to a novel carburetor arrangement therefor.

One of the primary objects of my invention is to provide means for by-passing air around the fuel inlets or jets of a carburetor when the throttle valve of the engine is closed, so as to effectively prevent the admission of fuel to the intake manifold incidental to the suction or vacuum effect created by the engine pistons.

Another salient object of my invention is the provision of novel means for controlling the flow of the incoming or breathing air of an internal combustion engine, so that the same can be made either to flow through the carburetor and past the fuel inlets or jets, or around the carburetor and directly into the intake manifold without going past the fuel inlets or jets.

In internal combustion engines there are two powers in propelling the load or vehicle: first, the power supplied by the engine itself, and, second, the power developed by gravity and the momentum of the vehicle, such as when coasting down hill, slowing down for stops, losing of engine speed as in shifting gears, and in tractors and stationary engines when the load is released.

It is, therefore, a further important object of my invention to provide means whereby the carburetor will function in its ordinary normal manner when the engine is propelling the load, but which will by-pass air around the carburetor when the throttle valve is closed, such as when the vehicle is coasting, and so forth.

A still further object of my invention is to provide means whereby the valve for controlling the incoming air for the internal combustion engine can be, if so desired, automatically actuated from the throttle valve of the engine, whereby necessity of independent manual actuation of the air valve by the operator of the engine is eliminated.

A still further important object of my invention is to provide means whereby the throttle valve can be actuated in the ordinary manner from idling position to a full open position without actuating the control valve for the incoming air.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawing, in which drawing:

Figure 1 is a fragmentary side elevational view of the carburetor showing my improved device in-

corporated therewith, parts of the view being shown broken away and in section.

Figure 2 is a sectional view taken on the line 2-2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a detail sectional view taken on the line 3-3 of Figure 4 illustrating the operating cam.

Figure 4 is an enlarged detail sectional view taken on the line 4-4 of Figure 1, illustrating the means for operatively connecting the throttle valve and the cam.

Figure 5 is an enlarged detailed sectional view illustrating one form of spring means employed for normally holding the throttle and air-control valve in a closed position.

Referring to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter C generally indicates a carburetor, and the letter A my novel attachment therefor. The carburetor C can be of any preferred construction or make, and hence the same will not be described in detail. It is to be noted, however, that the same includes a body 10 having a fuel line 11 for supplying gasoline to a centrally disposed gasoline sprayer head or jet 12. The sprayer head 12 is arranged at the axial center of the carburetor mixing chamber or passage 13. One end of the carburetor body is formed for the admittance of air, and this air is generally filtered through a suitable air cleaner prior to the entrance thereof into the carburetor.

The upper end of the mixing chamber 13 of the carburetor can be connected to an intake pipe 14, which leads to the intake manifold (not shown) of an internal combustion engine. A throttle valve 15 of the butterfly valve type is arranged within the mixing chamber or tube 13 of the carburetor, and controls the flow of the fuel mixture into the intake manifold. As illustrated, the butterfly valve 15 is secured to the throttle shaft 16, which is journaled within the carburetor. The throttle valve is normally held in a closed position on its seat by spring means. For the purpose of illustration, a coil spring 17 is placed around one end of the throttle shaft 16, and one end of the spring is anchored, as at 18, to the carburetor casing, and the other end is affixed to the shaft 16, as at 19. The tension of the spring is such as to normally rotate the shaft in a counter-clockwise direction (see Figure 1) to a closed position.

My invention resides broadly in a novel means for either passing air through the carburetor and past the gasoline sprayer head or jet 12, or for by-passing the air around the carburetor.

In Figures 1 to 5, inclusive, I have illustrated one form of means for accomplishing this purpose, and it is to be understood that other arrangements can be had and are contemplated by the invention.

5 In the present showing I have provided the attachment A in the form of an accessory, but the same can be built in carburetors being newly manufactured. The air inlet end of the carburetor has communicating therewith the substantially tubular shaped body 20, and the end of the body remote from the carburetor has communicating therewith a pipe 21, which can be led to the air cleaner. The tubular body 20, at a point intermediate its ends, is provided with an angularly disposed valve seat 22 and a horizontally disposed valve seat 23, which is arranged within a nipple 25 extending upwardly from the body of the attachment. Rockably mounted in the body 20 between the valve seats 22 and 23 is a flap valve 24, and when the valve is in its lowered position, as shown in full lines in Figure 1, incoming air to the carburetor through the main air intake is completely closed off, and air is permitted to flow through the nipple 25 and past the valve seat 23. 25 The valve 24 is keyed or otherwise secured to a rock shaft 26, which is rotatably mounted in suitable bearings formed on or secured to the body of the attachment. One end of the rock shaft 26 has keyed or otherwise secured thereto a crank arm 27, for a purpose which will be later set forth.

30 Spring means is employed for holding the flap valve 24 in its closed position on its seat 22, and this spring means can be in the nature of a spring 28 coiled about one end of the shaft 26. The spring has one end anchored to the body of the attachment, and the other end secured to the shaft. This spring functions to rotate the shaft in a counter-clockwise direction (see Figure 1).

Where the attachment A is employed as an accessory, a suitable coupling 29 can be interposed between the carburetor and the intake pipe 14. This coupling 29 is connected to the nipple 25 by an arcuate connecting pipe 30. Thus, when the flap valve 24 is closed, a large amount of fresh, 45 pure air will be by-passed around the carburetor and delivered into the intake manifolds.

Many different ways of operating the valve 24 can be employed, such as through engine-operated governors, manually actuated devices on the dashboard, and the like. However, it is preferred to actuate the valve 24 in the following manner: The crank arm 27 of the valve 24 has pivotally secured thereto a link 31, and this link is in turn pivotally connected to the upper end of a link 32, which is rockably mounted at its lower end on a bracket arm 33, moulded or otherwise secured to the carburetor. A cam 34 is rotatably mounted on the throttle shaft 16 for free movement, and one side of the cam has formed thereon a flat face 35 60 against which the link 32 is adapted to rest at certain times, as will be later set forth.

The cam 34 has rigidly secured thereto a crank arm 36, and this crank arm has connected thereto an actuating rod 37, which leads to the ordinary throttle control of the internal combustion engine. On the inner face of the cam, at a point spaced from the flat face 35 (say fifteen degrees), is arranged an inwardly directed lug or pin 38, and this lug or pin 38 is disposed in the path of a dog 39, which is keyed or otherwise secured to the throttle shaft 16. As shown, the dog is in a substantially vertical position when the throttle valve is in its closed position.

In the operation of my improved device, and 75 considering that the throttle valve is in its closed

position, and is held therein by the spring 17, the air-controlled valve 24 will be in its closed position with its seat 22, in view of the fact that the link 32 is lying against the flat face 35 of the cam 34. When the fuel mixture is to be supplied to the intake manifolds, the rod 37 is moved to the right (referring to Figure 1), and hence the flat face 35 of the cam 34 moves away from the link 32, and the round portion of the cam engages the link and moves the link to a raised position, pulling up on the link 32, and consequently raising the valve 24 to its position against the seat 23. This prevents further by-passing of the air. During this movement of the cam 34, and while the valve 24 is being moved on its seat 23, the lug 38 has been moved into engagement with the dog 39, and consequently further movement of the rod 37 and the crank 36 to the right will open the throttle valve. The carburetor will then function in its ordinary way. 20

Since my device is not in use when the engine is developing power, I will now refer to the coasting position of the engine, or when the load is propelled by gravity, or continuing in its forward movement by its own momentum. When the power is supplied by gravity, such as going down a hill, the engine is still geared to the load and continues to revolve at a high number of revolutions per minute. As the throttle valve is in a closed position, the fast reciprocating pistons create a high vacuum effect in the fuel intake channels, because the butterfly valve of the throttle obstructs the free passage of air to the combustion chamber or interferes with the breathing of the engine. Because the load revolves the engine faster than normal at the throttle setting, the fast reciprocating pistons create a high vacuum effect, and large amounts of gasoline vapors are drawn into the combustion chambers, as when the throttle is in idling position the vapor entering the combustion chamber is extremely rich with fuel, and as no power is derived from this fuel in propelling the vehicle, it becomes a complete waste. Also, because the fuel drawn into the combustion chambers under the above conditions is very rich, it generates much heat that is destructive to the pistons and valves, and burns the lubricating oil, leaving much ash or carbon. This is also true when shifting gears and the engine slows down in revolutions per minute while making the shifts. The same action takes place in a tractor or stationary engine when the load is cut off. By eliminating these wasteful conditions of the fuel system, as described above, the following advantages are gained: 55

First, this device will save gasoline because when the load is propelled by gravity it will eliminate the high vacuum created by the fast reciprocating pistons, which pistons draw a large amount of fuel mixture through the carburetor, as described above, or allows the engine to breathe pure air containing no fuel mixture. 60

Second, since the butterfly valve of the throttle interferes with the passage of air to the combustion chamber, or interferes with the breathing of the pistons, a high vacuum effect is created in the combustion chamber when the piston moves downwardly. The vacuum condition results in oil from the lubricating system being drawn past the piston rings into the combustion chamber, and if an engine is worn, the amount of oil wasted is very high. By using the carburetor bypass, the engine breathes freely, and the vacuum effect is eliminated and no oil is drawn into the 75

combustion chambers to leave as carbon deposits on the engine parts.

Third, by eliminating the rich mixture burning in the combustion chamber, when the engine is operating by gravity, and by eliminating the large amount of lubricating oil drawn into the combustion chamber, as described in the second advantage, the engine will be kept in a cleaner condition, for the main causes for ash or carbon forming in the combustion chambers are rich mixtures, as in idling conditions and oil leaking past the piston rings into the combustion chamber.

Fourth, since the fuel mixture drawn into the combustion chamber, when the engine is under gravity condition, is rich, there is much heat generated from the burning, and the carbon deposits from rich fuel mixture and oil consumption retain this heat in the engine combustion chamber. By using the carburetor, by-pass clean air can enter the combustion chamber after the engine has been working to eliminate the vacuum and cool the engine, thereby saving the parts from destruction by overheating, especially the valves and pistons that are subject to great amount of heat when operating under gravity conditions because of the extremely rich mixture of fuel being drawn into the combustion chamber which creates heat, and the carbon deposits on the engine parts retain the high temperatures.

Some trucking companies tell their drivers when going down hills to throw the truck out of gear to save gasoline and allow the engine to cool. This is unlawful in most states, and does not save the fuel wasted by the engine idling. Also, this is a dangerous practice, as the driver may lose control of his truck while coasting with the engine out of gear. My device saves fuel, cools the engine, and is lawful, because the engine is still connected to the load, and there is no danger of losing control of the vehicle. This device gives the advantages of free-wheeling, high cruising gears, and others, as previously set forth.

Obviously, adjustments and different settings will have to be made for different carburetors

and engines, and hence means can be provided for adjusting the linkage, and so forth.

Changes in details may be made without departing from the spirit or the scope of my invention, but what I claim as new is:

1. A charge-forming device for internal combustion engines comprising a carbureting passage having a throttle valve for controlling the feed of fuel mixture to said engine, said throttle valve including a throttle shaft, spring means normally moving the shaft and throttle valve in one direction and the throttle valve to a closed position, a dog rigidly secured to said shaft, means for feeding fuel to the carbureting passage, a main air inlet for the carbureting passage, a second air inlet beyond the carbureting passage and throttle valve, a swinging valve for controlling the flow of air through said air inlets having an operating shaft, a crank on said operating shaft, a link secured to the crank, an operating link pivotally secured to the first-mentioned link and to the device, a cam rotatably mounted on the shaft of the throttle valve having a flat side, said second mentioned link engaging the periphery of the cam, means for rotating the cam, and a lug on the cam arranged in the path of the dog, as and for the purpose specified.

2. A charge-forming device for internal combustion engines comprising, a carbureting passage, means for feeding fuel thereto, a main air inlet for said carbureting passage, a throttle valve for controlling the feed of fuel mixture to said engine, a second air inlet beyond the carbureting passage and the throttle valve, said main air inlet and said second air inlet having angularly related valve seats, a valve pivotally mounted between said seats for fitting on and positively closing said seats at different times, and means for actuating said valve to close said second air inlet and opening the main air inlet when the throttle valve is in any one of its adjusted open positions, and for closing the main air inlet and opening the second air inlet when the throttle valve is in its closed position.

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