

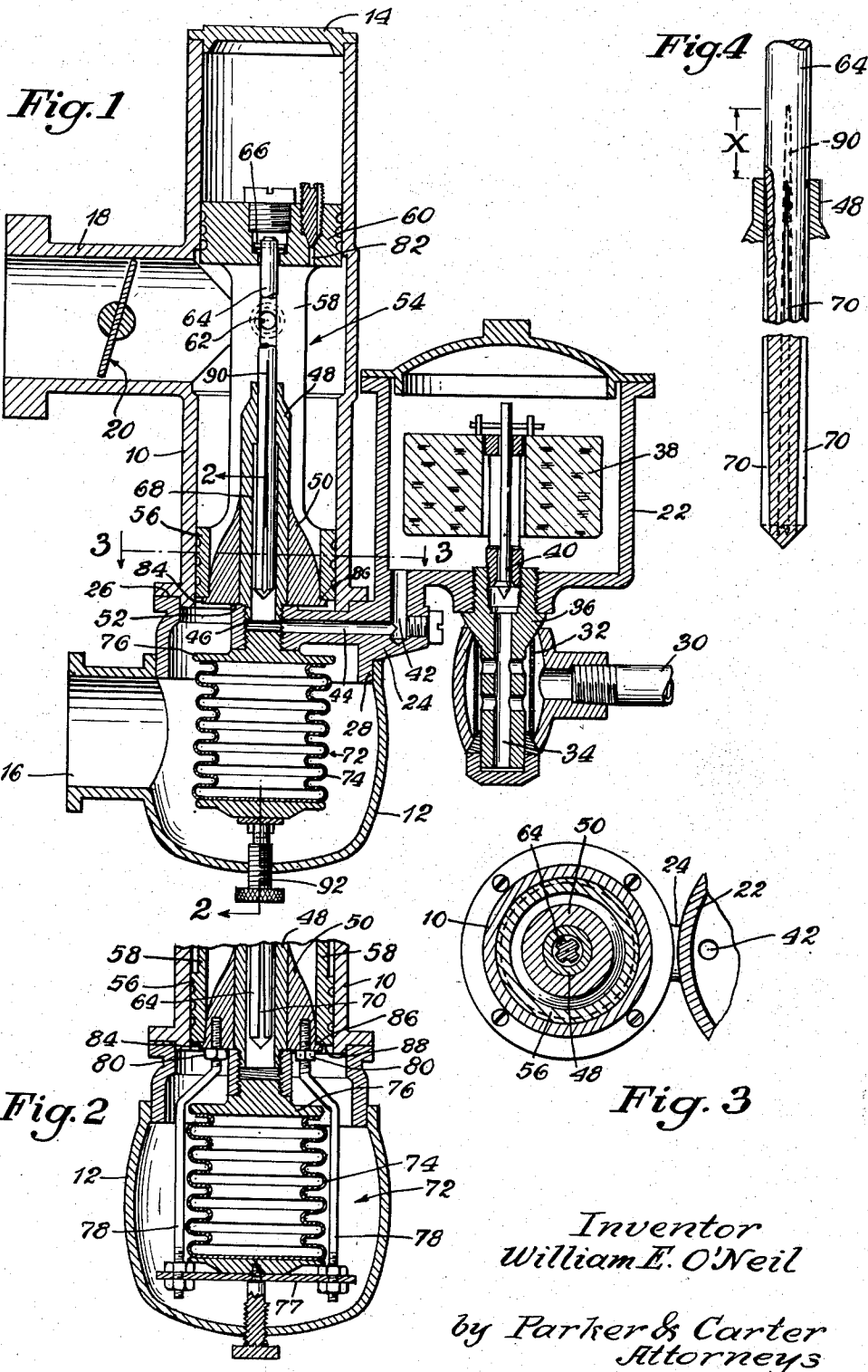
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CARBURETOR

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CARBURETOR

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My invention is concerned with carburetors and is a new and improved carburetor constructed and arranged to operate more efficiently and is specifically aimed at eliminating or reducing "flat spots" during acceleration and various other features.

A primary object of my invention is a new and improved carburetor which will momentarily supply a rich mixture during acceleration.

Another object is a carburetor that does away with an accelerating pump.

Another object is a carburetor which automatically provides a momentary rich or chemically correct mixture during acceleration to eliminate flat spots and slow acceleration.

Another object is a carburetor with a controllable venturi arranged automatically to eliminate flat spots by supplying a rich or chemically correct mixture.

Another object is a carburetor of the above type constructed for proper idling.

Another object is a carburetor of the above type with an auxiliary choke.

Other objects will appear from time to time in the ensuing specification and drawings in which:

Figure 1 is a vertical section of my carburetor with all of the parts in their lowermost or inoperative positions;

Figure 2 is a section along line 2—2 of Figure 1;

Figure 3 is a section taken along line 3—3 of Figure 1; and

Figure 4 is an enlarged longitudinal section of the metering pin.

A generally cylindrical casing, as indicated generally at 10, at its lower end has an auxiliary or inlet casing 12 and at its upper end a top cap or the like 14. The auxiliary chamber or casing 12 has a suitable inlet 16 and the main casing or housing 10 is provided with a suitable outlet 18 which may be connected to an internal combustion engine of any suitable type. For example, it might be connected through a suitably heated gooseneck or the like. The outlet may be provided with the usual throttle valve, indicated generally at 20.

A float chamber, indicated generally at 22, to one side of the main upright casing or housing, is provided with an extension or projection 24 which, on its upper surface, properly seats and engages the main casing, as at 26, and on its lower surface is properly fitted into or otherwise connected to the auxiliary casing, as at 28. The details of these connections are unimportant. For example, in Figure 1, the main casing 10 is provided with an outstanding flange which mates with a corresponding flange on the float chamber projection. The lower portion of the float chamber projection extends into and seals the auxiliary chamber or casing. These parts are conventional and in themselves are not important to this invention.

A fuel supply communicates with the float chamber through a suitable connection or pipe 30, the joint being provided with a suitable strainer or the like 32, if desired. Fuel rises through a suitable passage 34 in a conventional

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fitting 36 which threads or otherwise connects with the bottom of the float chamber. A suitable float 38 controlling a valve element 40 is provided to open and close the passage 34 leading into the float chamber in accordance with the height of the fuel in the float chamber. A suitable passage 42 with a lateral extension or branch 44 may be provided in the float chamber projection to supply fuel from the float chamber to the carburetor casing proper.

The outer end of the float chamber extension or projection is provided with a threaded bore as at 46. Screwed into the bore and rising upwardly into the casing is a stationary fuel nozzle 48. Around and slidably mounted on the fuel nozzle is a cone-shaped element or cone 50 which, in its lowermost position, engages a suitable seat 52 on the float chamber extension or base.

An air valve 54 is slidably disposed in the bore or passage through the casing and includes a lower ring 56 or the like and a plurality of arms or struts 58 rising upwardly to an upper piston 60. The upper piston is disposed generally in the upper part of the casing, as shown in Figure 1, generally above the outlet 18. The lower ring 56, struts 58, and upper piston 60 may be integral and move as a unit. The air valve may be prevented from rotating in the casing by a suitable key 62.

A metering pin 64 is carried by the upper piston 60, as by a pin 66, and projects down into a bore 68 in the fuel nozzle 48. It will be observed that the bore 68 of the fuel nozzle communicates with the passage 44 in the float chamber extension so that fuel will rise to a certain predetermined level in the bore 68 in accordance with the level maintained in the float chamber by the float. The metering pin is provided with a plurality of longitudinal grooves or channels 70, which are preferably tapered, so that in accordance with the suction or vacuum communicated to the casing or housing by the engine, more or less fuel may be drawn through these grooves into the moving air stream.

In the lower chamber 12 I provide a thermostat, indicated generally at 72, which may include a bellows or Sylphon tube 74 having an upper portion 76 screwed into the bore 46 or otherwise suitably connected to the float chamber extension so that the top of the bellows will be fixed. The bottom of the bellows is suitably connected by a cross piece 77, as shown in Figure 2, to two or more tie rods 78 which transmit the expansions and contractions of the bellows, responsive to changes in ambient temperature and pressure, to the cone. The upper ends of the tie rods are threaded into or otherwise connected to the cone, as shown in Figure 2, and held by suitable lock nuts 80 or the like. A metered opening 82 may be provided in the upper piston 60 to vary the responsiveness of the air valve to variations in the vacuum communicated to the carburetor from the engine.

To this point, my carburetor may be considered conventional and my invention is an improvement on the carburetor of the type generally shown in prior U. S. Patents No. 1,586,601 and 2,203,858. The general operation of a carburetor of this nature is that vacuum is communicated to the main casing or housing through the outlet 18. In response to that vacuum the air valve 54 tends to rise, thereby separating the lower ring or valve 56 from the cone 50. The upper piston 60 also rises with the air valve and carries the metering pin 64 with it. Air flows through the inlet 16, through the lower housing 12, between the cone 50 and ring 56, and through the main casing past the now exposed fuel groove or grooves 70 in the metering pin drawing fuel from the bore 68 of the fuel valve into the casing causing a fuel-air mixture of proper proportions which is carried through the outlet 18 to the engine. The degree of vacuum will vary with the load and speed of the engine. The air valve will be raised

more or less depending on the load, speed and resulting vacuum. At a high vacuum, which is caused by heavy loads or high speed, the air valve will rise a substantial amount exposing wider portions of the grooves 70 in the metering pin thereby admitting more fuel for the engine.

In cold weather, the bellows 74, which may be filled with a suitable temperature responsive substance, such as ether or a mixture of ether and other alcohols, contracts raising its lower portion and also tie rods 78, resulting in the cone 50 rising on the fuel nozzle 48. The air valve is raised with the cone, in a manner to be set forth hereinbelow, so that the metering pin is also raised exposing the grooves so that more fuel is supplied than in normal operation. Therefore, in cold weather a rich mixture will be provided to the engine. As the temperature of the ambient air increases the bellows 74 will expand, lowering the cone and bringing the metering pin back to normal.

In cold weather, the bellows 74 in response to lower ambient temperatures will contract, thereby raising the cone 50 and the flange 84 relative to the housing and the ring 56 on the air valve. The flange will effectively prevent the passage of air between the inner circumference of the air valve at its lower end at the ring 56 and the periphery of the base of the cone 50. This, in effect, functions as an auxiliary choke excluding air and increasing the amount and flow of gas into the housing so that the engine will start more readily in cold weather.

During rapid acceleration engines normally suffer from lack of fuel. In other words, they starve. For example, assume that an engine is idling and the throttle is thrown immediately to three-quarter load. This opens the valve 20 and full suction from the engine is communicated to the inside of the casing. The air valve will quickly rise, supplying the full quantity of air for that load and speed, but the viscosity and inertia of the fuel causes a momentary lag in the fuel supply which results in a momentary lean mixture for the engine. This condition or hesitation has been conventionally referred to as a "flat spot" in the carburetor and is conventionally taken care of by an accelerating pump, which is nothing more or less than a pump to supply an additional shot of fuel to raise the lean mixture to the proper air-fuel ratio only momentarily during acceleration. After the viscosity and inertia of the fuel in the carburetor has been overcome and the proper air-fuel ratio mixture is being supplied by the carburetor itself, the accelerating pump is no longer necessary and does not operate.

An accelerating pump is an extra piece of equipment which involves complications and expense. It has long been the desire of manufacturers to do away with it where possible, and in carburetors of the above type, it has never successfully been mastered prior to my invention.

To accomplish this end, I provide a small flange 84 outstanding from the bottom of the cone and underlying the ring 56 on the air valve. This flange provides, in effect, a right angled shoulder or seat 86 at the bottom of the cone onto which the lower inner edge of the ring 56 rests or seats. It should be noted that an annular gap or passage 88 is provided between the outer edge of this flange and the inside of the casing. I prefer that the flange extend out approximately one-fourth of the radial distance of the ring 56, but it might be otherwise. The flange is preferably integral with the cone and may be easily formed in the same machining operation as the cone, but it might be otherwise.

The function of the flange is three-fold. First, it serves to raise the air valve with the cone when the bellows 74 contracts in response to relatively low ambient temperatures. When the cone is raised by the bellows, the flange will also pick up the ring 56 which raises the air valve and metering pin functioning to supply a rich mixture for the engine in a manner set forth hereinabove. Second, during rapid acceleration the flange prevents the formation

of a flat spot in the carburetor. It functions in the following manner:

Assume, for the moment, that the engine is idling and is brought quickly to three-quarter load or full load. The valve 20 is thrown open and a substantially increased or possibly full vacuum is communicated to the carburetor. The air valve starts to rise quickly, which would normally create a quite wide gap or venturi between the ring 56 and the cone 50. But the outstanding flange 84 at the bottom of the cone provides a mild but effective momentary seal or restriction between the lower edge of the ring 56 and the cone. The increased vacuum during acceleration causes the bellows in the air stream to contract, in response to atmospheric pressure, causing the flange 84 to momentarily rise and approach or possibly go in contact with the lower edge of the ring 56, temporarily restricting the throat of the venturi. This brings about a higher velocity of the air and a lower pressure through the venturi and, therefore, freer flow of the gas. As the ring starts to rise with the air valve, the cone is drawn up with it by this seal. The vacuum, in effect, draws up the cone through the medium of the bellows. In effect, the vacuum or pressure differential causes the cone to rise due to the seal provided by the flange 84 with the bottom of the ring 56. The vacuum will compress the bellows 74 slightly. During this short period, the metering pin will rise and the grooves 70 in the metering pin will be exposed above the upper end of the fuel valve 48 and additional fuel will flow into the casing. In other words, the vacuum above the cone 50 and ring 56 and flange 84 will not be immediately relieved because the cone tends to follow the ring up. This increased vacuum is communicated to the grooves 70 in the metering pin, offsetting somewhat the inertia that tends to hold the fuel back. And last, in cold weather the flange will restrict or reduce the air flow during starting and low loads, functioning as an auxiliary choke.

At the same time, the air flow through the housing is restricted momentarily because the flange of the cone 50 remains in contact with the ring 56. Therefore, two factors are working against the creation of a lean mixture. First, the inertia of the fuel is partially overcome because a larger vacuum than normal is pulling it into the casing. Second, the amount of air that passes through the casing to mix with the fuel is less than normal. Thus, I provide not only a variable venturi but a controllable venturi since the momentary seal will provide momentary and instantaneous control over the air-fuel ratio during rapid acceleration to eliminate a flat spot. Therefore, instead of having a momentary lean mixture, a substantially chemically correct or richer mixture will be supplied and no flat spots will result.

The contact between the lower edge 86 of the ring and the flange at 84 is by no means an absolute seal and the sealing effect during rapid acceleration is only momentary. Nevertheless, it is during the initial part of a rapid acceleration that flat spots occur, which in the past have resulted in slow acceleration, insufficient power and, on occasion, misfiring because the mixture is too lean for ignition. But with this invention, the flat spot is overcome, the mixture resulting in the casing is more chemically correct, and under certain circumstances may be on the rich side, if desired, and an accelerating pump is no longer necessary.

A carburetor of the above type must idle properly, but prior to my invention it has proved very difficult. I solved this otherwise seemingly difficult problem by extending one of the channels or grooves 70 on the metering pin, as at 90 in Figure 4. The upper end of the fuel valve 48 and the metering pin 64 are shown in their lowermost or idling positions in Figure 4. One or possibly two channels are extended a predetermined distance X above the upper edge of the other channels, providing a sufficient channel so that an adequate amount of fuel may be drawn into the casing during idling. This in combination with the mildly effective seal caused by the flange 84 on

the bottom of the cone in engagement with the ring 56 insures that the mixture will be adequate and not lean during rapid acceleration.

Another advantage of a carburetor of this type is that one adjustment may be made. For example, in Figures 1 and 2, a threaded screw 92 or the like may be mounted in the bottom of the inlet casing 12, so as to bear against the bottom of the bellows 74. The screw may be manually adjusted so as to raise and lower the rods 78, compressing the bellows, and raising and lowering the cone. Thus, for any particular engine, the carburetor can be set for maximum efficiency with one simple adjustment.

It should additionally be noted that the bellows and flange 84, in combination, have a pump effect in that they take the place of the accelerating pump. This is to say that they function as an accelerating pump in that they restrict the air flow and increase the fuel flow.

While I have shown and described a preferred form of my invention, it should be understood that numerous additional modifications, substitutions, alterations and changes may be made without departing from the invention's fundamental theme. For example, the details of the bellows 74 are totally unimportant. The connection between the fuel line 30 and the float chamber 22 is also unimportant to this invention. The float mechanism 38 in the float chamber may be of any suitable type. With these and other modifications and changes in mind, I wish that the invention be unrestricted, except as by the appended claims.

I claim:

1. In a carburetor for an internal combustion engine

or the like, a generally open casing having an air passage, an air intake communicating with the casing, a cone element constructed to partially close the passage through the casing, a fuel nozzle element extending through the cone, the cone and fuel nozzle being mounted for relative movement, one being fixed relative to the casing, the other being movable, a seat in the passage fixed to the casing and constructed to accept and seat the movable element, an air valve constructed with the cone element to substantially close the passage when the engine is not operating and movable away from the cone element to provide a variable area orifice with the cone element in response to the vacuum created when the engine is operating, a metering pin having grooves therein extending into the nozzle element and movable with the air valve to open the grooves for admitting variable quantities of fuel, and a peripheral flange between the air valve and cone element which functions as a seal for momentarily preventing the admission of air between the cone element and air valve, during rapid acceleration, so that with a given amount of fuel drawn through the grooves in the metering pin, the air supply will be momentarily reduced to provide a relatively rich mixture for the engine.

2. The structure of claim 1 in which the flange is continuous.

References Cited in the file of this patent

UNITED STATES PATENTS

30	1,586,601	Booty	June 1, 1926
	2,203,858	Booty	June 11, 1940