

Sept. 19, 1933.

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1,927,684

CARBURETOR FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 16, 1932

Fig. 1.

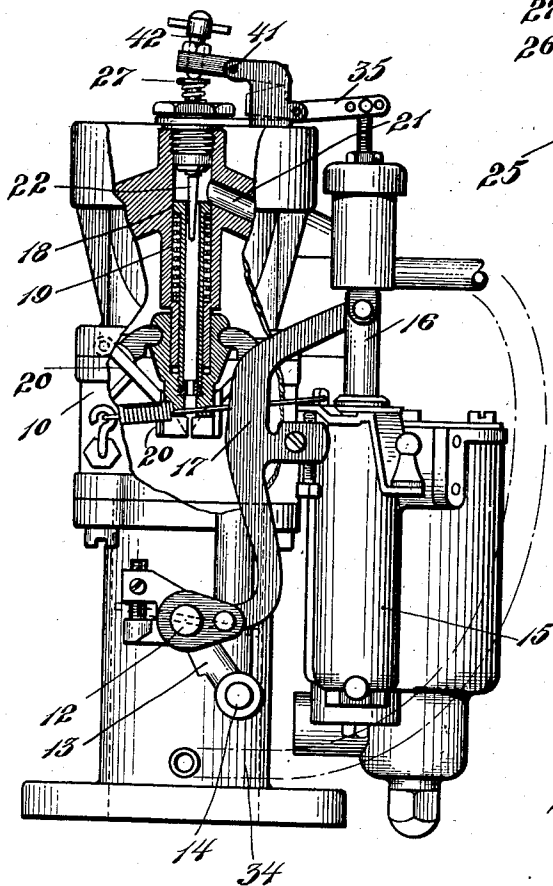


Fig. 2.

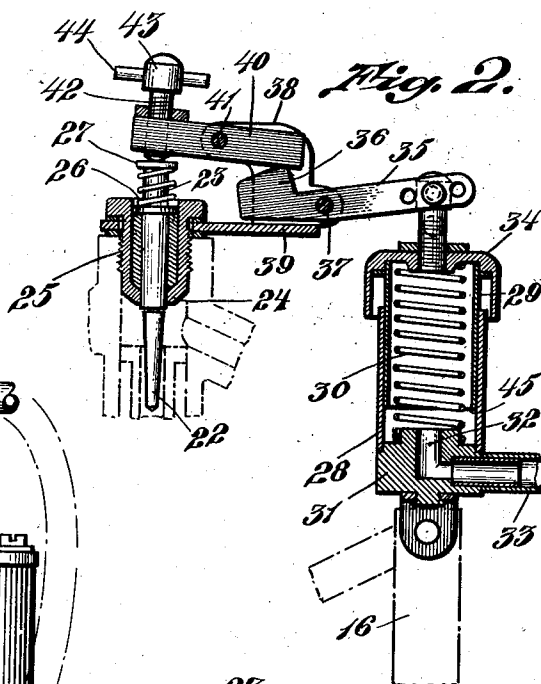
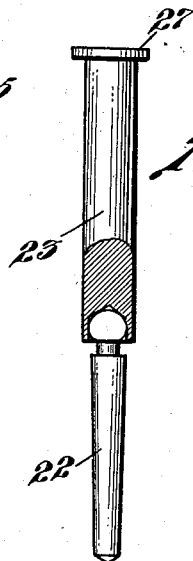


Fig. 3.



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UNITED STATES PATENT OFFICE

1,927,684

CARBURETOR FOR INTERNAL COMBUSTION ENGINES

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Application December 16, 1932
Serial No. 647,608

8 Claims. (Cl. 261-51)

This invention relates to an improvement in a carburetor for internal combustion engines; and has for one of its objects the variation of the fuel supply in an amount limited in proportion to the amount of throttle opening of the carburetor; the arrangement being such that the load requirements do not affect the fuel supply when the throttle is substantially closed but which may affect it to the full degree when wide open and proportionally affect it between these two positions.

A further object of the invention is the provision of a simple construction which may be attached to the carburetor of known type now in existence by a simple replacement of certain readily accessible parts and the addition of other parts thereto.

A still further object of the invention is the provision of the construction of a carburetor having two relatively movable parts for the control of the fuel, one of which is moved in response to the flow of air thru the carburetor to pick up the fuel and the other of which is moved independently of the throttle but in response to load conditions, whereby a saving may be effected in the fuel supplied.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims, in the accompanying drawing:

Fig. 1 is a side elevation of a carburetor partly broken away to show its internal construction with my improvement attached thereto, the same being in idling position of the engine.

Fig. 2 is a sectional view of the parts of my improvement showing in dotted lines the parts of the usual carburetor to which they are applied, the throttle being partly advanced.

Fig. 3 is a side elevation partly in section of the plunger and metering pin attached thereto for controlling the fuel supplied.

In the use of certain carburetors for internal combustion engines, it is desirable to control the fuel supply that the same may be richer or leaner in response to the load conditions of the engine. This may be to some extent controlled by the amount of vacuum or depression of atmospheric pressure in the manifold of the engine but it is found that when the engine is idling or when no load is applied the vacuum is relatively high and the fuel supply so controlled that it may be shut off to such an extent that the engine will fail to operate and that it is at the

greater speeds or when the throttle is advanced that a greater economy may be effected by the use of such connection to the manifold and accordingly I have devised an apparatus which may be attached to a carburetor which is unaffected by vacuum or depressed atmospheric condition in the manifold when the engine is idling but which may be affected by this vacuum in proportion as the throttle is opened, the arrangement being such that the fuel can never be shut off beyond a certain desired minimum amount; and the following is a detailed description of this invention illustrating the preferred means by which these advantageous results may be accomplished:—

With reference to the drawing, I have shown a carburetor such as is usual on the Ford V 8 automobiles and have illustrated my attachment applied thereto. This carburetor consists of a body part 10 having a throttle plate therein secured to and controlled by a shaft 12 which is moved by an arm 13 and which is connected at 14 to any convenient linkage for the operation thereof. For rapid acceleration this carburetor is provided with an accelerating pump to momentarily supply extra fuel to the mixing chamber 9, which pump is housed in the casing 15 from which there extends a pump plunger 16 which is connected by a suitable linkage 17 to the throttle shaft 12 so as to operate therewith. A quick opening of the throttle causes a rapid downward movement of the pump plunger and piston (not shown), forcing fuel up through the hollow stem of the pump plunger and out through the discharge nozzle (not shown) into the mixing chamber 9. The operation and control of the fuel in the pump is no part of this invention and need not be further described.

In the upper part of the body 10, there is located a gradually tapering metering pin 22 surrounded by a movable sleeve 18. This movable sleeve is threaded at its lower end to a bushing which is secured to and moved downwardly by a pair of vanes 20. These vanes 20 are pivotally mounted to move freely and are interposed in the path of the air entering the mixing chamber from the air chamber. As the throttle valve near the bottom of the carburetor is opened the suction thru the carburetor is increased and a greater amount of air enters the mixing chamber. This in-rushing air forces the lower ends of the vanes apart and swings downwardly the upper portion of the vanes thus moving downwardly the movable sleeve against the slight upward thrust of the light coiled spring 19 en-

circling the movable sleeve. Consequently, as the throttle valve is opened for higher engine speeds, the wider apart the vanes will open and the lower the sleeve will move, the end of the sleeve will surround the more slender part of the tapered pin thus increasing the opening for a greater amount of fuel to flow past.

In the carburetor as it now exists in the Ford V 8 engine the metering pin 22 is manually adjustable and when manually set remains in this set position, the flow being controlled by movement of the aspirating sleeve 18. In my improvement I mount this metering pin so that it may be moved limitedly, automatically by a vacuum device connected to the manifold.

The pin 22 is mounted by a ball and socket joint in the plunger 23, which is slidable in a bearing 24 in one end of a cup-shaped plug 25 and is forced upwardly by a spring 26 acting between the bottom of the plug and the enlarged head 27 of the plunger.

The vacuum device consists of a pair of telescoping parts which may be considered as a cylinder 28 and a piston 29 which are forced apart by a spring 30. The cylinder 28 is closed by a member 31 having an opening 32 therein, which I connect by a flexible conduit 33 to the manifold or it may be connected directly to the lower portion 34 of the body of the carburetor, as indicated in dotted lines in Fig. 1. The cylinder or part 28 is connected to the pump plunger 16 or any part which moves in response to the movement of the throttle. The piston or other part 29 of the vacuum device is provided with a cap 34 which is adjustably connected by a threaded pin to a lever 35 having a cam 36 on the end thereof, said lever being pivoted at 37 in a bracket 38 mounted upon the top 39 of the carburetor. In this bracket, there is also a lever 40 pivoted as at 41 and having contacting engagement with the cam 36. The lever 40 is provided with a threaded pin 42 having a head 43 with handles 44 thereon for convenience in manual adjustment. This pin engages the top of the plunger 23 whereby the plunger may be manually adjusted to set the metering pin 22 in its desired position.

The arrangement of the parts will be such that when the throttle plate is substantially closed and the pump plunger 16 at the top of its stroke, the cylinder and piston or two movable parts 28 and 29 will be at the limit of their travel so that the end 45 of the piston 29 will bottom against the closure member 31. This will be the position for the idling of the engine and as the parts are at the limit of their travel any vacuum acting upon the piston at this time will have no effect upon the metering pin 22. However, as the throttle is advanced, the pump plunger will be pulled down and consequently the cylinder 20 which moves with it and in the position illustrated in Fig. 2, which is that of partly opening the vacuum created in the manifold, may act upon the piston to a limited degree and pull the same down thereby moving the tapered metering pin into its opening to restrict the fuel supply. When the device is fully open or at maximum, the cylinder will be moved down to the limit of its travel and the vacuum may act to the full extent upon the piston to draw it down to an extent equal to the amount the cylinder has been moved down with the pump plunger, thus the action of the vacuum at any point of the opening of the throttle will be limited in its action in an

amount proportional to the amount that the throttle is opened and the inflow of gas will be affected up to this limit as the load occurs in the engine. This limit will be such that at no time will the metering pin be moved into the aspirating sleeve sufficiently to block the fuel supply which is to be guarded against when the engine is idling and yet variations according to the load are taken care of when the engine is running in normal operating condition or at the maximum operating condition thereby great saving in fuel is occasioned.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle control, and a fuel supply control comprising two members, one of which is movable about the other in response to the flow of air thru the throttle control, and means actuated by the vacuum acting on the carburetor to move the other of said members to vary the fuel supply.
2. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle control and a fuel supply control comprising a sleeve member and a metering pin member, one of which members is movable in response to the flow of air thru the throttle control and a device actuated by the vacuum acting on the carburetor to move the other member to vary the fuel supply.
3. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle control and a fuel supply control comprising a sleeve member and a metering pin member, said sleeve being movable in response to the flow of air thru the throttle control, and a device actuated by the vacuum acting on the carburetor to move the metering pin to vary the fuel supply.
4. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle control and a fuel supply control comprising two members, one of which is movable in response to the flow of air thru the throttle control, and means actuated by the vacuum acting on the carburetor to move the other of said members to vary the fuel supply, said means comprising two parts, one part being connected to be moved in response to the throttle and the other part being connected to the said other member.
5. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle control and a fuel supply control comprising a sleeve member and a metering pin member, one of which members is movable in response to the flow of air thru the throttle control, and means actuated by the vacuum acting on the carburetor to move the other member to vary the fuel supply, said means comprising two parts, one part being connected to be moved in response to the throttle and the other part being connected to the said other member.
6. In a fuel control apparatus for internal combustion engines, the combination of a car-

buretor having a throttle control and a fuel supply control comprising a sleeve member and a metering pin member, said sleeve being movable in response to the flow of air thru the throttle control, and means actuated by the vacuum acting on the carburetor to move the metering pin to vary the fuel supply, said means comprising two parts, one part being connected to be moved in response to the throttle and the other part being connected to said metering pin.

7. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle and a throttle control and a metering pin for controlling the fuel supply, and means connected to said throttle to move in response thereto and actuated by the vacuum acting upon the carburetor for affecting the action of the control of the fuel proportionally to the amount of movement of the throttle control, said means comprising two relatively movable parts drawn together by the action of said vacuum and set to be in contracted position when the throttle is closed, whereby the vacuum will have no effect thereon when the throttle is

closed, said parts being movable by the vacuum only in an amount corresponding to that which they are moved apart in response to movement of the throttle.

8. In a fuel control apparatus for internal combustion engines, the combination of a carburetor having a throttle and a throttle control and a metering pin for controlling the fuel supply, and means connected to said throttle to move in response thereto and actuated by the vacuum acting upon the carburetor for affecting the action of the control of the fuel proportionally to the amount of movement of the throttle control, said means comprising a cylinder and a piston therein moved by action of said vacuum, said piston being set to be at the limit of its stroke when the throttle is closed, whereby vacuum can cause no movement of said piston, said piston and cylinder being relatively movable by the vacuum only in an amount that they are relatively moved from this position of limit in response to movement of the throttle.

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