

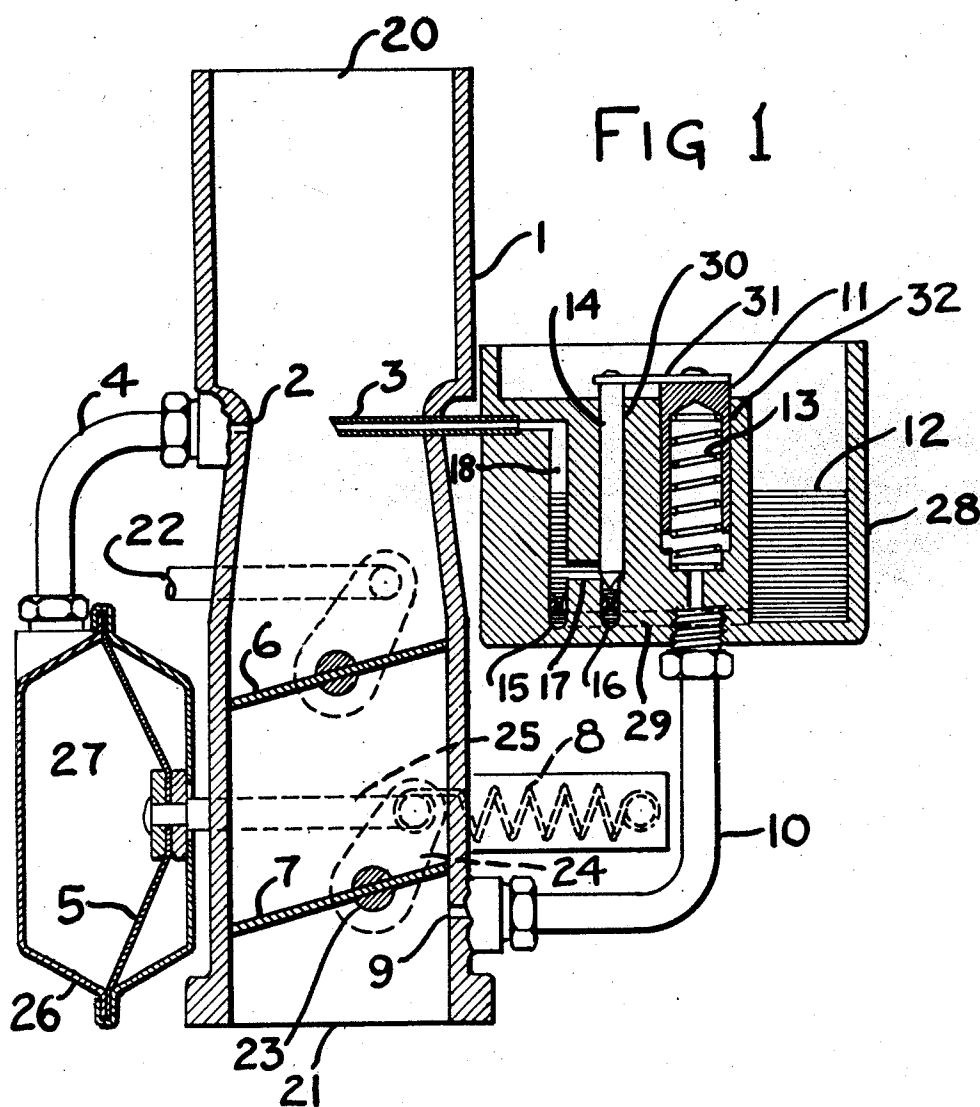
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M. MALLORY

2,296,172

CARBURETOR

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INVENTOR.

**MARION MALLORY**

BY  
*Barnes, Kessel, Laughlin & Kisch*  
ATTORNEYS.

## UNITED STATES PATENT OFFICE

2,296,172

CARBURETOR

Marion Mallory, Detroit, Mich.

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8 Claims. (Cl. 261-65)

This invention relates to a carburetion and charge control system for an internal combustion engine.

In carburetors having a throttle valve it has been proposed heretofore to use an auxiliary valve to control the charge instead of the throttle valve. When the engine is operating at low engine speeds, it does not require a rich mixture. Considering the fact that carburetors give a rich mixture when the throttle is wide open, the mixture will be too rich at times when the auxiliary valve is restricting the charge. I have found that for this type of carburetion and charge control system to work efficiently and properly, the mixture should be lean when the auxiliary valve is restricting the charge and rich when the speed of the engine is high enough to cause the auxiliary valve to open wide and permit the engine to receive a full charge.

It is the object of this invention to remedy the defects present in the above referred to carburetion systems utilizing an auxiliary valve. This object is achieved by providing means for leaning the mixture when the auxiliary valve is restricting the charge and for enriching the mixture when the speed of the engine is high enough to cause the auxiliary valve to open wide and permit the engine to receive a full charge.

The single figure of the drawing is a cross sectional view showing my carburetion and charge control system for an internal combustion engine.

The carburetor housing 1 is provided with an air inlet opening 20 and a fuel mixture outlet 21 into the engine intake manifold (not shown).

The carburetor is provided with the usual butterfly throttle valve 6 mechanically or manually controlled by rod 22. An auxiliary valve 7 is mounted in the throat of the carburetor on the engine side of throttle valve 6 by means of pintle 23 journaled in the housing 1.

A lever 24 is fixed on pin 23 exterior of the housing 1 and is connected by means of draft link 25 with flexible diaphragm 5 mounted in diaphragm housing 26. Spring 8 tends at all times to close auxiliary valve 7. Diaphragm 5 cooperates with housing 26 to form a chamber 27 which communicates only with the venturi in the throat of the carburetor through orifice 2 and conduit 4. Housing 26 to the right of diaphragm 5 is open to atmosphere.

The float bowl of the carburetor is designated 28. The fuel in the float bowl is designated 12. Nozzle 3 communicates with the interior of the float bowl 28 by means of conduits 18 and 29.

Conduit 29 communicates with conduit 18 continuously through restricted orifice 15 and conduit 29 also communicates with conduit 18 through restricted orifice 16 and conduit 17 which are controlled by needle valve 14. Valve 14 is slidably mounted in cylindrical opening 30 in the float bowl 28 and is fixed to piston 11 by member 31. Piston 11 is slidably mounted in cylindrical opening 32 in bowl 28 and is normally held in raised position by compression spring 13 which acts against the vacuum in cylinder 32 which communicates by means of conduit 10 and orifice 9 with the throat of the carburetor on the intake manifold side of auxiliary valve 7.

The operation of the device is as follows: Assuming the engine is running at slow speed and the throttle valve 6 is suddenly opened, the vacuum or suction under valve 7, which is an unbalanced valve, will open valve 7 slightly but not enough to give the engine sufficient charge to cause detonation. Since valve 7 is not opened very wide, the vacuum will be high in the manifold, that is, between valve 7 and the engine. This high vacuum in cylinder 32 beneath piston 11 will act through piston 11 to overcome spring 13 and hold needle valve 14 downwardly, closing off conduit 17 so that no fuel can flow through orifice 16 and channel 17 from conduit 29 into conduit 18. As shown in the drawing, needle valve 14 is closed. Under this condition nozzle 3 can receive fuel only from the float bowl by way of conduit 29, restricted orifice 15 and conduit 18, which gives a lean mixture.

As the speed of the engine increases, the suction or vacuum created at orifice 2 by air flowing through the venturi causes the vacuum to increase in chamber 27. This decrease in pressure in chamber 27 acts through diaphragm 5 to overcome spring 8 and open valve 7 more and more as the vacuum increases. As the valve 7 opens, the suction in the manifold or on the engine side of valve 7 decreases. When valve 7 is wide open, the engine is receiving a full charge and under these conditions a full power mixture is required. Due to the fact that the manifold vacuum is low when valve 7 is wide open, spring 13 will overcome the low vacuum in cylinder 32 and lift the needle valve 14 so that extra fuel can flow from conduit 29, through orifice 16 and conduit 17, into conduit 18, giving a full power mixture. Needle valve 14 has a tapered lower end so that it acts as a metering pin increasing the flow of fuel through passage-way 17 as the vacuum in cylinder 32 decreases and piston 11 is raised by spring 13.

When the throttle 6 is again closed, valve 7 will move towards closed position, thereby increasing the vacuum in cylinder 32 causing piston 11 to close valve 14.

I claim:

1. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a throttle valve in said passageway, an auxiliary throttle valve in said passageway for controlling the fuel mixture charge, a source of fuel, a fuel nozzle, a communication between the fuel nozzle and the source of fuel, means responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the intake passageway on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, and means responsive to pressure conditions in said intake passageway on the outlet side of said auxiliary valve for decreasing the flow of fuel through said communication as the vacuum increases in said passageway on the outlet side of the auxiliary valve and for increasing the flow of fuel through the communication as the vacuum in the said passageway on the outlet side of the auxiliary valve decreases.

2. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a throttle valve in said passageway, a venturi in said passageway on the inlet side of said throttle, an auxiliary throttle valve in said passageway for controlling the fuel mixture charge, a source of fuel, a fuel nozzle, a communication between the fuel nozzle and the source of fuel, means responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, a suction device connected into the venturi on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, and suction means communicating with said intake passageway, said suction means including a valve for restricting said communication when the auxiliary valve restricts the intake passageway and for opening said communication wide when the auxiliary valve is wide open.

3. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a throttle valve in said passageway, a venturi in said passageway on the right side of the throttle, an auxiliary unbalanced throttle valve in said passageway for controlling the fuel mixture charge, a source of fuel, a fuel nozzle, a com-

munication between the fuel nozzle and the source of fuel, said auxiliary unbalanced valve being responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the venturi responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, a diaphragm responsive to pressure conditions in said intake passageway on the engine side of said auxiliary valve, a valve controlling said communication actuated by said diaphragm to decrease the flow of fuel through said communication as the vacuum increases in said passageway on the engine side of the auxiliary valve and for increasing the flow of fuel through the communication as the vacuum in said passageway on the engine side of said auxiliary valve decreases.

4. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a manually controlled throttle valve in said passageway, an auxiliary unbalanced throttle valve in said passageway for controlling the fuel mixture charge, a source of fuel, a fuel nozzle, a communication between the fuel nozzle and the source of fuel, said auxiliary unbalanced valve being responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the intake passageway on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, a diaphragm responsive to pressure conditions in said intake passageway on the engine side of said auxiliary valve, a metering pin controlling said communication actuated by said diaphragm to decrease the flow of fuel through said communication when the auxiliary valve restricts the charge in said passageway and for increasing the flow of fuel through the communication correspondingly as the auxiliary valve is moved toward wide open position.

5. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a throttle valve in said passageway, an unbalanced auxiliary throttle valve in said passageway between the throttle valve and the said outlet for controlling the fuel mixture charge, said auxiliary unbalanced valve being responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the intake passageway on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, and suction means communicating with said intake passageway, said suction means including a valve for restricting said communication when the auxiliary valve restricts the intake passageway and for opening said communication wide when the auxiliary valve is wide open.

6. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a throttle valve in said passageway, an unbalanced auxiliary throttle valve in said passageway between the throttle valve and the said outlet for controlling the fuel mixture charge, said auxiliary unbalanced valve being responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the intake passageway on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, and suction means communicating with said intake passageway, said suction means including a valve for restricting said communication when the auxiliary valve restricts the intake passageway and for opening said communication wide when the auxiliary valve is wide open.

the intake passageway on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, a source of fuel, a fuel nozzle, and means controlling the flow of fuel out of said nozzle coordinated with said auxiliary valve whereby the flow of fuel through the nozzle increases as the auxiliary valve decreases the amount it restricts the charge flowing through the intake passageway.

6. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, an auxiliary throttle valve in said passageway for controlling the fuel mixture charge, a venturi in said passageway on the inlet side of said throttle valve, means responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the venturi responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, a source of fuel, a fuel nozzle in said passageway, and means controlling the flow of fuel out of said nozzle for increasing the flow of fuel out of said nozzle as the auxiliary valve moves toward open position and for decreasing flow of fuel out of said nozzle as the auxiliary valve moves toward closed position.

7. In a carbureting and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a throttle valve in said passageway, an unbalanced auxiliary valve in said passageway between the throttle valve and the outlet controlled to open as the speed of the airflow through the

passageway increases and close as the speed of the airflow decreases, said auxiliary valve being responsive to the vacuum on the outlet side of said auxiliary valve at low air flow speeds through the passageway to partially open said auxiliary valve whereby a relatively high vacuum is maintained on the outlet side of said auxiliary valve and the fuel atomized by a relatively high velocity air flow by the auxiliary valve, suction means connected into the intake passageway on the inlet side of said first mentioned throttle valve responsive to the vacuum created by the flow of air through the passageway on the inlet side of said throttle valve as the air flow speed increases through said passageway to further open the auxiliary valve whereby the vacuum on the outlet side of said auxiliary valve drops, means for enrichening the mixture as said auxiliary valve moves towards an open position and to lean out the mixture as the auxiliary valve moves towards a closed position.

8. A carburetion and charge control system for an internal combustion engine comprising an intake passageway having an inlet and an outlet, a manually controlled throttle valve in said passageway, a venturi in said passageway on the inlet side of said manually controlled throttle valve, an auxiliary unbalanced throttle valve between the manually controlled throttle valve and the outlet of said passageway, said unbalanced valve being influenced to open at low airflow speeds by the vacuum between the unbalanced valve and the outlet, suction means connected into the said venturi, a connection between the suction means and the said auxiliary throttle valve, the suction means responding to the vacuum created by the airflow through the venturi as the speed of the air flowing through the venturi increases to open said auxiliary throttle valve, a source of fuel, a fuel nozzle in said passageway, and a vacuum controlled valve controlled by the vacuum existing between the auxiliary valve and the outlet to lean out the fuel mixture as the auxiliary valve closes and to richen the fuel mixture as the auxiliary valve opens.

MARION MALLORY.

CERTIFICATE OF CORRECTION.

Patent No. 2,296,172.

September 15, 1942.

MARION MALLORY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 72, for "right" read --inlet--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of November, A. D. 1942.

(Seal)

Henry Van Arsdale,  
Acting Commissioner of Patents.