

Jan. 22, 1946.

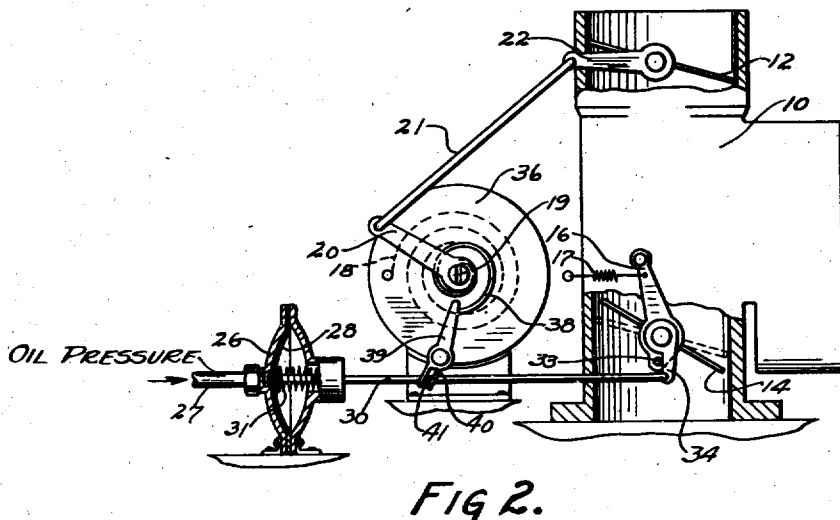
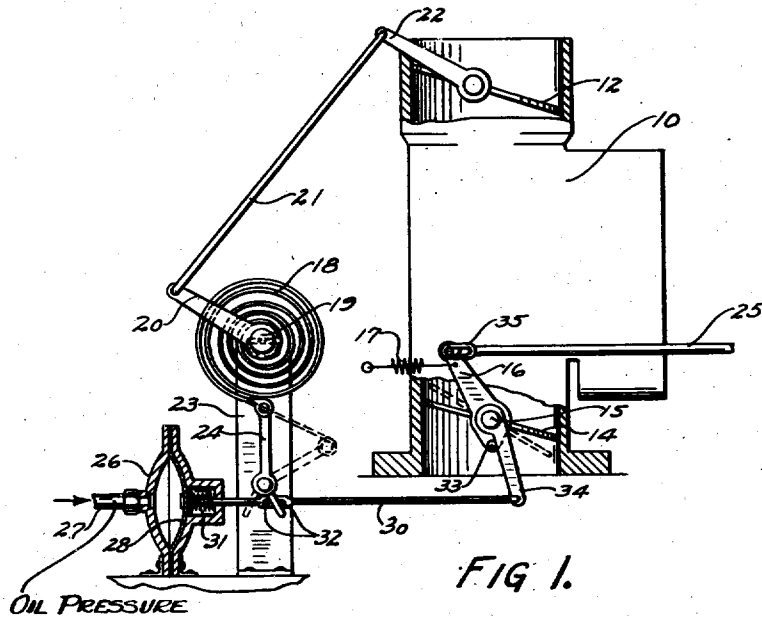
M. E. CHANDLER

2,393,290

CARBURETOR

Original Filed Feb. 9, 1933

2 Sheets-Sheet 1



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Jan. 22, 1946.

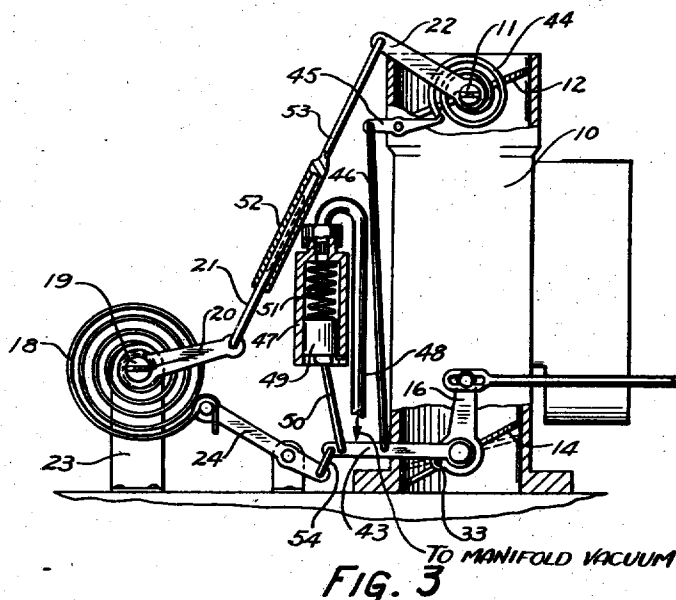
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2,393,290

CARBURETOR

Original Filed Feb. 9, 1933

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,393,290

CARBURETOR

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Original application February 9, 1933, Serial No.
656,016. Divided and this application October
12, 1935, Serial No. 44,675

6 Claims. (CL 123—119)

This invention relates to carburetors for internal combustion engines and more particularly to control mechanism therefor and has for its principal object the provision of a control mechanism whereby the choke valve and throttle are controlled as a function of engine temperature and/or pressure.

Internal combustion engines using a mixture of liquid fuel and air require a very rich mixture to start, require that the richness be graded down immediately the engine fires, and require that the richness of the mixture be very accurately controlled during the warming up period of the engine, particularly if the engine is to be idled at a slow speed before it has reached normal operating temperature. If the idling speed is maintained high, a wider variation in the richness of the mixture will be tolerated. While cold, an engine does not develop full power with a fuel mixture that is correct for idling and steady running and consequently it is desirable to increase the richness of the mixture for acceleration and heavy loading of the engine.

In the prior art of which I am aware, of which the abandoned application of Hunt and Olson Serial No. 575,025, filed November 24, 1931, and the copending Hunt application Serial No. 630,274, filed August 24, 1932, are examples, provision is made for controlling the richness of the fuel mixture as a function of engine temperature. The copending application of Elmer Olson, Serial No. 651,589, filed January 13, 1933, and now Patent Number 2,189,219 provides for setting the idling position of the throttle as a function of temperature to prevent stalling during the warming up period of the engine.

The present invention improves upon the devices of the prior art by providing a thermostat for controlling the degree of opening of the choke valve as a function of temperature and providing means actuated by vacuum and/or pressure in the engine for modifying the setting of the choke valve to meet particular requirements, this means also controlling the throttle to give a fast idle and prevent stalling.

The invention will be best understood from the detailed description and claims which follow, reference being had to the accompanying drawings in which a preferred embodiment of the invention is shown by way of example and in which:

Figure 1 is an elevational view, partly in section, showing the invention adapted for oil pressure actuation;

Figure 2 is a view similar to Figure 1, showing a modification; and

Figure 3 is a view similar to Figure 1 showing the invention adapted for vacuum actuation.

Referring now to the drawings in more detail, in Figure 1 I have shown a plain tube down draft carburetor 10 having an unbalanced choke valve 12 and a butterfly valve throttle 14 adapted to be rotated by a control mechanism which includes a control lever 16 fixed upon its shaft 15 and biased in the counter-clockwise direction by a tension spring 17. The type of carburetor illustrated is shown by way of example only, as the invention may be applied to any carburetor which has a throttle of the type shown. The control mechanism is shown as a separate unit mounted adjacent to the carburetor, this arrangement being shown to better illustrate the invention and it is to be understood that the control mechanism may be incorporated in the carburetor structure if desired. The mechanism comprises a thermostat 18 wound around shaft 19 which carries a lever 20 that is connected by rod 21 to the control arm 22 of the choke valve. Shaft 19 is journaled for rotation in a suitable bracket 23 upon which a lever 24 is pivotally mounted. The free end of thermostat 18 is connected to lever 24. The thermostat is preferably of the type described in S. F. Hunt application Serial No. 647,641, filed December 16, 1932, and is arranged to be tensioned to hold the choke valve closed when the engine is cold and to absorb heat radiated from the exhaust manifold of the engine when it is running. As the thermostat warms up, its tension decreases to permit the choke valve to open, as will presently appear. A fluid tight casing 26 is mounted adjacent to bracket 23 and connected to a source of pressure in the engine by a pipe 27. The oil pressure system of the engine affords a convenient source of pressure. Within the casing is a diaphragm 28 which is connected to a rod 30 that extends out of the casing. A spring 31 surrounds the rod and is tensioned to urge the diaphragm to the left. Rod 30 carries a pair of pins 32 disposed upon opposite sides of the lower end of lever 24 and adapted to actuate the lever as the rod is moved. Throttle control lever 16 carries a pin 33 adapted to be engaged by a lever 34 that floats upon the shaft 15 and is connected to the end of rod 30.

When the engine is not running and is cold there is no pressure in casing 26 and spring 31 moves the diaphragm to the left and with it rod 30. Movement of rod 30 rotates lever 34 against

pin 33 and opens the throttle to starting position, in which it is shown in dotted lines. The rod 25 by which lever 16 is connected to the manual throttle control, not shown, is provided with a lost motion connection 35 that permits the throttle to be set by rod 30 without disturbing the manual setting. Lever 24 is rotated into the position shown in dotted lines and the tension of the thermostat is increased. Since the engine is cold, the thermostat is internally tensioned and serves to rotate lever 20 to close the choke valve and to hold it closed for starting. When the engine begins firing and builds up oil pressure, diaphragm 28 is moved against spring 31 and rod 30 is moved to the right. Lever 34 is backed off and the throttle closed by spring 17 to prevent racing the engine. Lever 24 is rotated to release the tension it places in the thermostat so that the choke valve is free to open partially and grade down the richness of the fuel mixture. As the engine warms up, the tension of the thermostat decreases to permit the choke valve to open more, and to be fully open when the engine reaches normal operating temperature.

In the modification shown in Figure 2, the carburetor, choke valve, throttle, pressure casing, diaphragm and rod 30 are provided as before. Thermostat 18 is connected between shaft 19 and a suitable bracket in the casing 36 in which it is enclosed. A second thermostat 38 is fixed to shaft 19 and abutted against lever 39 that is pivotally mounted upon the thermostat casing. Lever 39 is slotted at 40 and a single pin 41 carried by rod 30 registers with this slot.

When the engine is not running there is no pressure in casing 26 and diaphragm 28 is moved to the left by spring 31 and with it rod 30 is moved. Pin 41 rotates lever 39 clockwise. If the engine is cold, thermostat 38 will be tensioned and its end will abut lever 39 to increase its tension, which tension will be added to the tension of thermostat 18 to close the choke valve and hold it closed for starting. If the engine is warm when the pressure in casing 26 dies away, thermostat 38 will not be engaged by lever 39 and the movement of the lever will not tension the thermostat. Movement of rod 30 sets the throttle to starting position as before.

In the embodiment of the invention shown in Figure 3, the carburetor is provided with a choke valve 12 and a throttle 14 as before. A thermostat element 44 is fixed to and wound around shaft 11 of the choke valve and its free end bears against a lever 45 that is pivotally mounted on the air horn of the carburetor. A lever 43 floats upon the throttle shaft and is connected to lever 45 by a rod 46. A cylinder 47 is mounted adjacent to the carburetor and connected by pipe 48 to the intake manifold or other source of vacuum in the engine. A piston 49 fits in the cylinder and is connected to lever 43 by a rod 50. A spring 51 in the cylinder urges piston 49 downwardly therein. Thermostat arm 20 is fixed upon shaft 19 and connected to choke valve lever 22 by rod 21 which telescopes into cylinder 52 that is fixed upon a rod 53 that is carried by lever 22. Thermostat 18 is fixed to and wound around shaft 19 and its free end hooked over a pin on lever 24 that is pivotally mounted adjacent to the thermostat. A link 54 connects lever 24 to lever 43.

When the engine is not running there is no vacuum, and spring 51 pushes piston 49 down and rotates lever 43 counterclockwise on the throttle

shaft and rotates lever 24 clockwise on its pivot. Lever 43 engages pin 33 and rotates the throttle to its starting position, in which it is shown in full lines. Movement of lever 43 rotates lever 45 counterclockwise. If the thermostat 44 is cold it will be tensioned against lever 45 and movement of the lever will rotate the choke valve clockwise to close the same for starting. This movement causes rod 21 to slide in cylinder 52. If thermostat 44 is hot it will have no tension and will not engage lever 45 so the movement of the lever will not rotate the choke valve. Movement of lever 43 rotates lever 24 to increase the tension of thermostat 18 and if the thermostat is cold it will have tension and this movement of lever 24 will cause arm 20 to rotate to engage rod 21 with the end of rod 53 so that thermostat 18 will aid thermostat 44 in keeping the choke valve closed. Immediately the engine fires, vacuum is built up in the manifold and piston 49 is drawn upwardly in cylinder 47. Lever 43 is rotated to permit the throttle to move to its fully closed position and to rotate lever 45 to relieve the tension of thermostat 44. Lever 24 is rotated to reduce the tension of thermostat 18. As long as the vacuum remains high enough to overcome the tension of spring 51, the piston will remain in operated position. Should the vacuum fall, as it will when the engine begins to stall and when the throttle is opened to accelerate rapidly, spring 51 overcomes the vacuum and moves levers 43 and 24 to perform the above functions. After the thermostats have been heated sufficiently to have zero tension, movement of levers 43 and 24 will not close the choke valve.

While I have illustrated and described specific arrangements for carrying out the teachings of my invention, I have done so by way of example only as there are many modifications and adaptations that can be made by one skilled in the art within the teachings of the invention. This application is a division of abandoned application Serial No. 656,016, filed February 9, 1933, in the names of Milton E. Chandler and Scott F. Hunt, and later converted into the sole application of Scott F. Hunt.

I claim:

1. In combination with an internal combustion engine carburetor, a choke valve having a shaft, a lever fixed on the shaft, a throttle having a shaft, a lever on the throttle shaft, a lever pivoted to the carburetor, a thermostat for controlling the degree of opening of the choke valve as a function of temperature, an auxiliary thermostat fixed to the choke valve shaft and engaging said pivoted lever, means connecting the pivoted lever to the throttle lever, means for moving the throttle lever to crack the throttle and to tension said auxiliary thermostat to close the choke valve, and means connected to the throttle lever and moved thereby for increasing the tension of said first thermostat.

2. A control mechanism for an internal combustion engine carburetor having a choke valve and a throttle, comprising a thermostat for controlling the degree of opening of the choke valve as a function of temperature, a diaphragm actuated by a pressure developed by engine operation, a rod connecting the diaphragm to the throttle, a spring for moving the rod to crack the throttle when the pressure on said diaphragm falls below a predetermined value, and means connecting the rod to the thermostat whereby the spring tensions the thermostat as it moves the rod.

3. A control mechanism for an internal combustion engine carburetor having a choke valve and a throttle, comprising a thermostat for controlling the degree of opening of the choke valve as a function of temperature, a diaphragm actuated by a pressure developed by engine operation, a rod connecting the diaphragm to the throttle, a spring for moving the rod to crack the throttle when the pressure of said diaphragm falls below a predetermined value, a pivoted lever engaging said rod to be rotated by a movement thereof, and an auxiliary thermostat connected between the lever and said thermostat and tensioned by a spring actuated movement of the rod to increase the tension of the thermostat.

4. Control mechanism for an internal combustion engine carburetor having a throttle and a choke valve, comprising a temperature responsive member for influencing the operation of the choke valve, and means controlled by a varying positive pressure derived from engine operation

for tensioning the thermostat and partially opening the throttle.

5. Control mechanism for an internal combustion engine carburetor having a throttle and a choke valve, comprising a temperature responsive member for yieldingly urging the choke valve toward closed position, and means controlled by pressure developed by operation of the engine to increase the force exerted by the thermostat and to partially open the throttle.

6. In combination with an internal combustion engine carburetor, an air inlet valve, a throttle having a shaft, a lever floating on the shaft and having an overrunning connection therewith, yielding temperature responsive means connected to said air inlet valve, and means controlled by a varying pressure developed in the operation of the engine for actuating said lever to rotate the throttle shaft and vary the tension on the temperature responsive means.

MILTON E. CHANDLER.

Certificate of Correction

Patent No. 2,393,290.

January 22, 1946.

MILTON E. CHANDLER

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 48, before "1. In combination" insert the following claims—

1. A control mechanism for an internal combustion engine carburetor having a rotatable throttle and a choke valve, comprising a thermostat for controlling the degree of opening of the choke valve as a function of temperature, and pressure controlled means connected in series with the thermostat for tensioning the thermostat to close the valve and for rotating the throttle partially open to prevent stalling of the engine.

2. A control mechanism for an internal combustion engine carburetor having a rotatable throttle and a choke valve, comprising a thermostat for controlling the degree of opening of the choke valve as a function of temperature, a cylinder connected to a source of vacuum in the engine, a piston, means connecting the piston to the thermostat and to the throttle, and a spring for moving the piston when the vacuum at said source is low to tension the thermostat to enrich the mixture and to move the throttle from closed position to a partially open position.

3. In combination with an internal combustion engine carburetor, a choke valve having a shaft, a lever fixed on the shaft, a throttle having a shaft, a lever floating on the throttle shaft having an overrunning connection therewith, a lever pivoted to the carburetor, a thermostat fixed to the choke valve shaft and engaging the pivoted lever, means connecting the pivoted lever to the floating lever, and means for moving the floating lever to crack the throttle and to tension the thermostat and close the choke valve.

and for the claims now numbered "1," "2," "3," "4," "5," and "6" read 4, 5, 6, 7, 8 and 9 respectively; in the heading to the printed specification, line 9, for "6 Claims" read 9 Claims; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.