Oct. 15, 1963 O. E. WILSON 3,107,266

CARBURETOR

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FIG. 1

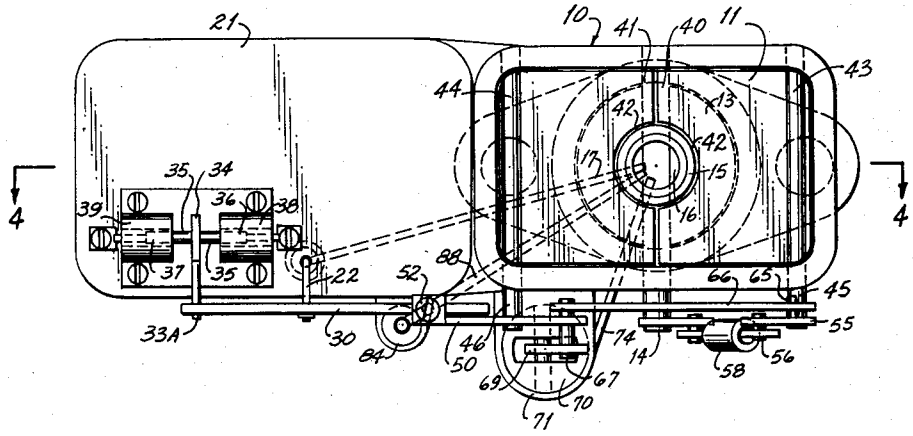
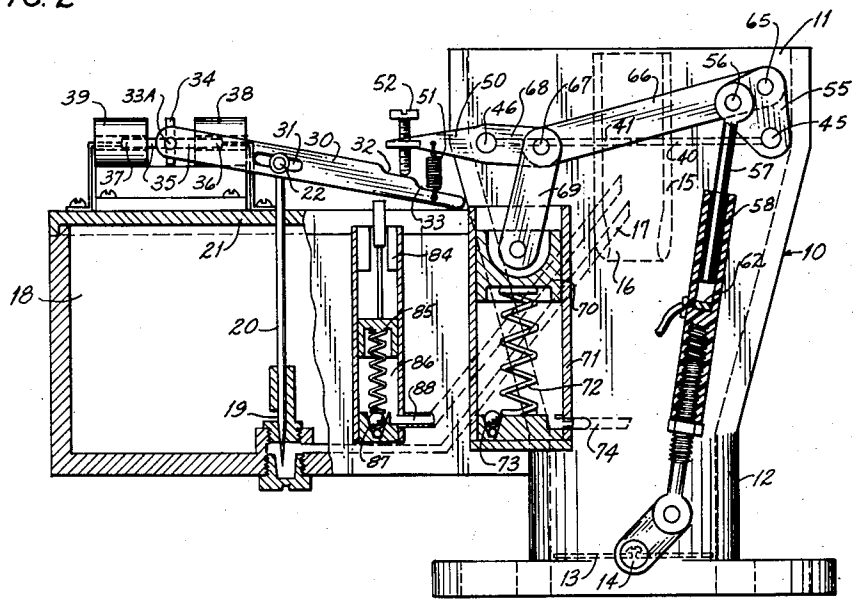


FIG. 2



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FIG. 3

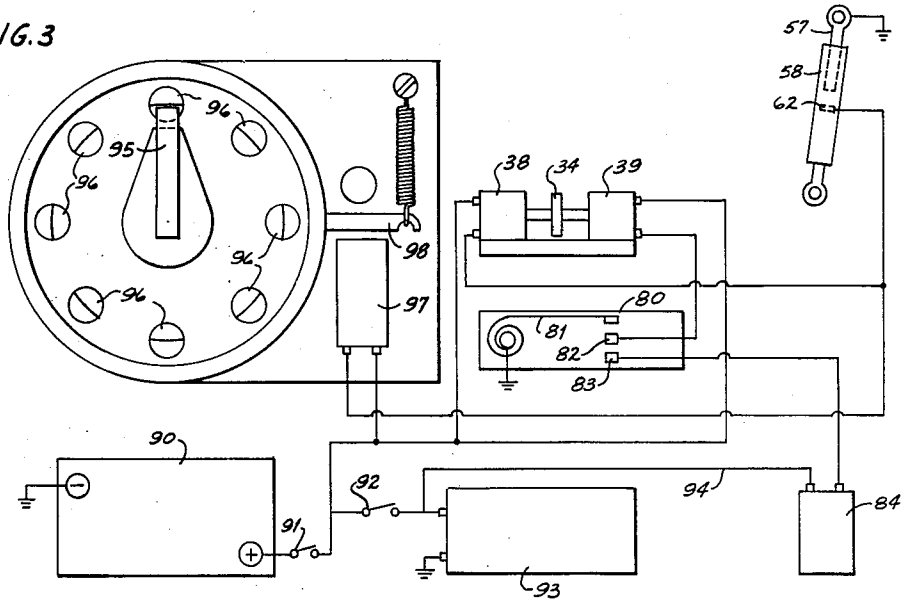
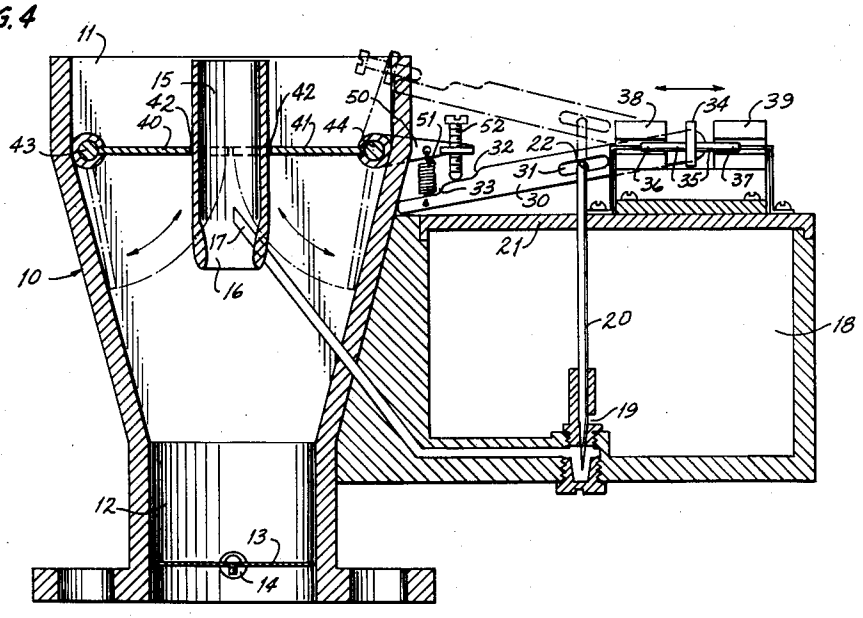


FIG. 4



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CARBURETOR

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This invention relates to carburetors for internal combustion engines. While certain aspects of the present inventive concept are broadly applicable to a wide variety of internal combustion engines, both stationary and for motor vehicles, and for two-cycle as well as four-cycle engines, that form of the invention herein specifically set forth with respect to its structural details, is designed for use on conventional multiple cylinder motor vehicle engines.

One of the primary objectives long sought for in the design and construction of internal combustion engine carburetors, is that of fuel economy, not only as a financial saving to the operator but as a means of reducing air pollution by the engine exhaust, since complete combustion of fuel reduces air pollution by the discharge of unburned fuel gases. While significant advances have been continuously made in the design and construction of carburetors in the direction of fuel economy, it is still common practice to provide the fuel feed control through the engine solely by means of a conventional throttle valve, using a substantially fixed needle valve for the feed of fuel to the venturi throat of the carburetor from the float chamber. This conventional arrangement provides no changes of the needle valve setting, in response to engine temperature fluctuations, or varying requirements for fuel as the engine speed varies. Nor has there been satisfactory developments in variation of engine timing in response to changes in air flow through the carburetor so as to automatically advance the timing as the engine increases its speed and thereby economize in the fuel consumption.

It is among the objects of the present invention to provide a novel and improved carburetor having means to control the needle valve setting between float chamber and venturi in response to the rate of air intake, so as to provide improved fuel economy. Another object of the invention is to provide a control of the needle valve setting in response to temperature conditions so as to provide adequate fuel supply in starting the engine cold, and to modify such supply as the engine temperature increases. Another object of the invention is to provide a carburetor with means for controlling the engine timing in response to the air intake, so as to automatically reduce the fuel consumption for greater economy at high speed operation of the engine. It is also an object of the invention to provide pressure responsive air supply control means responsive to engine speeds independent of the throttle which means modifies the setting of the needle valve to compensate for diminished fuel requirements at high speed operations. Numerous other objects, features and advantages of the present invention will be apparent from a consideration of the following specification taken in conjunction with the accompanying drawings, in which—

FIG. 1 is a top plane view of one form of carburetor constructed in accordance with the present inventive concept,

FIG. 2 is a side elevation of the carburetor shown in FIGURE 1, with portions thereof shown in section,

FIG. 3 is a wiring diagram for the control system of the present carburetor, and

FIG. 4 is a vertical sectional view through the carburetor shown in FIGURES 1 and 2.

In that form of the invention here shown, the carburetor includes a generally conventional body 10 formed

at its upper inlet end 11 in rectangular cross section, and merging into a conventional circular outlet throat 12. In the throat 12 there is mounted the throttle valve 13 on the throttle control shaft 14. Centrally located within the upper end of the throat or body 10, there is provided a generally conventional air venturi 15 in the reduced lower throat 16 of which there is located the open end of an air blade jet 17. Through the jet 17 fuel is supplied to the venturi from the usual fuel float chamber 18 under the control of a needle valve 19, the stem 20 of which extends upwardly through the cover 21 of the float chamber. With respect to the carburetor body, throttle valve, venturi, air blade jet, float chamber and needle valve, it will be understood that this arrangement is conventional and well-known to those skilled in the art and that the present inventive concept is applicable to a wide variety of structures, arrangements and designs of such mechanisms.

As distinct from more conventional control, the present day conventional carburetors wherein setting of the needle valve is by threaded adjustment maintained after satisfactory preliminary adjustment to conform with the engine operation, the needle valve 19 of the present carburetor is controlled by its freely slidable stem 20 through the medium of a gauge bar 30. The gauge bar 30 is formed with an elongate transverse opening 31 through which the angularly turned end 32 of the needle valve stem 20 passes. The inner end of the gauge bar 30 extending towards the carburetor body is formed with successive steps 32 and 33 defined by successive reductions in the vertical width of the gauge bar. The opposite outer end of the gauge bar 30 is pivotally mounted on a pin 33 protruding from a plate 34 of a magnetically controlled slide 35. The opposite inner and outer ends 36 and 37 respectively, of the slide 35 are slidable within inner and outer magnet coils or solenoids 38 and 39 respectively.

At the upper end 11 of the carburetor body 10, surrounding the venturi 15 there is provided a pair of transverse blades 40 and 41. In conformity with the generally rectangular cross section of the upper end 11 of the carburetor body the blades 40 and 41 are rectangular with a central semi-circular inner recess 42 conforming with the size and shape of the outer diameter of the venturi tube 15 at the plane of the blades. It will, of course, be understood that with other forms of carburetor bodies the blades will be configured otherwise. As will be hereinafter referred to in detail, spring means are provided for normally retaining the blades 40 and 41 in horizontal position across the intake mouth of the carburetor outwardly of the venturi tube 15. The blades 40 and 41 are pivotally mounted by blade arms 43 and 44 respectively to which they are secured, the blade arms having bearings through the wall of the carburetor body 10 with one end each extending outwardly as at 45 and 46 for the arms 43 and 44 respectively.

On the protruding end 46 of the pivot arm 44 of the blade 41, there is secured a projecting link 50 to which is attached a spring 51, the opposite end of which is engaged with the inner end of the gauge bar 30. At the outer end of the link 50 a threadedly adjusted set screw 52 is provided, the lower end of which is adapted to bear against the shoulder 32 or 33 at the inner end of the gauge bar 30. By this arrangement it will be seen that the spring 51 tends to urge the blade 41 to a horizontal position, but yieldably so, whereby at high engine speeds increased suction will cause the blade 41 to move downwardly towards the extreme open position indicated by the dotted lines of FIGURE 4. The spring 51 also acts to maintain contact of the adjustment screw 52 with the gauge bar 30. With respect to this feature of the invention, it will be

noted that as the blade 41 pivots downwardly under increased suction through the carburetor, the arm 51 will move upwardly with the pivotal movement of the blade 41. In so moving, by virtue of the spring connection between the arm 51 and the gauge bar 30, the gauge bar will pivot upwardly upon its pin 33A, thus raising the valve stem 20 to permit an increase of fuel feed through the jet 17 to the venturi 15. Obviously, as suction decreases, as when the engine slackens its speed, the blade 41 tends to resume its horizontal position, in which case reverse action follows and the needle valve stem 20 is lowered to diminish the flow of fuel.

On the outwardly projecting end 45 of the blade arm 43 of the blade 40 there is mounted a generally triangular crank plate 55. On one outer lobe of the plate 55, as at 56, there is attached the upper end of a conducting control rod 57. The lower end of the rod 57 is slidably mounted within a dielectric sleeve 58 which is threadedly secured as at 59 to a link 60 mounted on an arm 61 secured to the throttle control shaft 14. Within the sleeve 58 there is provided an electrical contact plate 62. By reference to the electrical diagram hereinafter referred to in detail, it will be seen that the rod 57 is energized and that upon contact of the rod 57 with the contact plate 62 energy will be supplied to magnetic means at the distributor to advance the timing. In operation, it will be seen that as the throttle 13 is opened the sleeve 58 will move downwardly. However, at the same time as the speed of the engine increases, as a result of the opening of the throttle, the end 45 of the rod 43 will be rotated in counter-clockwise direction, as shown in FIGURE 2, to thrust the conductor rod 57 downwardly. The downward movement of the rod 57 exceeds the downward movement of the sleeve 58 so that at a desired engine speed as reflected by increased suction through the carburetor, a contact between the rod 57 and plate 62 is established to advance the engine timing. With the energization of the magnetic means of the distributor to advance the timing, there is also an energization of the right hand magnet (FIGURE 2) to move the gauge bar to decrease the fuel feed as hereinafter referred to.

Associated with another outer lobe of the plate 55 there is connected as at 65, a link 66 united by a pin 67 with a projecting link 68 extending inwardly from the projection end 46 of the pivot arm 44 of the blade 41. There is also connected by the pin 67 a generally vertical link 69, the lower end of which engages a dash-pot piston 70 in a dash-pot cylinder 71. A spring 72 within the dash-pot cylinder 71 below the dash-pot piston 70 normally urges the piston 70 upwardly. Below the piston 70 the dash-pot is provided with a check valve 73 past which fuel is admited from the float chamber. This arrangement is such that, upon quick opening of the throttle for sudden acceleration, the opening of the air blades is retarded by the dash-pot spring, but at the same time the tendency of the blades to open under sudden acceleration moves the dash-pot piston 70 downwardly forcing fuel below the piston outwardly to the throat 12 of the carburetor through a jet tube 74, thus providing a richer mixture for the engine during sudden acceleration and until such time as the opening of the air blades balances with the speed of the engine to insure an economical consumption of fuel during periods of sustained rates of engine speed.

In the circuitry of the present invention, as shown in FIGURE 3, there is provided a thermal responsive switch 80 including an arm 81 which when the engine is cold retracts to establish electrical connection between the contacts 82 and 83 to complete a circuit for the energization of the outer magnet element 39, and at the same time through a starter jet solenoid 84. The energization of the solenoid 84 forces the piston 85 downwardly in a chamber 86 by which fuel admitted from the float chamber through the spring urged check valve 87 is forced through the venturi jet 88 to supply supplemental fuel

when the engine is started. In addition, when the engine is cold, circuit is established through the thermostatic switch 80 to the solenoid 39 which draws the gauge rod to the right (FIGURE 1) whereby the set screw 52 slips from the higher shoulder 32 to the lower shoulder 33 permitting the bar to rock upwardly to raise the valve stem 20 permitting an increased flow of fuel to the venturi 15 through the jet tube 17. However, when the engine heats up after original cold starting, the thermostatic switch is opened, terminating the energization of the magnet 39 and energizing the magnet 38 to move the gauge rod to the right (FIGURE 2) to cause the set screw 52 to contact the lower shoulder 32, thus permitting an increased flow of fuel as the engine is operated at high speed.

The circuit diagram of the present invention, as presented in FIGURE 3, also includes the conventional storage battery 90 through which current is supplied through a conventional ignition switch 91. With the ignition switch closed power may be supplied through a conventional starter switch 92 to start the motor 93 and likewise from the starter switch 92 power is supplied through the conductor 94 to the solenoid 84 to supply a jet of starting fuel, as referred to above, when the engine is cold. It may be noted, however, that when the engine is warm, while the starting switch will be effective to energize the starting motor, the current will not pass through the solenoid 84 nor will current pass to the solenoid 39. Thus when the engine is at normal operating temperature, the rod 30 will be so positioned as to receive the adjustable screw 52 on the lower shoulder 32. However, in starting the engine cold, the solenoid or magnet 39 will be energized to move the gauge rod 30 to receive the screw 52 at the upper shoulder, thus raising the valve stem 20 to maintain increased and adequate fuel flow during the starting cycle. With the engine at appropriate operating temperature and contact open through the switch 80, as engine speeds increase through opening of the throttle 13, the blades will open in response to increased engine suction. In such opening the control screw 52 will be raised as will the gauge bar to admit additional fuel as engine speed increases. In the diagram of FIGURE 3, the distributor is generally indicated by the numeral 95 with the contact points 96 movable by the magnet 97 through attraction of the arm 98. Thus, as the engine warms up and is operated at high speed, and as the rod 57 moves downwardly to establish contact with elements 62, as the blades open under increased engine suction, a circuit is established through the magnet 97 and also through the magnet or solenoid 38 through the rod 57 to the ground, thus moving the gauge rod to cause the bolt 52 to contact the lower shoulder to decrease the fuel flow as the timing is advanced. From the foregoing, it will be seen, that as the blades open under increased suction as the motor increases its speed, both solenoids 38 and 97 are energized through rod 57 and contact 62. Solenoid 38 upon energization moves the arm 30 to the right to increase the needle valve opening. When the solenoid 97 is energized it attracts arm 98, which being fixed to the contact plate of the engine distributor moves the contacts in clockwise rotation to advance the spark to conform with increased engine speed, fuel consumption and engine temperature.

Thus throughout the various cycles and various speeds of operation, the fuel flow is controlled in accordance with engine requirements to diminish the fuel flow when the engine is operating at high speeds and at the same time advancing the timing. On the other hand, in cold starting a starting spurt of fuel is supplied and the valve stem 20 is raised to supply adequate fuel for starting and slow speed operations of the motor. It will of course, be understood that in the practice of the present invention, numerous changes, modifications and the full use of equivalents may be resorted to without departure from the spirit or scope of the appended claims.

What I claim is:

1. A carburetor, including an air throat, a venturi within said throat, a fuel supply to said venturi, an air passage surrounding said venturi and means in said air passage responsive to the passage of air therethrough for affecting the supply of fuel to said venturi, said means including spring loaded blades.

2. A carburetor, including an air throat, a venturi within said throat, a fuel supply to said venturi, an air passage surrounding said venturi and means in said air passage responsive to the passage of air therethrough for affecting the supply of fuel to said venturi, said means including spring loaded blades normally restrained to a horizontal position across said passage limiting the flow of air therethrough.

3. A carburetor, including an air throat, a venturi within said throat, a fuel supply to said venturi, and air passage surrounding said venturi and means in said air passage responsive to the passage of air therethrough for affecting the supply of fuel to said venturi, said means including spring loaded blades normally restrained to a horizontal position across said passage limiting the flow of air therethrough and responsive to engine suction to move toward open position.

4. A carburetor, including a venturi, an air passage surrounding said venturi, blades in said passage responsive to engine suction, a float chamber, a fuel passage from said float chamber to said venturi, a valve in said passage and means for controlling said valve by said blades.

5. A carburetor, including a venturi, an air passage surrounding said venturi, blades in said passage responsive to engine suction, a float chamber, a fuel passage from said float chamber to said venturi, a valve in said passage and means for controlling said valve by said blades together with means acting independently of said blades for altering the effectiveness of said blades in controlling said valve.

6. A carburetor, including a venturi, an air passage surrounding said venturi, blades in said passage responsive to engine suction, a float chamber, a fuel passage from said float chamber to said venturi, a valve in said passage and means for controlling said valve by said blades together with means acting independently of said blades for altering the effectiveness of said blades in controlling said valve, said first mentioned means including an arm extending from one of said blades towards said valve.

7. A carburetor, including a venturi, an air passage surrounding said venturi, blades in said passage responsive to engine suction, a float chamber, a fuel passage from said float chamber to said venturi, a valve in said passage and means for controlling said valve by said

blades together with means acting independently of said blades for altering the effectiveness of said blades in controlling said valve, said first mentioned means including an arm extending from one of said blades towards said valve, and a second arm engaging said first arm and said valve.

8. A carburetor, including a venturi, an air passage surrounding said venturi, blades in said passage responsive to engine suction, a float chamber, a fuel passage from said float chamber to said venturi, a valve in said passage and means for controlling said valve by said blades together with means acting independently of said blades for altering the effectiveness of said blades in controlling said valve, said first mentioned means including an arm extending from one of said blades towards said valve, said second mentioned means including a pair of magnets for moving said second arm.

9. A carburetor, including a venturi, an air passage surrounding said venturi, blades in said passage responsive to engine suction, a float chamber, a fuel passage from said float chamber to said venturi, a valve in said passage and means for controlling said valve by said blades together with means acting independently of said blades for altering the effectiveness of said blades in controlling said valve, said first mentioned means including an arm extending from one of said blades towards said valve, said second mentioned means including a pair of magnets for moving said second arm, together with a dash-pot for restraining the movements of said blades.

10. The device as set forth in claim 9 in which a connection between a throttle arm and the blades controls the magnet.

11. The device as set forth in claim 9, in which two oppositely engageable magnets are provided for said second arm.

12. The device as set forth in claim 11 in which thermostatic means controls one magnet and a connection between a throttle arm and said blades controls the other magnet.

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